# PROPOSED NAVITUS BAY WIND PARK

## PRELIMINARY ENVIRONMENTAL INFORMATION 3

## CHAPTER 23
## GROUND CONDITIONS, CONTAMINATED LAND, SOILS AND LAND USE

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NAVITUSBAY

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# 23. GROUND CONDITIONS, CONTAMINATED LAND, SOILS AND LAND USE

## 23.1. Introduction

23.1. This chapter assesses the potential impacts on ground conditions, contaminated land, soils and land use arising from the construction, operation and maintenance ('O&M'), and decommissioning stages of the onshore components. For the purpose of this assessment, the Onshore Development Area comprises the following project elements: the Onshore Cable Corridor, Landfall, a 35 km onshore cable and associated accesses, temporary compounds and a new proposed Onshore Substation.

23.2. For details of the Project description used within this assessment refer to Chapter 2, Navitus Bay Wind Park Project.

23.3. This assessment identifies the existing geodiversity, soil and land use conditions at the onshore site and evaluates the potential for ground instability and existing land contamination from past and present land uses. This chapter details the baseline conditions and the methods used to assess the potential impacts of the onshore components of the Project. This chapter should be read in conjunction with Chapter 24 Water Environment.

## 23.2. Legislation, Policy and Guidance

23.4. This section outlines the legislation, policy and guidance that is relevant to this assessment. Professional judgement has been applied on their relevance and importance to the assessment.

### 23.2.1. International

23.5. EC Directive 2004/35/EC on environmental liability with regard to the prevention and remedying of environmental damage (2004) is applicable with respect to ground instability and land contamination. The Directive establishes a framework for environmental liability based on the "polluter pays" principle, with a view to preventing and remedying environmental damage.

### 23.2.2. National

23.6. The relevant national legislation, policy and guidance, are discussed below.

***National Policy Statements***

23.7. National Policy Statements (NPSs) establish the primary basis on which the Secretary of State is required to determine applications for development consent. In preparing this assessment the following NPSs were reviewed:

- Overarching National Policy Statement for Energy (EN-1) (DECC, 2011a);
- NPS for Renewable Energy (EN-3) (DECC, 2011b);
- NPS for Electricity Network Infrastructure (EN-5) (DECC, 2011c).

Table 23.1 Compliance with National Policy Statements

| Summary of NPS provision | Consideration in PEI |
|---|---|
| **NPS EN-1 Part 5** | |
| Paragraph 5.3.7 states that development should aim to avoid significant harm on geological conservation interests, using mitigation and consideration of reasonable alternatives. Where significant harm cannot be avoided, appropriate compensation measures to be sought. | The use of trenchless techniques to protect the Highcliffe to Milford Cliffs geological SSSI is discussed in the Embedded Mitigation section of this chapter. |
| Paragraph 5.3.3 states that the effects on designated sites of geological conservation importance should be assessed. | Refer to the Impact Assessment section of this chapter for details. |

| | |
|---|---|
| Paragraph 5.3.11 states that where a proposed development is likely to have an adverse effect on an SSSI, development consent should not normally be granted. Exceptions should be only where the benefits outweigh the impacts. | The use of trenchless techniques to protect the Highcliffe to Milford Cliffs geological SSSI is discussed in the Embedded Mitigation section of this chapter for details. |
| Paragraph 5.3.8 states that in taking decisions, appropriate weight should be given to designated sites of international, national and local importance. | Refer to the Impact Assessment section of this chapter for details. |
| Paragraph 5.10.8 states that applicants should consider the risk posed by land contamination. | Refer to the Impact Assessment section of this chapter for details. |
| EN-3 | |
| There are no specific paragraphs of relevance to this assessment. | |
| EN-5 | |
| Section 1.7 notes that the effects on soil, water, ecology and archaeology are likely to be negative, at least in the short term and may require significant mitigation. | Refer to the Impact Assessment section of this chapter for details. |
| Paragraph 2.8.8 relates to the undergrounding of cables and notes that the undergrounding cables can disturb sensitive habitats, and have an impact on soils and geology. | Refer to the Impact Assessment section of this chapter for details. |

***National Planning Policy Framework***

23.8. The National Planning Policy Framework ('NPPF') issued by the Government's Department of Communities and Local Government ('DCLG') (DCLG, 2012a) provides guidance on ensuring that a site is suitable for use with respect to the presence of any land contamination and ground stability risks. The NPPF states (paragraph 120 to 121):

- *"To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment and general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner."*
- *"Planning policies and decisions should also ensure that:*
  - *The site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*
  - *After remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990;*
  - *Adequate site investigation information, prepared by a competent person, is presented."*

23.9. In addition, the NPPF states that development should safeguard the long term potential of the best and most versatile agricultural land and conserve soil resources, by developing areas of poorer quality land in preference to higher quality areas.

23.10. The NPPF in Section 11 "Conserving and enhancing the natural environment", paragraph 109, promotes sustainable development by ensuring that geological diversity is enhanced as an integral part of economic development.

23.11. For planning purposes, the NPPF requires that an assessment of risks arising from contamination and remediation requirements should be considered on the basis of the current environmental setting. NPPF (paragraph 120 to 121) states:

*"To prevent unacceptable risks from pollution and land instability, planning policies and decisions should ensure that new development is appropriate for its location. The effects (including cumulative effects) of pollution on health, the natural environment or general amenity, and the potential sensitivity of the area or proposed development to adverse effects from pollution, should be taken into account. Where a site is affected by contamination or land stability issues, responsibility for securing a safe development rests with the developer and/or landowner."*

***The Wildlife and Countryside Act (1981)***

23.12. The Act designates Sites of Special Scientific Interest ('SSSI') which can be designated for ecological, geological or geophysical features. Both geological and ecological SSSIs can include areas of landslides (i.e. areas of ground instability). The Impact Assessment section gives details of how the requirements of the Wildlife and Countryside Act have been taken into account in this assessment.

***Countryside and Rights of Way Act (2000)***

23.13. The Countryside and Rights of Way Act ('CRoW') puts responsibility onto relevant authorities to: "take reasonable steps to further the conservation and enhancement of…geological and physiographic features by reason of which the site is a SSSI". The Impact Assessment section gives details of how the requirements of the Countryside and Rights of Way Act have been taken into account in this assessment.

***Environmental Protection Act 1990 ('EPA') Part IIA and the Environment Act 1995***

23.14. The EPA is primary legislation that is directly relevant to contaminated land in the UK. In paragraph 121 of the EPA, the developer is required to ensure that land, after development, cannot being classified as contaminated land under Part IIA of the EPA 1990.

***Defra Circular 04/2012***

23.15. Defra Circular 'Environmental Protection Act 1990:Part 2A Contaminated Land Statutory Guidance 04/2012' (Defra, 2012) provides updated guidance on defining statutory receptors of under Part IIA of EPA as including: human beings; various ecological systems and designated ecological sites; property including crops, produce and livestock; and buildings.

***Model Procedures for the Management of Land Contamination***

23.16. Contaminated Land Report 11 (CLR11) (EA, 2004) recommends a three tiered approach to risk assessment with respect to the assessment of potentially contaminated land. A Phase 1 desk study has been undertaken to inform this assessment.

***Water Environment (Water Framework Directive) (England and Wales) Regulations (DEFRA, 2003)***

23.17. The aims of the Water Framework Directive (WFD), and its associated Regulations, are to prevent deterioration and enhance status of aquatic ecosystems, including groundwater, reduce pollution and contribute to the mitigation of floods. The Embedded Mitigation section gives details of the measures to control/mitigate the impacts of construction works upon aquatic ecosystems, including groundwater.

***The Groundwater (England and Wales) Regulations***

23.18. The Groundwater Regulations (2009) set out provision to protect groundwater by prohibiting discharge of substances to groundwater. The regulations prohibit discharge of List I substances to groundwater and limits the discharge of List II substances to concentrations that would not cause pollution. The Embedded Mitigation section gives details of the measures for the control/management of surface water and surface water quality during construction works.

***Redevelopment and Clean-up of Contaminated Land***

23.19. The EA's Redevelopment and Clean-up of Contaminated Land (EA, 2011b) document provides guidance on how to undertake an impact assessment on 'potentially contaminated land'. There is also guidance that has been prepared in order to assist local authorities and practitioners in assessing

the degree to which land is contaminated within the meaning of Part IIA of the Environmental Protection Act 1990 (as amended).

***Scoping Guidelines on the Environmental Impact Assessment of Projects***

23.20. The EA provides guidance on the conduct of an EIA with regard to land contamination issues in its document Scoping Guidelines on the Environmental Impact Assessment of Projects 2002 (EA, 2002). Further guidance on the risk assessment process is given in EA documentation on the basis of the Contaminated Land Exposure Assessment ('CLEA') model, which is intended to be used as the common basis for contamination assessments in the UK.

***British Standards***

23.21. The approach and methodologies used within the assessment process are in accordance with BS 5930: 1999+A2 2010 Code of practice for site investigation and BS 10175:2011 Investigation of potentially contaminated sites – Code of practice. Whilst BS 5930 is partially withdrawn following the adoption of Euro codes for geotechnical design of civil engineering works and conduct of intrusive site investigation works, the standard gives best practice recommendations on information gathering on ground related features that might affect the design and construction of these works as well as the safety of neighbouring land and property.

***Construction Code of Practice for the Sustainable Use of Soils on Construction Sites***

23.22. Defra's (2009) recommendations for soil management during construction are:

- When stripping, stockpiling or placing soil, do so in the driest condition possible and use tracked equipment where possible to reduce compaction;
- Keep soil storage periods as short as possible;
- Clearly define stockpiles of different oil materials.

23.23. Defra's recommendations have been taken into account in the compilation of the Embedded Mitigation measures with respect to topsoil and agricultural soil.

***Specification for Highway Works***

23.24. Section 602, Clause 10 of the UK Highways Agency's (HA) Specification for Highway Works document (SHW, 2009) recommends:

- A maximum 2 m topsoil stockpile height is used;
- Topsoil is not to be stockpiled for more than 2 years;
- Stockpiles are not unnecessarily trafficked before or during stockpiling;
- Stockpiles are not surcharged or loaded;
- Multiple handling of topsoil should be minimised.

23.25. The HA's recommendations have been taken into account in the compilation of the Embedded Mitigation measures with respect to topsoil and agricultural soil. The Impact Assessment section gives details of the potential impacts.

***The British Standard BS4428:1989 'Code of practice for general landscape operations'***

23.26. BS4428:1989 recommends:

- Topsoil and subsoil should be carefully stripped and stockpiled in reasonably dry conditions to avoid unnecessary compaction and damage to soil structure;
- Topsoil should be stacked separately and strict precautions should be taken to prevent the mixing of subsoil and topsoil;
- Topsoil spoil heaps should not exceed 3 m in height, including topsoil existing on site and should be used within 12 months.

23.27. The recommendations have been taken into account in the compilation of the Embedded Mitigation measures with respect to topsoil and agricultural soil.

***The Natural Environment White Paper***

23.28. The Natural Environment White Paper (Defra, 2011) sets out the Government's vision that by the year 2030 all of England's soils will be sustainably managed to improve their quality and safeguard their ability to provide essential services for future generations.

***Defra Agricultural Land Classification***

23.29. In the UK, Defra classifies agricultural land into one of five grades (MAFF, 1988), with Grade 1 (excellent quality agricultural land) representing the highest and Grade 5 (very poor quality agricultural land) representing the lowest quality land. The grading allocated is based on many factors including climatic limitations (both overall and local), site limitations (including gradient, slopes and flooding), soil limitations (including texture, structure, soil depth, stoniness and soil chemistry) and interactive limitations (including soil wetness, droughtiness and soil erosion). The Defra Agricultural Land Classification (ALC) map covering the study area is presented in Figure 23.3. There is no Grade 1 or Grade 5 agricultural land within the study area.

23.30. Grade 2 land is described as 'very good quality agricultural land' which is defined as 'land with no or very minor limitations to agricultural use. A very wide range of agricultural and horticultural crops can be grown and commonly includes top fruit, soft fruit, salad crops and winter harvested vegetables. Yields are high and less variable than on land of lower quality'.

23.31. Grade 3 land is described as 'Good to moderate agricultural land' which is defined as 'land with moderate limitations which affect the choice of crops, timing and type of cultivation, harvesting or the level of yield. Where more demanding crops are grown yields are generally lower or more variable than on land in Grades 1 and 2'.

23.32. Subgrade 3a land is described as 'Good quality agricultural land' which is 'Land capable of consistently producing moderate to high yields of a narrow range of arable crops, especially cereals, or moderate yields of a wide range of crops including cereals, grass, oilseed rape, potatoes, sugar beet and the less demanding horticultural crops'.

23.33. Subgrade 3b land is described as 'Moderate quality agricultural land' which is 'Land capable of producing moderate yields of a narrow range of crops, principally cereals and grass or lower yields of a wider range of crops or high yields of grass which can be grazed or harvested over most of the year'.

23.34. Grade 4 land is described as 'Poor quality agricultural land' which is defined as 'land with severe limitations which significantly restrict the range of crops and/or level of yields. It is mainly suited to grass with occasional arable crops (e.g. cereals and forage crops) the yields of which are variable. In moist climates, yields of grass may be moderate to high but there may be difficulties in utilisation. The grade also includes very droughty arable land'.

***EA Pollution Prevention Guidelines***

23.35. This provides guidelines on how to prevent pollution of surface water, groundwater and land from activities such as the storage of oils and fuels, refuelling activities and construction. This assessment has regard to the requirements of the EA Pollution Prevention Guidelines (EA, 2001).

23.36. There is also legislation and guidance that seeks to deal with the prevention of land and groundwater contamination and aims to address and remediate contamination once it has occurred. These indirectly relevant regulations are as follows, but are listed here for reference only:

- Water Resources Act 1991 ('SI 57') (as partly amended by the Water Act 2003) and associated Anti-pollution Works Regulations 1999 (SI 1999/1006);
- Control of Pollution (Oil Storage) (England) Regulations 2001 (SI 2001/2954);
- Water Environment (Water Framework Directive) (England and Wales) Regulations 2003 (SI 2003/3243);
- The Environmental Permitting (England and Wales) Regulations 2010 (SI 2010 (SI 2010/675).

### 23.2.3. Local

***Joint Christchurch and East Dorset Core Strategy (March 2013)***

23.37. The document states "If impacts [from development] on Geodiversity are unavoidable then mitigation should be put in place to reduce the harm caused". No Regionally Important Geological/Geomorphical Sites (RIGS) are within influencing distance of the Onshore Cable Corridor and therefore this is not considered within this assessment.

***New Forest District (outside the National Park) Core Strategy: Adopted 26 October 2009 Policy CS5 (NFDC, 2009)***

23.38. Policy CS5 Safe and Healthy Communities states:

*"Development should not result in pollution or hazards which prejudice the health and safety of communities and their environments, including nature conservation interests and the water environment".*

23.39. Refer to the Impact Assessment section for details.

***Joint Christchurch and East Dorset Core Strategy***

23.40. Policy ME7 Protection of Groundwater states:

*"Where development is proposed in a location likely to affect a Groundwater Source Protection Zone, an assessment of the impact and any mitigation measures proposed must be provided".*

23.41. Refer to the Baseline Environment section for details.

***Planning Advice Note 'Redevelopment of Potentially Contaminated Land' - Dorset and New Forest Contaminated Land Consortium (including new Forest District Council (NFDC), Christchurch Borough Council (CBC) and East Dorset District Council (EDDC)***

23.42. The note states:

*"The risks [posed by contaminated land] must be identified early in the development process to ensure that appropriate mitigation measures are taken. This should take the form of a "source - pathway – receptor" assessment, whereby the sources of the hazard, the receptor and the pathway connecting the two are considered."*

23.43. The Impact Assessment follows the source-pathway-receptor methodology (refer to the Impact Assessment Methodology section for details).

***East Dorset Local Plan***

23.44. Policy 6.29 of the East Dorset Local Plan relates to the protection of groundwater and states "It is important to ensure that development does not pose a risk to the quantity, quality and availability of surface and underground water resources" (EDDC, 2002).

23.45. There is no local guidance with respect to the protection of topsoil or agricultural soil.

## 23.3. Assessment Methodology

### 23.3.1. Study area

23.46. The baseline assessment for ground conditions, contaminated land, soils and land use covers the land within the Onshore Development Area, including the Landfall site (to Mean Low Water Springs (MLWS)), the 35 km Onshore Cable Corridor and the Onshore Substation site. The study area envelops the area that could potentially be affected by the onshore components of the Project.

23.47. For geodiversity and ground stability considerations, a buffer zone of 1 km around the Landfall, Onshore Cable Corridor and Onshore Substation. The 1 km study area was adopted with respect to natural ground instability because the cause is often a combination of a number of factors, e.g. chalk geology may be susceptible to the development of natural solution features but these do not occur everywhere that is underlain by chalk. Some Jurassic aged strata may be susceptible to the formation of landslides when disturbed, but only where the existing land has slopes greater than seven degrees and not all areas underlain by Jurassic strata have such slopes. Thus the study area seeks to identify the wider local incidence of such features as well as site specific features within the Onshore Development Area.

23.48. For the environmental data collection, to inform the contaminated land related review process and subsequent impact assessment, a buffer of 250 m around the Landfall, Onshore Cable Corridor and Onshore Substation has been applied. The 250 m buffer is taken from EA's guidance (EA, 2011a), which states that it should be consulted on any development within 250 m of which is, or has been, used to deposit refuse or waste (excluding historic landfills, unless the proposal is on top of a landfill).

23.49. The Onshore Cable Corridor area studied includes up to seven temporary construction compound areas and a number of temporary construction accesses to the Onshore Cable Corridor. The study area is depicted in Figures 23.3 to 23.11, which also shows the environmental features within the Onshore Cable Corridor.

### 23.3.2. Consultation

23.50. As part of the EIA Scoping process, consultation was undertaken by the Infrastructure Planning Commission (IPC). Table 23.2 summarises the comments received in relation to this assessment.

Table 23.2 EIA consultation process – stakeholder responses

| Organisation and date | Summary of response | Where addressed in PEI |
|---|---|---|
| Infrastructure Planning Committee (November 2011) | *"The landfall crosses a SSSI. The assessment of the effects on erosion etc. should take account of data held by the local authority and EA."* | Refer to the Impact Assessment section of this chapter for details of the potential for damage to the Highcliffe to Milford Cliffs SSSI designated for geological reasons. |
| | *"Key potential environmental issues for onshore are: …(2) impacts on SSSI, SPA, SAC and Ramsar sites; …(4) mobilisation of existing ground contamination and creation of new pathways for contamination..."* | Refer to the Impact Assessment for details. |
| | It is recommended that a table is provided in the ES to summarise the scoping responses and clarification of whether the points have been addressed. | This table addresses this request. |
| | It was stated that specific receptors should be identified, along with their sensitivity/value. | Refer to the Impact Assessment section of this chapter for details of the receptors and their sensitivity identified at this stage. |
| | It was stated that 'IPC does not consider that an assessment of agriculture and soils during the operational and maintenance phase can be scoped out. The assessment should also assess the potential impacts of sterilisation of land for the easement along the underground cabling route'. | Refer to the Impact Assessment section of this chapter for details of the potential impact on agricultural soils and land use, including both temporary and permanent impacts. |
| | "Potential sources of pollution should be identified, as well as pathways to potential hydrological and surface water receptors". | Refer to the Impact Assessment of this chapter for details of the potential sources of pollution and pathways to potential hydrological and surface water receptors. |
| | "There is the potential for land contamination by creating new pathways…for all stages and elements of the project". | Refer to the Impact Assessment of this chapter for details of the potential for land contamination by creating new pathways. |
| EDDC (3rd October 2011) | It was stated that the following onshore constraints should be covered:<br>➢ Agriculture and soils;<br>➢ Ground conditions. | Refer to the Impact Assessment of this chapter for details. |

Table 23.2 EIA consultation process – stakeholder responses

| Organisation and date | Summary of response | Where addressed in PEI |
|---|---|---|
| EA (21st October 2011) | It was advised that the discussions with the local authority responsible for coastal protection schemes in this area should continue in relation to coastal erosion issues and an appropriate scheme design to ensure no exacerbation of existing problems. | Refer to the Impact Assessment of this chapter for details of the potential for damage to the Highcliffe to Milford Cliffs SSSI designated for geological reasons. |
| Lyndhurst Parish Council (18th October 2011) | LPC opposes the development on the grounds of geological impacts. | Refer to the Impact Assessment of this chapter for an assessment of geological impacts on the coastal geological SSSI which falls within the boundary of the Landfall site. |
| NFDC | NFDC wishes to discuss issues regarding the potential for contaminated land with Eneco, as Section 7.6.8 states that contamination in rural areas is likely to be from agriculture.<br>NFDC would like to discuss other potential sources of land contamination and would like the results of these discussions and other contaminants to be included. | The baseline studies and impact assessment considers all sources of potential contamination howsoever caused. All potential sources of contamination have been considered. Discussions specifically with the coast protection team have informed the assessment undertaken to date. |

23.51. This should be read in conjunction with Table 23.7 which provides details of data obtained during the consultation process.

### 23.3.3. The scope of assessment

23.52. This assessment has been carried out in accordance with the requirements of the NPSs and the other legislation, policy and guidance listed above in the Legislation, Policy and Guidance section. Consideration is given to potential geodiversity, ground instability, land contamination, soil and land use related impacts, collectively ground conditions, contaminated land and soils and land use.

23.53. In response to the Scoping Report submitted in September 2011 for the scheme to the Infrastructure Planning Commission ('IPC') (now the Planning Inspectorate) (Eneco, 2011), the IPC issued a Scoping Opinion in November 2011 (IPC, 2011). This included comments from stakeholders relating to ground conditions, contaminated land, soils and land use. In particular, the IPC (now the Planning Inspectorate), New Forest District Council ('NFDC'), East Dorset District Council ('EDDC') and Lyndhurst Parish Council ('LPC') all highlighted the need for an assessment of potential impacts on ground conditions, contaminated land, soils and land use (see Table 23.2).

23.54. The scoping response identified issues relating to:

- The impact on local geological features;
- The risk of disturbance and potential mobilisation of any remnant contaminants present in the ground from previous land use activities;
- The potential for creation of new pathways for migration of contaminants;
- The release of pollutants from construction works.

***Overview***

23.55. The scope of the assessment is as follows:

- To assess baseline ground conditions and contamination that currently exist with respect to soil, groundwater and ground-gas from a review of both desktop study and ground (intrusive) investigation data collected;
- Using the above information to assess the risks of baseline ground contamination impacting on human-health or the environment as a result of construction, operation and maintenance, and decommissioning activities within the Onshore Cable Corridor;
- To assess appropriate mitigation measures required to avoid, reduce or offset any likely impacts and resulting significant environmental effects.

23.56. A Phase 1 Desk Study and contamination risk assessment is the minimum requirement under the NPPF clause 121 to support any application on a site that might be potentially affected by contamination. This study will be included as part of the Environmental Statement that will be submitted in support of the application for development consent.

### 23.3.4. Issues scoped out

***Subsidence from coal and non-coal mining activity***

23.57. Baseline studies have identified that the Onshore Cable Corridor (including temporary compounds and accesses), Landfall and Onshore Substation site are not in areas listed in the Coal Authority Gazetteer for England & Wales (DECC, 2012) as a place currently requiring a (coal) mining search.

23.58. A review of the National non-coal mining (underground) cavities database has shown that there are no known artificial (underground) cavity records in the area of the Onshore Cable Corridor. There is no identified potential risk arising from past (or current) coal or non-coal mining.

***Subsidence from natural cavities***

23.59. The Eocene bedrock in this general locality is not known to be susceptible to dissolution. This is reflected in the absence of any records of natural cavity occurrence in the National Cavities Database within 5 km of the Landfall, Onshore Cable Corridor or Onshore Substation site. There is no identified potential risk to the development arising from natural dissolution related features.

***Subsidence from clay shrinkage/swelling movements***

23.60. The anticipated presence of predominantly granular bedrock and superficial soils would generally result in no risk of subsidence due to clay shrinkage/ swelling movements. In some areas however, where the River Terrace Deposits contain clay strata and where Alluvium and soils of the Barton Clay Formation outcrop, there would be an increased risk. However, given that construction on clay soil areas would be limited to in-ground joint bays, the risks are considered to be extremely low. This is therefore scoped out of this assessment.

***Subsidence from landslides***

23.61. Other than along the coast, landslides are not recorded inland in proximity of the Onshore Cable Corridor. As the Landfall would be constructed using trenchless techniques (i.e. HDD) which would avoid the risk of landslides, the risk is considered to be extremely low. Therefore this has been scoped out of this assessment.

***Agricultural stewardship***

23.62. It has been concluded that land under Agricultural Stewardships would not be affected as the Onshore Cable Corridor only covers a small proportion of the land under agreement and each agreement applies to the farm as a whole not to individual fields or strip within a field. The land use would continue as agricultural along the Onshore Cable Corridor after construction.

### 23.3.5. Impact assessment methodology

23.63. This section presents the criteria used for the assessment of potential impacts the onshore components of the Project may have on ground conditions, contaminated land, soils and land use.

23.64. There are no standard significance criteria for geodiversity, ground instability, land contamination, soil and land use. Therefore evaluation is based on the suitability of the geotechnical and geoenvironmental properties of the ground for the intended end use, and the processes and treatment of the ground that would be required to achieve that end use.

***Criteria for defining the sensitivity of a receptor***

23.65. The sensitivity of receptors adopted for this assessment is detailed in Table 23.3.

Table 23.3 Definition of receptor sensitivity

| Sensitivity of receptor | Receptor | Criteria |
|---|---|---|
| High | Geodiversity | International or nationally designated site, geological Site of Special Scientific Interest ('SSSI')<br>A feature or attribute with high quality and |

| | | |
|---|---|---|
| | | rarity, important on a national or regional scale with limited potential for substitution |
| | Ground instability | Slope stability or subsidence problems almost certainly present or have occurred in the past. Significant constraint on land use. |
| | Buildings and heritage assets | World Heritage status |
| | Human Health | Residential property, schools |
| | Ecology | Special Protection Area, Special Area of Conservation or Ramsar (protected wetland) site, or ecological SSSI |
| | Groundwater | Principle Aquifer providing regionally important potable water supply<br>SPZ1 – Inner Source Protection Zone<br>Private water supplies for potable use (boreholes, wells or springs) |
| | Agricultural Soil | Excellent Quality Agricultural Land (Grade 1) |
| | Land use | Commercial or industrial use which cannot be relocated elsewhere |
| Medium | Geodiversity | Regional or locally designated site, RIGS (Regionally Important Geological and Geomorphological Sites)<br>A feature or attribute with medium quality and rarity, important at a local scale, or a feature or attribute of medium quality and rarity, important at a regional scale with limited potential for substitution |
| | Ground instability | Slope stability or subsidence problems are possibly present or anticipated |
| | Buildings and heritage assets | Conservation area |
| | Human Health | Commercial premises |
| | Ecology | National Nature Reserve (‘NNR’) |
| | Groundwater | Principal Aquifer supplying locally important water supply<br>SPZ2 – Outer Source Protection Zone<br>Private water supplies for non-potable use (boreholes, wells or springs) |
| | Agricultural Soil | Very good quality agricultural land (Grade 2) |
| | Land use | Existing commercial or industrial premises |
| Low | Geodiversity | Geology/ geomorphology not designated but locally distinctive<br>A feature or attribute with low quality and rarity, important at a local scale |
| | Ground stability | Slope stability or subsidence problems are not likely to occur but consideration to potential problems should be considered. |
| | Buildings and heritage assets | Local value/ historical character |
| | Human Health | Industrial premises |
| | Ecology | County wildlife site or Area of Outstanding Natural Beauty (‘AONB’) |
| | Groundwater | Secondary Aquifer<br>SPZ3 –Source Protection Zone total catchment |
| | Agricultural Soil | Good to moderate quality agricultural land (Grade 3) |
| | Land use | Vacant commercial or industrial premises |
| Imperceptible | Geodiversity | Geology/ geomorphology not designated and non-distinctive |

| | | |
|---|---|---|
| | Ground stability | Slope stability or subsidence problems are not thought to occur but consideration to potential problems of adjacent areas should be considered |
| | Buildings and heritage assets | Replaceable |
| | Human Heath | Unoccupied/ limited access |
| | Ecology | Local habitat resource/ no local designation |
| | Groundwater | Unproductive non-aquifer |
| | Agricultural Soil | Poor/ very poor quality agricultural land (Grade 4 and 5) |
| | Land use | Derelict commercial or industrial land |

***Magnitude of effect***

23.66. The magnitude of an adverse impact is defined in Table 23.4.

Table 23.4 Definition of magnitude of effect

| Magnitude | Description |
|---|---|
| High | **Geodiversity –** The geology or geomorphology has a international or national designation<br>**Ground Instability -** Significant constraint on land use<br>**Land Contamination -** Soil contamination is considered to pose a high risk to potential receptors with one or more pollutant linkages certain to be present<br>**Agricultural Soil –** The fertility of the soil and crop yields (including grazing) would be significantly reduced<br>**Land Use:** (a) Agricultural land: Loss of more than 50 ha of the best and most versatile land; (b) Other land use**:** Commercial or industrial premises permanently unable to continue operation<br>**Duration:** Effects that last more than five years |
| Medium | **Geodiversity -** The geology or geomorphology has a local or regional designation<br>**Ground Instability -** Mitigation measures likely to be required<br>**Land Contamination –** Soil contamination is considered to pose a moderate risk to potential receptors with one or more pollutant linkages likely to be present<br>**Agricultural Soil** – The fertility of the soil would be reduced and crop yields (including grazing) would be moderately reduced<br>**Land Use:** (a) Agricultural land**:** Loss of more than 20 ha but less than 50 ha of best and most versatile land; (b) Other land use: Commercial or industrial premises temporarily (> 1 month) unable to continue operation<br>**Duration:** Effects that last between one and five years |
| Low | **Geodiversity -** The geology or geomorphology is not designated but possesses key characteristics which may be locally important<br>**Ground Instability -** Minimal change to slope stability or subsidence problems, which are not likely to require mitigation, although consideration of potential problems should be considered<br>**Land Contamination –** Soil contamination is considered to pose a low risk to potential receptors with one or more pollutant linkages possibly present<br>**Agricultural Soil** – The fertility of the soil would be slightly reduced and crop yields (including grazing) would be slightly reduced<br>**Land Use:** (a) Agricultural land: Loss of 10-20 ha best and most versatile land; (b) Other land use: Commercial or industrial premises temporarily (< 1 month) unable to continue operation<br>**Duration:** Effects that are no longer observed after 1 year |
| Imperceptible | **Geodiversity -** The geology or geomorphology is not designated and is non-distinctive<br>**Ground Instability -** No change to slope stability or probability of subsidence problems |

| | |
|---|---|
| | **Land Contamination –** Soil contamination is considered to pose a very low risk to potential receptors<br><br>**Agricultural Soil** – The fertility of the soil would be very slightly reduced and crop yields (including grazing) would be very slightly reduced<br><br>**Land Use:** (a) Agricultural land: < 10 ha agricultural land affected; (b) Other land use: No impact on commercial or industrial premises operation<br><br>**Duration:** Effects that last for a minimal period of time |

***Impact significance***

23.67. Impact significance takes into account the sensitivity of a receptor and the magnitude of effect. The derivation of significance is shown below.

| Magnitude of effect | Sensitivity of a receptor: High | Medium | Low | Imperceptible |
|---|---|---|---|---|
| High | Major | Major OR Moderate | Moderate OR Minor | Negligible |
| Medium | Major OR Moderate | Moderate / Minor | Minor | Negligible |
| Low | Moderate OR Minor | Minor | Minor | Negligible |
| Imperceptible | Negligible | Negligible | Negligible | Negligible |

23.68. The significance criteria are outlined in Table 23.5.

Table 23.5 Explanation of impact significance

| Impact significance | Description of consequence |
|---|---|
| Major Significance | **Geodiversity -** Results in permanent loss of geological or geomorphological features of designated conservation value.<br><br>**Ground Instability -** Structural damage to buildings requiring the services of a builder, including local underpinning. Weather-tightness of buildings impaired. Loss of functionality of floor slabs. Significant damage to service pipes. Significant loss of serviceability of roads/ footways requiring replacement.<br><br>**Land Contamination -** Significant local environmental hazard to water resources, aquatic fauna and flora, and/or humans (construction workers and/or end users) requiring monitoring and more extensive local remedial work.<br><br>Major reduction in environmental risk to humans or aquatic flora and fauna. Major improvement in quality or quantity of water resources (surface water and/or groundwater).<br><br>**Agricultural Soils and Land Use -** Significant reduction in the crop growing ability of the agricultural soil.<br><br>Existing agricultural land use would not be able to continue<br><br>Significant alteration to or loss of land used for commercial or industrial operation, such that the business cannot continue to operate. |
| Moderate Significance | **Geodiversity -** Significant area of local permanent change to the geology or geomorphology so that it is unrecognisable when compared to the baseline conditions.<br><br>**Built Environment (Ground Instability) -** Non-structural damage to buildings but repair requiring the services of a builder. Local damage to service pipes. Some loss of serviceability of roads/ footways requiring repair/ local replacement. |

| | |
|---|---|
| | **Natural Environment (Land Contamination) -** Local environmental hazard to water resources, aquatic fauna and flora, and/ or humans (construction workers and/ or end users) requiring monitoring and local remedial work.<br><br>Moderate reduction in environmental risk to humans or aquatic flora and fauna. Moderate improvement in quality or quantity of water resources (surface water and/or groundwater).<br><br>**Agricultural Soils and Land Use -** Moderate reduction in the crop growing ability of the agricultural soil.<br><br>Existing agricultural land use would be able to continue, but with noticeable changes (e.g. reduced cropping choices).<br>Reduction in land available for use for commercial or industrial operation, such that the business function is affected. |
| Minor Significance | **Geodiversity -** Noticeable local but not significant change to the near surface geology or geomorphology.<br><br>**Built Environment (Ground Instability) -** Minor (non-structural) damage to building fabric (brickwork/building finishes). Some continued maintenance required to all hardstanding areas.<br><br>**Natural Environment (Land Contamination) -** Temporary and minor environmental risk to surface water resources, aquatic fauna, flora or air quality. No appreciable risk to humans (construction workers or end users.<br><br>**Agricultural Soils and Land Use -** Slight reduction in the crop growing ability of the agricultural soil.<br><br>Existing agricultural land use would be able to continue, but with minor noticeable changes (e.g. measureable yield reductions).<br>Reduction in land available for use for commercial or industrial operation, although without an effect on business function. |
| Negligible | **Geodiversity -** Noticeable but not significant local changes to the near surface geology or geomorphology.<br><br>**Built Environment (Ground Instability) -** No discernible effect on building fabrics.<br><br>**Natural Environment (Land Contamination) -** No appreciable environmental risk on water resources, aquatic flora and fauna and humans. Any minor adverse impacts are reversible.<br><br>**Agricultural Soils and Land Use -** No discernible effect on agricultural soil.<br><br>No discernible effect on agricultural land use.<br>No impact on operation of commercial or industrial premises. |
| Minor Beneficial | **Natural Environment (Land Contamination) -** Minor local reduction in environmental risk to humans or aquatic flora and fauna. Minor improvement in water resources (surface water and/or groundwater). |
| Moderate Beneficial | **Natural Environment (Land Contamination) -** Moderate local reduction in environmental risk to humans or aquatic flora and fauna. Moderate improvement in water resources (surface water and/or groundwater). |
| Major Beneficial | **Natural Environment (Land Contamination) -** Significant local reduction in environmental risk to humans or aquatic flora and fauna. Significant improvement in water resources (surface water and/or groundwater). |

23.69. Potential impacts identified as major or moderate are considered to have a likely significant effect.

### 23.3.6. Limitations and embedded mitigation

***Limitations***

23.70. Detailed ground investigations have not yet been carried out along the full length of the Onshore Cable Corridor, therefore geotechnical data is not available for all locations.

23.71. The length of the Onshore Cable Corridor is approximately 35 km, of which it is assumed that 85% would be constructed by open cut methods and 15% would be installed by trenchless techniques.

23.72. For the purposes of this assessment it is assumed that each cable construction team would be working on a section of open trench cable laying no more than 3 km in length, therefore no more than 9 km in length or 36 ha in area would be affected at one time.

***Embedded mitigation***

23.73. In some instances, embedded mitigation is sufficient to prevent any significant impacts from occurring. Embedded mitigation measures that are taken into account during the impact assessment are detailed in Table 23.6.

23.74. With respect to ground conditions, mitigation would also include ground investigation works to inform the design process and provide engineering design parameters.

23.75. Control measures for topsoil stripping, storage and reinstatement include:

- Soil stripping would take account of weather conditions;
- Topsoil would be stored in linear bunds no higher than 2 m;
- Topsoil would be stored separately from the sub-soils to prevent mixing and;
- Topsoil would be stored for the minimum possible time prior to re-spreading.

23.76. Surface water drainage on construction sites would also be controlled in accordance with industry best practice, to ensure pollution would not result from contaminated run-off containing high levels of suspended solids, hydrocarbons or other pollutants.

23.77. Clay stankings, or similar, would be used to prevent the creation of a pollution pathway by the installed cable backfill, which could encourage the migration of contaminants.

***Industry Best Practice***

23.78. The industry standard mitigation measures shown in Table 23.6 are assumed to adopted during the construction, operation and maintenance, and decommissioning phases.

23.79. The suggested measures for topsoil protection, geoenvironmental contamination mitigation, general contamination control mitigation and ground stability mitigation, as well as worker health and safety mitigation, detailed in Table 23.6 would be put in place in accordance with industry best practice.

Table 23.6 Embedded mitigation measures

| Parameter | Mitigation measures embedded in the project design |
|---|---|
| **General** | |
| Construction, Operation and Maintenance, Decommissioning | A Code of Construction Practice (CoCP) would be produced in accordance with the EA's guidelines such as 'Pollution Prevention Guideline No.6 Working at Construction and Demolition Sites'.<br>Contaminated or potentially contaminated water extracted from cable trenches or excavations during construction would be managed in accordance with regulatory requirements and EA's guidance. |
| Construction, Operation and Maintenance, Decommissioning | Measures to control runoff would be included as part of the CoCP.<br>Industry best practice measures regarding the storage of fuel and hazardous materials (including compliance with the Oil Storage Regulations) would be followed. |
| Construction | A contaminated land plan would be included in the CoCP. |
| Project design | The location of the Landfall site and the profile of the horizontal directional drill used to bring the cables ashore have been located after assessment of predicted cliff erosion rates, to ensure that the cable ducts would be at appropriate depths both below future beach levels and behind future cliff line over the project lifetime. |

Table 23.6 Embedded mitigation measures

| Parameter | Mitigation measures embedded in the project design |
|---|---|
| Construction | Implementation of ground investigation works to obtain ground information and geotechnical parameters to inform design solutions. |
| Construction | Geoenvironmental scope shall be included in pre-construction site investigations for potential areas of contamination. |
| Onshore Cable Corridor | |
| Project design | Careful routing has avoided key areas of environmental sensitivity and potentially contaminated land. These include environmental features such as ancient woodland, SSSIs and sites of potential contamination |
| Construction (Contaminated areas) | The requirement for installation of stankings would be determined by the contractor, to prevent the possibility of backfill installed around the cable duct introducing new contaminant pathways. |
| Construction (Major trenchless crossings) | Relevant consents from the appropriate licensing authority would be obtained prior to construction commencing. These include Highways Agency's Geotechnical Certification, Flood Defence Consent and Network Rail approvals. |
| Construction (Soil stripping) | Soil stripping would take account of weather conditions, topsoil would be stored in linear bunds no higher than 2 m, topsoil would be stored separately from the sub-soils to prevent mixing and topsoil would be stored for the minimum possible time prior to re-spreading. |
| Decommissioning | At the end of the project's life underground services, cables and ducts would be cut and left in-situ, thereby minimising disturbance. Equipment |

Table 23.6 Embedded mitigation measures

| Parameter | Mitigation measures embedded in the project design |
|---|---|
| | and structures would be removed to 0.5 m below ground level and backfilled. |
| Onshore Substation | |
| Construction | A CoCP would incorporate measures to prevent uncontrolled releases of potentially contaminative substances to the ground.<br>Best environmental practices (e.g. in accordance with the Control of Pollution (Oil Storage) (England) Regulations 2001) would be followed. |

## 23.4. Baseline Environment

23.80. The following section details the baseline data gathering methodology for the assessment and data sources used.

23.81. The baseline environment for ground conditions, contaminated land, soils and land use has been based upon the Phase 1 study, which comprises:

- A desk based data collection and review exercise;
- Consultation with appropriate statutory bodies;
- Site reconnaissance walkovers;
- Intrusive investigations at selected locations along the cable route (i.e. at the coastal Landfall, selected locations where the route crosses significant natural features (e.g. the River Avon) and major existing transport infrastructure (e.g. railways and the A31 Trunk Road).

### 23.4.1. Baseline data gathering methodology

23.82. In the context of geodiversity and ground stability considerations, a buffer zone of 1 km has been applied to the Onshore Cable Corridor, Landfall and Onshore Substation sites, as discussed above. For the environmental data collection, to inform the contaminated land related review process and

subsequent impact assessment, a buffer of 250 m has been applied, as discussed above.

***Desk-based data collection***

23.83. Publicly available information sources that have been reviewed as part of this assessment include:

- Ordnance Survey topographic maps of the study area;
- Online geological mapping from the British Geological Survey (BGS, 2010);
- Publicly available information from the EA regarding flooding, Source Protection Zones ('SPZs') and Aquifer Designation maps[1];
- MAGIC (Multi-Agency Geographic Information for the Countryside) comprising web-based interactive mapping which includes information on key environmental schemes (e.g. Agricultural Stewardship Schemes (NE, 2013)), Agricultural Land Classifications ('ALC') and designations from six government organisations who have responsibilities for rural policy-making and management[2];
- Soil maps from the National Soil Resources Institute ('NSRI')[3];
- Mapping of pipelines owned and managed by BPA, Centrica Energy, ConocoPhillips, E-ON, Essar, Esso Petroleum Co Ltd, Government Pipelines and Storage System, IGas, INEOS, Mainline Pipelines Ltd, Manchester Jetline Ltd, Marchwood, National Grid, Sabic, Total, and Wingas, which shows the location of approximately 14,000 km of buried oil and gas pipelines in England, Wales and Scotland, available from the Linewatch website[4].

23.84. Envirocheck Reports were obtained and reviewed as part of the Phase 1 Desk Study work (LIG, 2011a & b and LIG, 2012). Envirocheck reports are available on-line and provide environmental information and digital mapping about a range of topics, including ground stability and land contamination. The Phase 1 Habitat Survey which was undertaken in support of Chapter 27, Terrestrial and Freshwater Ecology, has also been reviewed as part of baseline characterisation.

23.85. Table 23.7 summarises the data sources and the scope of data obtained to inform the baseline studies.

Table 23.7 Data Sources

| Organisation | Data requested | Data received |
|---|---|---|
| Environment Agency | Landfill sites, waste transfer & Waste treatment sites, sites designated under Part 2A of the Environmental Protection Act 1990, sites where the EA has knowledge of groundwater remediation, water abstractions, discharge consents, groundwater quality monitoring data and details of all current licenses including radiological sources in force for Part A processes. | Response received on 25/11/11.<br>Data received concerning: landfill sites, waste sites, pollution prevention and control sites, discharge consents and radiological licenses.<br>Confirmation received of no groundwater monitoring data in the area and no Part 2A contaminated land, contaminated land or groundwater remediation. |
| New Forest District Council | Land contamination information | Responses received on 18/10/11 and 27/10/11 concerning: petrol stations and fuel tanks, landfill sites, waste sites and plans and summary data table from NFDC ranking of sites according to potential geoenvironmental risk based on their land uses. |
| East Dorset District Council | Land contamination information | Response received on 18/07/11 concerning: petrol stations and fuel tanks, landfill sites, waste sites and plans and ranking of sites according to |

[1] http://maps.environment-agency.gov.uk/wiyby
[2] www.magic.defra.gov.uk
[3] http://www.landis.org.uk/soilscapes/
[4] http://www.linewatch.co.uk

| | | |
|---|---|---|
| | | geoenvironmental risk based on their land uses. |
| Animal Health Veterinary Laboratory Service | Locations of animal burials along the route | Responses received 29/0611 and 31/08/11 confirming no records of notifiable animal burial sites in Dorset or Hampshire. |

***Site reconnaissance walkover***

23.86. A site walkover was undertaken in April 2012 to confirm aspects of the information acquired. The walkover focussed on the following areas of interest on or close to the Landfall site, Onshore Substation site and Onshore Cable Corridor:

- The Highcliffe to Milford Cliffs geological SSSI at the Landfall site;
- The Onshore Cable Corridor crossings beneath the River Avon, A31 trunk road and railway line;
- Areas of potential land contamination identified in the Envirocheck report or other data sources, include the Avon Common Landfill; the former Dudley Avenue and Neacroft Pit landfills and the Golden Hill and Breakhill Copse sites, which were formerly associated with mineral extraction.

23.87. These areas were focussed on as they were identified in the assessment as being potential receptors or potential sources of pollution.

***Intrusive ground investigation***

23.88. Ground investigation studies were carried out in August 2012 out at selected locations to confirm subsoil and groundwater conditions. The locations at which this work was carried out and the scope at that specific location are detailed in Table 23.8.

Table 23.8 Intrusive Investigations

| Location | Grid reference | Scope of work |
|---|---|---|
| Landfall Site | 425981E, 092528N | One 100 mm diameter borehole sunk by rotary coring and dynamic sampling techniques to 45 m depth. |
| Railway Crossing Site | 425865E, 096099N | Southern Side – one 150 mm diameter borehole sunk by cable percussion techniques to 25 m depth.<br>Northern Side - one 150 mm diameter borehole to 20 m depth. |
| River Avon Crossing | 413481E, 099465N | One 150 mm diameter borehole on the western side of the floodplain sunk by cable percussion techniques to 10 m depth. |
| A31 Crossing | 410278E, 102469N | One 150 mm diameter borehole on the northern side of the crossing sunk by cable percussion techniques to 5 m depth. |
| Onshore Substation Site | 408363E, 104983N | Three trial pits to depth of 2 m to 2.4 m depth within the Onshore Substation compound footprint. Standpipes installed for groundwater monitoring. |

***Prepared technical (baseline) reports***

23.89. The data collected from the initial desk based study and intrusive investigation works have been used to prepare Phase 1 Ground Stability and Contaminated Land reports, which have been used to inform the baseline evaluation and impact assessment in this chapter.

23.90. A Soils and Agricultural Land Use Desk Study has also been undertaken, which has been used to inform the baseline evaluation and impact assessment in this chapter.

***Development on potentially contaminated land***

23.91. The approach to risk estimation adopted for this assessment is in accordance with the guidance provided by Part IIA of the Environmental

Protection Act (as amended), which provides a statutory definition of contaminated land:

"Contaminated land is any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that:

- Significant harm is being caused or there is a significant possibility of such harm being caused;
- Pollution of controlled waters is being, or is likely to be, caused."

23.92. In addition, the EA Model Procedures for the Management of Land Contamination document (EA, 2004), which provide further guidance on the risk assessment process, and introduces the Contaminated Land Exposure Assessment ('CLEA') model that has been used. The CLEA model was intended to be used as the common basis for contamination assessments in the UK that derives Soil Guideline Values ('SGVs') and can also calculate Site Specific Guideline values ('SSGs') using software based models.

23.93. Underpinning both sets of guidance is a source-pathway-receptor methodology, with the underlying principle being the identification of pollutant linkages in order to evaluate whether the presence of a source of contamination could potentially lead to harmful consequences.

23.94. A pollutant linkage consists of the following three elements:

- A source/hazard (a substance or situation that has the potential to cause harm or pollution);
- A pathway (a means by which the hazard moves along/generates exposure);
- A receptor/target (an entity that is vulnerable to the potential adverse effects of the hazard).

23.95. Without a significant pollutant linkage, the contamination may be a hazard but does not constitute a risk to human health or the environment. Therefore, in assessing the potential for contamination to cause a significant effect, the extent and nature of the potential source or sources of contamination must be assessed. Pathways must be identified, and sensitive receptors or resources identified and appraised, to determine their value and sensitivity to contamination related impacts.

23.96. The approach to risk estimation adopted for this assessment involved identifying the magnitude of the potential consequence (taking into account both the potential severity of the hazard and the sensitivity of the receptor) and the likelihood (taking into account the presence of the hazard and the receptor and the integrity of the pathway).

23.97. Potential pollutant linkages have been considered assuming large scale construction works would take place without a permanent change in land use, except at the Onshore Substation site where land use would change from agricultural to industrial. If a potential pollutant linkage is identified then it represents a potential risk that requires further consideration and either remediation/direct risk management or further tiers of assessment. Subsequent tiers require additional information and the refinement of the Conceptual Site Model (CSM).

23.98. Within the context of this PEI, this source-pathway-receptor methodology is used to identify the likely impact significance. In addition to the identification and assessment of existing pathways, consideration was given to the potential for construction to introduce new pathways and thereby create a new pollutant linkage.

***Ground instability***

23.99. Ground instability is a term used to describe all gravity-dominated movements of the ground such as creep, subsidence, shrinkage and heave. The term is also used to include slope movement (or landsliding) – the down slope movement of earth materials under the influence of gravity.

23.100. The object of the study is to recognise the risk of occurrence and potential for ground instability at the earliest possible stage in the development process, so that:

- Appropriate action can be taken in accordance with good practice to assess the risks of ground instability in the form of subsidence and, where practicable, to deal with them by ground treatment or by designing new buildings and structures to withstand the subsidence expected;
- Due account can be taken of the constraints imposed by subsidence at all stages of the development process;
- Appropriate action can be taken to minimise the risk of landslide.

23.101. The currently undefended cliff face is subject to erosion from the sea and this is likely to continue throughout the working life of the Landfall, as no plans are in place to defend this stretch of coastline. It is proposed to install the Export Cable Corridor from the Landfall site down beneath the cliffs to a point offshore using Horizontal Directional Drilling (HDD). The joints between the offshore and onshore cables would be housed in below ground joint bays, which would be sited behind the predicted cliff recession line to avoid future disturbance to them. In addition, the Export Cable Corridor would be located at such depth beneath the current beach and cliffs and rise to the surface at such as distance back from the current cliff edge as to prevent its exposure as the cliff recedes.

23.102. It is considered that provided this embedded mitigation is included in the construction works that it is unlikely that additional cliff instability would result from the HDD works and long term presence of the cable ducts beneath and behind the cliffs. The rate of cliff top recession also should not be affected. However, an intrusive geotechnical investigation will be undertaken to inform the detailed design stage and an ongoing assessment of the impacts on cliff instability at the Landfall site is taking place.

### 23.4.2. Geology

#### *Bedrock strata*

23.103. The Onshore Cable Corridor would cross a number of south-easterly dipping Eocene bedrock formations of the Palaeogene Period (see Figure 23.1). The youngest bedrock deposits are the Headon Formation which underlies the Onshore Cable Corridor and Landfall site. As the Onshore Cable Corridor would advance north-westwards, the bedrock strata progressively age with the northern end of the route (including the Onshore Substation site) being underlain by the Poole Formation.

23.104. Table 23.9, which should be read in conjunction with Figure 23.1, summarises the bedrock strata underlying the route and gives typical strata descriptions.

**Table 23.9 Bedrock strata lithology**

| Geological formation | | | General description |
|---|---|---|---|
| Headon Formation (formerly the 'Headon and Osborne Beds') including the Lyndhurst Member | | | Clays and sands with bands of ironstone nodules.<br><br>Lyndhurst Member - Sand. |
| Barton Group | Becton Sand Formation | | Clays and sands with thin basal limestone stratum. |
| | Chama Sand Formation | | Sandy clay |
| | Barton Clay Formation | | Stiff clays with sand strata. |
| | Boscombe Sand Formation | | Fine to medium grained well graded sands. |
| Bracklesham Group | Branksome Sand Formation | | Poole Formation generally comprises sands with one sandstone and four clay strata (members). |
| | Poole Formation | Parkstone Clay Member | - Parkstone Clay - laminated sand silty clays and clayey silts. |
| | | Parkstone Sand Member | - Parkstone Sand - Sands and sandstone. |
| | | Broadstone Clay Member | - Broadstone Clay - Laminated sandy silt clay. |
| | | Oakdale Clay Member | - Oakdale and Creekmoor Clays - Laminated sandy silty clay and clayey silt with lignite. |
| | | Creekmoor Clay Member | |

#### *Superficial deposits*

23.105. The bedrock deposits are overlain by superficial deposits (see Figure 23.2) that are dominated by river terrace deposits over the majority of the Onshore Cable Corridor and by alluvium in the valleys of the larger watercourses. Localised peat deposits are also mapped in Hurn Forest close to the Onshore Cable Corridor. The River Terrace Deposits are

predominantly sands and gravels with occasional clay strata. Borehole records held in the British Geological Survey ('BGS') database record the River Terrace Deposits in the vicinity of the Onshore Cable Corridor to be up to 7.2 m in thickness. The largest tracts of alluvium are mapped in the floodplains of the River Avon and Moors River. Alluvium is highly variable and can range from clays and silts to sands and gravels.

23.106. Preliminary ground investigation works were carried out at five sites along the Onshore Cable Corridor in August 2012. A summary of the ground conditions encountered is given below.

23.107. At the Landfall site a single 45 m borehole was sunk between the cliffs and the proposed Landfall construction compound site to record the ground conditions through which the proposed trenchless construction bores would run. The borehole recorded River Terrace Deposits comprising gravels and clays to 1.9 m depth, overlying deposits of the Headon Formation and Becton Sand Formation. The Headon Formation comprised very stiff silty clay and the Becton Sand very dense grey silty sand.

23.108. At the proposed railway trenchless crossing, two boreholes were sunk, one either side of the railway, to depths of 20 m and 25 m. The ground conditions comprised very stiff grey silty clays of the Headon Formation overlain by clays and gravels of the River Terrace Deposits up to 2.4 m thick.

23.109. On the western side of the proposed River Avon trenchless crossing, a single 10 m borehole recorded very dense silty sand of the Boscombe Sand Formation, overlain by 6.5 m of loose, becoming dense silty, sand and gravel of the River Terrace Deposits.

23.110. On the northern side of the proposed A31 trenchless crossing, a single 5 m borehole recorded dense to very dense silty fine to medium sand of the Branksome Sand Formation, overlain by clayey silty sand of the River Terrace Deposits.

23.111. At the Onshore Substation site three trial pits recorded slightly clayey silty sand, with occasional gravel of the River Terrace Deposits to depth of 2.4 m.

407000 413000 419000 425000 431000

104000 98000 92000

Note: Onshore development area is located on two different BGS tiles. To the south is the Bournemouth Sheet, which was mapped in the late 1980s, whilst to the north is the Ringwood sheet, which was mapped in the late 1990s. The Palaeogene bedrock was mapped in more detail on the more recent Ringwood sheet. To minimise discrepancies, where available, BGS 10k scale mapping is used, but there are reduced data coverage on the 10k scale mapping and therefore to fill in areas where there are data gaps 50k scale mapping is used.

PKS
PKS
BRTC
PKC
BOSS
BRKS
BRTC
BRTC
PKS
BRKS
BOSS
BECS
CHMS
LY
HE
BECH
PKS
POOL
BAC
BECB
HM
HE
HEOS
BECH

0 1 2 3 4 km



**Legend**

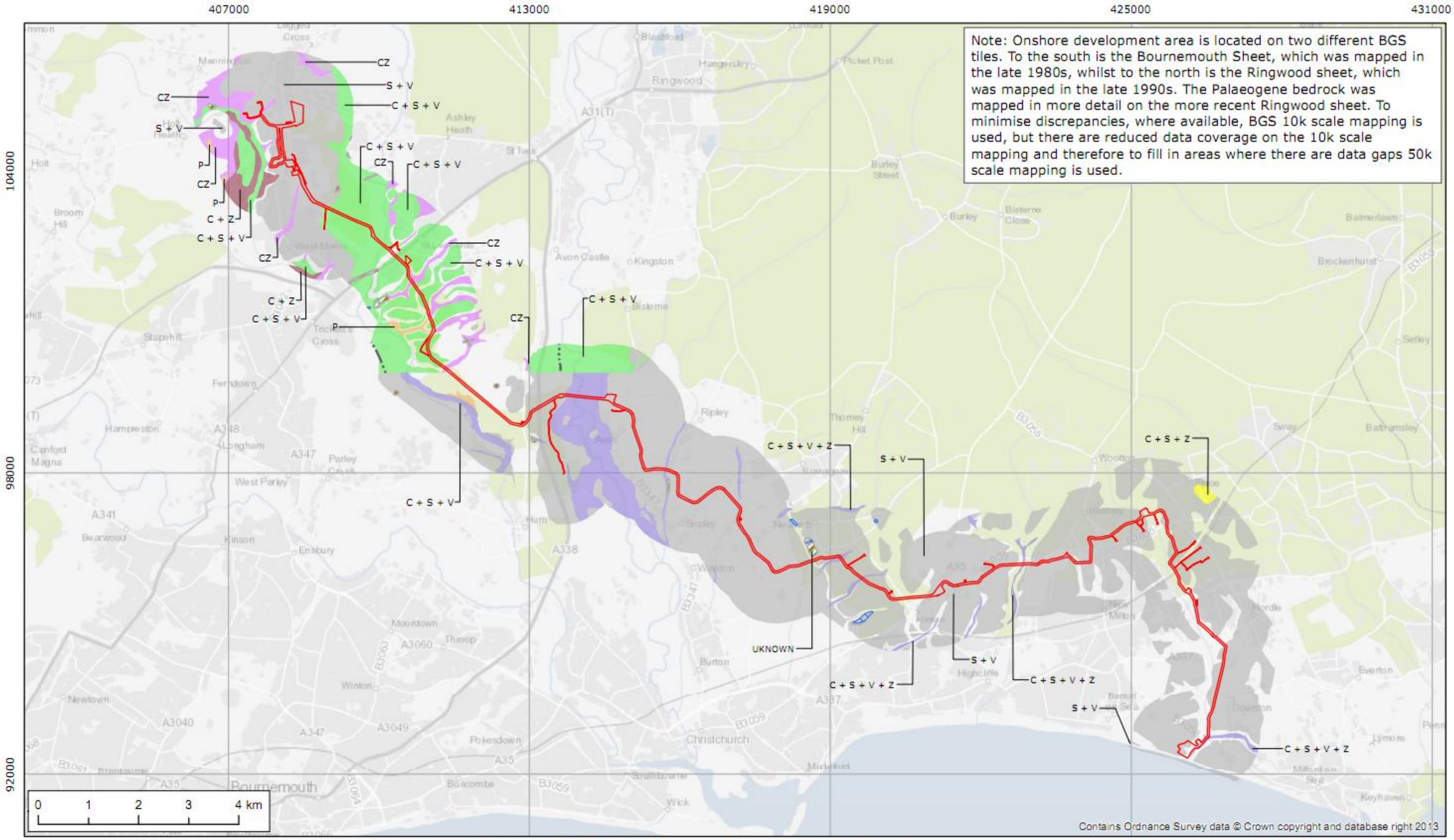
- Onshore Development Area
- Proposed HDD Crossing
- FAULT
- MADE GROUND (UNDIVIDED)
- WORKED GROUND (UNDIVIDED)
- BARTON CLAY FORMATION (BAC)
- BOSCOMBE SAND FORMATION (BOSS)
- BRANKSOME SAND FORMATION (BRKS)
- BROADSTONE CLAY MEMBER (BRTC)
- PARKSTONE CLAY MEMBER (PKC)
- PARKSTONE SAND MEMBER (PKS)
- POOLE FORMATION (POOL)
- BECTON BUNNY MEMBER (BECB)
- BECTON SAND FORMATION (BECS)
- BECTON SAND FORMATION AND CHAMA SAND FORMATION (UNDIFFERENTIATED) (BECH)
- CHAMA SAND FORMATION (CHMS)
- HAMSTEAD BEDS (HM)
- HEADON BEDS AND OSBORNE BEDS (UNDIFFERENTIATED) (HEOS)
- HEADON FORMATION (HE)
- LYNDHURST MEMBER (LY)

| | | |
|---|---|---|
| **Scale @A3** 1:75,000 | **Coordinate System:** British National Grid | N |
| **Date:** 09/08/2013 | **Datum:** OSGB 1936 | |
| **Ref. No.:** 010712062092/LT | **Data Source** BGS OS | |
| **Fig. No.:** Figure 23.1 | | |
| **Author:** CG | | |
| **Rv.No.:** 03 | **Checked:** LT | **Approved:** SMF |

# Navitus Bay Development Ltd

## Onshore Cable Route Bedrock Geology

NAVITUSBAY




**Legend**

- Onshore Development Area
- FAULT
- WORKED GROUND (UNDIVIDED)
- MADE GROUND (UNDIVIDED)
- SAND, SILT AND CLAY (C + S + Z)
- CLAY AND SILT (C+Z)
- CLAY, SAND AND GRAVEL (C+S+V)
- CLAY, SILT, SAND AND GRAVEL (C+S+V+Z)
- PEAT (P)
- SAND AND GRAVEL (S+V)
- SEDIMENT (SED)
- SILTY CLAY (CZ)
- UNKNOWN/UNCLASSIFIED ENTRY (UKNOWN)

| | |
|---|---|
| **Scale @A3** 1:75,000 | **Coordinate System:** British National Grid |
| **Date:** 09/08/2013 | **Datum:** OSGB 1936 |
| **Ref. No.:** 010712062091/LT | **Data Source** BGS OS |
| **Fig. No.:** Figure 23.2 | |
| **Author:** CG | |
| **Rv.No.:** 02 **Checked:** LT | **Approved:** SMF |

N

# Navitus Bay Development Ltd

**Superficial Geology**

NAVITUSBAY

***Protected geological or geomorphological sites***

23.112. The cliffs at the Landfall site are part of the Highcliffe to Milford Cliffs Geological SSSI. The cliffs are designated because they provide access to the standard succession of the fossil rich Barton Beds and Headon Beds, which are considered important both in a national and international context.

23.113. There are no identified RIGS on the Onshore Cable Corridor, Landfall site or Onshore Substation site and none is considered close enough to require further consideration.

### 23.4.3. Hydrogeology

23.114. The superficial deposits along the Onshore Cable Corridor are classified Secondary A (Minor) aquifers and the bedrock strata, with the exception of the Barton Clay Formation, are also Secondary A aquifers. A Secondary A Aquifer is defined by the EA as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

23.115. The Barton Clay formation is classified as non productive measures (Non Aquifer), which is defined as rock layers or drift deposits with low permeability that do not provide water for public supply or contribute to river base flow.

23.116. The Onshore Substation site is underlain by River Terrace Deposits and the Poole Formation, which are both Secondary A aquifers.

23.117. The Landfall site is underlain by River Terrace Deposits and the Headon Formation, which are Secondary A aquifers.

23.118. There is an interrelationship between hydrogeology and hydrology because groundwater provides the base flows for the watercourses. Groundwater SPZs and licensed potable water supplies from groundwater are not present within 1 km of the Onshore Cable Corridor, Landfall or Onshore Substation sites.

23.119. Groundwater abstractions are not recorded within the Landfall or Onshore Substation sites or within the Onshore Cable Corridor. Four groundwater abstractions are recorded within 125 m and 250 m from the Onshore Cable Corridor associated with three 'catch pits' and a borehole, all of which supply water for agricultural irrigation. The borehole lies 150 m south of the Onshore Cable Corridor near the hamlet of Waterditch and takes water from the Secondary A Aquifer in the Boscombe Sand Formation. Two of the catch pits are located 125 m and 250 m north-east of the Onshore Cable Corridor near the village of Middle Brockhampton and take groundwater from the River Terrace Deposits by pumping from an open pit excavated below the groundwater table. A third catch pit is located approximately 20 m to the south west of the Onshore Cable Corridor near the village of Bransgore.

23.120. Groundwater monitoring standpipes installed at all of the five preliminary ground investigation sites detailed in the Geology section were monitored from September 2012 to April 2013. The results identified the presence of very shallow groundwater tables at: the A31 crossing site (0.1 to 0.2 m below ground level (bgl)), River Avon site (0.5 m to 0.6 m bgl), Onshore Substation site (0.19 m above ground level to 1.06 m bgl).

23.121. It should be noted that high groundwater levels have been recorded at the Onshore Substation site and some surface water ponding has been noted during very wet conditions.

23.122. Groundwater was not recorded at the Landfall site and only very minor seepages from the clay at the railway crossing site were recorded.

### 23.4.4. Hydrology

23.123. Various watercourses cross the Onshore Cable Corridor with the three main watercourses, the Danes Stream, the Moors River and the River Avon, being the largest. The Onshore Cable Corridor would pass through nine separate watercourse catchments. Further details are provided in Chapter 24 (Water Environment). Surface waters could be potential sensitive receptors for any releases of contamination.

### 23.4.5. Soils

23.124. The surface soils along the majority of the Onshore Cable Corridor outside of the Moors River and River Avon floodplains are characterised as dry, acidic, loamy or sandy loam, low to very low fertility soils, that are typically free draining due to being underlain by granular soils derived from bedrock sand strata or sands and gravels of the superficial River Terrace Deposits. In lower lying areas around watercourses, these soils become waterlogged and in the floodplains of Moors River and River Avon the soils comprise wet, neutral to slightly acidic, moderately fertile loamy soils.

### 23.4.6. Land use

23.125. The Onshore Cable Corridor passes through predominantly agricultural land, occupied by a mixture of grazing pasture, arable crops, occasional horse paddocks and non-agricultural land including heathland and natural and managed woodland plantations. Numerous minor roads and watercourses would be crossed by the corridor as well a live railway line, three disused railway lines, a major trunk road (the A31) and several watercourses (including the River Avon and Moors River). There are numerous examples of sand and gravel extraction along the southern half of the Onshore Cable Corridor as shown on Figures 23.3 to 23.11 which records various small scale backfilled former sand pits and by the Golden Hill feature at Hordle which is a former gravel pit, now nature reserve that would be crossed by trenchless techniques. These features are noted as potential sources of contamination, due to the uncertain nature of the backfill.

23.126. At the northern end the Onshore Cable Corridor the route would run through a Ministry of Defence (MOD) fuel depot site, which has been operational since 1939. This comprises the fuel depot itself, with associated accommodation facilities for the site personnel, including residential properties, a sports field, parade ground and other ancillary buildings. Within Breakhill Copse the Onshore Cable Corridor would pass within 25 m of the former Dudley Avenue Landfill site. Small scale sand and gravel extraction has occurred along the southern half of the route at several locations in the 19th and early 20th centuries. These features are also noted as potential sources of contamination, due to the uncertain nature of the backfill.

23.127. Between the A338 and A31 lies an area of land owned by QinetiQ, a defence contractor company. The QinetiQ site comprises heathland and vehicle test tracks, used for confidential testing purposes. As the history of the site's use is not known, there is the potential for contaminated land to be present.

#### *Agricultural land*

23.128. The Agricultural Land Classification Plan (ALC) map shows that the Onshore Cable Corridor would not cross either Grade 1 or Grade 5 land; only Grades 2, 3 and 4 are present. The sections of the route which cross a golf course, Hurn Forest, various managed and non-managed woodlands and the West Moors MOD site are not considered in this section of the report as they do not constitute agricultural land.

23.129. The ALC map shows that the Landfall area is comprised of Grade 3 and Grade 4 land which is currently in use for grazing. From the Landfall to the Avon Valley the land is predominantly of Grade 3 quality, with small areas of Grade 4 and non-agricultural (forestry and woodland) land. Again, this is predominantly used for grazing but some arable and recreational land (caravan park golf course) is present. The area east of the River Avon around Neacroft is predominantly comprised of Grade 2 land with a short section of Grade 3. This is currently in use for a combination of arable, grazing and pig fields on rotation.

23.130. The location of the Onshore Substation is sited in an area of Grade 4 land quality and is currently in use for grazing stock.

424000 425000 426000 427000 428000 429000

94000 93000 92000

Danes Stream Tributary

Danes Stream

A337

Landfall Site

Sandpit Copse

Old Milton
Lymington Rd
A337
Manor Farm Cottages
Barton Common
Barton Common Rd
Milford Rd
Arnold La
Keepers Cottage
White Croft
Ashley Bridge
Christchurch Rd
Leagreen
Yeatton Cottages
The Rough
Newlands Manor Farm
Downton
Everton
Hordle Manor Farm Cottage
Orchards End
Studland Common

0 250 500 m



**Legend**

- Onshore Development Area
- 250m Buffer on Cable Route
- Mannington Substation
- Waste Management Facilities
- Transmission Pylons
- Licensed Waste Management Facility
- EA Historic Landfill
- SSSI
- Archaeological Feature
- Backfilled Historic Clay Pit
- Backfilled River Channel
- Historical Gravel Pit
- Historical Pond
- Historical Sand
- Historical Sand Pit
- Made Ground
- Modern Engineered Structure

| | | |
|---|---|---|
| **Scale @A3** 1:15,000 | **Coordinate System:** British National Grid | N |
| **Date:** 12/08/2013 | **Datum:** OSGB 1936 | |
| **Ref. No.:** 0107130307232/03 | **Data Source** OS Envirocheck | |
| **Fig. No.:** Figure 23.3 | | |
| **Author:** CG | | |
| **Rv.No.:** 03 | **Checked:** NDU | **Approved:** SMF |

# Navitus Bay Development Ltd

## Environmental Features Plan, Area 0

NAVITUSBAY

424000 425000 426000 427000 428000 429000

96000 95000 94000

Live Railway Line

Great Woar Copse

Golden Hill

Former Dudley Avenue Landfill Site

Danes Stream Tributary

NEW MILTON

Hordle

Ashley

Oakley Farm

Arrewood Court Turkey Farm

Fairmeads Farm

Long Acre Farm

Broadmead Trees Farmhouse

Old Milton

Lymington Rd

A337

The Rough

Yeatton Cottages

Manor Farm Cottages

Ashley Bridge

Christchurch Rd

Leagreen

Highlands Manor Farm

0 250 500 m



**Legend**

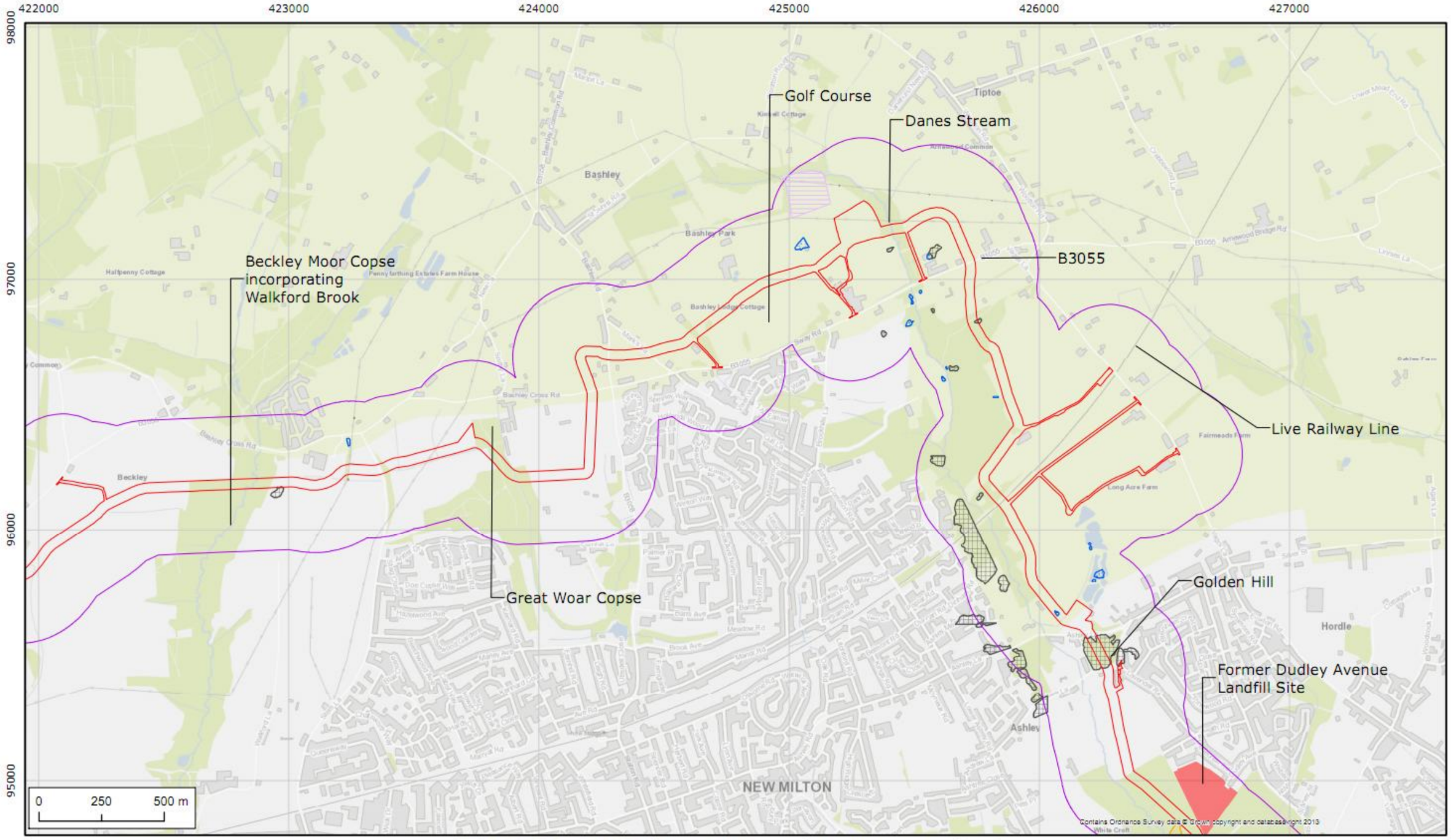
- Onshore Development Area
- 250m Buffer on Cable Route
- Mannington Substation
- Waste Management Facilities
- Transmission Pylons
- Licensed Waste Management Facility
- EA Historic Landfill
- SSSI
- Archaeological Feature
- Backfilled Historic Clay Pit
- Backfilled River Channel
- Historical Gravel Pit
- Historical Pond
- Historical Sand
- Historical Sand Pit
- Made Ground
- Modern Engineered Structure

| | | |
|---|---|---|
| **Scale @A3** 1:15,000 | **Coordinate System:** British National Grid | N |
| **Date:** 12/08/2013 | **Datum:** OSGB 1936 | |
| **Ref. No.:** 0107130307232/03 | **Data Source** OS Envirocheck | |
| **Fig. No.:** Figure 23.4 | | |
| **Author:** CG | | |
| **Rv.No.:** 03 | **Checked:** NDU | **Approved:** SMF |

# Navitus Bay Development Ltd

## Environmental Features Plan, Area 1

NAVITUSBAY




**Legend**

- Onshore Development Area
- 250m Buffer on Cable Route
- Mannington Substation
- Waste Management Facilities
- Transmission Pylons
- Licensed Waste Management Facility
- EA Historic Landfill
- SSSI
- Archaeological Feature
- Backfilled Historic Clay Pit
- Backfilled River Channel
- Historical Gravel Pit
- Historical Pond
- Historical Sand
- Historical Sand Pit
- Made Ground
- Modern Engineered Structure

| | | |
|---|---|---|
| **Scale @A3** 1:15,000 | **Coordinate System:** British National Grid | |
| **Date:** 12/08/2013 | **Datum:** OSGB 1936 | |
| **Ref. No.:** 0107130307232/03 | **Data Source** OS Envirocheck | |
| **Fig. No.:** Figure 23.5 | | |
| **Author:** CG | | |
| **Rv.No.:** 03 | **Checked:** NDU | **Approved:** SMF |

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# Navitus Bay Development Ltd

## Environmental Features Plan, Area 2

NAVITUSBAY

419000 420000 421000 422000 423000 424000

97000 96000 95000

Beckley Moor Copse
incorporating
Walkford Brook

Great Woar Copse

A35

0 250 500 m



**Legend**

- Onshore Development Area
- 250m Buffer on Cable Route
- Mannington Substation
- Waste Management Facilities
- Transmission Pylons
- Licensed Waste Management Facility
- EA Historic Landfill
- SSSI
- Archaeological Feature
- Backfilled Historic Clay Pit
- Backfilled River Channel
- Historical Gravel Pit
- Historical Pond
- Historical Sand
- Historical Sand Pit
- Made Ground
- Modern Engineered Structure

| | |
|---|---|
| **Scale @A3** 1:15,000 | **Coordinate System:** British National Grid |
| **Date:** 12/08/2013 | **Datum:** OSGB 1936 |
| **Ref. No.:** 0107130307232/03 | **Data Source** OS Envirocheck |
| **Fig. No.:** Figure 23.6 | |
| **Author:** CG | |
| **Rv.No.:** 03 | **Checked:** NDU **Approved:** SMF |

N

# Navitus Bay Development Ltd

## Environmental Features Plan, Area 3

NAVITUSBAY

416000 417000 418000 419000 420000 421000

98000 97000 96000

Former Neacroft Pit Landfill Site

River Mude

Bransgore
North Bockhampton
Middle Bockhampton
Neacroft
Sopley
Winkton
Godwinscroft
Waterditch
Heathfield
Wavarley House
Harrow Farmhouse
Ringwood Lodge
Lyndhurst Rd
The Shack
Holfleet
Waterditch Farm
Burton Rough

0 250 500 m



**Legend**

- Onshore Development Area
- 250m Buffer on Cable Route
- Mannington Substation
- Waste Management Facilities
- Transmission Pylons
- Licensed Waste Management Facility
- EA Historic Landfill
- SSSI
- Archaeological Feature
- Backfilled Historic Clay Pit
- Backfilled River Channel
- Historical Gravel Pit
- Historical Pond
- Historical Sand
- Historical Sand Pit
- Made Ground
- Modern Engineered Structure

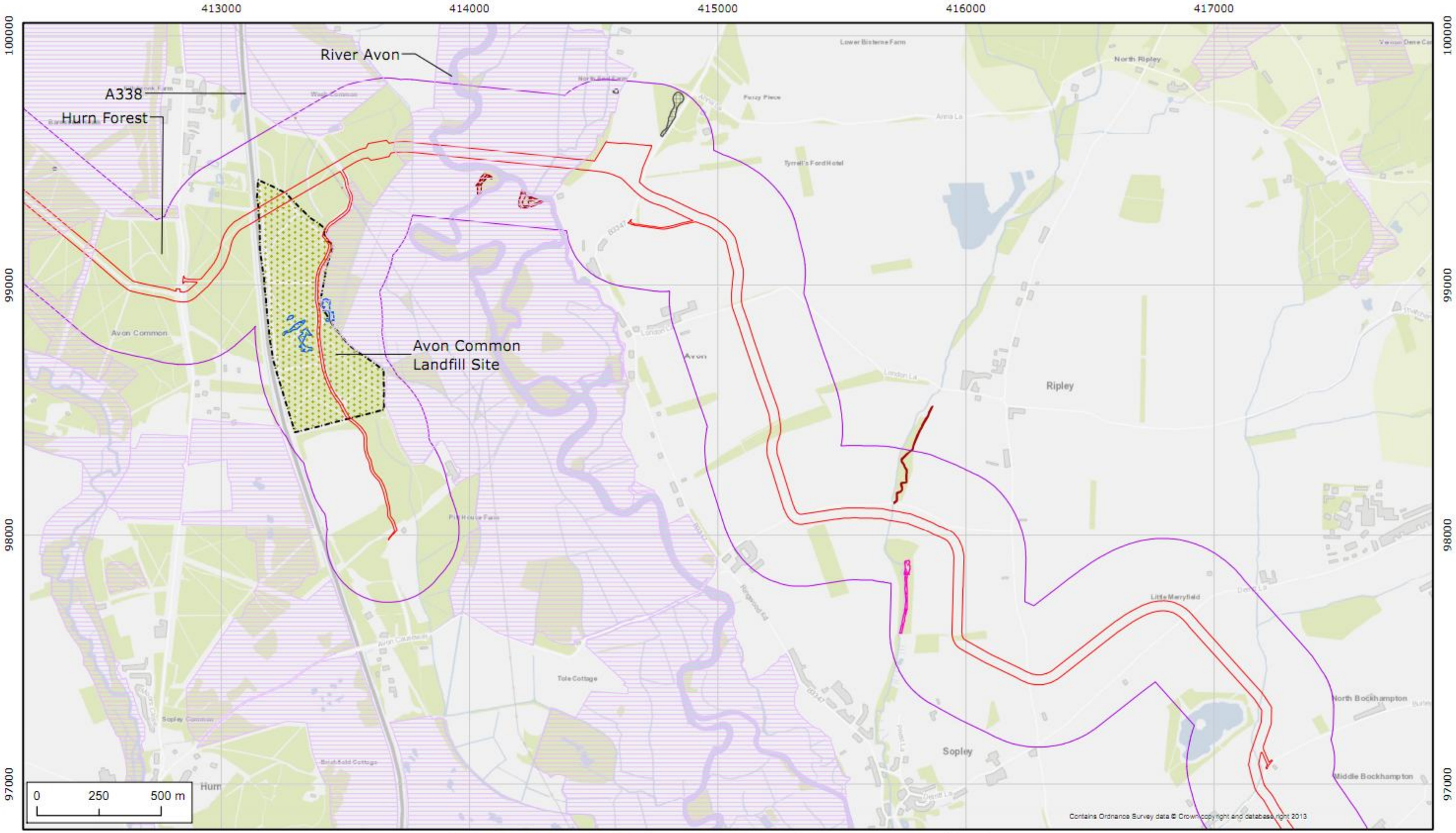
| | | |
|---|---|---|
| **Scale @A3** 1:15,000 | **Coordinate System:** British National Grid | |
| **Date:** 12/08/2013 | **Datum:** OSGB 1936 | |
| **Ref. No.:** 0107130307232/03 | **Data Source** OS Envirocheck | |
| **Fig. No.:** Figure 23.7 | | |
| **Author:** CG | | |
| **Rv.No.:** 03 | **Checked:** NDU | **Approved:** SMF |

N

# Navitus Bay Development Ltd

## Environmental Features Plan, Area 4

NAVITUSBAY




**Legend**

- Onshore Development Area
- 250m Buffer on Cable Route
- Mannington Substation
- Waste Management Facilities
- Transmission Pylons
- Licensed Waste Management Facility
- EA Historic Landfill
- SSSI
- Archaeological Feature
- Backfilled Historic Clay Pit
- Backfilled River Channel
- Historical Gravel Pit
- Historical Pond
- Historical Sand
- Historical Sand Pit
- Made Ground
- Modern Engineered Structure

| | |
|---|---|
| **Scale @A3** 1:15,000 | **Coordinate System:** British National Grid |
| **Date:** 12/08/2013 | **Datum:** OSGB 1936 |
| **Ref. No.:** 0107130307232/03 | **Data Source** OS Envirocheck |
| **Fig. No.:** Figure 23.8 | |
| **Author:** CG | |
| **Rv.No.:** 03 | **Checked:** NDU **Approved:** SMF |

N

# Navitus Bay Development Ltd

## Environmental Features Plan, Area 5

NAVITUSBAY

410000 411000 412000 413000 414000 415000

101000

100000

99000

New Forest National Park

River Avon

A338

Hurn Forest

Moors River

Avon Common Landfill Site

Avon

0 250 500 m



**Legend**

- Onshore Development Area
- 250m Buffer on Cable Route
- Mannington Substation
- Waste Management Facilities
- Transmission Pylons
- Licensed Waste Management Facility
- EA Historic Landfill
- SSSI
- Archaeological Feature
- Backfilled Historic Clay Pit
- Backfilled River Channel
- Historical Gravel Pit
- Historical Pond
- Historical Sand
- Historical Sand Pit
- Made Ground
- Modern Engineered Structure

| | |
|---|---|
| **Scale @A3** 1:15,000 | **Coordinate System:** British National Grid |
| **Date:** 12/08/2013 | **Datum:** OSGB 1936 |
| **Ref. No.:** 0107130307232/03 | **Data Source** OS Envirocheck |
| **Fig. No.:** Figure 23.9 | |
| **Author:** CG | |
| **Rv.No.:** 03 **Checked:** NDU | **Approved:** SMF |

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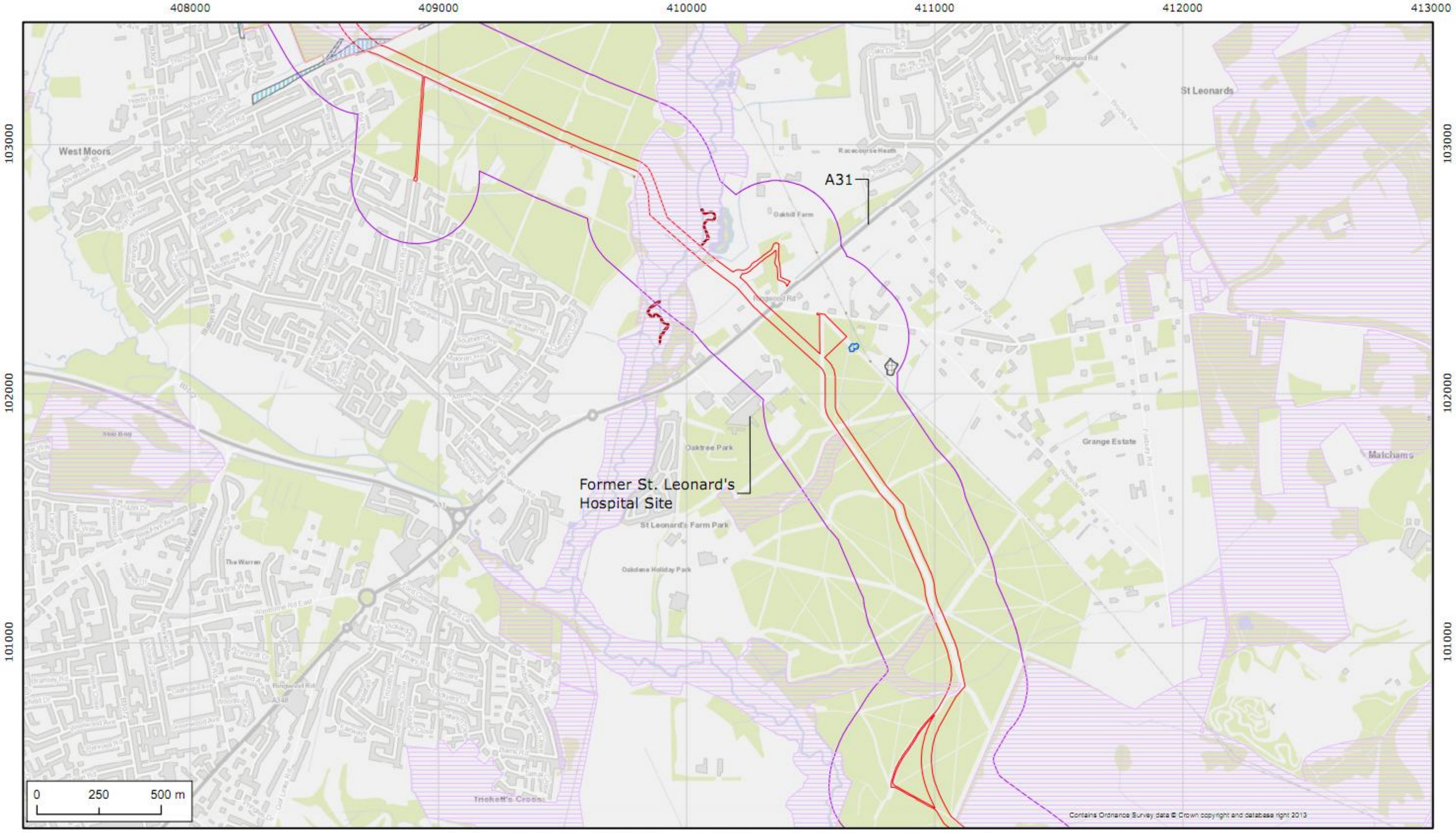
# Navitus Bay Development Ltd

## Environmental Features Plan, Area 6

NAVITUSBAY




**Legend**

- Onshore Development Area
- 250m Buffer on Cable Route
- Mannington Substation
- Waste Management Facilities
- Transmission Pylons
- Licensed Waste Management Facility
- EA Historic Landfill
- SSSI
- Archaeological Feature
- Backfilled Historic Clay Pit
- Backfilled River Channel
- Historical Gravel Pit
- Historical Pond
- Historical Sand
- Historical Sand Pit
- Made Ground
- Modern Engineered Structure

| | |
|---|---|
| **Scale @A3** 1:15,000 | **Coordinate System:** British National Grid |
| **Date:** 12/08/2013 | **Datum:** OSGB 1936 |
| **Ref. No.:** 0107130307232/03 | **Data Source** OS Envirocheck |
| **Fig. No.:** Figure 23.10 | |
| **Author:** CG | |
| **Rv.No.:** 03 **Checked:** NDU **Approved:** SMF | |

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# Navitus Bay Development Ltd

## Environmental Features Plan, Area 7

NAVITUSBAY

406000 407000 408000 409000 410000 411000

105000 104000 103000

Mannington National Grid Substation Site

Substation Site

Uddens River

MoD Fuel Depot Site

Disused Railway Line

Disused Railway Line

Mannington
Three Legged Cross
Crooked Willies
Lower Mannington
Holt Heath
Woolsbridge
Westwood
Newman's Farm South
West Moors
Clayford Farm
Ashley
Racecourse Heath
Oakhill Farm
A31

0 250 500 m



**Legend**

- Onshore Development Area
- 250m Buffer on Cable Route
- Mannington Substation
- Waste Management Facilities
- Transmission Pylons
- Licensed Waste Management Facility
- EA Historic Landfill
- SSSI
- Archaeological Feature
- Backfilled Historic Clay Pit
- Backfilled River Channel
- Historical Gravel Pit
- Historical Pond
- Historical Sand
- Historical Sand Pit
- Made Ground
- Modern Engineered Structure

| | |
|---|---|
| **Scale @A3** 1:15,000 | **Coordinate System:** British National Grid |
| **Date:** 12/08/2013 | **Datum:** OSGB 1936 |
| **Ref. No.:** 0107130307232/03 | **Data Source** OS Envirocheck |
| **Fig. No.:** Figure 23.11 | |
| **Author:** CG | |
| **Rv.No.:** 03 | **Checked:** NDU **Approved:** SMF |

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# Navitus Bay Development Ltd

## Environmental Features Plan, Area 8

NAVITUSBAY

407000 413000 419000 425000 431000

104000 98000 92000

Mannington
Three Legged Cross
Ashley Heath
Holt Heath
Holt
Broom Hill
St Ives
Avon Castle
Hangersley
Ringwood
Burley Lodge
Burley Street
Burley
Bisterne Close
Kingston
Bisterne
Stapehill
Ferndown
Thorney Hill
Setley
Hampreston
West Parley
Ripley
Sway
Canford Magna
Longham
Bransgore
Wootton
Tiptoe
Parley Cross
Bearwood
Ensbury
Kinson
Throop
Hurn
Winkton
New Milton
Hinton
Gordleton
Hordle
Burton
Moordown
Highcliffe
Everton
Newtown
Winton
Branksome
Pokesdown
CHRISTCHURCH
Downton
Lymore
Parkstone
Wick
Mudeford
Christchurch Bay
Boscombe
Southbourne
Milford on Sea

0 1 2 3 4 km

## Legend

- Onshore Development Area
- GRADE 1
- GRADE 2
- GRADE 3
- GRADE 4
- GRADE 5
- NON AGRICULTURAL
- URBAN

| | |
|---|---|
| **Scale @A3** 1:75,000 | **Coordinate System:** British National Grid |
| **Date:** 09/08/2013 | **Datum:** OSGB 1936 |
| **Ref. No.:** 010712062092/LT | **Data Source** OS Natural England |
| **Fig. No.:** Figure 23.12 | |
| **Author:** CG | |
| **Rv.No.:** 03 **Checked:** LT **Approved:** SMF | |

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# Navitus Bay Development Ltd

**Agricultural Land Classification Plan**

NAVITUSBAY

### 23.4.7. Potential sources of land contamination

23.131. A Phase 1 Ground Condition Desk Study has been undertaken and used to inform this assessment.

***Landfall***

23.132. The Phase 1 Ground Conditions Desk Study did not identify any potential sources of contamination ('PSC') on or near the Landfall site (i.e. within a distance of 250 m) or its associated construction compound in the car park to the north-east.

***Onshore Cable Corridor***

23.133. The study identified five potential PSC on and in close proximity to the Onshore Cable Corridor. These PSC are:

- Backfilled historical land use features (ponds, clay pits and gravel pits) – the Onshore Cable Corridor is planned to be trenched (i.e. open cut construction techniques) through five small features, and would pass close to several others. The features the Onshore Cable Corridor would pass through are backfilled former sand pits at: approximate chainage 2,900 m within Breakhill Copse; at approximate chainage 4,075 m north of Ashley Lane, Hordle; at approximate chainage 9,350 m immediately east of Beckley Moor Copse; within Stanley's Copse at approximate chainage 5,450 m; and immediately north of the hamlet of Waterditch at approximate chainage 14,400 m. A single feature that is very close to the Onshore Cable Corridor and could possibly encroach on to it is a backfilled former clay pit within Breakhill Copse at approximate chainage 3,000 m. These features are backfilled with unknown materials.
- Disused and live railways – the Onshore Cable Corridor would pass beneath a live railway east of Ashley and a disused railway south of the MOD site using trenchless methods of installation. A second disused railway crossing north of West Moors Road would be trenched.
- Historic Dudley Avenue Landfill – the Onshore Cable Corridor would pass within 25 m of the southern boundary of the former Dudley Avenue Landfill at Hordle. This landfill is known to have been subject to a Phase IIA investigation and risk assessment by NFDC as part of their obligations under Part IIA of the Environmental Protection act 1990. The intrusive site investigation informed a Tier 2 Soils, Groundwater and Ground Gas Risk Assessment undertaken for the Council by WPA Consultants Ltd. The report concluded "that there are no locations where the current data indicates a significant possibility of significant harm in the context of Part IIA of the Environmental Protection Act". The report however identified the presence of "chromium and several PAHs (polyaromatic hydrocarbons)" as potential contaminants of concern with respect to soils within the surface soils (from 0 m to 0.6 m depth). Also, it noted that whilst there was some impact on groundwater, there was no evidence that "significant contamination of controlled waters is occurring". The study also showed "occasionally elevated levels of methane and continuously elevated carbon dioxide". The risk assessment for ground gas concluded the presence of a "low risk".
- Historic Neacroft Gravel Pit Landfill - The Onshore Cable Corridor would pass approximately 75 m from the site of this closed (historic) landfill that lies between the villages of Neacroft and Waterditch. The EA identified that this landfill accepted 'inert waste' only i.e. "waste which remains largely unaltered once buried such as glass, concrete, bricks, tiles, soil and stones".
- Mannington National Grid substation – the Onshore Cable Corridor would be trenched up to the boundary of the Onshore Substation, where there is the potential for hydrocarbons from leaks and spills to migrated off-site into the groundwater and soils.
- MOD Fuel Depot – The MOD site has been active as a fuel storage and distribution depot since 1939 and hydrocarbons from leaks and spills are likely to be present in the groundwater and soils on the site. The Onshore Cable Corridor would enter the southern side of the depot via trenchless techniques to cross beneath the Holt and West Moors Heath SSSI that occupies the south-western corner of the MOD site. The Onshore Cable Corridor would then be open trenched through the remainder of the site.

***Onshore Substation***

23.134. The Phase 1 Ground Conditions Desk Study identified two PSC in the vicinity of the Onshore Substation site. These are the MOD fuel depot that borders the southern boundary of the Onshore Substation and the light industrial

land uses adjacent and close to the northern boundary. However, the study identified that pollution linkages between both PSC and the Onshore Substation site are unlikely to exist on the basis that any contamination from the sources is very unlikely to be able to migrate onto the Onshore Substation site. This is because the migration pathway would be via groundwater flow and the industrial estate to the north is separated from the Onshore Substation site by a watercourse that would intercept any contaminated groundwater and cause it to flow in the surface watercourse away from the Onshore Substation site. A pollutant linkage with the MOD site however, was not considered to be likely as it was considered that the groundwater flow was likely to be southwards away from the Onshore Substation site. This was later confirmed by the results of groundwater monitoring which showed a southerly groundwater flow direction from the Onshore Substation site towards the MOD site.

23.135. It should be noted that high groundwater levels have been recorded at the Onshore Substation site and some surface water ponding has been noted during very wet conditions. If this were to result in overland flow during extreme conditions, any mobile contamination released into floodwaters could drain across the Onshore Substation site en route to the stream. Potential water quality impacts/potential for contamination of surface watercourses in general arising from construction activities is discussed in Chapter 24: Water Environment.

23.136. Figures 23.3 to 23.12 show the locations of the environmental features at the Landfall, along the Onshore Cable Corridor and at the Onshore Substation.

## 23.5. Impact Assessment

23.137. This section describes the potential impacts of the onshore components upon ground conditions, contaminated land, and soils and land use. This assessment is split into the three distinct areas: the Landfall, Onshore Cable Corridor and Onshore Substation. The potential impacts are assessed for each phase.

### 23.5.1. Landfall

***Construction***

23.138. This section describes the identified potential environmental impacts that may arise during the construction of the Landfall site, which is located on agricultural land.

23.139. The Landfall would be installed by trenchless construction techniques (using HDD). The construction works at the Landfall would require a construction compound and in addition an access road between Milford Road and the compound.

*On-site ground conditions*

23.140. The Landfall site incorporates the cliffs which are part of the Highcliffe to Milford Cliffs SSSI. The cliffs, which are considered to be a receptor of **high** sensitivity, are actively retreating inland due to coastal erosion. There is therefore the possibility not only for coastal erosion to leave the cables and other project infrastructure exposed, but also for the works to affect the erosion of the cliffs and possibly increase erosion rates. Construction activities at the Landfall site, which would include the presence of heavy plant and machinery, the construction of a haul road and trench and joint bay excavations, have the potential to cause ground instability to slopes. In addition, ground settlement could possibly affect the culvert on the Landfall site boundary with the Milford Road and the slope at the rear edge of the Landfall works compound. This could trigger slope instability by loading of the ground, removal of support by excavation and altering the groundwater regime by pumping. Local ground settlements could be triggered by the loss of ground into trenches, lowering of groundwater levels or the removal of fines during groundwater pumping.

23.141. A desk-study carried out to identify baseline conditions included an assessment of potential ground instability considerations from both natural and construction induced sources. The geological SSSI at the Landfall site only (part of the Highcliffe to Milford Cliffs SSSI) is a potential receptor with respect to ground instability. Work on the potential impacts on cliff instability at the Landfall site is ongoing and will be assessed further in the Environmental Statement ('ES') that will form part of the application for development consent.

*Accidental emissions of contaminants*

23.142. The use of plant and the storage and use of fuels or other hazardous materials within the Landfall works compound could result in emissions to the ground via accidental leakage of fuel from tanks, leakage from plant as a result of breakdown or during repair, spillages during re-supply of fuel tanks or during fuelling of plant and machinery. Spillage or leakage of hazardous materials or fuels at the Landfall site could adversely affect several receptors. These receptors include:

- Site workers or general public using the nearby public footpath or private land could be affected by a spillage of release of contamination. Both receptors are considered to be of **high** sensitivity and the site workers could be impacted by direct contact with the contaminants and the general public by contact with contamination that migrates off site either by runoff, or by being blow by the wind.
- Livestock and crops in the fields near to the Landfall site and Landfall works compound could be affected by a spillage or emission of contamination. This could occur by runoff or wind blowing contamination on to grass that animals graze or crops could be affected due to uptake of contamination through their roots via groundwater flow. Both livestock and crops are considered to be receptors of **low** sensitivity.
- The Landfall works compound and the Landfall site are underlain by Secondary A aquifers, which are assessed as being receptors of **low** sensitivity. The aquifers could be impacted by any spillage or release of contamination infiltrating the ground.

23.143. The pathways for migration of contaminants could be via groundwater flow, runoff, temporary drainage measures, wind-blown dust, infiltration into the ground or release of gases or vapours to the atmosphere. The duration of the effects would be short term and intermittent.

23.144. However, through the implementation of industry best practice measures regarding the storage (including adherence to the Oil Storage Regulations) and use of fuel and hazardous materials, controls on site drainage and other pollution prevention techniques the magnitude of effects are considered to be **imperceptible**. The significance of impact is therefore considered to be **negligible**. This impact is therefore **Not Significant**.

*Mobilisation of existing sources of contamination*

23.145. If construction activities caused the release of unexpected sources of contamination, those contaminants could affect the same receptors as accidental emissions of contaminants. However, the current baseline study has identified that the risk of encountering existing contamination on the Landfall site is very low. This will be further verified by additional ground investigation works to be carried out as part of the detailed design stage.

23.146. As such, the risk of encountering (and mobilising) unexpected contamination at the Landfall site during construction can reasonably be concluded to be unlikely to occur. However, the CoCP would implement procedures should contamination be found. The magnitude of the effect is therefore considered to be **imperceptible**, and the resultant significance of impact **negligible**. This impact is therefore **Not Significant**.

23.147. Impacts on surface water receptors from mobilisation of existing sources of contamination are assessed in Chapter 24, Water Environment.

*Potential damage to agricultural soil*

23.148. Construction activities such as plant movement and stripping and stockpiling of soils have the potential to damage agricultural soil, in particular the topsoil structure and fertility. As part of the construction works for the Landfall site the existing topsoil would be stripped from the working width.

23.149. The agricultural soil is considered to be a receptor of **low** sensitivity, it is Grade 3 agricultural land. As the duration of the effect on the topsoil would likely be short to medium term and intermittent, and the works undertaken in accordance with industry best practice measures to ensure the soils would be reinstated to the same quality land as pre-construction, the effect is assessed to be of **imperceptible** magnitude. Both the temporary and permanent impacts are therefore considered to be **negligible**. This impact is therefore **Not Significant.**

***Operation and maintenance***

*Potential loss of agricultural land*

23.150. No permanent above ground structure is to be retained at the Landfall. Remote monitoring of the cables at the Landfall would be undertaken

throughout the operating period and an annual inspection of any joints bays is also anticipated. In the event of a fault, there is the potential for faulty sections to be excavated, removed and replaced. These works would be completed in much the same manner as the construction works considered above.

23.151. All maintenance (including repair works) would be carried out in accordance with the best practice techniques detailed in a CoCP, which would be secured in connection with a Development Consent Order. Measures would include the safe storage of fuels, oils and chemicals and controls on surface water drainage to ensure no polluted run-off. On this basis, the effects likely to arise from such activities are considered to be short term and of **imperceptible** magnitude; therefore both the temporary and permanent impacts are considered to be **negligible**. This impact is therefore assessed as **Not Significant**.

***Decommissioning***

23.152. Decommissioning activities at the Landfall site would comprise the removal of in-ground structures to 0.5 m below ground level and the backfilling of the remaining voids. The cables and ducts would remain in-situ to minimise disruption.

23.153. The potential impacts during decommissioning could arise due to accidental emissions of contaminants or triggering of ground instability. However, as for the construction and operation and maintenance phases, the use of measures detailed within a CoCP would mean effects would be short term and of **imperceptible** magnitude. Therefore, both the temporary and permanent impacts are considered to be **negligible**. This impact is therefore assessed as **Not Significant**.

### 23.5.2. Onshore Cable Corridor

***Construction***

23.154. This section describes the identified potential environmental impacts that may arise during the construction of the Onshore Cable Corridor,

23.155. Construction activities would take place within the Onshore Cable Corridor, which will also utilise seven temporary compounds within the Onshore Cable Corridor. In addition, a number of construction accesses on to the Onshore Cable Corridor from the public highway are also proposed at intervals along the route.

*On-site ground conditions*

23.156. The primary proposed construction technique would involve open cut trenching involving excavating individual trenches and installing cables generally at a depth of 1 m. In exceptional circumstances and for certain crossings, the cables may be laid at a shallower depth. The trenches would be approximately 1.0 m wide per circuit, with up to six circuits required. Where required, trenches may be wider or deeper and the use of trenchless techniques would be necessary at selected crossing locations.

23.157. The geology and geomorphology along the Onshore Cable Corridor is a receptor of **negligible** to locally **low** sensitivity, as it is not designated and largely non-distinctive. As the duration of the effect would be short term at any section along the corridor, and the works would be undertaken in accordance with the procedures in a CoCP, the effect on the near surface geology and geomorphology is assessed to be of **imperceptible** magnitude. Both the temporary and permanent impacts are therefore considered to be **negligible**. This impact is therefore assessed as **Not Significant**.

*Triggering ground instability*

23.158. Construction activities along the Onshore Cable Corridor include the presence of heavy plant and machinery, the presence of a haul road, and trench and joint bay excavations have the potential to cause ground and slope instability and ground settlement, which could result in structural damage to utilities, structures, or infrastructure. Slope instability could be triggered by loading of the ground, removal of support by excavation and altering the groundwater regime by pumping. Ground settlements could be triggered by the loss of ground into trenches, lowering of groundwater levels, or collapsing of bores associated with trenchless construction.

23.159. Receptors along the Onshore Cable Corridor include steep slopes and significant infrastructure. Assessment of topographical maps of the Onshore Cable Corridor has identified that generally the Onshore Cable Corridor would not cross steeply sloping ground, with the exception of Breakhill Copse, where the corridor crosses relatively steep sidelong ground. Slope instability caused here could destabilise the landfill that sits atop the slope.

23.160. The sensitivity receptors of ground instability are assessed to be as follows:

- Slope instability generally - **negligible** sensitivity;
- Slope stability at Breakhill Copse – **high** sensitivity;
- Ground settlements generally - **negligible** sensitivity;
- Ground compression or settlements affecting infrastructure, structures or utilities locally - **medium** sensitivity.

23.161. The potential magnitude of impacts would range from **medium to imperceptible**. Without mitigation, the resultant significance of the effects, where high Sensitivity is identified, could locally be of **moderate to minor** significance (e.g. at Breakhill Copse and where existing infrastructure has to be crossed).

23.162. Should the potential for ground instability be triggered at any point by the construction works work would cease and risk assessment be carried out in accordance with standard practice. Through the implementation of this and other best practice measures. With mitigation this impacts is therefore assessed as**Not Significant**.

*Accidental emissions of contaminants*

23.163. The baseline studies confirm that the Onshore Cable Corridor is underlain for almost all of the corridor by various Secondary A aquifers in both the superficial deposits and bedrock geology. Impacts on groundwater and surface water receptors from accidental emissions are assessed in Chapter 24 Water Environment.

23.164. Site workers or members of the public living, working or passing close to the route could be impacted by a spillage of release of contamination. These receptors are considered to be **high** sensitivity. The site workers could be impacted by direct contact with the contaminants or hazardous ground gases and the general public could be impacted by contact with contamination that migrates off site either by run off, or by being blown by the wind.

*Mobilisation of existing sources of contamination*

23.165. With respect to construction works in the Onshore Cable Corridor (including temporary compound and construction access), mobilisation of existing sources of contamination is considered, on the basis of the baseline study completed, to be very unlikely to occur. Further work is likely to be carried out by additional targeted ground investigation as part of the detailed design process post application. In the unlikely event that the presence of any contamination became apparent during construction, ground investigations would be carried out to gain further understanding of the risks posed. A site specific risk assessment would then be carried out to identify the need for any specific remediation measures. This would include liaison with the local authority, EA and other relevant statutory bodies, and agreement of disposal or remediation options.

23.166. Those identified PSCs that lie within or partially along the Onshore Cable Corridor that would or could potentially be trenched through, possibly mobilising existing contamination, are detailed below:

- Backfilled former gravel and clay pit features at five locations on the route including Breakhill Copse (one backfilled former sand pit and one former clay pit). The pits are backfilled with unknown materials;
- Disused railways would be crossed at two locations near the MOD site and close to Sturt's Farm south of Three Legged Cross;
- The Mannington National Grid substation, the boundary of which the Onshore Cable Corridor would be trenched near and where hydrocarbons from leaks and spills from the site could have migrated off site into the groundwater and soils;
- The MOD Fuel Depot – the route will be open trenched through the majority of the south-western corner of the MOD site.

23.167. Those identified PSCs which lie outside the Onshore Cable Corridor, but are close enough to the Onshore Cable Corridor to potentially have an impact where trenching is used, are:

- The former Dudley Avenue Landfill site, which lies approximately 25 m from the Onshore Cable Corridor as it runs through Breakhill Copse;
- The former Neacroft Pit Landfill site, which lies between the villages of Neacroft and Waterditch approximately 75 m from the Onshore Cable Corridor;

23.168. Each of these identified PSCs is assessed separately below.

a) <u>On Cable Corridor backfilled pit features</u>

23.169. The potential receptors and their sensitivity to mobilisation of contamination from the former gravel and clay pit features would be Secondary A Aquifers

in bedrock and superficial strata (**low** sensitivity), site workers and the general public (**high** sensitivity), crops and livestock (**low** sensitivity). Impacts on surface water receptors are assessed in Chapter 24 Water Environment. Designated ecological sites would be unaffected due to the potential sources of contamination being too distant from these potential receptors.

23.170. The mobilisation of any contaminants in these pits could occur by excavations into them resulting in direct contact by construction workers, by depositing wind-blown dust deposition, or by disposal of groundwater pumped from trenches and excavations to soakaways. It should be noted however, that the pits are unlined and therefore any potential contamination within them could already be migrating in the Secondary A aquifers since backfilling of the pits.

23.171. Backfill installed around the cable could introduce new pathways for the migration of contaminants. However the use of clay stankings or similar, would prevent the creation of pathways and therefore limit the migration of contaminants.

23.172. The magnitude of the effects on site workers and the general public (both **high** sensitivity receptors) from a release of contamination from the pit features on the Onshore Cable Corridor could potentially be an effect of **high** magnitude and therefore an impact of **major** significance is assessed.

23.173. The effect on aquifers and crops and livestock (all of **low** sensitivity) from a release of contamination from the pit features on the Onshore Cable Corridor would be low magnitude, leading to an impact that is assessed as **negligible**.

b) <u>On Cable Corridor disused railway lines</u>

23.174. The mobilisation of any contaminants at the disused railway crossings shown in Figures 23.3 to 23.12 could occur by excavations resulting in direct contact by construction workers, by wind-blown dust deposition, or by disposal of groundwater or accumulated surface water pumped from trenches and excavations to soakaways. It should be noted however, that the railway lines lie directly over the Secondary A aquifers. Therefore any potential contamination at these sites could already be migrating through the groundwater.

23.175. Backfill installed around the cable could introduce new pathways for the migration of contaminants. However, the use of clay stankings, would prevent the creation of pathways and therefore limit the migration of contaminants.

23.176. The potential receptors and their sensitivity to mobilisation of contamination from the disused railway features would be Secondary A aquifers in bedrock and superficial strata (**low** sensitivity), site workers and the general public (**high** sensitivity) and crops and livestock (**low** sensitivity). Impacts on surface water receptors are assessed in Chapter 24 Water Environment.

23.177. The magnitude of the effects on humans and ecological sites (**high** sensitivity) from a release of contamination from the disused railway features could potentially be **high** and a **major** impact could therefore arise to both. This impact is therefore assessed as **Significant**.

23.178. The likely magnitude of the effects on aquifers and crops and livestock (both of **low** sensitivity) from a release of contamination from the disused railway features on the cable route is assessed as low and the resulting impact would be **negligible**. This impact is therefore assessed as **Not Significant**.

c) <u>On Cable Corridor MOD Fuel Depot Site</u>

23.179. There has been a fuel depot at the MOD site since the WWII, and it is therefore possible that spillages and leaks of fuels and other hydrocarbons could have occurred over the last 70 years (approximately) of operation. While no contamination has been identified at this site, it is possible that it could be identified during construction works, in which case it would be remediated or removed offsite for disposal using best practice techniques.

23.180. Backfill installed around the cable could introduce new pathways for the migration of contaminants. However, the use of clay stankings and similar mitigation measures which are being identified in discussion with relevant statutory consultees would seek to minimise predicted impacts. The magnitude of impact on the public and site workers (receptors of **high sensitivity**) or livestock (receptors of **low** sensitivity) from a release of contamination from the MOD site would be **imperceptible**. The significance of impact would be **negligible**. This impact is therefore assessed as **Not Significant**.

23.181. The potential sources of contamination that are outside the Onshore Cable Corridor but are within influencing distance of the corridor (i.e. within a distance of 250 m) are detailed below:

d) On Cable Corridor – existing Mannington National Grid Substation

23.182. The Onshore Cable Corridor would be trenched up to the boundary of the Onshore Substation where hydrocarbons from leaks and spills from the National Grid Substation site could have migrated off site into the groundwater and soils. In addition, there would also be trenching within the National Grid site at a shallow depth, due to the use of cable troughs.

23.183. The mobilisation of any contaminants at the Mannington National Grid Substation site could occur by excavations resulting in direct contact by construction workers, by wind-blown dust deposition from contaminated soil arisings, or by disposal of groundwater pumped from trenches and excavations to soakaways. It should be noted however, that the Mannington Grid site overlies directly the Secondary A aquifers of the River Terrace Deposits and Poole Formation and therefore any contamination could already be migrating through the groundwater.

23.184. Backfill installed around the cable could introduce new pathways for the migration of contaminants. However the use of clay stankings would prevent the creation of pathways and therefore limit the migration of contaminants.

23.185. The potential receptors and their sensitivity to mobilisation of contamination from the Mannington Grid site would be site workers and the general public (**high** sensitivity) and crops and livestock in the adjacent fields (**low** sensitivity).

23.186. A CoCP could include measures such as the protection or covering of exposed soils, and dust suppression measures to prevent airborne contamination. Any discharge of groundwater would require a Consent to Discharge from the EA, which would impose conditions on the quality of the discharge and prevent any pollution resulting.

23.187. The magnitude of the effects on humans (**high** sensitivity) and crops and livestock (**low** sensitivity) from a release of contamination from close to the Mannington Grid site on the cable route would therefore be **imperceptible** and the significance of impact is considered to be **negligible**. This impact is therefore assessed as **Not Significant**.

e) Off Cable former Dudley Avenue landfill site

23.188. The former Dudley Avenue Landfill site lies 25 m from the Cable Corridor as it runs through Breakhill Copse. The landfill was previously a domestic waste disposal site and contaminated groundwater could be migrating downhill from the landfill site through Breakhill Copse (including the Onshore Cable Corridor) to Danes Stream lower down the slope. The landfill is also producing soil gases.

23.189. Contamination mobilisation as a result of construction works could occur from site worker contact with contaminated groundwater or with soil gases migrating off the landfill, wind-blown dust from stockpiles if contaminated soils are encountered or the disposal of contaminated groundwater pumped from cable trenches or joint bay excavations. The potential receptors and their sensitivity to mobilisation of contamination from the Dudley Avenue Landfill site are site workers and the general public (**high** sensitivity) and livestock grazing on the landfill 25 m to the north (**low** sensitivity). Impacts on surface water receptors are assessed in Chapter 24 Water Environment. The Secondary A aquifers of the River Terrace Deposits that underlie both the landfill and the cable route are not considered to be at additional risk as the landfill is unlined and groundwater from within the landfill could already be migrating through the groundwater.

23.190. The mobilisation of any contaminants migrating from the landfill site at Breakhill Copse could occur as a result of excavations resulting in direct contact by construction workers, by depositing wind-blown dust, or by disposal of groundwater pumped from trenches and excavations to soakaways. It should be noted however, that the landfill lies directly over the Secondary A aquifers and therefore contamination could already be migrating through the groundwater. Any discharge of groundwater would require a Consent to Discharge from the EA, which would impose conditions on the quality of the discharge and prevent any pollution resulting.

23.191. Backfill installed around the cable could introduce new pathways for the migration of contaminants. However the use of clay stankings would prevent the creation of pathways and therefore limit the migration of contaminants. Through the implementation of these and other measures that would be secured through a CoCP (e.g. the protection or covering of exposed soils and dust suppression measures) the magnitude of impact the public and site workers from a release of contamination from the land

adjacent to Dudley Avenue Landfill site (Breakhill Copse) would be **imperceptible**. The significance of impact would be **negligible**. This impact is therefore assessed as **Not Significant**.

f) Off cable corridor former Neacroft Pit landfill site

23.192. The Onshore Cable Corridor would pass approximately 75 m from the site of the former Neacroft Pit Landfill inert landfill site, which lies between the villages of Neacroft and Waterditch. The potential impact from this source could be from the migration of contaminated groundwater from the PSC on to the Onshore Cable Corridor. This likelihood of this happening is quite low because the landfill accepted only inert fill (i.e. uncontaminated waste materials).

23.193. Contamination mobilisation as a result of construction works could occur from site workers having contact with contaminated groundwater or with soil gasses migrating off the landfill or the disposal of contaminated groundwater pumped from cable trenches or joint bay excavations. Backfill installed around the cable could introduce new pathways for the migration of contaminants. However the use of clay stankings would prevent the creation of pathways and therefore limit the migration of contaminants.

23.194. The potential receptors and their sensitivity to mobilisation of contamination from the Neacroft Pit Landfill site are site workers and the general public (**high** sensitivity) and crops and livestock on the adjacent land (**low** sensitivity). The Secondary A aquifers in the River Terrace Deposits and Boscombe Sand Formation that underlie both the landfill and the route are not considered to be at additional risk because the landfill is unlined and groundwater from within could already be migrating through the groundwater. As the landfill only accepted inert waste and any contamination leaching from it would be minimal, the effects on site workers and the general public, and crops and livestock on adjacent land would be **imperceptible**. The significance of impact would be **negligible.**

23.195. This impact is therefore assessed as **Not Significant**. Impacts on surface water receptors from this historical landfill are assessed in Chapter 24 Water Environment.

*Damage to agricultural topsoil*

23.196. Construction activities such as plant movement, stripping and stockpiling of soils, the making of construction accesses across fields and the construction of Compounds 3, 4 and 5 have the potential to damage agricultural soil and topsoil structure and fertility. The cable route itself would be stripped of topsoil during construction. The topsoil and agricultural soil are considered to be receptors of **low** sensitivity.

23.197. Through implementation of a CoCP and embedded mitigation measures, the likelihood of an impact arising is very unlikely. The measures secured through a CoCP could include avoiding unnecessary trafficking of topsoil before stripping and storage of the topsoil for the minimum time before re-laying.

23.198. With these measures in use the magnitude of effect is considered to be **imperceptible** and the significance of impact is therefore **negligible**. This impact is therefore assessed as **Not Significant**.

*Loss of agricultural land*

23.199. There would be temporary loss of agricultural land of approximately 136 ha. No permanent general loss of agricultural land would result from the construction of the Onshore Cable Corridor. The land along the cable route comprises Grade 2, 3 and 4 agricultural land which are receptors of **medium, low** and **negligible** sensitivity respectively. The magnitude of effect would be **low**, as although 136 ha in total would be affected the construction works would be staggered and it is assumed that no more than 12 ha would be affected at any one time. In addition, agricultural land would be re-instated to the same grade once construction works are complete.

23.200. The impact would therefore be **minor** for the Grade 2 land and **negligible** for the Grade 3 and 4 land. This impact is therefore assessed as **Not Significant**.

*Changes to land use*

23.201. The QinetiQ and MOD sites both lie along the Onshore Cable Corridor. Both of these sites are highly specialised and their relocation to alternative sites is therefore considered to be impractical. Both sites are therefore considered to be receptors of **high** sensitivity.

23.202. It is proposed that the cable corridor would be routed to the west of the QinetiQ site, and would therefore not impact on the operation of the facility in terms of land take.

23.203. This is therefore an effect of imperceptible magnitude and the significance of impact is considered to be **negligible**. This impact is therefore **Not Significant**.

23.204. Similarly for the MOD site, the Onshore Cable Corridor would skirt around the west of the MOD fuel depot site and would not affect the use of the land for fuel storage. However, the proposed route would pass through the MOD sports pitches, which would be unusable for the duration of the construction activity. This would be an effect of **low** magnitude, as it would not prevent the function of the fuel depot itself. This would therefore be an impact of **minor** significance. This impact is assessed as **Not Significant**.

***Operation and maintenance***

23.205. No permanent above ground structure is to be retained at any point along the Onshore Cable Corridor. Remote monitoring of the Onshore Cable Corridor would be undertaken throughout the operating period and an annual inspection of all joints bays is proposed. In the event of a fault, there is the potential for faulty sections to require excavation, removal and replacement. These works would be completed in much the same manner as the construction works considered above in accordance with a CoCP.

23.206. On this basis, the impacts likely to arise from such activities are generally considered to be **negligible**. This impact is therefore **Not Significant**.

***Decommissioning***

23.207. Decommissioning activities at the Onshore Cable Corridor would comprise the removal of in-ground structures, such as cable joint bays, to 0.5 m below ground level and backfilling of the remaining voids. The cables and ducts would remain in-situ to minimise disruption and the ducts may be grouted to seal them where appropriate. Decommissioning activities could include the occasional use of plant, which could cause damage to agricultural soil, accidental emissions of contaminants or triggering of ground instability.

23.208. The receptors, their sensitivity and the impacts are expected to be the same as for construction impacts, as described above. On this basis, the impacts likely to arise from such activities are considered to be **negligible**. This impact is therefore **Not Significant**.

### 23.5.3. Onshore Substation

***Construction***

23.209. This section describes the identified potential environmental impacts that may arise during the construction of the Onshore Substation.

23.210. The Onshore Substation site is a flat site that sits adjacent to the north of the MOD Fuel Depot site. Ground investigation work at the site has confirmed that the site is underlain by River Terrace Deposits overlying bedrock of the Poole Formation, which are both Secondary A Aquifers. Groundwater level monitoring has identified the presence of a very shallow groundwater table beneath the Onshore Substation site.

*Loss of agricultural land*

23.211. There would be a loss of agricultural land of approximately 5 ha. The land at the Onshore Substation comprises Grade 4 agricultural land which is a receptor **negligible** sensitivity. The magnitude of effect would be **low** and the impact would therefore **negligible**. This impact is therefore assessed as **Not Significant**.

*On-site ground conditions*

23.212. The geology and geomorphology of the Onshore Substation site is a receptor of **negligible** to locally **low** sensitivity. Some earthworks may be required at the site to provide suitable levels for drainage. The duration of this effect due to the earthworks would be permanent whilst other construction works would be temporary. The works would be undertaken in accordance with the procedures that would be secured in a CoCP and as such the effect on the near surface geology and geomorphology is assessed to be of **imperceptible** magnitude. The impacts are therefore considered to be **negligible**. This impact is therefore assessed as **Not Significant**.

*Triggering ground instability*

23.213. The topography of the Onshore Substation site is essentially flat and therefore slope instability is not considered to be a risk.

*Accidental emissions of contaminants*

23.214. At the Onshore Substation site (including the temporary construction compound) the use of plant and the storage and use of hazardous materials

could result in emissions to the ground via accidental leakage of fuel from tanks, by deliberate vandalism or poor maintenance, leakage from plant as a result of breakdown or during repair, spillages during resupply of fuel tanks or during fuelling of plant and machinery. Spillages or leaks during installation and commissioning of oil filled transformers and other apparatus specific to the Onshore Substation site are also potential effects.

23.215. Spillage or leakage of hazardous materials or fuels could adversely affect several receptors. These receptors are:

- The baseline studies confirm that the Onshore Substation site and temporary compound site are underlain by River Terrace Deposits and the Poole Formation. These are classified as Secondary A aquifers and preliminary ground investigation work at the Landfall site confirms very shallow groundwater levels are present. The aquifers are assessed to be receptors of **low** sensitivity. The aquifers could be affected by any spillage or release of contamination infiltrating the ground.
- Site workers or the public on the industrial estate site to the north of the MOD site could be impacted by a spillage or release of contamination. Both receptors are considered to be of **high** sensitivity. The site workers could be impacted by direct contact with the contaminants and the general public by contact with contamination that migrates off site, either by run off or by being blown by the wind.
- Livestock and crops in the fields adjacent to the construction works could be impacted by spillages or emissions of contamination. This could occur by runoff or windblown contamination onto grass that is used for grazing or contamination of animal drinking water from watercourses fed by groundwater flow into which contamination has migrated by infiltration. Crops could be affected due to uptake of contamination through their roots via groundwater flow. In accordance with Table 23.3 both livestock and crops are considered to be receptors of **low** sensitivity.
- The Dorset Heaths SAC and Holt and West Moors Heath SSSI lie within the MOD site to the south and are assessed to be receptors of **high** sensitivity. These could be affected by contamination entering the groundwater, as the direction of groundwater flow is southwards towards the designated sites.
- The Onshore Substation site is underlain by River Terrace Deposits and the Poole Formation, which are both Secondary A aquifers and therefore considered to be receptors of **low** sensitivity.

23.216. Through the implementation of the embedded mitigation measures regarding the storage and use of fuel and hazardous materials and those secured in a CoCP, the magnitude of impact is considered to be **imperceptible** and the significance of impact on the receptors is considered to be **negligible**. This impact is therefore assessed as **Not Significant**.

*Mobilisation of existing sources of contamination*

23.217. Unearthing unexpected sources of contamination and releasing those contaminants could affect the same receptors in the same ways as the accidental emission of contamination effect detailed above.

23.218. A desk study assessment has identified that the off-site potential sources of contamination are the MOD site and the industrial estate to the north of the Onshore Substation site. However, it is unlikely that any plausible pollutant linkages are present therefore it is assumed there are no on-site sources of contamination.

23.219. Through the implementation of measures within a CoCP regarding the storage and use of fuel and hazardous materials, the magnitude of effect is considered to be **imperceptible** and the significance of impact is considered to be **negligible**. This impact is therefore assessed as **Not Significant**.

***Operation and maintenance***

23.220. All maintenance (including repair works) would be carried out in accordance with the requirements of the EA's Pollution Prevention Guidelines, the impacts likely to arise from such activities are considered to be short term, of **imperceptible** magnitude and therefore both the temporary and permanent impacts are considered to be **negligible**. This impact is therefore assessed as**Not Significant**. Impacts on surface water receptors during the operational phase are assessed in Chapter 24 Water Environment.

***Decommissioning***

23.221. Decommissioning activities would comprise demolition of the Onshore Substation and removal and backfilling of in-ground structures prior to returning the Onshore Substation site to agriculture. The impacts during decommissioning of the damage to agricultural topsoil, accidental emission of contaminants and mobilisation of existing sources of contamination are expected to be the same as for construction impacts, as described above.

23.222. There would be no impact during the decommissioning stage.

## 23.6. Potential mitigation

23.223. Mitigation measures are being identified in discussion with relevant statutory consultees which will seek to minimise predicted impacts.

23.224. Where potential sources of geoenvironmental contamination are identified visual or olfactory observations and ground investigations will be carried out to gain further understanding of the risks posed. A site specific risk assessment would then be carried out to identify the need for any specific remediation measures. This would include liaison with the local authority EHOs, EA and other relevant statutory bodies, and disposal or remediation options.

23.225. Should the potential for ground instability be triggered at any point by the construction works work would cease and risk assessment be carried out in accordance with standard practice.

23.226. Monitoring may be required for the proposed railway crossing where trenchless techniques are used. The current Network Rail Standards require adequate monitoring during the course of the construction works, and this would be complied with.

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## Glossary

| TERM | DEFINITION |
|---|---|
| **Agricultural Topsoil** | The surface soil on agricultural land that has been disturbed by ploughing and other agricultural activities. |
| **Aquifer** | Underground layers of water-bearing permeable rock or superficial deposits from which *groundwater* can be extracted. |
| **Artificial Cavity** | A man made void in the ground, such as a mine. |
| **Bedrock** | Geological term meaning the solid unweathered rock that lies beneath the surface (*Superficial*) deposits. |
| **Conceptual Site Model** | Aims to provide a description of relevant site features and the surface and subsurface conditions to understand the extent of identified contaminants of concern and the risk they pose to receptors. |
| **Contaminated Land** | The UK Environmental Protection Act (1990) defines contaminated land as any land that appears to the local authority as containing harmful substances that will harm plants and animals. |
| **Contamination Source/ Hazard** | A substance or situation which has the potential to cause harm or pollution. Hazards may be chemical, biological or physical. |
| **Contamination Pathway** | A means by which the contamination *source/ hazard* moves along and generates exposure to the receptor(s). |
| **Contamination Receptor** | An entity that is vulnerable to the potential adverse effects of the *contamination hazard*. |
| **Conceptual Site Model** | The Conceptual Site Model identifies the types and locations of potential *contaminant sources/hazards* and potential *receptors* and potential migration/ transportation *pathway*(s). |
| **Desk Study** | A desk study is the collation and review of information already available about a site, and is carried out at an early stage of a site appraisal. |
| **Geodiversity** | Geodiversity describes the geological variety of an area including rocks, fossils, minerals, sediments and soils as well as landforms and natural processes such as erosion and landslips. |
| **Ground Instability** | Often damaging ground movements that can be triggered by natural geological processes or anthropogenic activities such as construction. |
| **Groundwater** | Water in the ground. |
| **Landfill** | A site where waste is placed on or into land. |

| TERM | DEFINITION |
|---|---|
| **Landslide** | A landslide is a movement of mass rock, debris, or earth down a slope. The failure of the slope happens when gravity exceeds the strength of the earth materials and is often triggered by changes in *groundwater* conditions. |
| **Natural Cavity** | A void in the ground produced by natural weathering or erosional processes. |
| **Pollutant Linkage** | A pollutant linkage between a potential *contaminant source* and a potential *receptor* of the contamination is deemed to exist if all three elements (i.e. *source*, *pathway* and *receptor*) are in place. |
| **RAMSAR** | Ramsar sites are wetlands of international importance designated under the Ramsar convention, an international agreement made in Ramsar, Iran in 1971. |
| **Remediation** | The breaking of a *pollutant linkage* by the removal of pollution or contaminants from environmental media e.g. soil or *groundwater*, for the general protection of human health and the environment. |
| **Secondary A Aquifer** | Permeable rock layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers. |
| **Site Investigation** | Ground investigation by excavation or drilling boreholes to record the ground and *groundwater* conditions. |

| TERM | DEFINITION |
|---|---|
| **Site Investigation Information** | Includes a risk assessment of land potentially affected by contamination, or ground stability and slope stability reports, as appropriate. All investigations of land potentially affected by contamination should be carried out in accordance with established procedures (such as BS10175 (2011) Code of Practice for the Investigation of Potentially Contaminated Sites). The minimum information that should be provided by an applicant is the report of a desk study and site reconnaissance. |
| **Source Protection Zone** | A zone of risk determined by the Environment Agency around groundwater sources such as wells, boreholes and springs used for public drinking water supply. |
| **Soil Gases (or Hazardous Ground Gas)** | Potentially harmful vapours in the air spaces between soil particles that can be poisonous or explosive and are usually generated by a contamination source. These can be generated by processes such as biodegradation and chemical reactions. |
| **Superficial deposits** | Superficial deposits are the youngest geological deposits formed during the Quaternary period. They rest on older deposits or rocks referred to as bedrock. |
| **Vapours** | This occurs as a result of volatilisation from contamination that has been spilt or placed in the ground. |

## Abbreviations

| TERM | DEFINITION |
|---|---|
| ALC | Agricultural Land Classification |
| AHVLA | Animal Health Veterinary Laboratory Agency |
| ASS | Agricultural Stewardship Schemes |
| BGS | British Geological Survey |
| CEMP | Construction Environmental Management Plan |
| CIRIA | Construction Industry Research and Information Association |
| CLEA | Contaminated Land Exposure Assessment |
| CLR | Contaminated Land Reports |
| CoCP | Construction Code of Practice |
| CQA | Construction Quality Assurance |
| CSM | Conceptual Site Model |
| DCLG | Department for Communities and Local Government |
| DECC | Department of Energy and Climate Change |
| Defra | Department of the Environment Farming and Rural Affairs |
| DMRB | Design Manual for Roads and Bridges |
| DNCLC | Dorset and New Forest Contaminated Land Consortium of Local Authorities |
| DTLR | Department for Transport, Local Government And The Regions |
| EA | Environment Agency |
| EDDC | East Dorset District Council |
| EIA | Environmental Impact Assessment |
| EPA | Environmental Protection Act |
| ES | Environmental Statement |
| GQA | General Quality Assessment |
| HA | Highways Agency |
| IPC | Infrastructure Planning Commission |
| MAFF | Ministry of Agriculture, Fisheries and Food |
| MAGIC | Multi-Agency Geographic Information Centre |
| MOD | Ministry of Defence |
| NFDC | New Forest District Council |
| NPPF | The National Planning Policy Framework |
| NPSs | National Policy Statements |
| NSRI | National Soil Resources Institute |
| PPE | Personal Protective Equipment |
| PSC | Potential Source of Contamination |
| RIGS | Regionally Important Geological or Geomorphological Site |
| SAC | Special Area of Conservation |
| SPA | Special Protection Area |
| SPZ | Source Protection Zone |
| SSSI | Site of Special Scientific Interest |