

Hornsea Project Three
Offshore Wind Farm



Hornsea Project Three Offshore Wind Farm

Preliminary Environmental Information Report:
Chapter 6 - Land Use and Recreation

Date: July 2017

Environmental Impact Assessment
Preliminary Environmental Information Report

Volume 3
Chapter 6 - Land Use and Recreation

Report Number: P6.3.6

Version: Final

Date: July 2017

This report is also downloadable from the Hornsea Project Three offshore wind farm website at:
www.dongenergy.co.uk/hornseaproject3

DONG Energy Power (UK) Ltd.

5 Howick Place,

London, SW1P 1WG

© DONG Energy Power (UK) Ltd, 2017. All rights reserved.

Front cover picture: Kite surfer near one of DONG Energy's UK offshore wind farms © DONG Energy Hornsea Project Three (UK) Ltd., 2016.

Liability

This report has been prepared by RPS, with all reasonable skill, care and diligence within the terms of their contracts with DONG Energy Power (UK) Ltd.

Table of Contents

6. Land Use and Recreation	1
6.1 Introduction	1
6.2 Purpose of this chapter	1
6.3 Study area	1
6.4 Planning policy context	9
6.5 Consultation	10
6.6 Methodology to inform the baseline	12
6.7 Baseline environment	14
6.8 Key parameters for assessment	33
6.9 Impact assessment criteria	37
6.10 Assessment of significance	38
6.11 Cumulative Effect Assessment methodology	42
6.12 Cumulative Effect Assessment	46
6.13 Transboundary effects	47
6.14 Inter-related effects	47
6.15 Conclusion and summary	47
6.16 Next Steps	48
6.17 References	50

List of Tables

Table 6.1: Summary of NPS EN-1 provisions relevant to land use and recreation	9
Table 6.2: Summary of NPS EN-1 policy on decision making relevant to land use and recreation.	9
Table 6.3: Summary of key consultation issues raised during consultation activities undertaken for Hornsea Three relevant to land use and recreation.	11
Table 6.4: Summary of key desktop reports	12
Table 6.5: Summary of site-specific survey data	13
Table 6.6: Climatic data for Agricultural Land Classification (ALC)	14
Table 6.7: Summary of soil types and likely ALC gradings	21
Table 6.8: Distribution of agricultural land use	32
Table 6.9: Distribution of farm sizes in Norfolk and England.	32
Table 6.10: Maximum design scenario considered for the assessment of potential impacts on land use and recreation.	34
Table 6.11: Impacts scoped out of the assessment for land use and recreation (onshore cable corridor search area)	36
Table 6.12: Definition of terms relating to the sensitivity of land use and recreational receptors	37
Table 6.13: Definition of terms relating to the magnitude of an impact.	37
Table 6.14: Matrix used for the assessment of the significance of the effect	37

Table 6.15: Designed-in measures adopted as part of Hornsea Three	38
Table 6.16: List of other projects and plans considered within the CEA	44
Table 6.17: Maximum design scenario considered for the assessment of potential cumulative impacts on land use and recreation	45
Table 6.18: Summary of potential environment effects, mitigation and monitoring	49

List of Figures

Figure 6.1: Land Use and Recreation Study Area	2
Figure 6.2: Recreational resources	23

List of Annexes (Included separately in Volume 6)

Annex 6.1: ALC Published Data.	
--------------------------------	--

Glossary

Term	Definition
Agri-environment scheme	A government-funded scheme to encourage farmers to manage their land in an environmentally friendly way.
Alluvium	Unconsolidated (not cemented together into a solid rock) soil or sediment, which has been eroded, reshaped by water in some form, and redeposited in a non-marine setting.
Auger boring	A core of soil taken for examination to a depth of 1 m with a Dutch Combination hand auger.
Best and Most Versatile Land	The highest quality grades 1, 2 and 3a agricultural land as determined by Defra.
Calcareous	Containing lime or being chalky.
Drift deposit	Unconsolidated (not cemented together into a solid rock).
Environmental Stewardship	An agri-environment scheme, which provides funding to farmers and other land managers in England who deliver effective environmental management of their land.
Entry Level Stewardship (ELS)	Basic level of entry into the Environmental Stewardship Scheme. As described under Environmental Stewardship above.
Glacial till	Unsorted material deposited directly by glacial ice and showing no stratification.
High Level Stewardship (HLS)	A more demanding level of Environmental Stewardship (than Entry Level) designed to build on the Entry Level Stewardship agreement.
Lacustrine deposit	Sediment derived from a lake.
Loam	Soil composed of sand, silt, and clay in relatively even concentration.
Permissive path	A path which the landowner has given the public permission to use.
Under drainage	Plastic pipe or tile drains located at approximately 85-95cm depth within the soil.

Acronyms

Acronym	Description
AAR	Average Annual Rainfall
ALC	Agricultural Land Classification
AONB	Area of Outstanding Natural Beauty
ATO	Accumulated Temperature
AP	Available Water Capacity
CEA	Cumulative Effect Assessment
CoCP	Code of Construction Practices
CROW Act	Countryside and Rights of Way Act 2000

Acronym	Description
DCLG	Department for Communities and Local Government
DECC	Department of Energy & Climate Change
Defra	Department for Environment, Food & Rural Affairs
DMRB	Design Manual for Roads and Bridges
HDD	Horizontal Directional Drilling
MAFF	Ministry of Agriculture, Fisheries and Food
MHWS	Mean High Water Springs
NPPF	National Planning Policy Framework
PRoW	Public Right of Way
SoS	Secretary of State
SSSI	Site of Special Scientific Interest
TJB	Transition Jointing Bay

Units

Unit	Description
g	gram
GW	Gigawatt (power)
ha	Hectare
km	Kilometre (distance)
kV	Kilovolt (electrical potential)
kg	Kilogram
kW	Kilowatt (power)
m	Metre (distance)
MW	Megawatt (power)
mg/l	Milligram / litre (concentration)

6. Land Use and Recreation

6.1 Introduction

6.1.1.1 This chapter of the Preliminary Environmental Information Report (PEIR) presents the preliminary results of the Environmental Impact Assessment (EIA) for the potential impacts of the Hornsea Project Three offshore wind farm (hereafter referred to as Hornsea Three) on land use and recreation (namely the Hornsea Three landfall area, the onshore cable corridor search area, the onshore HVAC booster station, the onshore HVDC converter/HVAC substation and the connection with the Norwich Main National Grid substation), during its construction, operation and maintenance, and decommissioning. The onshore cable corridor search area comprises a 200 m wide corridor within which the refined onshore export cable corridor (80 m wide) will be located. The refined onshore cable corridor will be included in the application for Development Consent. The onshore HVAC booster station is an option which would only be considered for the HVAC transmission option (see volume 1, chapter 3: Project Description).

6.2 Purpose of this chapter

6.2.1.1 The primary purpose of the Environmental Statement is to support the Development Consent Order (DCO) application for Hornsea Three under the Planning Act 2008 (the 2008 Act). This PEIR constitutes the Preliminary Environmental Information for Hornsea Three and sets out the findings of the EIA to date to support pre-application consultation activities required under the 2008 Act. The EIA will be finalised following completion of pre-application consultation and the Environmental Statement will accompany the application to PINS for Development Consent.

6.2.1.2 The PEIR will form the basis for Phase 2 Consultation which will commence on 27 July and conclude on 20 September 2017. At this point, comments received on the PEIR will be reviewed and incorporated (where appropriate) into the Environmental Statement, which will be submitted in support of the application for Development Consent scheduled for the second quarter of 2018. The purpose of this PEIR chapter is to:

- Present the existing environmental baseline established from desk studies, dedicated surveys and consultation;
- Present the potential environmental effects on land use and recreational receptors arising from Hornsea Three, based on the information gathered and the analysis and assessments undertaken to date;
- Identify any assumptions and limitations encountered in compiling the environmental information; and
- Highlight any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects identified at the relevant stage in the EIA process.

6.2.1.3 The land uses considered in this chapter are those that are present within or adjacent to the onshore cable corridor search area, the onshore HVAC booster station (if required) and the onshore HVDC converter/HVAC substation. These land uses predominantly comprise agricultural land, together with land used for a variety of recreational activities including walking, cycling and horse riding. Recreational and visitor resources within or proximate to the onshore cable corridor search area include areas of common land and access land, holiday parks, camping facilities, churches and recreational railway services.

6.2.1.4 Matters relating to the potential effects on the amenity of land use resources are addressed in volume 3 chapter 4: Landscape and Visual Resources and chapter 8: Noise and Vibration, as appropriate, while likely socio-economic effects on land uses are addressed in chapter 10: Socio-economics of the PEIR.

6.3 Study area

6.3.1.1 The land use and recreation study area comprises the area required for the onshore infrastructure (as described in 6.1.1.1) and the potential location of the main construction compound together with the land and recreational resources immediate proximate to, or linking to these onshore elements (as shown on Figure 6.1). Additional construction compounds will be required and will be identified and assessed in the Environmental Statement. This study area has been selected as it represents the area in which the land use and recreation impacts are predominantly likely to occur. The study area for farm holdings considers the farm holdings as a whole affected by Hornsea Three which could include a wider area beyond the physical boundary of the development works themselves. Therefore, the study area for farm holdings is based on the ownership boundaries of those farms with land that falls within the onshore cable corridor search area. A regional land use and recreation study area has been used to assess potential cumulative effects and is shown on Figure 6.1. This study area comprises a 1 km buffer around the onshore cable corridor search area and identifies where potential cumulative effects for land use and recreation are likely to occur. The scope of the PEIR assessment for Land Use and Recreation has been discussed with the local planning authorities leading up to the PEIR submission and further feedback is welcomed at this stage.

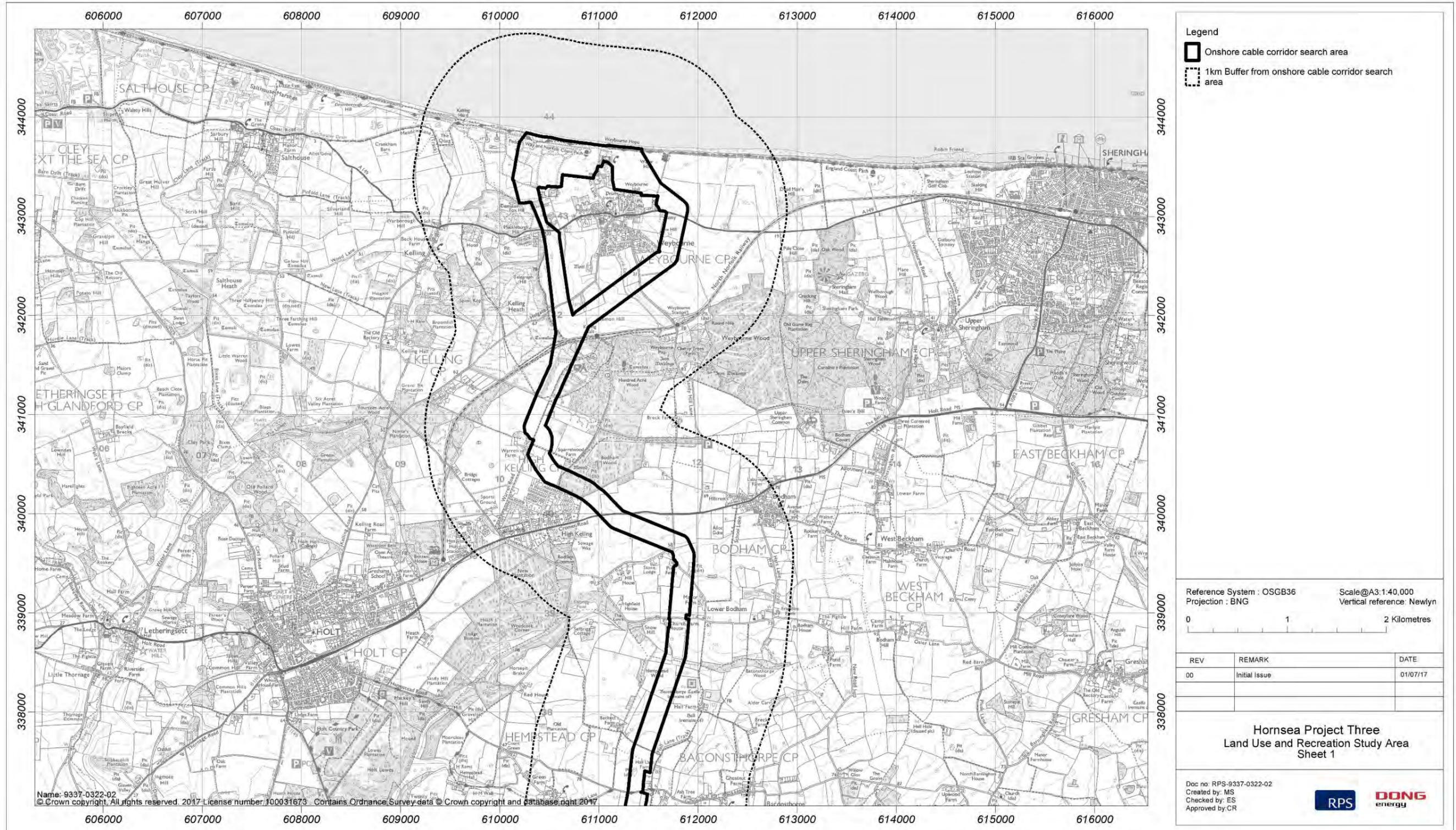


Figure 6.1: Land Use and Recreation Study Area.

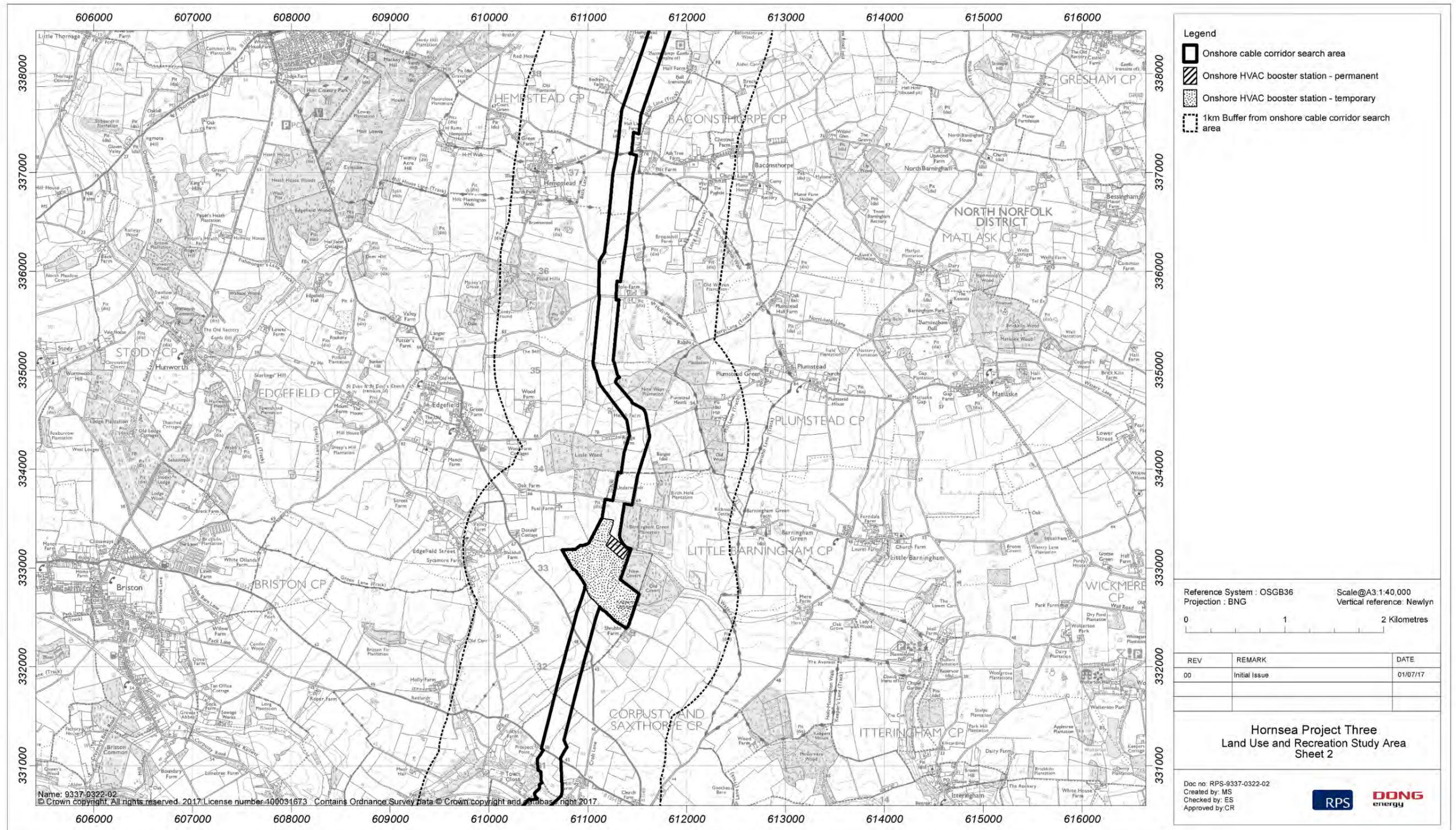


Figure 6.1: Land Use and Recreation Study Area.

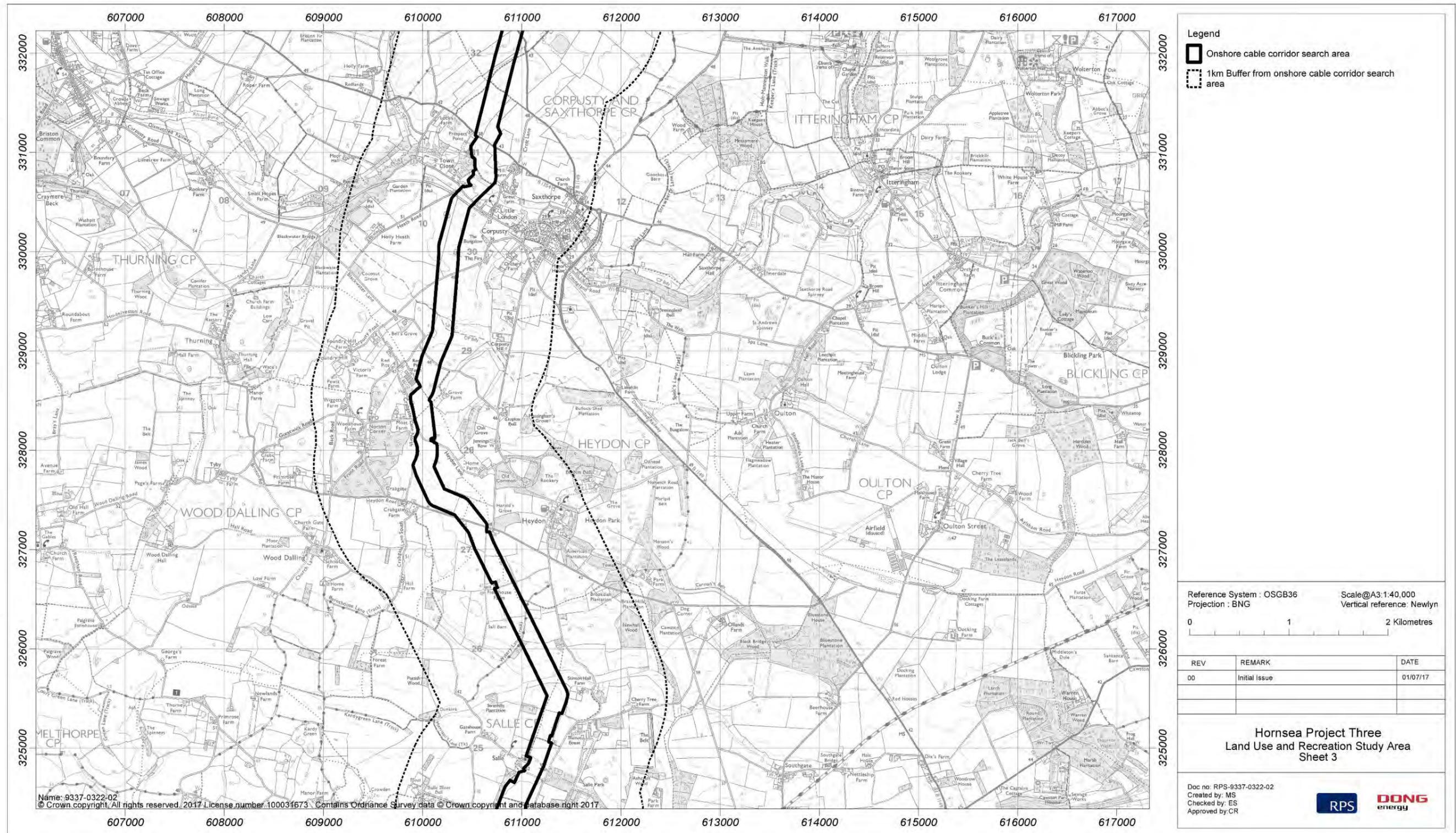


Figure 6.1: Land Use and Recreation Study Area.

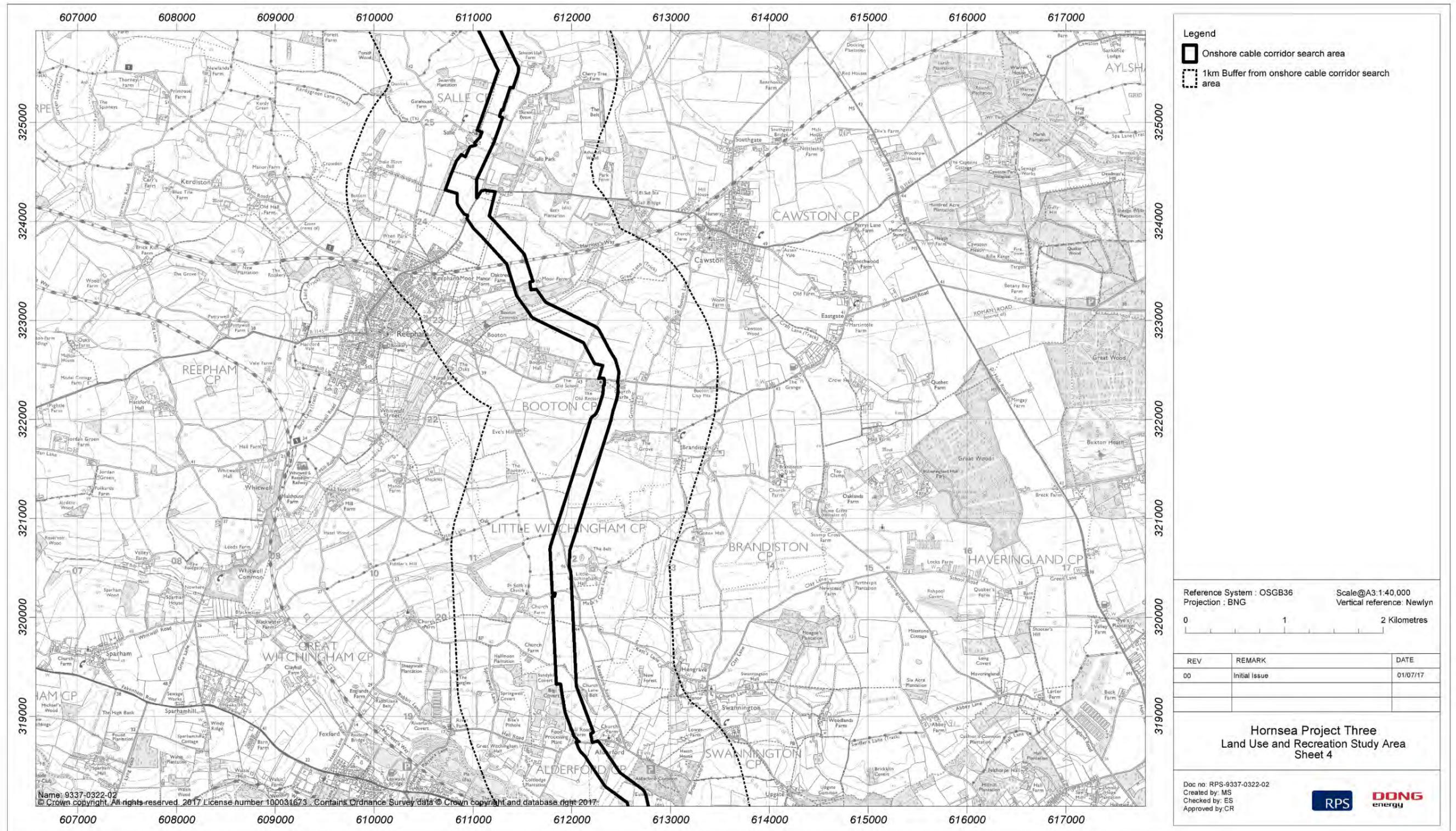


Figure 6.1: Land Use and Recreation Study Area.

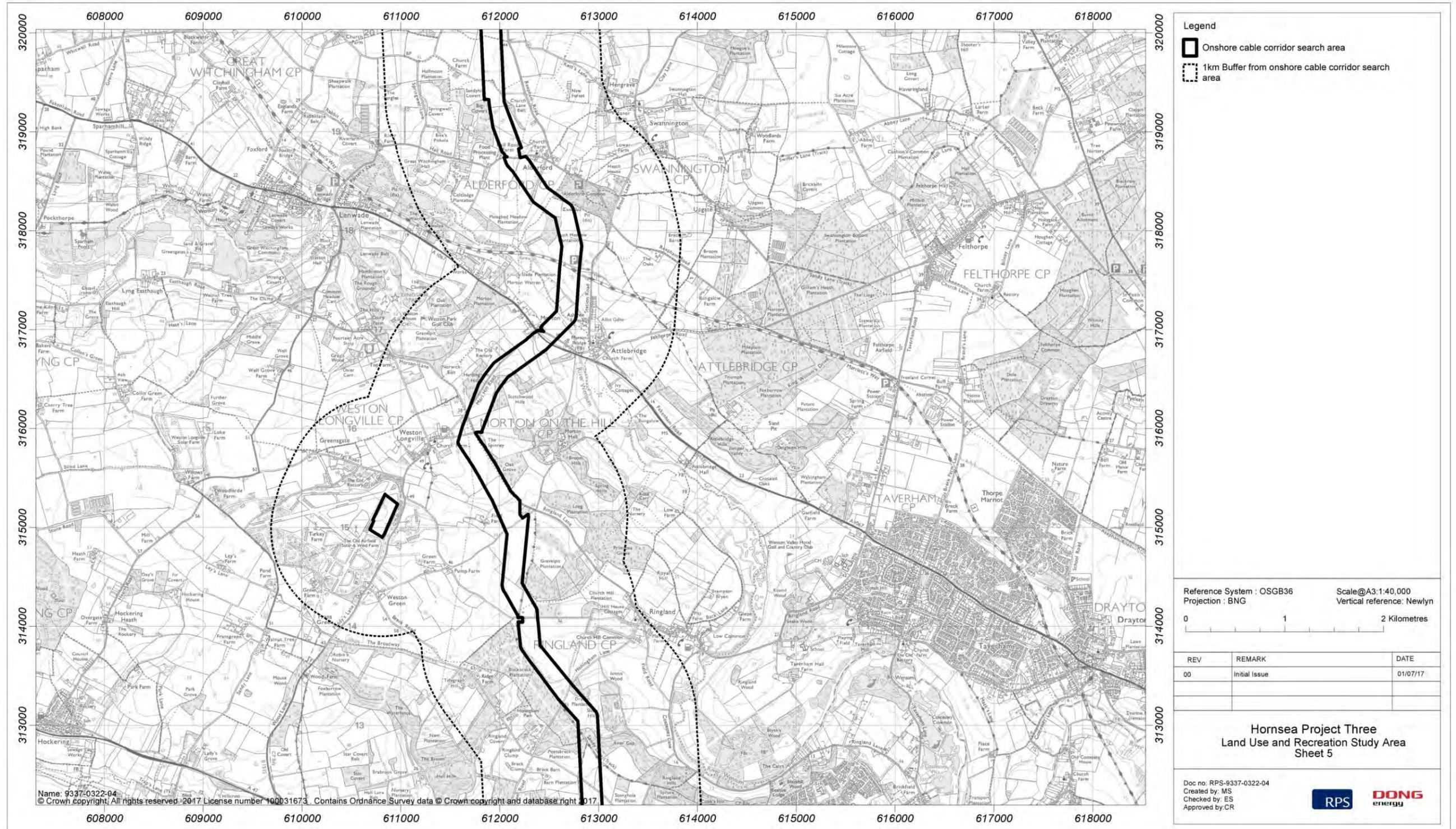


Figure 6.1: Land Use and Recreation Study Area.

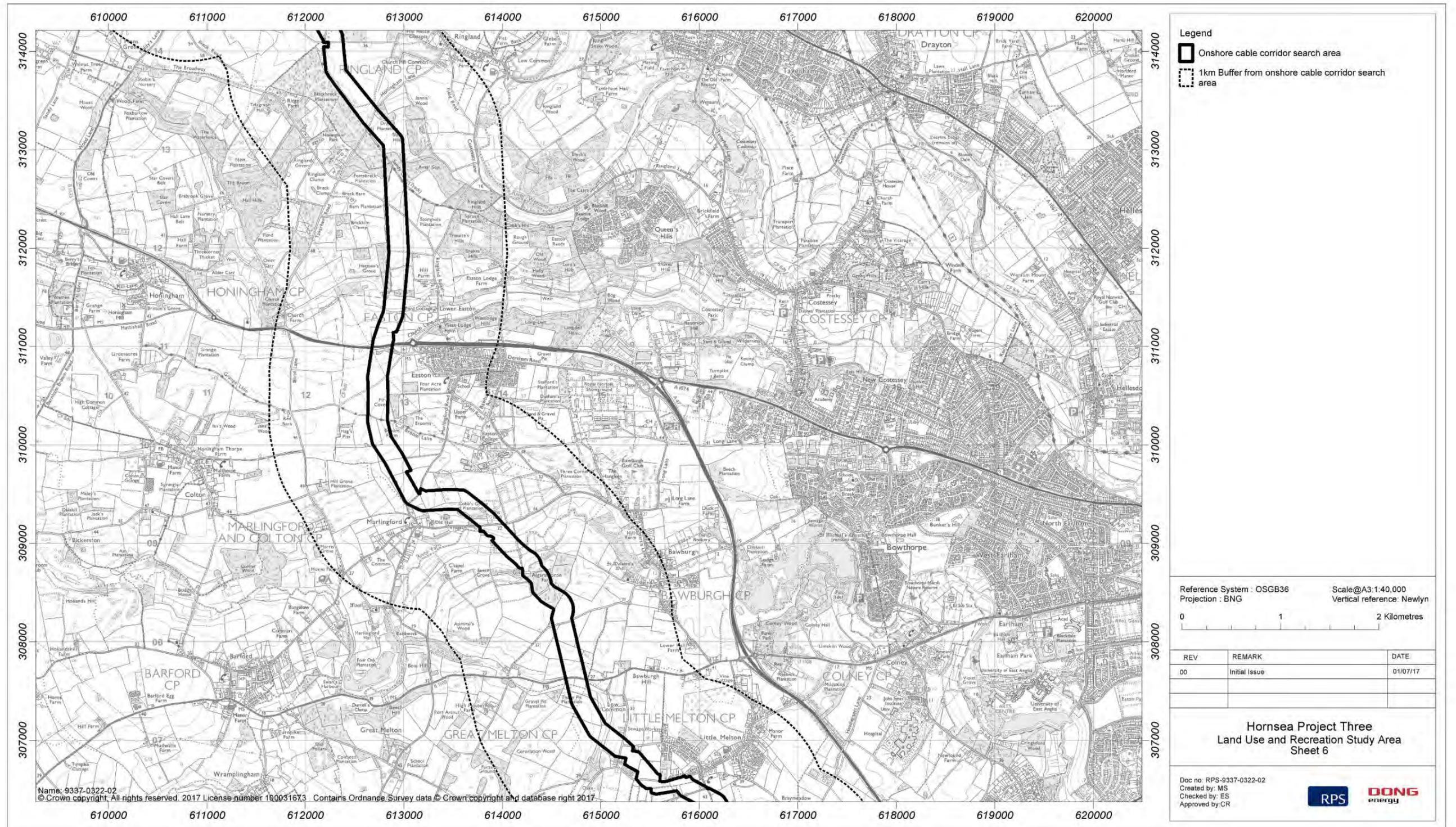


Figure 6.1: Land Use and Recreation Study Area.

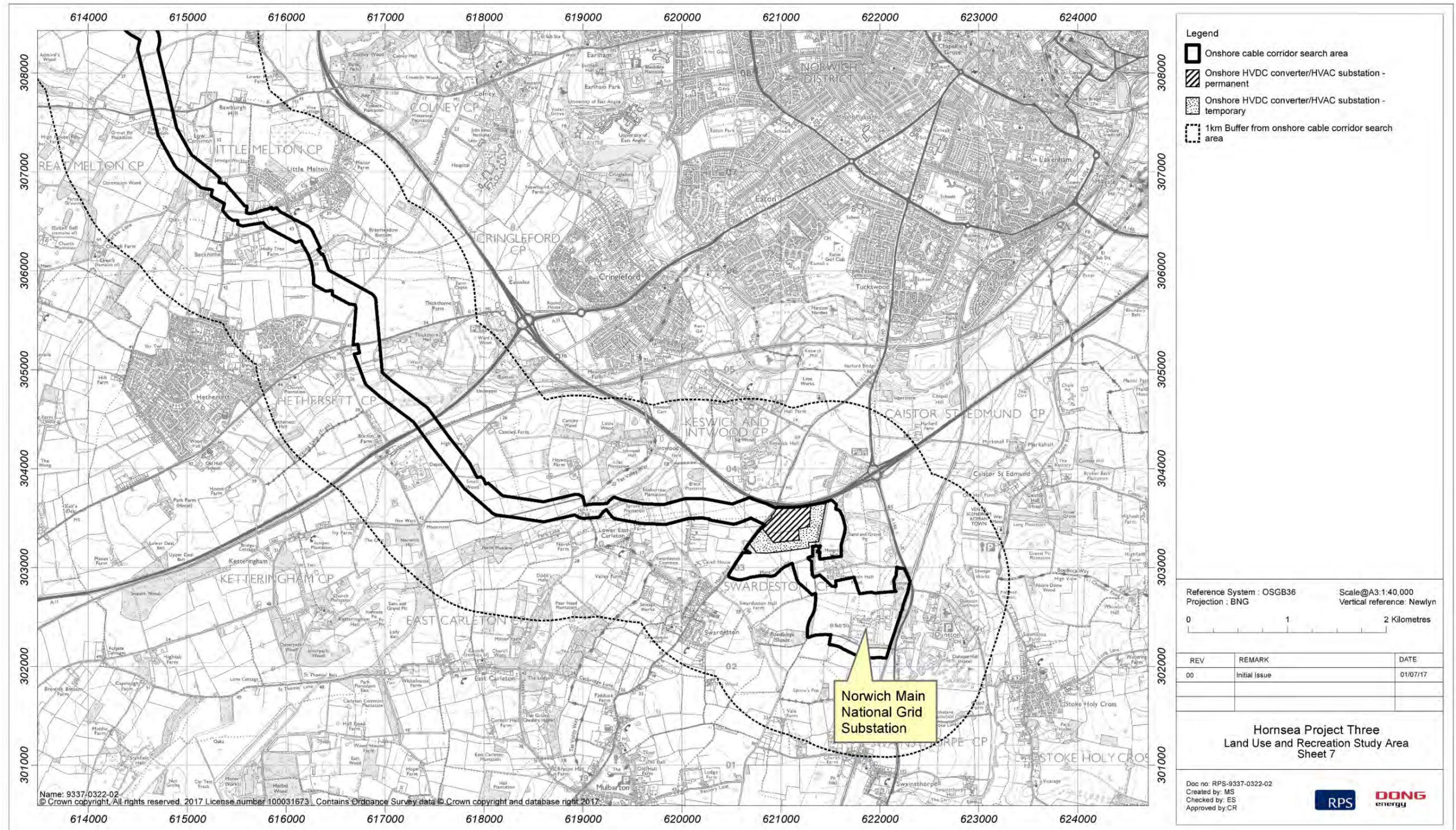


Figure 6.1: Land Use and Recreation Study Area.

6.4 Planning policy context

6.4.1.1 Planning policy on offshore renewable energy Nationally Significant Infrastructure Projects (NSIPs), specifically in relation to land use and recreation, is contained in the Overarching National Policy Statement (NPS) for Energy EN-1 (Department of Energy & Climate Change (DECC), 2011a) and the NPS for Renewable Energy Infrastructure EN-3 (DECC, 2011b). Other planning policy and guidance relevant to this chapter includes:

- National Planning Policy Framework (NPPF) (2012);
- Web based planning practice guidance is provided by the Department for Communities and Local Government (DCLG). Guidance on the Natural Environment, updated in January 2016; North Norfolk Core Strategy (adopted 2008); and
- South Norfolk and Broadlands Joint Core Strategy.

6.4.1.2 The guidance provided within NPS EN-3 (DECC, 2011b) in relation to offshore wind farms focuses primarily on the offshore elements of the project. In terms of general principles for the assessment of onshore grid connections, NPS EN-3 notes at paragraph 2.6.43 that where precise details of proposed developments are not known, the maximum potential adverse effects of the project should be considered. In accordance with this guidance, where options are currently being considered and assessed, the maximum likely development footprint has been considered within this assessment (see Table 6.10 below).

6.4.1.3 NPS EN-1 includes guidance on what matters are to be considered in the assessment. These are summarised in Table 6.1 below.

Table 6.1: Summary of NPS EN-1 provisions relevant to land use and recreation.

Summary of NPS EN-1 provision	How and where considered in the PEIR
The Environmental Statement should identify existing and proposed land uses near the project and assess the effects of the development (paragraph 5.10.5 of NPS EN-1).	The baseline environment has been identified and likely effects assessed within this chapter of the PEIR (see sections 6.7 and 6.11).
Pre-application discussions between the applicant and the Local Authorities should identify any concerns regarding land use, having regard to the development plan and other relevant applications (paragraph 5.10.7 of NPS EN-1).	Public consultation has taken place during the development of the project proposals. Consultation has taken place with the Local Authorities to identify relevant proposed developments for cumulative assessment (see Table 6.3).
Applicants should seek to minimise effects on 'best and most versatile' agricultural land except where this would be inconsistent with other sustainability considerations. Applicants should preferably use land in areas of poorer quality and should also identify any effects and seek to minimise impacts on soil quality (paragraph 5.10.8 of NPS EN-1).	This chapter of the PEIR considers the effects on agricultural land and soils, including effects on best and most versatile land (see section 6.10). Land take will be reduced further as a result of refining the cable corridor which will be reported in the ES. Measures proposed to be adopted as part of Hornsea Three to minimise impacts on soil quality are set out in Table 6.15.

Summary of NPS EN-1 provision	How and where considered in the PEIR
Applicants should safeguard any mineral resources on the proposed site as far as possible, taking into account the long-term potential of the land use after any future decommissioning has taken place (paragraph 5.10.9 of NPS EN-1).	This matter is addressed in volume 3, chapter 1: Geology and Ground Conditions.
Paragraph 5.10.14 of NPS EN-1 states that consent should not be granted for development on existing open space, sports and recreational buildings and land unless they are surplus to requirements and, the Secretary of State, when deciding if the benefits outweigh the potential loss of facilities, is to take into account any positive proposals made by the applicant to provide new, improved or compensatory land or facilities.	An assessment of effects on recreational resources is provided in this chapter of the PEIR (see section 6.10). However, it should be noted that the development of Hornsea Project Three would not directly impact on existing sports and recreational buildings.
Applicants should include appropriate mitigation measures to address adverse effects on coastal access, National Trails and other Public Rights of Way (PRoW) (paragraph 5.10.24 of NPS EN-1).	An assessment of effects on coastal access and PRoW is provided in this chapter of the PEIR, including National Trails and other promoted routes (see section 6.10).

6.4.1.4 NPS EN-1 also highlights a number of points relating to the determination of an application and in relation to mitigation. These are summarised in Table 6.2 below.

Table 6.2: Summary of NPS EN-1 policy on decision making relevant to land use and recreation.

Summary of NPS EN-1 policy on decision making (and mitigation)	How and where considered in the PEIR
The examining authority should ensure that developments are not located on the best and most versatile agricultural land without justification. It should give little weight to the loss of poorer quality agricultural land except in areas where particular agricultural practices contribute to the quality and character of the environment or economy (NPS EN-1, 5.10.15).	Effects from the onshore export cable construction activities, including any HDD works, would be largely temporary, with works areas restored following construction. The impacts arising from the locations for the onshore HVAC booster station and the onshore HVDC converter/HVAC substation are set out in section 6.10 below.
The examining authority should not grant consent for a development on existing open space, sports/recreational buildings or land unless an assessment to show the open space/land to be surplus to requirements has been undertaken or the benefits of the project outweigh the potential loss of such facilities, taking into account any positive proposals e.g. compensatory measures made by the applicant (NPS EN-1, 5.10.14).	Effects from the onshore export cable construction activities on PRoW would be temporary, with land and routes fully restored following construction. The impacts on all recreational resources arising from the locations for the onshore HVAC booster station and the onshore HVDC converter/HVAC substation are set out in section 6.10 below.
In considering the impact on maintaining coastal recreation sites and features, the IPC should expect applicants to have taken advantage of opportunities to maintain and enhance access to the coast.(paragraph 5.10.16 of NPS EN-1)	An assessment of effects on coastal recreation is set out in section 6.10 in this chapter of the PEIR.

- 6.4.1.5 With regard to the development of agricultural land, the National Planning Policy Framework (NPPF) (Department for Communities and Local Government 2012) states at paragraph 112 that: *‘Where significant development of agricultural land is demonstrated to be necessary, local planning authorities should seek to use areas of poorer quality land in preference to that of a higher quality.’* The NPPF defines high quality ‘best and most versatile’ agricultural land to comprise grades 1, 2 and 3a as defined within the Agricultural Land Classification (ALC) system. This approach has been followed in the site selection process (see volume 1, chapter 4: Site Selection and Alternatives).
- 6.4.1.6 The NPPF at paragraph 73 highlights the importance of access to high quality open spaces and opportunities for sport and recreation to the health and well-being of communities, and at paragraph 74 states that existing open space, sports and recreational buildings and land, including playing fields, should not be built on unless certain criteria are met.
- 6.4.1.7 Protection and enhancement of PRoWs and access is covered in paragraph 75 and the NPPF states that *‘Local Authorities should seek opportunities to provide better facilities for users, for example by adding links to existing rights of way networks including National Trails’.*
- 6.4.1.8 Web based planning practice guidance is provided by the Department for Communities and Local Government (DCLG). Guidance on the Natural Environment, updated in January 2016, includes the need to protect and enhance valued soils and to take into account the economic and other benefits of the best and most versatile agricultural land. Guidance in relation to recreational resources is provided under the headings of ‘Open space, sports and recreation facilities’ and ‘Public rights of way and National Trails’, which reiterates that PRoWs form an important component of sustainable transport links and should be protected or enhanced.
- 6.4.1.9 At a local level the onshore infrastructure (i.e. the onshore export cable, onshore HVAC booster station and onshore HVDC converter/HVAC substation) will pass through three local authority areas: North Norfolk, South Norfolk and Broadland. Planning policy relevant to this topic for each of these Local Authorities is described below.
- 6.4.1.10 Planning policy in North Norfolk is currently contained within the Local Development Framework, which will be replaced by the emerging North Norfolk Local Plan in 2018. Planning policies which guide planning decisions are contained in the Core Strategy and those relevant to this topic are as follows:
- Policy SS2 *“Development in the Countryside”* which limits development to certain categories including renewable energy projects;
 - Policy SS4 *“Environment”* which includes the protection and enhancement of natural and built environmental assets; protection of open spaces and the creation of green networks;
 - Policy SS6 *“Access and Infrastructure”* which includes the protection and enhancement of existing provision / facilities; open space; walking and cycling networks and PRoWs;
 - Policy EN1 *“Norfolk Coast Area of Outstanding Natural Beauty”* which places limits development which would have a detrimental effect on the special qualities of the Norfolk Coast Area of Outstanding Natural Beauty (AONB);

- Policy EN3 *“Undeveloped Coast”* which limits development to that which can demonstrate that a coastal location is required and that will not be significantly detrimental to the open coastal character; and
- Policy CT1 *“Open Space Designations”* which restricts development in areas designated as *“Open Land Areas”* or *“Educational and Formal Recreation Areas”*.

6.4.1.11 Planning policy for South Norfolk and Broadland is currently contained within the adopted Joint Core Strategy between South Norfolk District Council, Broadland District Council, Norwich City Council and Norfolk County Council. Policies relevant to this topic are as follows:

- Policy 1 *“Addressing climate change and protecting environmental assets”* which includes the protection, maintenance, restoration and enhancement of environmental assets; the expansion and linking of valuable open space and areas of biodiversity importance to create green networks; and
- Policy 6 *“Access and Transportation”* which includes the improvement of the bus, cycling and walking network.

6.5 Consultation

6.5.1.1 Table 6.3 below summarises the issues raised relevant to land use and recreation which have been identified during consultation activities undertaken to date. Table 6.3 also indicates either how these issues have been addressed within this PEIR or how the Applicant has had regard to them.

Table 6.3: Summary of key consultation issues raised during consultation activities undertaken for Hornsea Three relevant to land use and recreation.

Date	Consultee and type of response	Issues raised	Response to issue raised and/or where considered in this chapter
July 2016	Broadland District Council	Broadland District Council flagged that areas around the River Wensum Site of Special Scientific Interest (SSSI), near Haydon and Aylsham, would be particularly sensitive to potential construction impacts.	The soil type/character of areas in the vicinity of the River Wensum and its tributaries are identified in section 6.7.2. Recreational use of the River Wensum and surrounding network is also considered in section 6.7.2. Potential impacts on soils are considered in section 6.10.2.
July 2016	North Norfolk District Council	Heritage rail lines near Weybourne and associated activities are likely to be a constraint, along with interface with past buried cable projects (Dudgeon and Sheringham Shoal Offshore Wind Farms).	Potential impacts on the North Norfolk Railway are considered in section 6.10.2.
December 2016	PINS - Scoping Opinion	The potential for sterilization of land along the onshore cable corridor during all phases of the proposed development was highlighted. This a particular issue with underground connecting infrastructure and the Secretary of State (SoS) expects the Environmental Statement to assess these impacts.	Potential impacts on agricultural land and land within farm holdings are considered in section 6.10.2. During the construction phase, top soil and sub soils will be stripped and stored in accordance with best practice and the land within the onshore export cable corridor will be restored to its original condition, therefore reducing the potential for sterilisation.
December 2016	PINS - Scoping Opinion	The Scoping Report notes that in relation to recreational impacts, there is an overlap with other chapters in the Environmental Statement. It is important that any cross-referencing is clear to demonstrate that all impacts have been assessed.	Cross-references to the other Environmental Statement chapters are provided in paragraph 6.2.1.4. Inter-related effects are considered in volume 3, chapter 11: Inter-Related Effects.
December 2016	PINS - Scoping Opinion	The study area at paragraphs 12.3.3 and 12.3.4 of the Scoping Report references land use and recreation but not agriculture. The Environmental Statement needs to be clear as to how impacts on land use, agriculture and recreation have individually been assessed, what the impacts are and any mitigation that has been taken into account in the assessment.	The assessment methodology is set out in section 6.9, the measures adopted as part of Hornsea Three are outlined in Table 6.15 and the impacts on agriculture are identified in section 6.10.
December 2016	PINS - Scoping Opinion	The study area does not include any land outside the onshore cable corridor. The Applicant is encouraged to justify this in the Environmental Statement ensuring that any land use impacts within the onshore cable corridor do not affect land outside the onshore cable corridor, for example, leading to severance.	The study area is defined in paragraph 6.3.1.1 and explains that the study area for farm holdings considers the farm holdings as a whole (i.e. land that could lie outside the onshore cable corridor search area and 1km buffer used for the study area) where severance issues may occur for this topic.
December 2016	PINS - Scoping Opinion	The Applicant does not appear to propose undertaking any assessments through site visits to inform the baseline position.	A site visit was undertaken in February 2017 to establish the nature and condition of the PRoW resources (see paragraph 6.6.1.5). Site visits are also proposed in autumn 2017 to undertake soil sampling (see section 6.16). Further site visits were carried out in April 2017 to consider potential construction access locations in more detail, and potential crossing locations.
December 2016	PINS - Scoping Opinion	This section should consider the interrelationships with impacts to ecology, in particular the impacts from the removal of grassland, trees and hedgerows and socio-economic impacts. Recreation is also assessed as part of the socio-economic chapter. The Environmental Statement should be clear on which topics are assessed within each chapter to reduce duplication.	The scope of the chapter is set out in section 6.2 and cross references to other relevant chapters are provided. The removal of trees and hedgerows are only considered in this chapter where it has an impact on farming systems or represents a loss of or disruption to recreational resources.
December 2016	PINS - Scoping Opinion	The Scoping Report does not clearly set out how significance of impact is assessed.	The assessment methodology is set out in section 6.9 below.
December 2016	PINS - Scoping Opinion	The Scoping Report sets out the measures to be adopted to mitigate effects. At present this does not make reference to a soil management strategy.	A soil management strategy and other measures adopted as part of Hornsea Three are set out in Table 6.15 below.
December 2016	PINS - Scoping Opinion	Impacts from the development should be considered in light of the Government's policy for the protection of the best and most versatile agricultural land. We also recommend that soils should be considered under a more general heading of sustainable use of land and the ecosystems they provide.	The assessment has been undertaken in accordance with paragraph 112 of the NPPF and the measures adopted as part of Hornsea Three in Table 6.15 follows guidance from Defra's Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (Defra, 2011).
February 2017	Broadland District Council - Update Meeting	Broadland District Council flagged that potential effects on PRoWs will be important, noting in particular the well-used Marriott's Way.	Potential impacts on the Marriotts Way route are considered in section 6.10.2 below.

6.6 Methodology to inform the baseline

6.6.1 Desktop study

6.6.1.1 Information on land use and recreation within the land use and recreation study area was collected through a detailed desktop review of existing studies and datasets. These are summarised in Table 6.4 below.

Table 6.4: Summary of key desktop reports

Title	Source	Year	Author
1 inch to 1 mile ALC Sheets 125 and 126 and accompanying Reports	Ministry of Agriculture	1972	MAFF
Soils of Eastern England 1:250,000 and accompanying Regional Bulletin	Soil Survey of England and Wales	1983	Soil Survey of England and Wales
Soils in Norfolk V and accompanying Record No. 64	Soil Survey of England and Wales	1980	Elridge
Soils of Norfolk II and accompanying Record No. 21	Soil Survey of England and Wales	1974	Corbett and Tatler
Meteorological Office Climatological Data for ALC	Meteorological Office	1990	-
MAGIC	http://www.natureonthemap.naturalengland.org.uk/	Online	Defra
Definitive map of public rights of way	https://maps.norfolk.gov.uk/highways/	Online	Norfolk County Council Highways
Cycle routes	http://www.sustrans.org.uk/	Online	Sustrans

6.6.1.2 The desktop study of available published information from the land use and recreation study area was undertaken to identify existing baseline conditions in relation to agricultural land use and soils. This has focused on the identification of:

- Soil types and patterns of soils through the land quality and soils study area;
- The quality of the agricultural land determined by the application of the Ministry of Agriculture Fisheries and Food (MAFF) ALC system 1988; and
- The nature and pattern of farm holdings or the farming framework across the farm study area (see section 6.3).

6.6.1.3 The assessment includes consideration of the published data set out in Table 6.5, British Geological Survey Internet Portal (at British Geological Survey n.d) and Natural England Access to Evidence Published ALC Data. <http://publications.naturalengland.org.uk/category/5954148537204736> (Reports and Maps contained at Appendix 6.1.) that provides information that will be used in the assessment of the likely ALC of the land use and recreation study area.

6.6.1.4 Information on the pattern of agricultural land use and the farming framework likely to be affected has been collated from Defra Farming Statistical Data (Defra, n.d.) (<http://www.defra.gov.uk/statistics/foodfarm/>).

6.6.1.5 The recreation assessment has addressed predicted impacts arising during construction, operation and maintenance and decommissioning on recreational resources, including land used by the community (e.g. public open space; common land), recreational facilities (e.g. the coast; camping and caravanning sites; visitor attractions) and PRoW and other linear recreational routes. This is based on baseline data collection, including:

- A desktop study to identify those recreational resources within and in proximity to the onshore infrastructure (i.e. the onshore export cable, onshore HVAC booster station and onshore HVDC converter/HVAC substation); and
- A site visit, which was undertaken in February 2017, to establish the nature and condition of those resources.

6.6.1.6 The source material for the baseline desk study has included OS mapping, definitive maps of PRoW, tourist information and information about tourism/recreation facilities available from the local authority and web resources.

6.6.2 Designated sites

6.6.2.1 All designated sites within the land use and recreation study area that could be affected by the construction, operation and maintenance and decommissioning of Hornsea Three for land use and recreation were identified using the three step process described below:

- Step 1: All designated sites of international, national and local importance within the land use and recreation study area were identified using a number of sources. These included MAGIC www.natureonthemap.naturalengland.org.uk/;
- Step 2: Information was compiled on the relevant features for each of these sites; and
- Step 3: Using the above information and expert judgement, sites were included for further consideration if sites and associated features were located within the land use and recreation study area.

6.6.3 Site specific surveys

6.6.3.1 In order to inform the EIA, site-specific surveys were undertaken. A summary of surveys planned to inform the final Environmental Statement and the surveys undertaken to date are outlined in Table 6.5 below.

Table 6.5: Summary of site-specific survey data.

Title	Extent of survey	Overview of survey	Survey contractor	Month/Year
Walkover survey	PRoWs within the land use and recreation study area, including footpaths and National Cycle Network Routes; areas of access land; other recreational resources e.g. caravan and holiday parks	Walkover of the PRoWs likely to lie within the onshore export cable, onshore HVAC booster station and onshore HVDC converter/HVAC substation to establish the nature and condition of these recreational resources. The surveyors identified issues that may arise at crossing points, particularly in relation to the temporary stopping up and/or diversion of routes during construction and the identification of locations at which it is essential to keep routes open through traffic management measures. Visit to areas of access land and recreational resources affected by the scheme.	RPS	February 2017
Site visits	Various locations on the onshore cable route, focusing on locations around larger watercourse crossing areas.	Review of potential construction access points and potential crossing locations, to inform further project development work and discussion with stakeholders/asset/land owners.	RPS/Kelvin Engineering	April 2017
ALC surveys	Areas of agricultural land temporarily and permanently affected by Hornsea Three.	The survey would comprise two parts: <ul style="list-style-type: none"> • A reconnaissance survey of the soils to identify the nature and ALC of the soil types identified from the study of published information. This would include the use of hand auger borings and soil pits to confirm the characteristics of soil profiles within each of the soil types; and • A detailed ALC survey of area where there would be permanent loss of agricultural land (i.e. the onshore HVAC booster station and onshore HVDC converter/HVAC substation), comprising hand auger borings taken at approximately 100 m intervals across the area and soil pits as necessary. 	RPS	September/October 2017

6.7 Baseline environment

6.7.1.1 This section outlines the land use and recreational resources in relation to the onshore components of Hornsea Three, specifically at the Hornsea Three landfall area, onshore cable corridor search area, the potential onshore HVAC booster station, the onshore HVDC converter/HVAC substation site and the connection with the National Grid substation, within the land use and recreation study area.

6.7.2 Land use and recreation baseline

Designated sites

6.7.2.1 Designated sites within close proximity to Hornsea Three within the land use and recreation study area and therefore, likely to be potentially affected by activities associated with the construction, operation and decommissioning of the project are described here and assessed in section 6.10.

6.7.2.2 The Norfolk Coast AONB runs along the coastline at the proposed Hornsea Three landfall area, extending inland to Bodham and High Kelling up to the A148, Cromer Road. The statutory purpose of designating an area of land as an AONB is to conserve and enhance the natural beauty of the area, with two secondary aims to:

- To meet the need for quiet enjoyment of the countryside, so far as this is consistent with the statutory purpose of conserving and enhancing the area's natural beauty; and
- To have regard for the interests of those who live and work there (i.e. to take account of the needs of agriculture, forestry, fishing and other local rural industries and of the economic and social needs of local communities).

6.7.2.3 The Norfolk Coast AONB contains a mix of coastal features such as salt-marsh, intertidal flats, dunes, shingle and grazing marsh, together with inland agricultural landscapes of rolling hills and ridges of chalk, greensand and sands and gravels. The coastal economy relies on tourism and other service industries' although agriculture and fishing are still important. Day and weekend visitors enjoy a range of informal recreational activities including walking (including along the Peddars Way and Norfolk Coast Path National Trail), beach activities and exploring local villages.

Climate

6.7.2.4 The climatic data needed to apply the revised ALC system can be derived from the Meteorological Office standard 5 km grid point data set for chosen representative points whose grid reference and altitude are known. It includes the Accumulated Temperature (ATO) (day degrees) and Average Annual Rainfall (AAR) (mm), both of which are used to determine the maximum grading due to the overall climatic conditions.

6.7.2.5 The data also includes the Field Capacity Duration which is the number of days over winter (or longer) when the soils are at or above a critical moisture content known as Field Capacity. This is used, with other information, to determine the Wetness Class of the soils and the effect of any drainage defects on the ALC gradings.

6.7.2.6 Droughtiness limitations in the revised ALC system are assessed by comparing the dryness of the climate during the growing season with the ability of the soils to supply water to two test crops, wheat and potatoes. The climatic parameter used is the Moisture Deficit which is calculated from rainfall and evapotranspiration data, taking account of the rooting pattern of the crop under consideration. This is then compared with the calculated, crop-adjusted, available water capacities for the soils from their horizon depths, textures, structural conditions and stone content.

6.7.2.7 The data for selected representative points within the land use and recreation study area, located from north to south within the study area are given in Table 6.6 below.

Table 6.6: Climatic data for Agricultural Land Classification (ALC).

Grid Reference	Height (m)	Accumulated temperature (day degrees)	Average annual rainfall (mm)	Field capacity duration (days)	Moisture deficit wheat (mm)	Moisture deficit potatoes (mm)
TG107434	8	1,407	641	134	117	113
TG112434	13	1,401	644	134	117	112
TG106415	72	1,335	679	141	107	99
TG118399	61	1,348	682	143	108	100
TG094370	61	1,359	694	146	106	97
TG113368	82	1,325	706	148	103	93
TG101353	83	1,331	708	149	103	93
TG101344	70	1,340	705	148	104	94
TG111330	58	1,354	698	146	105	96
TG106315	41	1,375	683	141	107	99
TG102297	47	1,369	680	140	106	98
TG102275	47	1,370	672	136	109	101
TG112254	40	1,375	662	133	112	104
TG120230	36	1,384	650	130	114	107
TG120210	44	1,376	650	129	114	107
TG121190	32	1,390	637	126	117	111

Grid Reference	Height (m)	Accumulated temperature (day degrees)	Average annual rainfall (mm)	Field capacity duration (days)	Moisture deficit wheat (mm)	Moisture deficit potatoes (mm)
TG118162	39	1,384	629	123	118	113
TG125135	37	1,387	625	122	119	114
TG128109	39	1,385	627	123	119	114
TG141089	15	1,413	614	121	122	118
TG147077	33	1,394	623	122	118	113
TG162062	42	1,384	626	122	115	109
TG176040	35	1,392	615	120	116	110
TG201035	32	1,404	611	118	117	112
TG199020	38	1,390	599	117	116	111
TG218025	34	1,393	598	115	118	113

Soils and Agricultural Land Classification

- 6.7.2.8 In terms of soils and ALC, the land use and recreation study area crosses four landscape regions of Norfolk. In the north there is a relatively narrow strip on the Coastal Plain. Here the soils are developed mainly in Marly Drift and are placed in Association 343g Newmarket 2. It is considered that these soils, although somewhat variable, give land generally of ALC Subgrade 3a quality. North-east of Weybourne is a small area of Association 551d NEWPORT 1 on more sandy drift.
- 6.7.2.9 The Hornsea Three onshore cable corridor search area then rises onto the Cromer Ridge which is followed to the south by the so-called Sand-Loam Uplands or the Sand and Gravel Platform. This region extends south as far as Norwich. In both regions the main parent materials consist of glaciofluvial sands and gravels.
- 6.7.2.10 Where the soils are formed mainly in these sands and gravels, for example on the Cromer Ridge itself, Associations 551f Newport 3 and 551g NEWPORT 4 are found. These soils suffer from a droughtiness limitation and give land mainly of Subgrade 3b quality but with some Subgrade 3a and Grade 4.

- 6.7.2.11 Where the sands and gravels are themselves covered by aeolian drift, often referred to as the Norwich Brickearth there is an increase in the occurrence of deeper, more loamy and more moisture-retentive soils, especially in valley bottoms where hill-wash has increased the thickness of the loamy material. These are placed in Associations 541s WICK 2 and 541t WICK 3 which give land predominantly in Subgrade 3a or even Grade 2 where the covering of aeolian drift is relatively thick. However, patches with little or none of this drift i.e. soils more like those which dominate the Newport Associations are more likely to be in Subgrade 3b. The Wick Associations occur in patches on the Cromer Ridge but are much more extensive on the Sand-Loam Uplands (or Sand and Gravel Platform) between about Edgefield and Salle.
- 6.7.2.12 Just north of Salle, the land use and recreation study area passes southwards onto the Boulder Clay Plateau. These soils are formed in or greatly influenced by the underlying slowly permeable glacial till (boulder clay) and many show signs of impeded drainage. They are categorised as belonging to Associations 572n BURLINGHAM 1 and 572p BURLINGHAM 3. Land quality, as elsewhere on the onshore cable route, is variable with both winter wetness and summer droughtiness having to be taken into account. Detailed surveys of land in these associations indicate the likelihood of substantial areas of Grade 2 and Subgrade 3a with only minor amounts of Subgrade 3b.
- 6.7.2.13 Where the land use and recreation study area crosses the valleys of the Glaven, Bure, Wensum and Yare and their main tributaries the soils are poorly or very poorly drained and often peaty. Three Associations, 861b Isleham 2, 871c HANWORTH and 1024b ADVENTURERS 2, are encountered all giving land generally no better than Grade 4.
- 6.7.2.14 The following Soil Associations crossed by the land use and recreation study area are therefore as follows:
- 343g Newmarket 2;
 - 551d NEWPORT 1;
 - 551g NEWPORT 4;
 - 541s WICK 2;
 - 541t WICK 3;
 - 871c HANWORTH;
 - 572n BURLINGHAM 1;
 - 572p BURLINGHAM 3;
 - 551f Newport 3;
 - 861b Isleham 2; and
 - 1024b ADVENTURERS 2.
- 6.7.2.15 The nature of these soils, their locations and their likely ALC gradings are described in more detail below.

Association 343g Newmarket 2

- 6.7.2.16 This association is found in a small area on the Coastal Plain west, south and southeast of Weybourne. The geological map shows the Weybourne Town Till Member (formerly the Marly Drift) which is a mixture of whitish chalk stones in a chalk flour matrix. This is, however, overlain by or mixed with a variable thickness of sandy material. This somewhat mixed association is thus described as a collection of "Shallow well drained calcareous coarse loamy and sandy soils over chalk rubble associated with well drained deeper coarse loamy and sandy soils often in an intricate pattern. Slight risk of water erosion". In this description, the term "coarse loamy" indicates textures in the sandy loam to sandy silt loam range.
- 6.7.2.17 However, the more detailed 1:25,000 scale Barningham/Sheringham soil map suggests that the well drained Swaffham Prior series is the most likely to be found to the west, south and southeast of Weybourne. This typically has a profile consisting of about 30 cm of calcareous, variably stony, sandy loam topsoil over a pale brown, very calcareous clay loam subsoil with abundant chalk fragments. At about 50 to 60 cm from the surface there is a sharp boundary to the underlying very pale brown Marly Drift. The shallower Newmarket series *per se* tends to occur on slopes, is paler in colour and lacks the brown subsoil of the Swaffham Prior series so that it passes down into Marly Drift or broken chalk more or less immediately below the topsoil. Subsidiary soils include the less calcareous Moulton and Worlington series.
- 6.7.2.18 The detailed soil map shows that the land use and recreation study area, west of Weybourne also crosses small areas of land dominated by the so-called Weybourne series. This is also the dominant soil to the northeast of Weybourne where the National Soil Map shows Association 551d NEWPORT 1 (see below).
- 6.7.2.19 The main limitation of the soils in Association 343g Newmarket 2 is droughtiness because of the relatively limited rooting depth, though typical profiles would be more moisture retentive than very shallow soils developed directly over chalk. Typical Swaffham Prior and Newmarket profiles would qualify for ALC Grade 2 and Subgrade 3a respectively. However, it could be argued that the variability of the soils over short distances is such that the sort of uniformity which might be expected for Grade 2 land is missing and that overall a grading of Subgrade 3a is more realistic. This would correspond with the undifferentiated Grade 3 shown on the published Provisional ALC map.
- 6.7.2.20 The soil resources consist of a dark brown, calcareous, sandy loam topsoil and a paler brown, highly calcareous subsoil. The thickness of the latter may vary considerably, but it usually extends to only about 50 to 60 cm from the surface. Recovery of this subsoil should stop when a more or less pure white chalky substrate is reached.

Association 551d NEWPORT 1

- 6.7.2.21 This association is developed in glaciofluvial drift with little or no superficial aeolian drift and is shown on the National Soil Map only as a small area crossed by the Hornsea Three onshore cable corridor search area northeast of Weybourne. The geological map shows this as glacial sand and gravel. The Association is described as a collection of "Deep, well drained sandy and coarse loamy soils. Some coarse loamy soils affected by groundwater. Risk of wind and water erosion".
- 6.7.2.22 The more detailed 1:25,000 scale soil map for the Barningham/Sheringham area, however, shows this area as the Weybourne series (since renamed the Arrow series) which has signs of impeded drainage at depth. These are the "coarse loamy soils affected by groundwater" in the above generalised description of the Association. A typical profile would consist of a dark brown sandy loam topsoil over a brown subsoil of a similar texture, but becoming more clayey (e.g. sandy clay loam, with depth and showing signs of impeded drainage in the form of colour mottling called gleying at about 50 cm from the surface). Profiles are unlikely to be worse than Wetness Class II (moderately well drained). The well drained sandy soils are the Newport series *per se* (formerly called the Freckenham series), but the detailed soil map suggests that these are relatively uncommon.
- 6.7.2.23 Small patches of Arrow (formerly Weybourne) series accompanied by the more sandy and better drained Newport (formerly Freckenham) series occur round Weybourne.
- 6.7.2.24 The main limitation of these soils is droughtiness in this climatically dry area. Typical Arrow (formerly Weybourne) soils would qualify for Grade 2 while the relatively insignificant occurrences of Newport (formerly Freckenham) soils would be more drought prone and probably Subgrade 3b at best. Overall, however, the part of the land use and recreation study area, shown as Association 551d NEWPORT 1 on the National Soil Map northeast of Weybourne is probably best regarded as mainly of Grade 2 quality.
- 6.7.2.25 The soil resources from this association will consist, for the most part, of loamy topsoil and subsoil with no need to strip separately the somewhat heavier textured material at depth. Recovery of this subsoil should stop when very sandy and/or stony and/or very clayey (glacial till) material is encountered.

Association 551g NEWPORT 4

- 6.7.2.26 This association is developed in glaciofluvial drift with effectively no superficial aeolian drift and so it is probably the sandiest of the Newport associations. It is described as a collection of "*Deep well drained sandy soils. Some very acid soils with bleached subsurface horizon especially under heath or in woodland. Risk of wind erosion*". The well drained sandy soils are those of the Newport (formerly Freckenham) series. A typical profile of the well-drained sandy soils (i.e. a typical Newport (formerly Freckenham) series) would have a moderately thin, often stony, sandy loam or loamy sand topsoil, overlying loamy sand or sand, becoming pure sand within 40 cm from the surface. A typical, relatively deep profile of the Wick (formerly Hall) series has a topsoil and upper subsoil of sandy loam or sandy silt loam texture, becoming stony, loamy sand or sand at between about 40 and 70cm from the surface. Thus there is a greater thickness of loamy material over the sandy substrate than in the Newport series this also tends to be somewhat less sandy i.e. more loamy. This trend is continued in the Sheringham series of which a typical profile is similar to that of the Wick series, but the loamy subsoil continues to more than 70cm from the surface.
- 6.7.2.27 The very acid soils belong to the Redlodge series and are characterised by profiles affected by podzolisation which is the process, over many years, whereby iron and aluminium compounds are leached out of the upper subsoil which thereby becomes "bleached" or white, and are deposited along with the organic matter responsible for the process in brightly coloured black and orange subsoil horizons. These soils are extremely infertile and are responsible for the current and former heathland such as Kelling Heath and Weybourne Heath.
- 6.7.2.28 This Association is shown on the National Soil Map as occurring between the former Kelling Heath Park Station (approximate grid reference TG108418) and near Warren Heath Farm (approximate grid reference TG104407) and again from where the Hornsea Three onshore cable corridor search area emerges from Bodham Wood, immediately north of High Kelling (approximate grid reference TG109402) at Pine Farm (approximate grid reference TG119395).
- 6.7.2.29 The detailed 1:25,000 scale soil map for the Barningham/Sheringham area shows the first of these (i.e. from the former Kelling Heath Park Station to near Warren Heath Farm) as consisting of a mixture of the Newport (formerly Freckenham) and Redlodge series. The main limitation of the soils on this part of the Hornsea Three onshore cable corridor search area is droughtiness which is particularly pronounced in these very sandy soils. Application of the revised ALC criteria suggest that typical profiles of the Newport series give land of only Subgrade 3b quality and the very acidic Redlodge series would probably be downgraded to Grade 4 because of its very low fertility.

- 6.7.2.30 The second occurrence of Association 551g NEWPORT 4 at Pine Farm is shown on the 1:25,000 scale soil map for the Barningham/Sheringham area as mainly Newport (formerly Freckenham) series, but with narrow strips of well drained Wick (formerly Hall) and Sheringham series where the Hornsea Three onshore cable corridor search area crosses small valleys. For profiles with up to about 70cm of loamy material in the climatic regime of these parts of the Hornsea Three onshore cable corridor search area, the calculations of moisture holding capacities suggest a grading of ALC Subgrade 3a for typical Wick (formerly Hall) series, but Grade 2 for the deeper Sheringham soils. This is in contrast to the nearby Newport soils on the higher ground which would be Subgrade 3b land.
- 6.7.2.31 Association 551g NEWPORT 4 also occurs between the Swannington Beck, near Alderford (approximate grid reference TG124184) to the River Tud (approximate grid reference TG 129115).
- 6.7.2.32 This part of the land use and recreation study area is covered by the detailed 1:25,000 scale soil map for the Attlebridge area which shows that virtually all the soils would be classed as the Newport (formerly Freckenham) series *per se*. Soils with glacial till material at depth are virtually entirely absent. The Newport (formerly Freckenham) series are mainly of the sandy and slightly stony variety with a profile consisting of a loamy sand topsoil directly over sand, or perhaps with negligibly thin loamy sand subsoil. They are accompanied both by some with a sandy loam topsoil and some which are distinctly more stony.
- 6.7.2.33 The main limitation of these sandy and variably stony soils is droughtiness. Application of the revised ALC criteria suggests that typical profiles give land of only Subgrade 3b quality, with potentially areas of Grade 4 land.

Association 541s WICK 2

- 6.7.2.34 This association is the less prevalent of the two WICK Associations found within the land use and recreation study area. It is found where the geological map indicates sand and gravel, brickearth (i.e. aeolian drift) and patches of glacial till. It is thus described as being developed in "*glaciofluvial and aeolian drift and till*". It differs from Association 541t WICK 3 in having both a generally greater thickness of loamy surface material and having, in places, soils which are influenced by underlying glacial till (absent in areas of Association 541t WICK 3). Thus Association 541s WICK 2 is described as a collection of "*Deep well drained coarse loamy soils often stoneless. Some similar soils with slowly permeable subsoils and slight seasonal waterlogging. Slight risk of water erosion*". In this description, the term "*coarse loamy*" indicates textures in the sandy loam to sandy silt loam range.
- 6.7.2.35 The association is identified from the southern edge of the valley of the River Glaven (approximate grid reference TG118384) to southeast of Beckett's Farm (approximate grid reference TG116378) and then further south from near to Corpusty south to Stinton Hall Farm (approximate grid reference TG112250)

- 6.7.2.36 The more detailed 1:25,000 scale soil map for the Barningham/Sheringham area shows an assortment of soils of which the well-drained, coarse loamy Wick (formerly Hall) series appears to be the most common (see description in paragraph 6.7.2.26 above). It is, however, variously accompanied by the sandier Newport (formerly Freckenham) series (see description in paragraph 6.7.2.26), including some notably stony ones; the deeper Sheringham series (see description in paragraph 6.7.2.26 above); as well as two series showing signs of poor drainage at depth, the Aylsham and Wickmere series, which are both influenced by the presence of slowly permeable glacial till material at depth.
- 6.7.2.37 The National Soil map shows that south of approximate grid reference TG116378, southeast of Beckett's Farm, the land use and recreation study area crosses from Association 541s WICK 2 to 541t WICK 3. The detailed soil map shows a broadly similar soil pattern on both soil associations in this area.
- 6.7.2.38 It is difficult to make any predictions as to the likely land quality since it can vary from Grade 2 on the deep Sheringham soils, through Subgrade 3a on typical Wick (formerly Hall) series, to 3b on the sandier Newport (formerly Freckenham) series. The poor drainage at depth of the Aylsham and Wickmere series can fairly readily be rectified and in this relatively dry climatic area is not a major limitation. Thus, they too suffer mainly from summer droughtiness, but probably would qualify for Grade 2. The relative proportions of these grades cannot be accurately predicted, but overall a grading at the Grade 2 to Subgrade 3a boundary would appear reasonable.
- 6.7.2.39 The soil resources consist of a dark brown sandy loam or sandy silt loam topsoil and a paler brown subsoil of similar texture. The latter may extend to about 80 cm from the surface, but this may vary from place to place and may be entirely absent. Recovery of this subsoil should stop when very sandy and/or stony and/or clayey material is encountered at depth.
- Association 541t WICK 3
- 6.7.2.40 This Association is found on sand and gravel but where this is covered, at least in places, by aeolian drift and is dominated by Wick series soils. Association 541t WICK 3's main difference from Association 541s WICK 2 is that it is found where the aeolian drift is thinner and the soils are accordingly more sandy at depth. The generalised description of Association 541t WICK 3 is accordingly that it is a collection of "Deep well drained coarse loamy often stoneless soils. Some similar sandy soils. Complex soil pattern locally. Risk of water erosion". In this description, the term "coarse loamy" indicates textures in the sandy loam to sandy silt loam range and the term "sandy" indicates loamy sand and sand textures.
- 6.7.2.41 This Association is crossed by the Hornsea Three onshore cable corridor search area from near Warren Heath Farm (approximate grid reference TG104407) to where the land use and recreation study area emerges from Bodham Wood immediately north of High Kelling. It then is located in areas further south from close to Heath Farm (approximate grid reference TG105 307) to the River Bure and then south from here towards Corpusty.
- 6.7.2.42 The main limitation of the three main soils, Wick (formerly Hall), Newport (formerly Freckenham) and Sheringham, is droughtiness and the degree of limitation depends on the thickness of loamy material above the sandy and/or stony substrate. In the Newport (formerly Freckenham) soils this is taken as no more than 40cm and accordingly calculations of moisture holding capacity suggest a grading of Subgrade 3b in the climatic regime of this part of the route. The Wick (formerly Hall) series has a greater thickness, between 40 and 70cm, of surface loamy material which would typically give Subgrade 3a while the Sheringham series with more than 70cm of loamy material would be in Grade 2.
- 6.7.2.43 Two nearby areas of this Association south of Holt have been mapped in more detail by MAFF using the revised ALC system. The combined results show around 40% Grade 2, 35% Subgrade 3a and 25% Subgrade 3b. However, the amount of Grade 2 and Subgrade 3a has been somewhat inflated because the availability of irrigation on some of the land has been taken into account whereas more recent practice has been that this should be ignored and that the gradings should be based just on the inherent physical characteristics of the soils. In that case, a more realistic estimate would be around 10% Grade 2, 50% Subgrade 3a and 40% Subgrade 3b.
- 6.7.2.44 The soil resources consist of dark, brown sandy loam topsoil and a paler brown subsoil of similar texture, but becoming sandier with depth. The latter may extend to about 70cm from the surface, but this may vary from place to place. Recovery of this subsoil should stop when very sandy and/or stony material is encountered.
- Association 871c HANWORTH
- 6.7.2.45 This association is found where the Hornsea Three onshore cable corridor search area crosses the River Glaven and River Bure.
- 6.7.2.46 Association 871c HANWORTH is said to be developed in aeolian drift and peat and is described as collection of "Deep permeable coarse loamy often stoneless soils affected by groundwater, mainly with a peaty or humose surface horizon. Associated peat soils".
- 6.7.2.47 The detailed 1:25,000 scale soil map for the Barningham/Sheringham area shows all occurrences of this Association as a complex of poorly drained mineral soils of the Sustead series and thick peat of the Adventurers series.
- 6.7.2.48 The usefulness of these soils depends critically on the extent to which groundwater has been controlled. In their unimproved condition they give poor quality, wet, low-lying land no better than Subgrade 3b, but potentially they could be valuable agricultural land. They are shown on the published ALC map as undifferentiated Grade 3 and are mentioned in the accompanying reports as low in the grade (i.e. what would now be Subgrade 3b). However, the text accompanying the detailed soil map considers these valley bottoms as being "sites unsuitable for economic drainage", and so really Grade 4. The 1:63,360 scale Provisional ALC map duly shows the Bure valley at the southern end of this Section as Grade 4. The Glaven valley further north is too narrow for it to be shown as a separate area of Grade 4.

6.7.2.49 The only soil resource worth recovering is the loamy or peaty topsoil of the Sustead series and the thick peat of the Adventurers series. The underlying material is likely to be very variable and almost indistinguishable from what might be considered as “raw” geological alluvium.

Association 572n BURLINGHAM 1

6.7.2.50 The soils of this Association, one of the typical associations of the Boulder Clay Plateau, are formed in clayey or fine loamy chalky till and Head (a locally derived superficial drift) which partly covers glaciofluvial sands and gravels. This gives a considerable range of soils so that Association 572n BURLINGHAM 1 is described as a collection of “*Deep coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Some deep well drained coarse loamy and sandy soils*”. In this description “*fine loamy*” and “*coarse loamy*” mean medium textures, the former tending to heavier, more clayey textures, the latter to lighter, more sandy textures.

6.7.2.51 Four occurrences of this association are crossed by the land use and recreation study area. The first is in the north between Stinton Hall Farm (approximate grid reference TG112250) and a tributary of the River Wensum near Moor Farm (approximate grid reference TG115233). It is next encountered south of the River Tud (approximate grid reference TG129114) extending to the River Yare at Marlingford (approximate grid reference TG140091). The northern part of this, north of OS Northing 100, is on the more detailed 1:25,000 scale soil map for the Attlebridge area and it is likely that similar soils will be found on other occurrences of the association. The third occurrence is south of the River Yare (approximate grid reference TG141089) to the end of Section 3 SW of Cringleford (approximate grid reference TG182036). This last occurrence also crosses an insignificantly small strip of a tributary of the River Yare near Bawburgh Hill (approximate grid reference TG182036). The final occurrence is west of the River Tas.

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

6.7.2.53 The corresponding coarse loamy soils with slowly permeable subsoils are in the Wighill (formerly Attlebridge) series, and together with the better drained coarse loamy Wick (formerly Hall) series (see description in paragraphs 6.7.2.68 and 6.7.2.26 above) are found on the Head deposits. The deep well drained sandy soils are the Newport (formerly Freckenham) series similar to those already described above.

6.7.2.54 The portion of the land use and recreation study area on the more detailed 1:25,000 scale soil map for the Attlebridge area is dominated by the Wighill (formerly Attlebridge) series, sometimes accompanied by Newport (formerly Freckenham) series, the moderately well drained, chalky and clayey Ashley series and even well drained soils of the Swaffham Prior series over particularly chalky drift.

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

6.7.2.56 It is thus difficult to predict what kinds of soils are likely to be crossed by the actual Hornsea Three export cable, except to say that soils of the Burlingham series *per se*, even though the association is named after them, seem unlikely and that the most likely soils are similar to those on the portion covered by the more detailed 1:25,000 scale soil map for the Attlebridge area, though overall with probably more of the sandy Newport (formerly Freckenham) series than encountered there.

6.7.2.57 Most of the likely soils are either well drained or at worst moderately well drained such that any wetness limitation in a climatic regime as dry as round Norwich would be minimal. Thus, the main limitation is droughtiness. Where the soils have been investigated in detail the predominant grading is Subgrade 3b. The Subgrade 3a has been placed in this grade only because the availability of irrigation was been taken into account whereas more recent practice has been that this should be ignored and the gradings should be based just on the inherent physical characteristics of the soils.

6.7.2.58 Thus, the overall conclusion is that Association 572n BURLINGHAM 1 should be regarded as mainly Subgrade 3b with some 3a.

6.7.2.59 Assuming that the main soils are Newport (formerly Freckenham) and Wighill (formerly Attlebridge) series, the soil resources recoverable from this association consist of a dark brown sandy or loamy topsoil which could be stripped as a single unit, and similarly textured paler brown subsoil over variable thickness ranging from virtually nil to perhaps 70 cm from the surface. Recovery of the latter should cease when the underlying sand or chalky material is reached.

Association 572p BURLINGHAM 3

6.7.2.60 Like Association 572n BURLINGTON 1 typical soils of this association are formed in clayey or fine loamy chalky till and Head (a locally derived superficial drift). These tend to have impeded drainage but the association also includes better drained soils formed in sandy glaciofluvial sands and gravels. Thus Association 572p BURLINGHAM 3 is described as a collection of “*Deep fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Some similar fine or coarse loamy over clayey soils. Some deep well drained coarse loamy over clayey, fine loamy and sandy soils*”. In this description “*fine loamy*” and “*coarse loamy*” mean medium textures, the former tending to heavier, more clayey textures, the latter to lighter, more sandy textures.

- 6.7.2.61 Much of the land in this association has been the subject of detailed surveys carried out by MAFF in the 1990s. Although they do not use series names it would seem that, in general, only two main soil types are considered to be present. The first consists of soils which have developed over underlying chalky boulder clay drift. Typical profiles have a slightly stony sandy loam or sandy clay topsoil overlying similar or sometime stonier upper subsoils which in turn overlie clayey lower subsoils below 40 to 75 cm depth. In many locations the clay overlies a friable chalky drift below approximately 80 cm. These profiles are typically non calcareous in the upper horizons and become calcareous as the underlying chalky drift is approached. Soil drainage is assessed predominantly as wetness class II with smaller areas of wetness class III and I. Such soils are similar to those described in other publications as the Burlingham series *per se*. (i.e. the “*deep fine loamy soils with slowly permeable subsoils*” of the generalised description of the association).
- 6.7.2.62 The second main soil type occurs where the parent material is glacial sand and gravel. The well drained soils typically comprise variably stony, sandy loam, or less frequently loamy sand topsoils over similar or lighter, slightly or moderately stony subsoils which may extend to depth or overlie gravel below 40 to 60 cm from the surface. These are the “*deep well drained coarse loamy and sandy soils*” of the Newport (formerly Freckenham) series found frequently elsewhere along the entire land use and recreation study area.
- 6.7.2.63 The better drained of the Burlington type soils have been placed in Grade 2 and are considered to be limited by minor winter wetness and summer droughtiness constraints. The heavier, stonier or wetter examples are Subgrade 3a, as are soils said to be transitional between the Burlington and Newport series. The more typical sandy Newport soils are classed as Subgrade 3a. Overall, a representative area of this association would have approximately equal amounts of Grade 2, Subgrade 3a and Subgrade 3b.
- 6.7.2.64 The soil resources recoverable from this association generally consist of a dark brown loamy topsoil and similarly textured paler brown subsoil. Recovery of the latter should cease when the underlying chalky clay (glacial till) or very sandy and/or stony substrate is reached.
- Association 551f Newport 3
- 6.7.2.65 This association is developed in glaciofluvial drift with little or no superficial aeolian drift. It is described as a collection of “*Deep, well drained sandy and coarse loamy soils. Some coarse and fine loamy soils with slowly permeable subsoils and slight seasonal waterlogging. Risk of wind erosion*”. In this description “*fine loamy*” and “*coarse loamy*” mean medium textures, the former tending to heavier, more clayey textures, the latter to lighter, more sandy textures.
- 6.7.2.66 The well drained sandy and coarse loamy soils are the Newport (formerly Freckenham) and Wick (formerly Hall) series respectively, as described above. The soils with slowly permeable subsoils are found where the superficial covering of sand and gravel is relatively thin and/or partly incorporated with heavier glacial till material and most belong to the coarse loamy Wighill (formerly Attlebridge) series. The glacial till derived horizons in the lower parts of the profiles are responsible for the impeded drainage, the result of which is colour mottling and/or greyish colours in these horizons and immediately above them.
- 6.7.2.67 Association 551f Newport 3 occurs south of a tributary of the River Wensum, at approximate grid reference TG116232, to Swannington Beck, near Alderford (approximate grid reference TG124184) and as a short stretch from Furze Meadow (approximate grid reference TG177029) to the valley of the River Tas at approximately grid reference TG193026.
- 6.7.2.68 Part of the land use and recreation study area which crosses this association is covered by the detailed 1:25,000 scale soil map for the Attlebridge area, from OS Northing 200 to the Swannington Beck (approximate grid reference TG124184). The detailed soil map shows that the soils are a complex (i.e. mixture of typical Newport (formerly Freckenham) series and the Wighill (formerly Attlebridge) series). The former have a moderately thin, slightly stony, sandy loam topsoil, overlying loamy sand or sand, becoming pure sand within 40 cm from the surface. The latter, the Wighill (formerly Attlebridge) series is developed in loamy drift over glacial till material below about 70 cm from the surface which causes some drainage impedence. Thus, the profiles are only moderately well drained though this is not major limitation in such a climatically dry region as this. A typical profile has a sandy loam topsoil and subsoil, the latter becoming increasingly mottled with depth before passing into a greyish-brown mottled sandy clay loam at about 70 cm from the surface.
- 6.7.2.69 The main limitation is droughtiness which is more pronounced in these sandy soils than in the more loamy soils of the Wick associations. Application of the revised ALC criteria suggest that typical profiles of the Newport (formerly Freckenham) series give land of only Subgrade 3b quality, although the more loamy Wighill (formerly Attlebridge) series are likely to give Subgrade 3a. However, the extent of these better soils cannot be predicted and it could be argued that the soil variability over short distances is such that an overall grading of 3b is the most reasonable one.
- 6.7.2.70 For the record, an area of this association west of Brandiston (approximate grid reference TG 120215) is actually shown as Grade 2 on the 1:63,360 Provisional ALC map, but the reason why this rather than any other area has been so differentiated is unknown.
- 6.7.2.71 The soil resources from this association will include the topsoil which will be sufficiently similar for all the soils encountered to be stripped as a single entity. Below that there will be a variable thickness of loamy subsoil, ranging from virtually nil to around 70 cm from the surface. Stripping of this, again as a single entity, should stop when a particularly sandy and/or stony and/or clayey substrate is reached.

Associations 861b Isleham 2 and 1024b ADVENTURERS 2

- 6.7.2.72 These associations are shown where the land use and recreation study area crosses the valleys of the River Wensum near Attlebridge Station (approximate grid reference TG127173), its tributaries near Moor Farm (approximate grid reference TG115233), Alderford (approximate grid reference TG124184), the River Tud (approximate grid reference TG129115), the River Yare and a tributary thereof at Marlingford (approximate grid reference TG140091) and Bawburgh Hill (approximate grid reference TG147076), and in the valley of the River Tas and its tributaries.
- 6.7.2.73 The National Soil Map shows all of these as Associations 861b Isleham 2 with very poorly drained soils developed in glaciofluvial drift and deep peat except the valley of the Wensum itself which is shown as Association 1024b ADVENTURERS 2 which consists virtually entirely of deep peat.
- 6.7.2.74 However, the detailed 1:25,000 scale soil map for the Attlebridge area shows those stretches of the Wensum tributaries and the River Tud as mainly having deep peaty soils of the Adventurers series and it seems somewhat strange that these, too are not shown as Association 1024b ADVENTURERS 2 on the National Soil Map. There is no corresponding information for Association 861b Isleham 2 in the valley of the Yare and its tributary, but it seems reasonable to assume that peaty soils predominate here too.
- 6.7.2.75 Whatever the actual soil types present, the main feature is that these are soils which occupy low-lying positions in the landscape and are accordingly affected by high groundwater and, in the winter, possibly by flooding. Their usefulness depends critically on the extent to which groundwater has been controlled but it would seem that these valley bottoms are “sites unsuitable for economic drainage”, and so ALC Grade 4 at best. The 1:63,360 scale Provisional ALC map duly shows them as this grade where they are sufficiently wide for it to be possible to show them separately from the adjacent areas of Grade 3 on higher ground.
- 6.7.2.76 The main recoverable soil resource on these associations is the peat, often of considerable thickness, and the peaty topsoil where there is a mineral substrate relatively near the surface. This mineral substrate is likely to be very variable and virtually indistinguishable from what might be considered as “raw” geological alluvium. Accordingly it is recommended that only the peat and peaty topsoil is specifically conserved.

Summary

- 6.7.2.77 The distribution of soil types and likely ALC gradings, based on the desk top information can be summarised as follows in Table 6.7 below.

Table 6.7: Summary of soil types and likely ALC gradings

Location within land use and recreation study area	Soil association	Likely ALC grading
Coast south to Former Kelling Heath Station (TG108418)	343g Newmarket 2	Grade 2 or 3a dependent on variability
Former Kelling Heath Park Station to Warren Heath Farm (TG104407)	551g NEWPORT 4	Grades 3b and 4
Warren Heath Farm to Bodham Wood (High Kelling) TG 109402	541t WICK 3	Grades 2/3a
Bodham Wood to Pine Farm (TG119395)	551g NEWPORT 4	Grade 3b
Coast to A149 (TG 118430)	551d NEWPORT 1	Grade 2
A149 to Former Kelling Heath Park Station (TG 108418)	343g Newmarket 2	Grade 2 or 3a dependent on variability
Former Kelling Heath Park Station to Warren Heath Farm (TG104407)	551g NEWPORT 4	Grades 3b and 4
Warren Heath Farm to Bodham Wood (High Kelling) TG 109402	541t WICK 3	Grades 2/3a
Bodham Wood to Pine Farm (TG119395)	551g NEWPORT 4	Grade 3b
Pine Farm to River Glaven (TG 118 385)	551g NEWPORT 4	3b with some 3a; occasional 2
Low lying land around River Glaven	871c HANWORTH	4
River Glaven to Hempstead (TG113 371)	541s WICK 2 (no 541t WICK 3)	2 and 3a
Hempstead (TG 113 371 to Wood Farm (TG1013440)	551g NEWPORT 4	3b with some 3a; occasional 2
Hempstead to Heath Farm (TG112 349)	551g NEWPORT 4	3b some 3a or even 2
Heath Farm to River Bure (TG105 307)	541t WICK 3	3a and 3b, some 2
Proximity to River Bure	871c HANWORTH	4
River Bure to Corpusty	541t WICK 3	3a and 3b, some 2
Corpusty to Stinton Hall Farm (TG 102293)	541s WICK 2	Grades 2 and 3a
Stinton Hall Farm to W Wensum tributary (TG115233)	572n BURLINGHAM 1	Grade 3b some 3a
Land adjacent to River Wensum	861b Isleham 2	Grade 4
River Wensum tributary to Swannington Beck (TG 124 184)	551f Newport 3	Grade 3b
Land adjacent to Swannington Beck (TG 124 184)	861b Isleham 2 / 1024b ADVENTURERS 2	Grade 4
Swannington Beck to River Wensum (TG 127 173)	551g NEWPORT 4	Grade 3b with some 3a; occasional 2
River Wensum	1024b ADVENTURERS 2	Grade 4
River Wensum to River Tud (TG 129 114)	551g NEWPORT 4	Grade 3b with some 3a; occasional 2

Location within land use and recreation study area	Soil association	Likely ALC grading
River Tud	861b Isleham 2 / 1024b ADVENTURERS 2	Grade 4
River Tud to River Yare (TG 140 091)	572n BURLINGHAM 1	Grade 3b some 3a
River Yare	861b Isleham 2 / 1024b ADVENTURERS 2	Grade 4
River Yare to Bawburgh Hill River Yare tributary (TG 147 076)	572n BURLINGHAM 1	Grade3b some 3a
River Yare tributary	861b Isleham 2 / 1024b ADVENTURERS 2	Grade 4
River Yare tributary	572n BURLINGHAM 1	Grade 3b some 3a
To River Tas (TG 189 036)	572n BURLINGHAM 1	Grade 3b some 3a
River Tas	861b Isleham 2 / 1024b ADVENTURERS 2	Grade 4
River Tas to southern end of the onshore cable route	572p BURLINGHAM 3	Approximately equal amounts of Grades 2, 3a and 3b

The Coast (see Figure 6.2)

- 6.7.2.78 The shingle beach at Weybourne is primarily noted for fishing. Anglers can park in the beach side car park from where there is direct access onto the beach (Visit Norfolk n.d.). Fishing takes place from the beach or from boats that are pulled up onto the beach when not in use. The catch includes the usual species common to the Norfolk shingle including flatfish ('flatties'), along codling and whiting during the winter. Details of coastal fishing activities are contained in volume 2, chapter 6: Commercial Fisheries and volume 2, chapter 11: Infrastructure and Other Users.
- 6.7.2.79 The steeply shelving beach makes it more difficult for swimming as the water gets deep quickly. Apart from the car park there are no other visitor facilities on or adjacent to the beach, which is dog friendly.

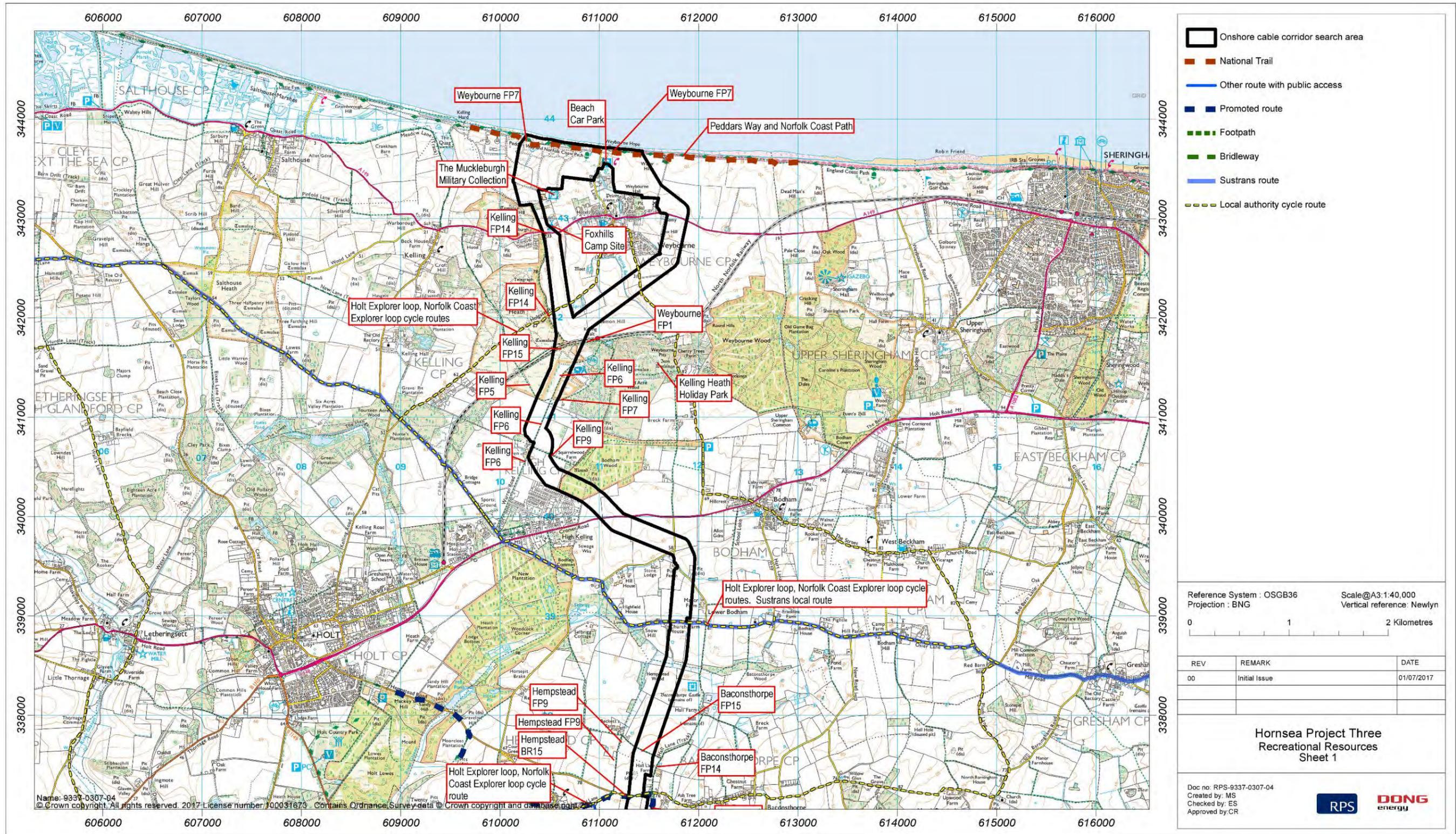


Figure 6.2: Recreational resources.

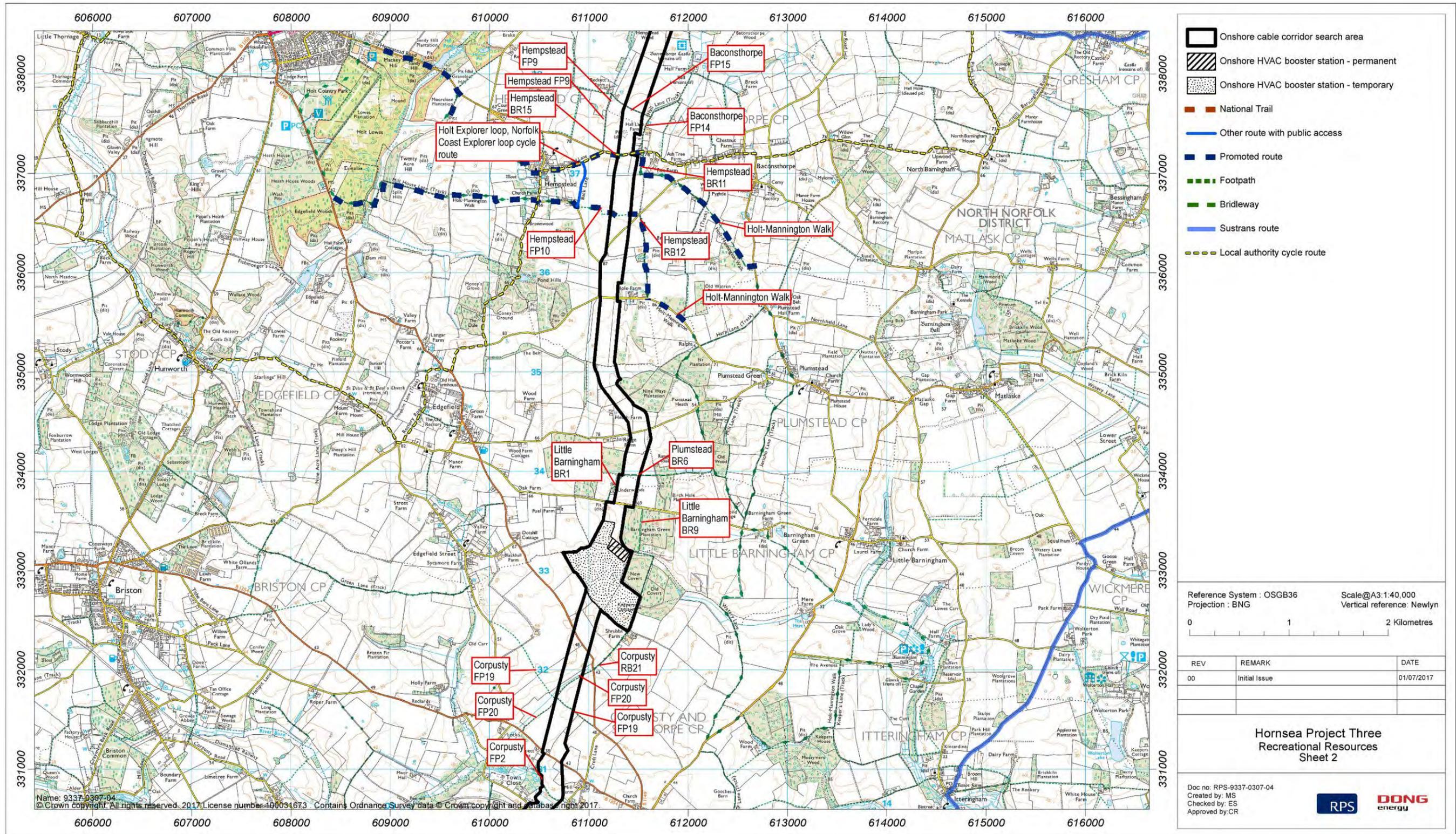


Figure 6.2: Recreational resources.

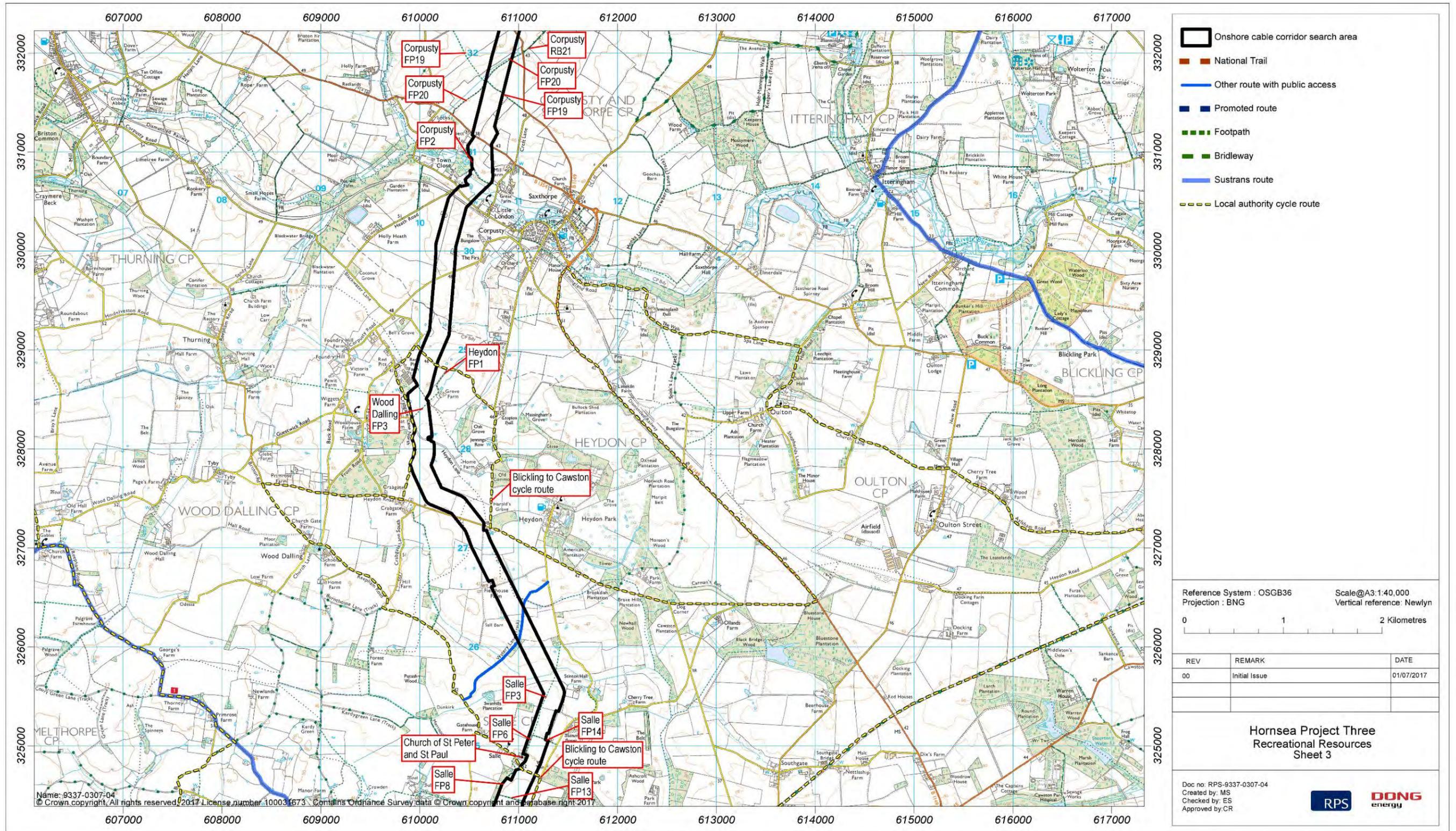


Figure 6.2: Recreational resources.

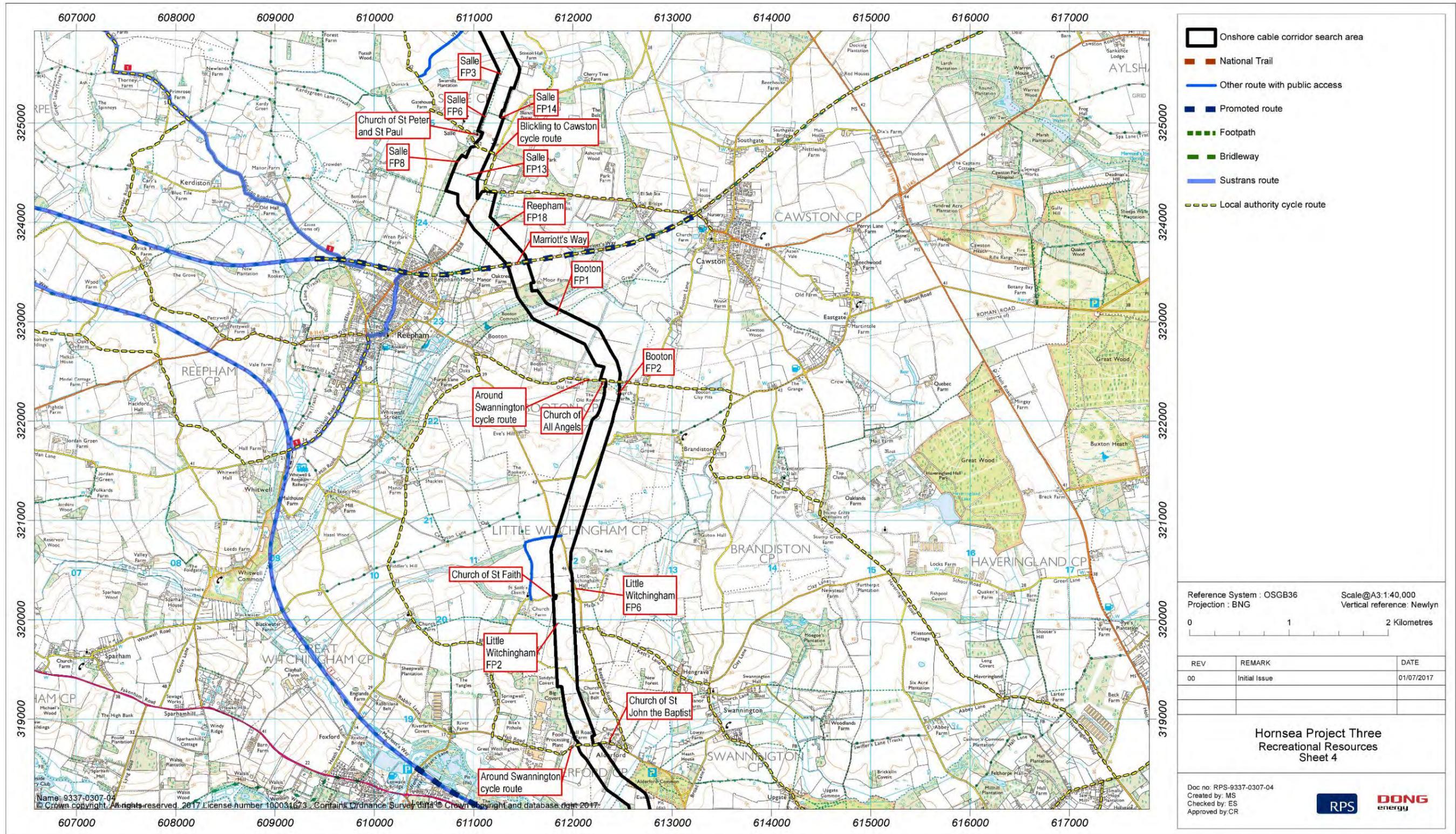


Figure 6.2: Recreational resources.

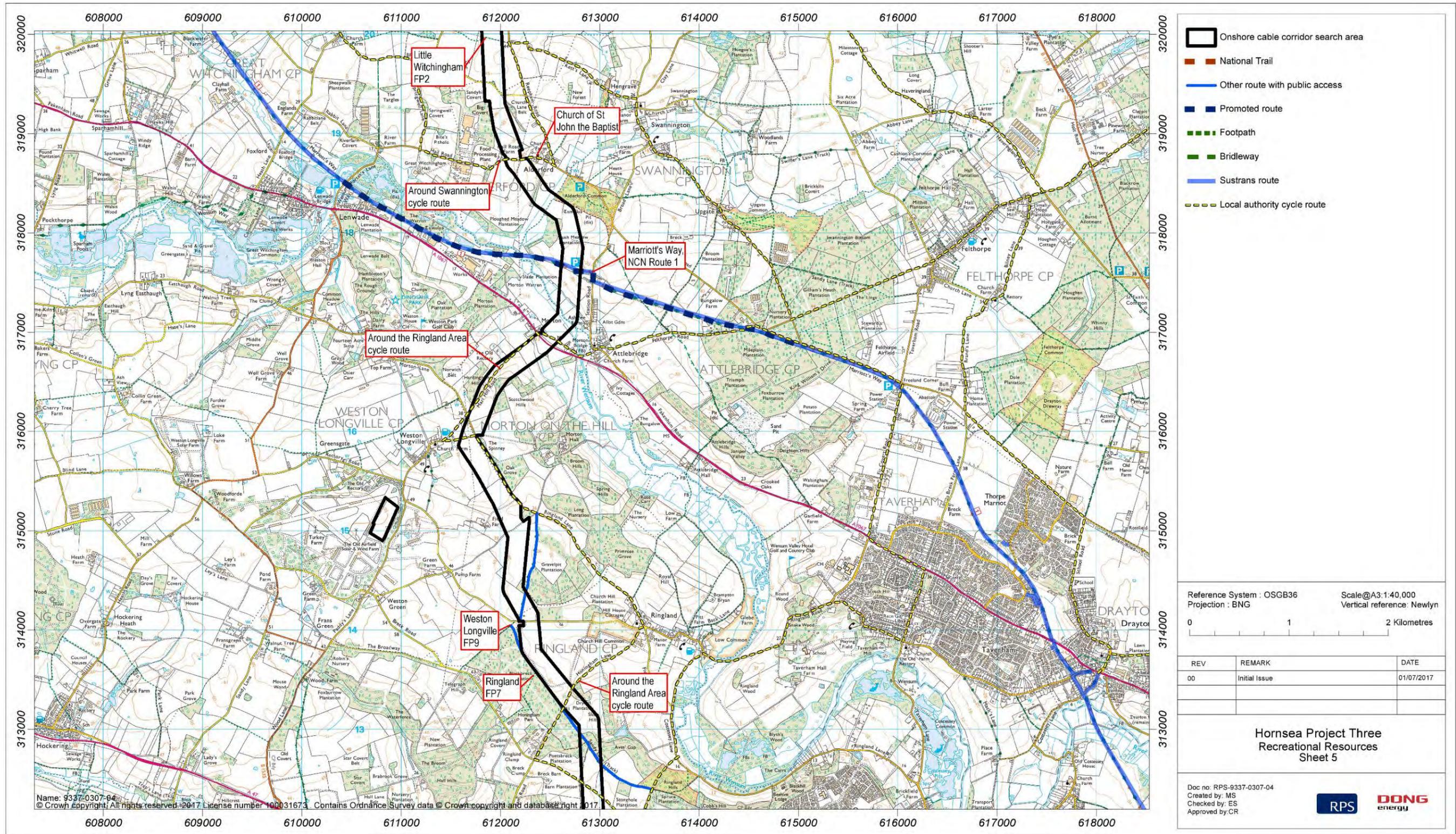


Figure 6.2: Recreational resources.

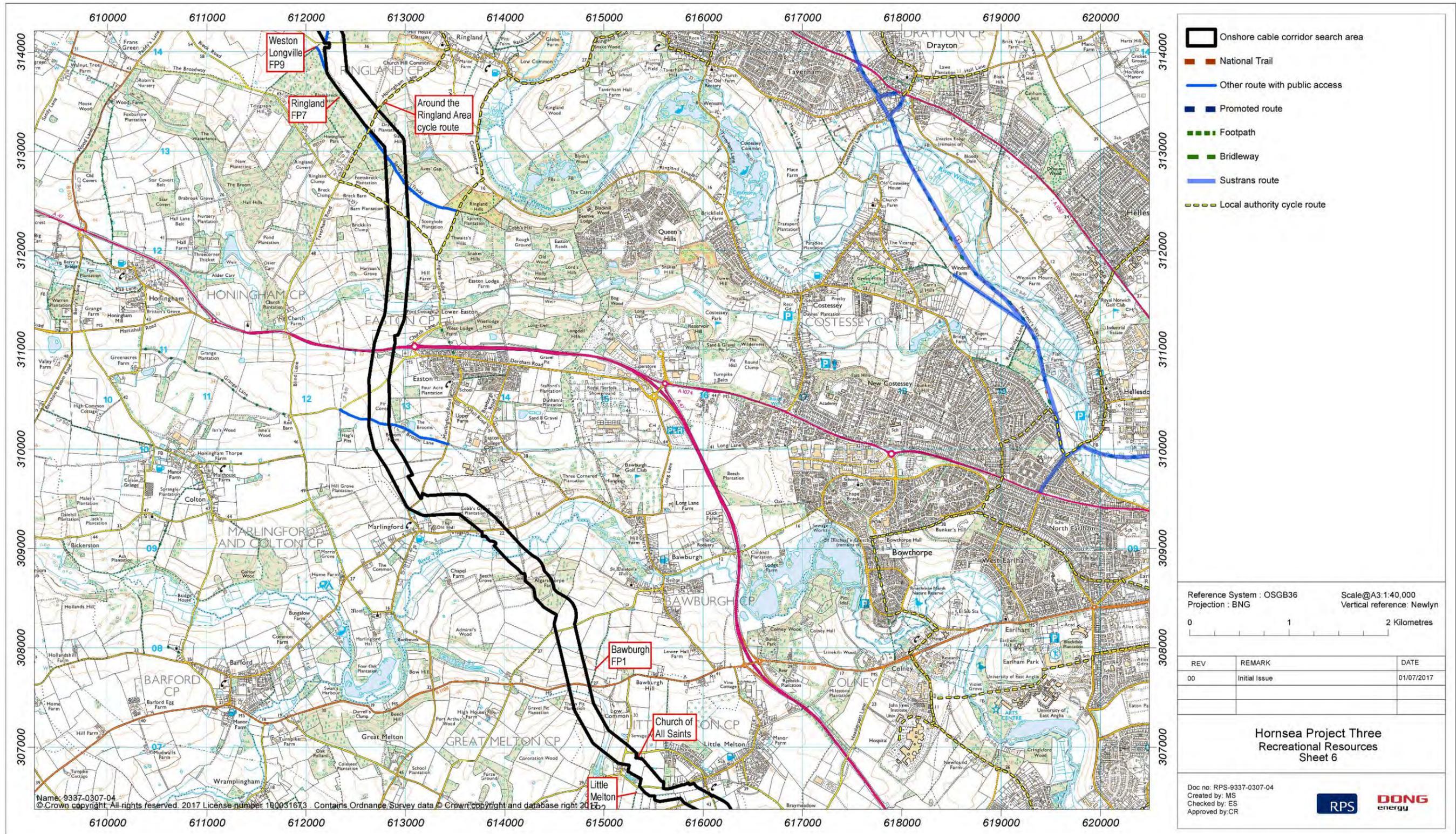


Figure 6.2: Recreational resources.

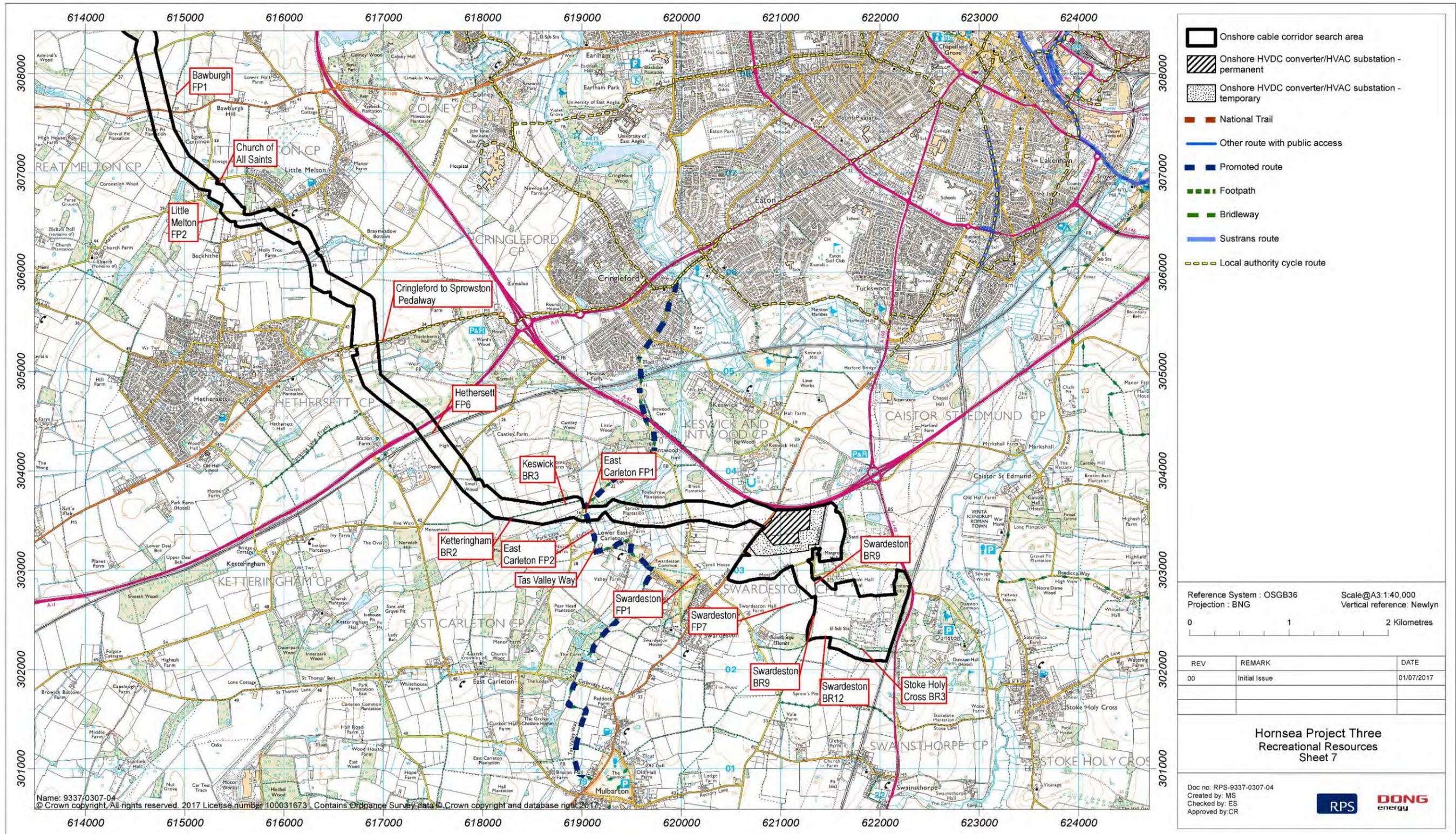


Figure 6.2: Recreational resources.

Access Land (see Figure 6.2)

- 6.7.2.80 Access land, as defined by the Countryside and Rights of Way Act 2000 (the CROW Act) and as mapped by the Countryside Agency (now Natural England), comprises open country (predominantly mountain, moor, heath, and down) and registered common land. The land use and recreation study area crosses the eastern edge of an area of access land known as Kelling Heath, to the east of Kelling, in two locations. Kelling Heath is also designated as a SSSI (for SSSI boundary see chapter 3: Ecology and Nature Conservation). In the reasons for notification it states that “*Kelling Heath provides perhaps the best example of glacial outwash plain in England*”, and is “*a fine example of oceanic heathland*”. The SSSI covers some 90 ha. The Hornsea Three onshore cable corridor search area also lies immediately adjacent to access at Muckleburgh Hill.
- 6.7.2.81 The land use and recreation study area then crosses the southern part of an area of dedicated access land (under Section 16 of the CROW Act) at Bodham Wood, a Forestry Commission England wood covering over 39 ha.
- 6.7.2.82 At Alderford, the land use and recreation study area crosses the western corner of Alderford Common which lies to the south of the village of Alderford. The site forms registered common land parcel CL186. It offers a diverse flora, including species-rich chalk grassland, and is also designated as a SSSI. There is a small car park on the Reepham Road just east of Alderford village.

Recreational Resources (see Figure 6.2)

- 6.7.2.83 A number of recreational resources are located within the land use and recreation study area, including the following:
- The coastal car park accessed from Beach Lane to the north of Weybourne and the area of beach between the car park and MHWS;
 - A corner of the camping site to the north of the A149, west of Weybourne;
 - The North Norfolk Railway, which offers a nearly 17 km round trip by steam train or vintage diesel train between Sheringham and Holt, with stations at Weybourne and Kelling Heath Park. The railway runs three timetables, with services running from February to November;
 - Kelling Heath Holiday Park which offers accommodation in woodland lodges, luxury holiday homes and homes for those with limited mobility, together with touring and camping facilities. The Park has a range of other facilities including a health and fitness club, an outdoor pool, tennis courts, an eco gym, adventure playgrounds, a village store and laundrette. The Park also has a network of footpaths and several self-guided trails and offers a cycle hire service;
 - The Muckleburgh Military Collection is sited on the former Royal Artillery Anti-Aircraft training camp at Weybourne. Its website states that it was opened to the public in 1988 and is the largest privately owned military Museum in the United Kingdom with an extensive range of tanks and armoured cars and exhibits of artillery, machine guns, missiles, ships and land warfare models. The museum is open daily from the end of March to the end of October;

- The River Wensum at Attlebridge and the River Yare at Marlingford are both crossed by the onshore cable corridor. Both rivers are popular for fishing and water-based activities such as canoeing and kayaking.
- Baconsthorpe Castle scheduled monument which lies to the east of the Hornsea Three onshore cable corridor search area. The extensive ruins of the moated and fortified 15th century manor house, gatehouse, courtyards and formal gardens are open to the public at no cost during daylight hours. The site is also Section 15 land under the CROW Act (i.e. land where pre-existing public access rights that on CROW access land apply instead of the CROW rights);
- Salle Park, which lies less than 0.5 km to the east of the Hornsea Three onshore cable corridor search area. The gardens are open to guided tours by appointment;
- The Church of St Peter and St Paul at Salle built in 1400, which lies immediately adjacent to the Hornsea Three onshore cable corridor search area. Services are held twice a month;
- Booton Common nature reserve, which lies immediately adjacent to the Hornsea Three onshore cable corridor search area and is open to the public daily;
- The Church of St Michael and all Angels at Booton, which lies immediately adjacent to the Hornsea Three onshore cable corridor search area. The Grade 2 listed decorative and extraordinary church was the creation of the Reverend Whitwell Elwin, a descendant of Pocahontas of Hiawatha fame, and is described as a “gothic fantasy”. It is open daily;
- The Church of St Faith at Little Witchingham which lies approximately 250 m to the west of the Hornsea Three onshore cable corridor search area. The church is now in the care of the Churches Conservation Trust and is open every day;
- The Church of St John the Baptist at Alderford, built in 1200, which lies less than 200 m to the east of the Hornsea Three onshore cable corridor search area. Services are held every Sunday;
- The Church of All Saints at Mill Road, Little Melton which lies immediately adjacent to the Hornsea Three onshore cable corridor search area. Services are weekly on a Sunday and every Tuesday;
- Mangreen Country House is located to the immediate south and east of the onshore HVDC converter/HVAC substation. This offers bed and breakfast accommodation, a conference centre, meeting rooms and ancillary facilities such as a swimming pool complex and coffee shop. It also runs retreats, training and courses; and
- Gowthorpe Manor which provides holiday accommodation located approximately 450 m to the west of the onshore HVDC converter/HVAC substation.

PRoWs (see Figure 6.2)

- 6.7.2.84 Two National Trails are located within the land use and recreation study area:
- The England Coast Path, a new National Trail around the English Coast which is being opened in sections. The section from Sea Palling to Weybourne is now open to the public and can be accessed from the car park on Beach Lane in Weybourne. This runs along Weybourne FP7; and
 - Behind the shingle beach, the Peddars Way and Norfolk Coast Path National Trail runs west along Weybourne FP7 from its junction with the England Coast Path in Weybourne and comprises two

long distance walking trails, the Peddars Way and the Norfolk Coast Path. The Peddars Way starts in Suffolk at Knettishall Heath Country Park and meets the Norfolk Coast Path at Holme-next-the-Sea. The majority of the Trail runs through the Norfolk Coast AONB.

6.7.2.85 In addition to the National Trails, a network of PRoWs is crossed by the land use and recreation study area. These are listed below.

- Kelling FP14 which runs north-south between The Street in Weybourne to the North Norfolk railway line and then runs south-westwards along the northern side of the line to meeting Kelling FP5;
- Kelling FP15 which runs along the southern side of the North Norfolk railway line from its junction with Weybourne FP1 and Kelling FP5;
- Kelling FP5 which runs south-eastwards from Holgate Hill to its junction with Kelling FP6;
- Kelling FP6 which runs southwards between its junction with Weybourne FP1 and Bridge Road in High Kelling;
- Kelling FP7 which runs southwards from Weybourne FP3 to its junction with Kelling FP6;
- Kelling FP9 which runs in an easterly direction from its junction with Kelling FP6 and Bodham FP2;
- Bodham FP2 which runs in an easterly direction and then southwards from its junction with Kelling FP9 to the A148 Cromer Road.;
- Hempstead FP10 which runs eastwards from Marlpit Lane in Hempstead to School Lane;
- Hempstead BR11 which runs westwards from Hempstead FP14 outside the Hornsea Three onshore cable corridor search area to Hempstead Road and Hempstead BR15;
- Hempstead BR15 which runs westwards from Hempstead Road and Hempstead BR15 to Chapel Lane. The Holt-Mannington Walk runs along BR15 at this location. This 29 km circular walk runs between Holt Country Park and the Mannington Estate and is also crosses by along Hempstead FP10;
- Baconsthorpe FP15 which runs east-west between Hempstead FP8 at Beckett's Farm to Hall Lane where it turns north to meet Baconsthorpe FP1;
- Plumstead BR6 which runs eastwards from its junction with Little Barningham BR1 at Little Wood to Plumstead BR4;
- Little Barningham BR1 which runs southwards along the western boundary of the Hornsea Three onshore cable corridor search area from its junction with Plumstead BR6;
- Corpusty FP19 which runs in a south-easterly direction from Edgefield Road to the B1149 Norwich Road to the north of Saxthorpe;
- Corpusty FP20 which runs in a south-westerly direction from the B1149 Norwich Road to the north of Saxthorpe to Briston Road;
- Corpusty FP2 which runs in a generally south-easterly direction from Briston Road to Croft Lane to the west of Saxthorpe and Corpusty;
- Wood Dalling FP3 which runs in a south-westerly direction from Blackwater Lane to Crabgate Lane, Norton Corner;
- Salle FP3 which runs in a southerly direction from Heydon Road to The Street in Salle;

- Salle FP14 which runs to the east from Salle FP3 to Heydon Road;
- Salle FP13 which runs eastwards from Salle FP8 to Heydon Road;
- Salle FP15 which runs eastwards from Reepham FP18;
- Reepham FP18 which runs southwards from the B1145 Cawston Road to the railway line and then westwards to meet Reepham FP19;
- Booton FP1 which runs in a general south-westerly direction from Booton Lane outside Cawston to The Street in Booton;
- Booton FP2 which runs southeast from Church Road to Grove Lane;
- Little Witchingham FP6 which runs east-west between Reepham Road and Church Road;
- Little Witchingham FP2 which runs generally in an easterly direction between Church Road and Reepham Road;
- Hetherset FP6 which runs in a general east-westerly direction to the north of the railway line between Cantley Lane and Station Cottages Service Road;
- Ketteringham BR2/Keswick BR3 which runs in an east-westerly direction between Cantley Lane and Intwood Lane;
- East Carleton FP1 which runs generally northwards from its junction with East Carleton FP2. The promoted Tas Valley Way, a 40 km long distance path from Cringleford, near Norwich, to Attleborough, runs along this footpath;
- Swardeston BR9 which runs north-south from Mangreen to its junction with Swainsthorpe BR7;
- Swardeston BR12/Stoke Cross BR3 which runs east-west from the A140 Ipswich Road to its junction with Swardeston BR9; and
- Swainsthorpe BOAT6 which runs east-west along Hickling Lane between Gowthorpe Lane and the A140 Ipswich Road.

Other Linear Routes (see Figure 6.2)

6.7.2.86 The land use and recreation study area crosses National Cycle Network Route 1 (NR1) at Attlebridge, which follows the alignment of the disused railway line at this location. NR1 is a long distance cycle route connecting Dover and the Shetland Islands, via the east coast of England and Scotland. It links to a local cycle route running along Station Road to the east. NR1 is also known as the Marriott's Way in this area. The Hornsea Three onshore cable corridor search area also crosses the Marriott's Way at Reepham. Marriott's Way is a 42 km footpath, bridleway and cycle route, which follows the routes of two disused railway lines and runs between the town of Aylsham and the city of Norwich.

6.7.2.87 Other cycle routes crossed by the cable route within the land use and recreation study area are:

- Sustrans Regional Cycle Route 30 (RR30) is crossed by the Hornsea Three onshore cable corridor search area on Church Road in the parish of Bodham. This is an on-road route between Cromer and Wighton;
- The Holt Explorer Loop/Norfolk Coast Explorer Loop on Sandy Hill Lane and Holgate Hill south of Weybourne, and on Church Road in Bodham;

- Bickling to Cawston Cycle Route along Blackwater Lane in Heydon and The Street in Salle. It also runs alongside the cable route on Crabgate Lane North in Heydon;
- Around Swannington Cycle Route on Church Road in Booton and on Hall Road in Alderford;
- Around Ringland Cycle Route on The Street in Attlebridge, Marl Hill Road between Attlebridge and Weston Longville, Ringland Lane south of Weston Longville, and Honingham Lane and Weston Road south of Ringland;
- Cringleford to Sprowston Pedalway along Norwich lane in Hetherset;
- A local cycle route where it runs along Little Melton Road, Mill Road and Rectory Lane between Hetherset and Little Melton and also on Bawburgh Road at Marlingford; and
- A local cycle route along Intwood Lane between East Carleton and Intwood.

6.7.2.88 There are a number of informal paths located landwards from the coast to the northwest of Weybourne and others within the Kelling Heath Holiday Park, which fall within the land use and recreation study area. In addition, the land use and recreation study area crosses following routes marked as 'recreational routes' on OS mapping:

- A route along the Watery Lane track to the south of Heydon. This track is an unsurfaced Norfolk County Council maintained road;
- The eastern end of a route along Cawston Lane to the north of Little Witchingham Hall. This track is an unsurfaced Norfolk County Council maintained road;
- A route along Blackbreck Lane to the west of Ringland. This is an unsurfaced Norfolk County Council maintained road;
- A route along Sandy Lane to the south of Ringland. This is an unsurfaced Norfolk County Council maintained road; and
- A route along Broom Lane to the south of Easton. This is an unsurfaced Norfolk County Council maintained road.

6.7.3 Farming Information

6.7.3.1 Statistical data is available for 2013 from the government website, www.gov.uk/government/statistical-data-sets/structure-of-the-agricultural-industry-in-england-and-the-uk-at-june (Defra, 2016).

6.7.3.2 The distribution of agricultural land use within Local Authority areas that form part of the land use and recreation study area are summarised in the Table 6.8 below.

Table 6.8: Distribution of agricultural land use.

Local Authority area	Area of cereal cropping (ha)	Percentage of cereals	Area of fruit and vegetable growing (ha)	Percentage of fruit and vegetable	Grassland area (ha)	Percentage of grassland
North Norfolk	32,719	68	1,673	4	12,776	28
Broadland	16,136	60	767	3	10,027	37
Norwich and South Norfolk	31,895	62	1,072	2	18,749	36
England	2,492,296	35	128,094	2	4,412,696	63

6.7.3.3 The statistical information identifies that the Local Authority areas within which the Hornsea Three onshore cable corridor search area is situated are characterised as mainly cereal cropping (60 to 68%). This is a much higher percentage than for England as a whole which is dominated overall by grassland use (63%). This data confirms the findings of site visits to the area that identified the Hornsea Three onshore cable corridor search area to be characterised mainly by large scale arable farming, with smaller areas of grassland use, often close to river corridors or around the edges of settlements.

6.7.3.4 The 2013 farming statistical datasets also provide an indication of average farm size at a county level as shown in the Table 6.9 below:

Table 6.9: Distribution of farm sizes in Norfolk and England.

Size of farm (ha)	Norfolk number of farms	Percentage	England number of farms	Percentage
< 5 ha	475	14	9,797	10
5 to 20 ha	695	21	26,918	26
20 to 50 ha	541	16	20,815	20
50 –to100 ha	521	16	18,295	18
100+ ha	1,102	33	27,011	26

6.7.3.5 This data indicates that there is a higher than average number of large farm units (33%), that is those >100 ha in size, compared to the average for England (26%). The site visit for Hornsea Three indicated that, as the statistical data suggests, the land use and recreation study area is characterised by large arable holdings and country estates.

6.7.4 Future baseline scenario

6.7.4.1 No significant changes to the baseline are anticipated in relation to land use, access land, PRowS and other linear recreational routes. New recreational resources may be developed in the future but it is not possible to anticipate what the nature and location of these resources is likely to be. It is possible that land within the land use and recreation study area may be allocated for future development but such additional future land requirements are not known at this point in time. However, this situation will continue to be monitored and the baseline assessment updated as required.

6.7.5 Data limitations

6.7.5.1 Representative soil sampling along within the land use and recreation study area and areas of permanent land take will be undertaken in autumn 2017 (see Table 6.5 and section 6.16) and the results will be reported in the Environmental Statement. For the purposes of the PEIR, the overall pattern of soils and land quality has been established using published data and this provides a suitable data set for the assessment,

6.7.5.2 No data limitations have been identified in the preparation of this PEIR chapter with regard to recreation.

6.8 Key parameters for assessment

6.8.1 Maximum design scenario

6.8.1.1 The maximum design scenarios identified in Table 6.10 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. These scenarios have been selected from the details provided in the project description (volume 1, chapter 3: Project Description). Effects of greater significance are not predicted to arise should any other development scenario, based on details within the project Design Envelope (e.g. alternative cable trench layout), to that assessed here be taken forward in the final design scheme.

6.8.2 Impacts scoped out of the assessment

6.8.2.1 On the basis of the baseline environment and the project description outlined in volume 1, chapter 3: Project Description, a number of impacts are proposed to be scoped out of the assessment for land use and recreation. These impacts are outlined together with a justification for scoping them out in Table 6.11.

Table 6.10: Maximum design scenario considered for the assessment of potential impacts on land use and recreation.

Potential impact	Maximum design scenario	Justification
Construction phase		
Impacts of construction may affect Agricultural Land Classification and farm holdings	<p><u>Hornsea Three landfall</u> Open cut techniques installing up to eight cables with a corridor up to 20 m either side of each cable. The width of the corridor at landfall would be up to 20 m either side of each cable. Up to eight transition joint bays of total up to 2,000 m² (250 m² x 8).</p> <p><u>Onshore export cable corridor</u> Permanent onshore cable corridor area is 3,300,000 m² (60 m wide and 55 km long). Up to six cable trenches (each containing one circuit) each trench is 5 m wide and 2 m deep. Depth of stabilised backfill up to 1.5 m. Up to 330 junction bays and link boxes. Closest separation distance between junction bay and link box: - 750 m. Up to 74,250 m² required for junction bays (based on 330 junction bays (each junction bay is 9 m x 25 m)). Up to 2,970 m² area required for link boxes (based on 330 link boxes (each link box: is 3 m x 3 m)). Up to two temporary haul roads 5 m wide (7 m wide at passing places). The haul road would be surfaced with aggregate on geotextile Up to 50 HDD crossings across surface watercourses. A HDD compound would be located at both ends of the HDD crossing each with a footprint of up to 4,900 m² (70 m x 70 m) with permeable surfacing.</p> <p><u>Onshore HVDC converter/HVAC substation</u> 'Permanent area of site is 128,000 m² (including an area which may be used for landscaping) plus a temporary area of 100,000 m² plus a temporary works area of 100,000 m² The transmission option with the greatest number of buildings and largest footprint is the HVDC converter station – up to five buildings. The main building (single building scenario) for the HVDC converter station will have a footprint of 11,250 m² (75 m x 150 m). Dimensions for the multiple building scenario would be reduced proportionately but the overall footprint would be the same.</p> <p><u>Onshore HVAC booster station</u> Permanent area of site is 25,000 m² plus a temporary works area up to 25,000 m². Building scenario with the largest footprint - single building with area of 4,500 m² (150 m length and 30 m width) and height up to 12.5 m.</p> <p><u>Construction programme</u> Up to 11 years long with up to three phases with a maximum gap of four years.</p>	<p>Open cut construction methods at the Hornsea Three landfall and the onshore cable export route represents the maximum design scenario for construction impacts on Agricultural Land Classification as it leads to disruption of the largest area of agricultural land.</p> <p>The HVAC transmission option represents the maximum design scenario due to the greater number of cable trenches required and therefore, the greatest area of disturbance.</p> <p>The construction period up to 11 years represents the maximum design scenario as it represents the longest period of disruption to Agricultural Land Classification and to farm holdings.</p> <p>These parameters identify the likely maximum length of the construction period and the maximum area of land likely to be affected by the onshore HVAC booster station and onshore HVDC converter/HVAC substation.</p>
Impacts of construction may affect recreational use of the coast	<p><u>Hornsea Three landfall</u> Open cut techniques installing up to eight cables with a corridor up to 20 m either side of each cable. . The width of the corridor at landfall would be up to 20 m either side of each cable. Up to eight transition joint bays of total up to 2,000 m² (250 m² x 8).</p> <p><u>Construction programme</u> Up to 11 years long with up to three phases with a maximum gap of four years.</p>	<p>The maximum design scenario in terms of impacts on the recreational use of the coast is represented by open cut construction methods as this would lead to a larger area of disturbance</p> <p>These parameters identify the likely maximum length of the construction period and the maximum area of land to be affected at the Hornsea Three landfall area. The HVAC transmission option represents the maximum design scenario due to the greater number of cable trenches required and therefore, the greatest area of disturbance.</p> <p>The construction period up to 11 years represents the maximum design scenario as it represents the longest period of disruption to recreational resources.</p>

Potential impact	Maximum design scenario	Justification
<p>Impacts of construction may affect access land</p> <p>Impacts of construction may affect recreational resources</p> <p>Impacts of construction may affect PRoWs</p> <p>Impacts of construction may affect other linear routes</p>	<p><u>Hornsea Three landfall</u></p> <p>Open cut techniques installing up to eight cables with a corridor up to 20 m either side of each cable. . The width of the corridor at landfall would be up to 20 m either side of each cable. Up to eight transition joint bays of total up to 2,000 m² (250 m² x 8).</p> <p><u>Onshore export cable corridor</u></p> <p>Permanent onshore cable corridor area is 3,300,000 m² (60 m wide and 55 km long). Up to six cable trenches (each containing one circuit) each trench is 5 m wide and 2 m deep. Depth of stabilised backfill up to 1.5 m.</p> <p>Up to 330 junction bays and link boxes. Closest separation distance between junction bay and link box: - 750 m. Up to 74,250 m² required for junction bays (based on 330 junction bays (each junction bay is 9 m x 25 m)).</p> <p>Up to 2,970 m² area required for link boxes (based on 330 link boxes (each link box: is 3 m x 3 m)).</p> <p>Up to two temporary haul roads 5 m wide (7 m wide at passing places).</p> <p>Up to 50 HDD crossings across surface watercourses.</p> <p>A HDD compound would be located at both ends of the HDD crossing each with a footprint of up to 4,900 m² (70 m x 70 m) with permeable surfacing.</p> <p><u>Onshore HVDC converter/HVAC substation</u></p> <p>Permanent area of site is 128,000 m² (comprising up to 100,000 m² occupied by the onshore HVDC converter/HVAC substation and approximately up to 30,000 ha for visual mitigation) plus a temporary works area of 100,000 m².</p> <p>The transmission option with the greatest number of buildings and largest footprint is the HVDC converter station – up to five buildings.</p> <p>The main building (single building scenario) for the HVDC converter station will have a footprint of 11,250 m² (75 m x 150 m). Dimensions for the multiple building scenario would be reduced proportionately but the overall footprint would be the same.</p> <p><u>Onshore HVAC booster station</u></p> <p>Permanent area of site is 25,000 m² plus a temporary works area up to 25,000 m².</p> <p>Building scenario with the largest footprint - single building with area of 4,500 m² (150 m length and 30 m width) and height up to 12.5 m.</p>	<p>The maximum design scenario for impacts to recreational resources would be the HVAC transmission option due to the greater number of cable trenches required and the potential need to construct the onshore HVAC booster station as this would result in the largest area of disturbance of the secondary aquifers.</p> <p>The onshore HVDC converter station represents the maximum design scenario as this has the greatest number of buildings and largest footprint and therefore, the largest disturbance from the construction of foundations.</p> <p>The construction period up to 11 years represents the maximum design scenario as it represents the longest period of disruption to recreational resources.</p>
Operation and maintenance phase		
<p>Impacts of operation and maintenance may affect Agricultural Land Classification and farm holdings.</p>	<p><u>Hornsea Three landfall area</u></p> <p>Link boxes would remain in place covered by manhole covers up to 4 m² in size.</p> <p><u>Hornsea Three onshore cable corridor search area</u></p> <p>Up to link boxes. Closest separation distance between link box: - 750 m. Link boxes would remain in place covered by manhole covers up to 4 m² in size.</p>	<p>The HVAC transmission option is the maximum design scenario for impacts to Agricultural Land Classification as it requires a greater number of link boxes and therefore represents the maximum areas that would be out of agricultural production during the operational and maintenance phase.</p>
Decommissioning phase		
<p>Impacts of decommissioning may affect Agricultural Land Classification and farm holdings</p>	<p><u>Hornsea Three onshore cable corridor search area</u></p> <p>Export cables would remain in the ground.</p> <p><u>Onshore HVAC booster station and onshore HVDC converter/HVAC substation</u></p> <p>Complete decommissioning and removal of the onshore HVAC booster station and onshore HVDC converter/HVAC substation. Both would be removed and the site reinstated to its original or for alternative use.</p>	<p>Although the removal of the export cable would present the most disturbance to agricultural land and farm holdings, the most realistic scenario would be that the cable ends are cut, sealed and remain in situ.</p> <p>The maximum design scenario in terms of impacts to Agricultural Land Classification is the removal of the onshore HVAC booster station and onshore HVDC converter/HVAC substation as this represents the most disturbance to agricultural land and farm holdings.</p>

Table 6.11: Impacts scoped out of the assessment for land use and recreation (onshore cable corridor search area).

Potential impact	Justification
Operation phase	
Impacts on recreational resources	Following the completion of the construction works, all areas of access land, recreational resources, PRoWs and other linear routes affected by the onshore works would be re-instated to their current condition and/or along their current alignments. Periodic maintenance operations would not impact on the ongoing use of linear recreational routes or other recreational facilities. Inspection pits along the cable route will be sited to avoid such resources and there are no recreational facilities within the areas required for permanent development.
Decommissioning phase	
Impacts on recreational resources	The onshore export cables would be left in place in the ground during decommissioning so there would be no change to access land, recreational resources, PRoWs or other linear routes within the land use and recreation study area. There are no recreational resources within the sites identified for the onshore HVAC booster station and onshore HVDC converter/HVAC substation. Any effects on the amenity of recreational resources arising from these onshore elements are addressed in volume 3, chapter 4: Landscape and Visual Resources and volume 3, chapter 8: Noise and Vibration of this PEIR..

6.9 Impact assessment criteria

6.9.1.1 The criteria for determining the significance of effects is a two stage process that involves defining the sensitivity of the receptors and the magnitude of the impacts. This section describes the criteria applied in this chapter to assign values to the sensitivity of receptors and the magnitude of potential impacts. The terms used to define sensitivity and magnitude are based on those used in the Design Manual for Roads and Bridges (DMRB) methodology, which is described in further detail in volume 1, chapter 5: Environmental Impact Assessment Methodology.

6.9.1.2 The criteria for defining sensitivity in this chapter are outlined in Table 6.12 below.

Table 6.12: Definition of terms relating to the sensitivity of land use and recreational receptors.

Sensitivity	Definition used for land use receptors	Definition used for recreational resources
Very High	Grade 1 agricultural land, specialised horticultural, intensive agricultural units.	Very high importance and rarity, international scale and very limited potential for substitution.
High	Grades 1 and 2 agricultural land, annual horticultural cropping and arable land.	High importance and rarity, national scale and limited potential for substitution.
Medium	Grades 2 and 3a land, arable land and horticultural cropping.	High or medium importance and rarity, regional scale, limited potential for substitution.
Low (or lower)	Grades 3b and lower quality land. Arable and grassland areas.	Low or medium importance and rarity, local scale.
Negligible	Grade 4 or 5 agricultural land.	Very low importance and rarity, local scale.

6.9.1.3 The criteria for defining magnitude in this chapter are outlined in Table 6.13 below.

Table 6.13: Definition of terms relating to the magnitude of an impact.

Magnitude of impact	Definition used for land use receptors	Definition used for recreational resources
Major	Loss of more than 50 ha of the best and most versatile land. Agricultural production affected at a regional level with full time farming enterprises rendered unworkable	Loss of resource and/or quality and integrity of resource; severe damage of key characteristics, features or elements.
Moderate	Loss of more than 20 ha of the best and most versatile land. Agricultural production	Loss of resource but not adversely affecting integrity of resource; partial loss of/damage to

Magnitude of impact	Definition used for land use receptors	Definition used for recreational resources
	affected at a local level. Full-time farming enterprise/s rendered unworkable.	key characteristics, features or elements.
Minor	Loss of 5 – 20 ha of the best and most versatile land. Affects the workability of individual farming enterprises, but farming can continue as before.	Some measurable change in attributes, quality or vulnerability, minor loss or alteration to one (maybe more) key characteristics, features or elements.
Negligible	Loss of less than 5 ha of the best and most versatile land. No adverse effects on farming enterprises or production.	Very minor loss or detrimental alteration to one or more characteristics, features or elements.
No change	No effects on agricultural land.	No loss or alteration or characteristics, features or elements.

6.9.1.4 The significance of the effect upon land use and recreation is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 6.14. Where a range of significance of effect is presented the final assessment for each effect is based upon expert judgement.

6.9.1.5 For the purposes of this assessment, any effects with a significance level of minor or less have been concluded to be not significant in terms of the EIA Regulations.

Table 6.14: Matrix used for the assessment of the significance of the effect.

Sensitivity of receptor	Magnitude of impact				
	No change	Negligible	Minor	Moderate	Major
Negligible	Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Negligible	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Negligible	Negligible or minor	Minor	Moderate	Moderate or major
High	Negligible	Minor	Minor or moderate	Moderate or major	Major or substantial
Very high	Negligible	Minor	Moderate or major	Major or substantial	Substantial

6.10 Assessment of significance

6.10.1 Measures adopted as part of Hornsea Three

6.10.1.1 As part of the project design process, a number of designed-in measures have been proposed to reduce the potential for impacts on land use and recreation (see Table 6.15). These measures are considered standard industry practice for this type of development. These measures will be secured through a Code of Construction Practice (CoCP) which will be developed in consultation with the relevant stakeholders, and secured through a requirement of the DCO.

Table 6.15: Designed-in measures adopted as part of Hornsea Three.

Measures adopted as part of Hornsea Three	Justification
Soils and agricultural land quality- Soil Management Strategy	
The identification and management of the soil materials on the site (the different soil types present, their characteristics and ALC and topsoil/subsoil depths that will be identified during the soil survey to be undertaken in autumn 2017).	To ensure that the individual soil types and soil profiles are stripped, stored and restored.
Separate stripping and storage of identified topsoil and subsoil resources.	To prevent mixing of soil materials which can reduce overall soil quality.
Location of topsoil and subsoil heaps so as to avoid cross-contamination of materials and the trafficking of soil heaps by construction traffic.	To prevent damage to and losses of soil materials.
Maintenance of topsoil and subsoil heaps in order to reduce potential losses of soil materials during the length of storage.	To prevent damage to and losses of soil materials.
Control of the timing of soil handling operations.	To reduce potential soil damage through handling in unsuitable conditions.
Choice of soil handling machinery and method for its use, in order to reduce potential for soil compaction and soil damage.	To reduce potential soil damage through the inappropriate use of machinery.
Implementation of appropriate soil aftercare following reinstatement.	To enable the land to be handed back to the farmer in a suitable condition.
Careful supervision of soil handling operations on site.	To ensure that recognised good practice is effectively implemented on site.
Implementation of a soil management strategy as part of the site waste management plan.	To provide suitable detailed soil handling guidance that can be implemented effectively on site.
After construction has been completed on a length of Hornsea Three onshore cable corridor, the associated construction compounds and side accesses will be promptly dismantled and the land reinstated.	To reduce the length of time land is out of agricultural production.

Measures adopted as part of Hornsea Three	Justification
Farming framework	
The maintenance and reinstatement, where reasonably practicable, of existing water supplies and drainage systems during the construction process.	To reduce potential disruption of soil drainage in areas beyond the construction corridor.
The maintenance of access routes across individual fields, where reasonably practicable, where these are severed during construction.	To allow the continued management of severed fields throughout the construction.
The maintenance of farm access routes, wherever reasonably practicable, between fields within a farm holding.	To enable the continued operation of farm holdings during the construction process.
Appropriate fencing of the construction corridor, dependent upon the nature of the individual farm holding affected.	To ensure that livestock are kept out of construction areas.
Appropriate construction practices to be implemented to ensure that the potential risk for the spread of animal and plant diseases is reduced as far as practicable.	To reduce, as far as possible, the risk for the spread of animal and plant diseases.
Timing of construction works, where feasible, to minimise disruption to landowners/farming practice, through agreement with landowners.	To reduce, as far as practicable, impacts on farming and ongoing activities on the land affected.
Recreation	
PRoW affected during the construction phase of the works would be crossed by either HDD or by open trench. When HDD is utilised the PRoW would remain open during the duration of construction. Where open trenching is used to cross PRoW, the routes would either be temporarily stopped up/diverted or traffic management measures would be put in place in some locations to maintain access. Where such measures cross a bridleway, all material used would be suitable for use by horses.	To minimise the effects on the PRoW network and maintain access where possible during the construction works. To deaden the noise that may unnerve a horse.
Any PRoW affected during the construction phase will be reinstated following completion of the works to ensure that no permanent effects remain.	To maintain the connectivity of the PRoW network following the completion of the construction works.
Where a PRoW runs along the side of a construction side access traffic management measures would be put in place during construction. These would involve fencing to separate PRoW users from traffic.	To ensure the safety and separation of walkers and HGVs.

6.10.1.2 In some cases there may be additional mitigation measures required that are not "built in" to the project design ahead of the assessment. These are to be discussed in the sections on Further Mitigation and Future Monitoring sections below.

6.10.2 Construction Phase

6.10.2.1 The impacts of the onshore construction of Hornsea Three have been assessed on land use and recreation. The environmental impacts arising from the construction of Hornsea Three are listed in Table 6.10 above, along with the maximum adverse scenario against which each construction phase impact has been assessed.

6.10.2.2 A description of the potential effect on land use and recreation receptors caused by each identified impact is given below.

Impacts of construction may affect Agricultural Land Classification and farm holdings

Magnitude of impact - Agricultural Land Classification

6.10.2.3 There would be a permanent loss of approximately 2.5 ha of land associated with the onshore HVAC booster station and approximately 12.8 ha of land associated with the onshore HVDC converter/HVAC substation at the start of the construction period. In the case of the onshore HVDC converter/HVAC substation this is considered likely to comprise best and most versatile agricultural land. This will be verified in ALC surveys later in 2017.

6.10.2.4 In addition, the onshore cable route would be likely to affect areas of Grades 2 and 3a land, and this could lead to temporary effects on more than 50 ha of the best and most versatile land.

6.10.2.5 The magnitude of the impact on agricultural land classification is assessed as **major** during the construction phase, based on the permanent loss of land associated with the onshore HVAC booster station and HVDC converter/HVAC substation, together with the temporary loss of the best and most versatile land along the Hornsea Three onshore cable corridor search area.

6.10.2.6 However, the implementation of the measures adopted as part of Hornsea Three (Table 6.15) would ensure that soils and the quality of the agricultural land would be restored at the end of the construction period to reduce, as far as possible, any permanent effects on the best and most versatile land.

Magnitude of impact – farm holdings

6.10.2.7 The construction of the Hornsea Three onshore cable corridor search area landward of the Hornsea Three landfall area would also lead to the temporary severance of farmland during this period within a number of farm holdings. There would be an area of approximately 2.5 ha of land permanently lost from agricultural production associated with the onshore HVAC booster station and approximately 12.8 ha of land associated with the HVDC converter/HVAC substation which could affect the workability of individual farms at a local level. During this period there could be disruption to farming management, including changes to farm access within individual fields and along local roads, as well as temporary effects on field drainage and irrigation systems. The construction would affect the workability of individual farms and potentially agricultural productivity at a local level and the magnitude of impact on farm holdings is assessed as **moderate**.

Sensitivity of receptor – Agricultural Land Classification

6.10.2.8 The sensitivity of the receptor is assessed to be **medium** based on the presence of the areas of the best and most versatile land Grades 2 and 3a land.

Sensitivity of receptor – farm holdings

6.10.2.9 The sensitivity of the receptor is assessed to be **medium** based on the presence of mainly arable based farming enterprises.

Significance of the effect- Agricultural Land Classification

6.10.2.10 The temporary effect on Agricultural Land Classification is assessed to be of **major adverse** significance, which is significant in EIA terms. As discussed at paragraph 6.10.2.6, measures adopted as part of Hornsea Three will reduce any permanent effects. The impacts will be temporary and occur only in the construction phase. As the onshore cable route is refined there may be opportunities to avoid areas of best and most versatile land. Hornsea Three will carry out ALC surveys on the onshore cable route targeting different soils types to gain a representative sample of ALC across the works area. It may indicate that less best and most versatile land is present, and less would therefore be affected. Soils management strategies will be developed in order to prevent loss of ALC as a result of the cable route construction, and ensure agreed restoration principles are in place. Hornsea Three will liaise with landowners and the relevant local planning authorities on the development of those strategies.

Significance of the effect- farm holdings

6.10.2.11 The temporary effect on farm holdings is assessed to be of **moderate adverse** significance, which is significant in EIA terms. Hornsea Three will consult with landowners to manage potential disruption to the operation of farm holdings during the construction phase. The final impact assessment on farm holdings will be updated when the onshore cable route is refined, and the construction plan further progressed. The potential impacts on the operation of farm holdings may be reduced as a result.

Impacts of construction may affect the coast

Magnitude of impact

6.10.2.12 The shingle beach at Weybourne is extensive and whilst an area may need to be secured against public access during landfall construction activities, there remain large areas to the east and west that would remain accessible for fishing and other beach based activities during the construction phase. However, there may be temporary disruption to the use of the beach side car park which is addressed below. The magnitude of impact is therefore assessed to be **minor**.

Sensitivity of receptor

6.10.2.13 The beach at Weybourne is primarily a local resource, with extensive areas of shingle to the east and west and therefore the sensitivity is **low**.

Significance of the effect

6.10.2.14 The effect is assessed to be of **minor adverse** significance, which is not significant in EIA terms.

Impacts of construction may affect access land

Magnitude of impact

6.10.2.15 The Hornsea Three onshore cable corridor search area encounters access land on Kelling Heath in two locations, crossing the north eastern tip and a swathe predominantly to the south of the North Norfolk Railway and the southern part of an area of dedicated access land at Bodham. In both cases the public would continue to have access to large areas of access land on both side of Holgate Hill on Kelling Heath, and other areas of access land at Muckleburgh Hill and Weybourne Wood. The Hornsea Three onshore cable corridor search area also crosses the western corner of Alderford Common but the public would continue to have access to the rest of the access land on the common and it would not affect the car parking facilities on the site. The magnitude of impact is therefore assessed to be **minor**.

Sensitivity of receptor

6.10.2.16 Access land is a national designation and therefore the sensitivity is **high**.

Significance of the effect

6.10.2.17 The effect is assessed to be of **minor adverse** significance, which is not significant in EIA terms.

Impacts of construction may affect recreational resources

Magnitude of impact

6.10.2.18 The Hornsea Three onshore cable corridor search area crosses the River Wensum at Attlebridge and the River Yare at Marlingford and both are popular for fishing and water-based activities such as canoeing and kayaking. The onshore export cable would be installed under these rivers by means of a directional drilling technology and therefore there would be no direct effects on their use for recreational purposes. Any effects on their amenity during the construction phase arising from changes to the visual and acoustic environment are addressed in chapter 4: Landscape and Visual Resources and chapter 8: Noise and Vibration respectively.

6.10.2.19 Baconsthorpe Castle scheduled monument lies to the east of the Hornsea Three onshore cable corridor search area and would remain available to visitors during the construction stage of the project. Any effects on the setting of this site during construction are addressed in chapter 5: Historic Environment and any temporary effects on its amenity arising from changes to the visual and acoustic environment addressed in chapters 4: Landscape and Visual Resources and chapter 8: Noise and Vibration respectively.

6.10.2.20 Those visitor resources that lie outside but proximate to the onshore export cable construction activities (i.e. Salle Park; The Church of St Peter and St Paul at Salle; Booton Common nature reserve; The Church of St Michael and all Angels at Booton; The Church of St Faith at Little Witchingham; The Church of St John the Baptist at Alderford; and The Church of All Saints at Mill Road, Little Melton; Mangreen Country House; and Gowthorpe Manor) would remain available to visitors during the construction stage of the project. The effects on the amenity of these visitor resources arising from changes to the visual and acoustic environment addressed in chapters 4: Landscape and Visual Resources and chapter 8: Noise and Vibration respectively.

6.10.2.21 There is the potential for the installation of the onshore export cable to result in temporary disruption to a number of recreational resources for during construction, as listed below:

- The coastal car park accessed from Beach Lane to the north of Weybourne and the area of beach between the car park and MHWS;
- The Muckleburgh Military Collection is sited on the former Royal Artillery Anti-Aircraft training camp at Weybourne;
- Foxhills Camping site in Weybourne accessed off the A149;
- The North Norfolk Railway west of Kelling Halt; and
- The western part of Kelling Heath Holiday Park.

6.10.2.22 These resources operate at maximum capacity during the summer months and therefore the magnitude of the impact on them will be dependent on construction phasing and programming. Should disruption occur at peak times, the magnitude of impact could be as high as **major**.

Sensitivity of receptor

6.10.2.23 These local resources are also visitor attractions and therefore the sensitivity is **medium**.

Significance of the effect

6.10.2.24 The effect is assessed to be of up to **moderate adverse** significance, which is significant in EIA terms. This presents a worst case scenario and given the expected durations of each element of construction as set out in volume 1, chapter 3: Project Description. It is unlikely that all of these receptors would be impacted at the same time of year. If construction activities in these locations took place outside peak times then the impact level would likely be reduced.

Impacts of construction may affect PRowS

Magnitude of impact

- 6.10.2.25 There is the potential for the landfall construction works to result in the temporary disruption to a section of the Peddars Way and Norfolk Coast Path National Trail running west from its junction with the England Coast Path in Weybourne during construction. The magnitude of impact would be dependent on the method of construction and the construction phasing (i.e. the use of HDD technology to install the onshore export cable under the National Trail would have a lower magnitude of impact than open cutting a trench through the route). Likewise, landfall construction outside the peak period for visitors would have a lower magnitude of impact than construction at the height of the peak summer period. Therefore, the magnitude of impact could be as high as **major**.
- 6.10.2.26 In addition to the Peddars Way and Norfolk Coast Path National Trail, there is the potential for the onshore cable construction works to have a temporary impact on those PRowS identified in the baseline section of this chapter (see paragraph 6.7.2.84 and 6.7.2.85).
- 6.10.2.27 The method of crossing those PRowS that traverse the Hornsea Three onshore cable corridor search area will either be via an open cut method, trenching or HDD technology, the latter more likely to be used alongside the North Norfolk Railway, for example. In such cases temporary traffic management measures would be put in place to maintain public access along affected routes as far as it is practicable to do so. Where the PRowS run within the Hornsea Three onshore cable corridor it is proposed that they would be temporarily diverted to maintain public access where possible. Should it be necessary to temporarily stop up any PRowS alternative routes would be waymarked to maintain public access to the PRowS network. During the construction phase the public would also have be able to use unaffected areas of access land in the area (e.g. at Kelling Heath) and also other PRowS within the local area. The magnitude of impact on these local PRowS is therefore assessed to be **minor**.

Sensitivity of receptor

- 6.10.2.28 The Peddars Way and Norfolk Coast Path National Trail is a national designation and therefore the sensitivity is **high**. The other PRowS affected by the installation of the onshore export cable comprise local routes and therefore the sensitivity is **low**.

Significance of the effect

- 6.10.2.29 The temporary effect on the Peddars Way and Norfolk Coast Path National Trail is therefore assessed to be of up to **major adverse** significance, which is significant in EIA terms. This represents the worst case. This will be mitigated through the agreement and implementation of temporary network management measures, and discussion about the timing of the works, which will be progressed with Norfolk County Council. Construction works could be managed to minimise impacts at peak times (e.g. public holidays) in which case the impact level would reduce to **minor adverse** significance, which is not significant in EIA terms.

Impacts of construction may affect other linear routes

Magnitude of impact

- 6.10.2.30 The Hornsea Three onshore cable corridor search area crosses the off-road National Cycle Network Route 1 (NR1) at Attlebridge and Sustrans Regional Cycle Route 30 (RR30) in two locations on Church Road to the south of Bodham. In addition the following routes would be affected by the installation of the onshore cable route:
- Some informal paths between the coast and Weybourne and within Kelling Heath Holiday Park;
 - A local cycle route running along Little Melton Road, Mill Road and Rectory Lane between Hethersett and Little Melton and also on Bawburgh Road at Marlingford;
 - The Marriott's Way at Reepham;
 - A number of 'recreational routes' (e.g. along Watery Lane, Blackbreck Lane, Sandy Lane and Broom Lane) which are all unsurfaced maintained roads;
 - The Holt Explorer Loop/Norfolk Coast Explorer Loop on local roads south of Weybourne and at Bodham;
 - Bickling to Cawston Cycle Route on local roads in Heydon and Salle;
 - Around Swannington Cycle Route on local roads in Booton and Alderford;
 - Cringleford to Sprowston Pedalway in Hethersett;
 - Around Ringland Cycle Route on local roads in Attlebridge, Weston Longville and south of Ringland; and
 - A local cycle route along Intwood Lane between East Carleton.
- 6.10.2.31 These routes could be subject to temporary disruption during construction. Alternative routes may be available to the public but these may result in longer journeys depending on their start and finish locations. The magnitude of impact would primarily be dependent on the method of construction as these routes are used throughout the year (i.e. the use of HDD technology to install the onshore export cable under the National Cycle Route would have a lower magnitude of impact than open cutting a trench through the route). Therefore, the magnitude of impact could be as high as **moderate**.

Sensitivity of receptor

- 6.10.2.32 The National Cycle Network Route is a national designation and therefore the sensitivity is **high**. The remaining resources are local in scale and therefore the sensitivity is **low**.

Significance of the effect

- 6.10.2.33 The temporary effect is therefore assessed to be of **moderate adverse** significance for the National Cycle Network Route, which is significant in EIA terms. This will be mitigated through the agreement and implementation of temporary network management measures, and discussion about the timing of the works, which will be progressed with Norfolk County Council. The temporary effect on the other routes is assessed to be of **minor adverse** significance, which is not significant in EIA terms.

Future monitoring

- 6.10.2.34 No future monitoring is required in relation to land use or recreational resources temporarily affected during the construction phase of Hornsea Three.

6.10.3 Operational and maintenance phase

- 6.10.3.1 The impacts of the onshore operation and maintenance of Hornsea Three have been assessed on land use and recreation. The environmental impacts arising from the operation and maintenance of Hornsea Three are listed in Table 6.10 along with the maximum adverse scenario against which each operation and maintenance phase impact has been assessed.

- 6.10.3.2 A description of the potential effect on land use and recreation receptors caused by each identified impact is given below.

Impacts of operation and maintenance may affect Agricultural Land Classification and farm holdings

Magnitude of impact – Agricultural Land Classification

- 6.10.3.3 The restoration of soils along the Hornsea Three onshore cable corridor search area following the completion of the construction of Hornsea Three would enable land to be returned to its former agricultural use. There would be a remaining permanent loss of approximately 2.5 ha of land associated with the onshore HVAC booster station and approximately 12.8 ha of land associated with the onshore HVDC converter/HVAC substation.
- 6.10.3.4 The measures in Table 6.15 would be implemented to reduce, as far as possible, any permanent effects on the best and most versatile land. However, it is considered that there could be a loss of quality in limited areas along the Hornsea Three onshore cable corridor search area following restoration, and therefore that the magnitude of the impact on agricultural land classification is assessed as **minor**.

Magnitude of impact – farm holdings

- 6.10.3.5 There would be a remaining permanent loss of approximately 2.5 ha of land associated with the onshore HVAC booster station and approximately 12.8 ha land associated with the onshore HVDC converter/HVAC substation. The restoration of soils along the Hornsea Three onshore cable corridor search area following the completion of the construction of Hornsea Three would enable the land to be returned to its former agricultural use and returned to the farm holdings of which it forms part. The impact on farm holdings during operation is therefore assessed to be **negligible to minor**.

Sensitivity of receptor- Agricultural Land Classification

- 6.10.3.6 The sensitivity of the receptor is assessed to be **medium** based on the presence of the best and most versatile land.

Sensitivity of receptor – farm holdings

- 6.10.3.7 The sensitivity of the receptor is assessed to be **medium** based on the presence of mainly arable based farming enterprises.

Significance of the effect- Agricultural Land Classification

- 6.10.3.8 The effect on agricultural land classification is assessed to be of **minor adverse** significance, which is not significant in EIA terms.

Significance of the effect – Farm Holdings

- 6.10.3.9 The effect on farm holdings is assessed to be of **negligible to minor adverse** significance, which is not significant in EIA terms.

6.10.4 Decommissioning phase

- 6.10.4.1 The impacts of the onshore decommissioning of Hornsea Three have been assessed on land use. The environmental effects arising from the decommissioning of Hornsea Three are listed in Table 6.10 along with the maximum design scenario against which each decommissioning phase impact has been assessed.

- 6.10.4.2 A description of the potential effect on land use and recreation receptors caused by each identified impact is given below.

Impacts of decommissioning may affect Agricultural Land Classification and farm holdings

- 6.10.4.3 For the purposes of this assessment, the onshore export cables would be left in place in the ground after decommissioning. It is also assumed that the onshore HVAC booster station and onshore HVDC converter/HVAC substation areas would be restored to its original use or alternative use. These activities would not result in any impacts on recreational resources within the land use and recreation study area although traffic management measures may be required should access to the site for these purposes need to cross a linear recreational route. Hornsea Three will develop those management measures in consultation with Norfolk County Council.

6.11 Cumulative Effect Assessment methodology

6.11.1 Screening of other projects and plans into the Cumulative Effect Assessment

- 6.11.1.1 The Cumulative Effect Assessment (CEA) takes into account the impact associated with Hornsea Three together with other projects and plans. The projects and plans selected as relevant to the CEA presented within this chapter are based upon the results of a screening exercise undertaken as part of the 'CEA long list' of projects (see annex 4.5: Cumulative Effects Screening Matrix and Location of Schemes). Each project on the CEA long list has been considered on a case by case basis for scoping in or out of this chapter's assessment based upon data confidence, effect-receptor pathways and the spatial/temporal scales involved.

6.11.1.2 In undertaking the CEA for Hornsea Three, it is important to bear in mind that other projects and plans under consideration will have differing potential for proceeding to an operational stage and hence a differing potential to ultimately contribute to a cumulative impact alongside Hornsea Three. For example, relevant projects and plans that are already under construction are likely to contribute to cumulative impact with Hornsea Three (providing effect or spatial pathways exist), whereas projects and plans not yet approved or not yet submitted are less certain to contribute to such an impact, as some may not achieve approval or may not ultimately be built due to other factors. For this reason, all relevant projects and plans considered cumulatively alongside Hornsea Three have been allocated into 'Tiers', reflecting their current stage within the planning and development process. This allows the CEA to present several future development scenarios, each with a differing potential for being ultimately built out. Appropriate weight may therefore be given to each Tier in the decision making process when considering the potential cumulative impact associated with Hornsea Three (e.g. it may be considered that greater weight can be placed on the Tier 1 assessment relative to Tier 2). An explanation of each tier is included below:

- Tier 1: Hornsea Three considered alongside other project/plans currently under construction and/or those consented but not yet implemented, and/or those submitted but not yet determined and/or those currently operational that were not operational when baseline data was collected, and/or those that are operational but have an on-going impact;
- Tier 2: All projects/plans considered in Tier 1, as well as those on relevant plans and programmes likely to come forward but have not yet submitted an application for consent (the PINS programme of projects is the most relevant source of information). Specifically, this Tier includes all projects where the developer has submitted a Scoping Report; and
- Tier 3: All projects/plans considered in Tier 2, as well as those on relevant plans and programmes likely to come forward but have not yet submitted an application for consent (the PINS programme of projects is the most relevant source of information, along with the planning register maintained by the relevant local planning authorities). Specifically, this Tier includes all projects where the developer has advised PINS in writing that they intend to submit an application in the future but have not submitted a Scoping Report.

6.11.1.3 The specific projects scoped into this CEA and the Tiers into which they have been allocated, are outlined in Table 6.16. The projects included as operational in this assessment have been commissioned since the baseline studies for this project were undertaken and as such were excluded from the baseline assessment.

Table 6.16: List of other projects and plans considered within the CEA.

Tier	Phase	Project/Plan	Distance from Hornsea Three	Details	Date of Construction (if applicable)	Overlap of construction phase with Hornsea Three construction phase	Overlap of operation phase with Hornsea Three operation phase
1	Housing						
	Construction	PF/14/0859 Land at Hall Close, Bodham, Holt	<1 km	16 dwellings	2017 and 2018	Yes	No
		PF/15/1224 Land off Rectory Road, Edgefield	<1 km	22 dwellings	2020 to 2022	Yes	No
		2015/2082 Land south of Village Hill, Bawburgh	<1 km	10 dwellings	2021 and 2022	Yes	No
		2014/2611 Land north and south of Dereham Road, Easton	<1 km	890 dwellings	2021 to 2028	Yes	No
		2013/0092 Land South of Ringwood Close, Little Melton	<1 km	20 dwellings	2020 and 2021	Yes	No
		2015/2630 Land South east of the Gardens, Little Melton	<1 km	8 dwellings	2017 and 2018	Yes	No
		2015/1697 Land North of Gibbs Close, Little Melton	<1 km	27 dwellings	2019 and 2020	Yes	No
		2015/1594 Land North of Hethersett Village	<1 km	95 dwellings	2018 to 2050	Yes	No
		2015/1681 Land North of Hethersett Village	<1 km	126 dwellings	2018 to 2050	Yes	No
2012/1814 Land North of Great Melton Road, Hethersett	<1 km	158 dwellings	2017 to 2020	Yes	No		
Aggregates							
Construction	C/7/2014/7030	< 1 km	A southern extension to Mangreen Quarry and ancillary works with progressive restoration to agriculture and nature conservation; retention of existing consented facilities; establishment of crossing point over Mangreen Lane; and proposed variation to approved restoration scheme.	2019 to 2014	Yes	No	
Campsite							
Construction	PF/12/1263	Access to the site is along a track within the Hornsea Three onshore cable corridor search area.	Change of use of land from agriculture to 53 units tent-only campsite and formation of vehicular access at Pitt Farm, The Street, Baconsthorpe.	No information is available.	Yes - should both projects be constructed at the same time there is the potential for cumulative impacts on this recreational resource.	There would be no impacts on this PRoW during the operation of Hornsea Three and therefore no cumulative impacts would arise.	
2	Offshore wind farm						
Construction	EN10079 Norfolk Vanguard is a proposed offshore windfarm with an approximate capacity of 1800 MW off the coast of Norfolk.	The proposed onshore cable route crosses the Hornsea Three cable corridor near Reepham	Norfolk Vanguard is a proposed offshore windfarm with an approximate capacity of 1800 MW off the coast of Norfolk.	2020 to 2024	Yes - should both projects be constructed at the same time there is the potential for cumulative impacts on these recreational resources.	There would be no impacts on these resources during the operation and maintenance of Hornsea Three and therefore no cumulative impacts would arise.	

6.11.2 Maximum design scenario

6.11.2.1 The maximum design scenarios identified in Table 6.17 have been selected as those having the potential to result in the greatest effect on an identified receptor or receptor group. The cumulative impact presented and assessed in this section have been selected from the details provided in the Hornsea Three project description (volume 1, chapter 3: Project Description), as well as the information available on other projects and plans, in order to inform a 'maximum design scenario'. Effects of greater significance are not predicted to arise should any other development scenario, based on details within the project Design Envelope, to that assessed here be taken forward in the final design scheme.

Table 6.17: Maximum design scenario considered for the assessment of potential cumulative impacts on land use and recreation.

Potential impact	Maximum adverse scenario	Justification
Construction phase		
Impacts of construction on Agricultural Land Classification and farm holdings	Tier 1 PF/14/0859 Land at Hall Close, Bodham, Holt PF/15/1224 Land off Rectory Road, Edgefield 2015/2082 Land south of Village Hill, Bawburgh 2014/2611 Land north and south of Dereham Road, Easton 2013/0092 Land South of Ringwood Close, Little Melton 2015/2630 Land South east of the Gardens, Little Melton 2015/1697 Land North of Gibbs Close, Little Melton 2015/1594 Land North of Hethersett Village 2015/1681 Land North of Hethersett Village 2012/1814 Land North of Great Melton Road, Hethersett C/7/2014/7030	These housing schemes together would lead to the permanent loss of agricultural land and could affect areas of the “best and most versatile” Grades 1, 2 and 3a land and farm holdings. The extension of Mangreen Quarry would be restored to agricultural land at the end of the construction period and would not therefore lead to cumulative permanent losses of agricultural land or permanent effects on farm holdings.
	Tier 2 Hornsea Three and EN010079	The onshore cable route for proposed Norfolk Vanguard windfarm would be restored to agricultural land at the end of the construction period and would not therefore lead to cumulative permanent losses of agricultural land or permanent effects on farm holdings.
Impacts of construction may affect the coast.	Tier 1 Hornsea Three and PF/12/1263	Should these projects be constructed at the same time as Hornsea Three there is the potential for cumulative impacts on PRowWs and other linear recreational resources.

Potential impact	Maximum adverse scenario	Justification
Impacts of construction may affect recreational resources. Impacts of construction may affect access land. Impacts of construction may affect PRowWs. Impacts of construction may affect other linear routes.	The access to the Pilt Farm site is along an existing track along which Hempstead BR11. The long distance Holt-Mannington Walk runs along this PRowW and therefore there is a potential cumulative impact on this resource during construction and operation Tier 2 Hornsea Three and EN010079 The proposed onshore cable route for Norfolk Vanguard crosses Reepham FP18 and Salle FP15 and the long distance Marriott's Way and therefore there is a potential impact on these resources during construction.	Should these projects be constructed at the same time as Hornsea Three there is the potential for cumulative impacts on PRowWs and other linear recreational resources.
Tier 3 – No Projects included for Cumulative Assessment		
Operation phase		
No further effects on Agricultural Land Classification and farm holdings would be anticipated following the completion of construction for these projects.	N/A	N/A
There would be no impacts on these linear recreational resources during the operation of Hornsea Three and therefore no cumulative impacts with other projects would arise.	N/A	N/A
Decommissioning phase		
No further effects on Agricultural Land Classification and farm holdings would be anticipated during the de-commissioning of Hornsea Three.	N/A	N/A
There would be no impacts on these linear recreational resources during the de-commissioning of Hornsea Three as it is anticipated that the onshore cables would be left in situ. Therefore no cumulative impacts with other projects would arise.	N/A	N/A

6.12 Cumulative Effect Assessment

6.12.1.1 A description of the significance of cumulative effects upon land use and recreation receptors arising from each identified impact is given below. These only relate to the construction phase.

6.12.2 Construction phase

Cumulative loss of Agricultural Land Classification and farm holdings

Tier 1

Magnitude of impact

Agricultural Land Classification

6.12.2.1 Based on the assumption that the areas of land permanently affected within the cumulative schemes could include additional Grades 2 or 3a agricultural land, it is assessed that the magnitude of the impact on agricultural land from these schemes and Hornsea Three could be **major**.

Farm holdings

6.12.2.2 The cumulative magnitude of impact is assessed to be **minor**. Whilst the workability of farming enterprises may be affected, overall, farming operations can continue as before.

Sensitivity of receptor

Agricultural Land Classification

6.12.2.3 Based on the assumption that the areas of land within the cumulative schemes could include additional the “*best and most versatile*” Grades 2 or 3a agricultural land, it is assessed that these areas, together with the land within Hornsea Three, would be of **high** sensitivity.

Farm holdings

6.12.2.4 The cumulative sensitivity of the resources affected is assessed to be **medium**, based on the dominance of arable cropping in the areas.

Significance of effect

Agricultural Land Classification

6.12.2.5 The cumulative effect of Hornsea Three would be assessed as **moderate adverse**, based on a **medium** sensitivity and a potential **major** magnitude of impact, which is significant in EIA terms.

6.12.2.6 As discussed at paragraph 6.10.2.6, measures adopted as part of Hornsea Three will reduce any permanent effects. The impacts will be temporary and occur only in the construction phase. As the onshore cable route is refined there may be opportunities to avoid areas of best and most versatile land. Hornsea Three will carry out ALC surveys on the onshore cable route targeting different soils types to gain a representative sample of ALC across the works area. It may indicate that less best and most versatile land is present, and less would therefore be affected. Soils management strategies will be developed in order to prevent loss of ALC as a result of the cable route construction, and ensure agreed restoration principles are in place. Hornsea Three will liaise with landowners and the relevant local planning authorities on the development of those strategies.

Farm Holdings

6.12.2.7 The cumulative effect of Hornsea Three would be as assessed as **negligible to minor adverse**, based on a **medium** sensitivity and a **minor** magnitude of impact, which is not significant in EIA terms.

Tier 2

Cumulative loss of Agricultural Land Classification and farm holdings

Agricultural Land Classification and farm holdings

6.12.2.8 The onshore cable route for proposed Norfolk Vanguard windfarm would be restored to agricultural land at the end of the construction period and would not therefore lead to cumulative permanent losses of agricultural land.

Cumulative temporary impact on access land, recreational resources, PRoWs and other linear routes

Tier 1

Magnitude of impact

6.12.2.9 The impact is predicted to be of local spatial extent, short term duration, continuous and reversible. It is predicted that the impact will affect the receptors directly. The magnitude is therefore, considered to be **minor**.

Sensitivity of receptor

6.12.2.10 The receptors are deemed to be low value. The sensitivity of the receptors is therefore considered to be **low**.

Significance of Effect

6.12.2.11 Overall, it is predicted that the sensitivity of the receptors are considered to be **minor** and the magnitude is deemed to be **low**. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Tier 2

Magnitude of impact

- 6.12.2.12 The impact is predicted to be of local spatial extent, short term duration, continuous and reversible. It is predicted that the impact will affect the receptors directly. The magnitude is therefore, considered to be **minor**.

Sensitivity of receptor

- 6.12.2.13 The receptors are deemed to be low value. The sensitivity of the receptor is therefore, considered to be **low**.

Significance of Effect

- 6.12.2.14 Overall, it is predicted that the sensitivity of the receptors is considered to be **minor** and the magnitude is deemed to be **low**. The effect will, therefore, be of **minor adverse** significance, which is not significant in EIA terms.

Future monitoring

- 6.12.2.15 No future monitoring is proposed.

6.13 Transboundary effects

- 6.13.1.1 A screening of transboundary impacts has been carried out and is presented in volume 5, annex 5.5: Transboundary Impacts Screening Note. This screening exercise identified that there was no potential for significant transboundary effects with regard to land use and recreation from Hornsea Three upon the interests of other EEA States.

6.14 Inter-related effects

- 6.14.1.1 Inter-relationships are considered to be the impacts and associated effects of different aspects of the proposal on the same receptor. These are considered to be:
- Project lifetime effects: Assessment of the scope for effects that occur throughout more than one phase of the project (construction, operational and maintenance, and decommissioning), to interact to potentially create a more significant effect on a receptor than if just assessed in isolation in these three key project stages (e.g. construction phase noise, operational noise and noise during decommissioning and dismantling at the onshore HVDC converter/HVAC substation sites); and
 - Receptor led effects: Assessment of the scope for all effects to interact, spatially and temporally, to create inter-related effects on a receptor. As an example, all effects on a given land use and recreation, such as PRowS (e.g. construction dust and noise, increased traffic and visual change etc.) may interact to produce a different, or greater effect on this receptor than when the effects

are considered in isolation. Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

- 6.14.1.2 A description of the likely inter-related effects arising from Hornsea Three on land use and recreation is provided in chapter 12: Inter-Related Effects (Onshore).

6.15 Conclusion and summary

6.15.1 Agricultural Land Use

- 6.15.1.1 A summary of the potential environmental effects on agricultural land classification and farm holdings is set out in Table 6.18 below. This illustrates that there would be **major adverse** effect on agricultural land classification during the construction phase of Hornsea Three as a result of the permanent loss of land associated with the onshore HVAC booster station and onshore HVDC converter/HVAC substation, together with the temporary loss of the best and most versatile land along the Hornsea Three onshore cable corridor search area. During construction, measures adopted as part of Hornsea Three (Table 6.15) would ensure that soils and the quality of the agricultural land would be restored at the end of the construction period to reduce, as far as possible, any permanent effects on the best and most versatile land. Further ALC survey work later in 2017 will provide more detailed information about the agricultural land that would potential be affected, and will be used to inform the updated assessment that will accompany the final DCO application. Following completion of the construction works the soils along the Hornsea Three onshore cable corridor search area would be restored to enable land to be returned to its former agricultural use but there could be a loss of quality in limited areas along the route and therefore there would **minor adverse** effect on agricultural land classification during operation.
- 6.15.1.2 There would be **moderate adverse** effects on farms holdings during construction arising from the potential severance of farmland within a number of farm holdings and the permanent loss of approximately 12.5 ha from agricultural production associated with the onshore HVAC booster station and the onshore HVDC converter/HVAC substation. During this period there could be disruption to farming management, including changes to farm access within individual fields and along local roads, as well as temporary effects on field drainage and irrigation systems. This impact will be reviewed as part of the updated assessment that will accompany the final DCO application, following further refinement of the onshore cable route, and liaison with landowners. Following construction the restoration of soils along the Hornsea Three onshore cable corridor search area would enable the land to be returned to its former agricultural use and returned to the farm holdings of which it forms part but there would still be permanent loss of approximately 12.5 ha of land which is assessed to have a **negligible to minor adverse** effect on farm holdings during operation.

6.15.1.3 It is assumed that the onshore export cables would be left in place in the ground after decommissioning and the onshore HVAC booster station and onshore HVDC converter/HVAC substation areas would not be restored to an agricultural use, resulting in the permanent loss of agricultural land quality in these areas remains. The effects on both agricultural land classification and farm holdings would therefore be the same as during operation.

6.15.2 Recreation

6.15.2.1 A summary of the potential environmental effects on recreational resources is set out in Table 6.18 below. This shows that during the construction phase of Hornsea Three there would be temporary **minor adverse** effects on the following recreational resources, with the public having access to a range of alternative resources during this time.

- Public access to the coast at the Hornsea Three landfall area;
- Access land on Kelling Heath, Bodham and Alderford Common;
- Local PRoWs; and
- Local cycle routes and other recreational routes.

6.15.2.2 There is the potential for the installation of the onshore export cable to result in temporary disruption to a number of other recreational resources during construction, such as the coastal car park accessed from Beach Lane, the Muckleburgh Military Collection, the Foxhills camp site, the North Norfolk Railway west of Kelling Hall, part of Kelling Heath Holiday Park. The impact on these resources will largely be dependent on programming (i.e. the impact will be less if the construction is undertaken outside the peak summer months) but should this not be possible construction activities could result in **moderate adverse** effects. There is also the potential for **moderate adverse** effects on the off-road National Cycle Network Route 1 during construction dependent on the installation technology used (e.g. the use of HDD technology to install the onshore export cable under the National Cycle Route would reduce the effect).

6.15.2.3 At the Hornsea Three landfall area, construction works have the potential to result in a **major adverse** effect on a section of the Peddars Way and Norfolk Coast Path National Trail at Weybourne, although this would depend on the method of construction and the construction phasing. Following the submission of the PEIR, consideration would be given to install the onshore export cable using HDD under the National Trail outside the peak period for visitors would reduce the effect on this resource. This would be reported in the Environmental Statement.

6.15.2.4 Following the completion of the construction works all areas of access land, recreational resources, PRoWs and other linear routes affected by the onshore works would be re-instated to their current condition and/or along their current alignments. There would be no physical effects on these resources arising from the operation or maintenance of Hornsea Three.

6.15.2.5 During decommissioning it is anticipated that the onshore export cables would be left in place and the permanent onshore HVAC booster station and onshore HVDC converter/HVAC substation would be decommissioned and removed from the site. The site would then either be reinstated to its original use or an alternative use. These activities would not result in any impacts on recreational resources within the land use and recreation study area although traffic management measures may be required should access to the site for these purposes need to cross a linear recreational route.

6.16 Next Steps

6.16.1 A site survey to verify the agricultural soil conditions will be undertaken during summer 2017, together with further consultation, where required, with the relevant Local Authorities on matters relating to PRoWs and other linear recreational routes, and the development of soils management plans. The results will be incorporated into the Environmental Statement.

6.16.1.1 Hornsea Three will continue to progress the refinement of the onshore cable route, and consult with landowners regarding potential construction implementation plans.

Table 6.18: Summary of potential environment effects, mitigation and monitoring.

Description of impact	Measures adopted as part of Hornsea Three	Magnitude of impact	Sensitivity of receptor	Significance of effect	Additional measures	Residual effect	Proposed monitoring
Construction phase							
Loss of agricultural land and impact on quality	Soil Management Strategy	Major	Medium	Major Adverse	None	Major Adverse (pre-restoration)	None
Disruption to or severance of farm holdings	Maintenance of farm accesses; water supplies and drainage. Fencing of construction works	Medium	Medium	Moderate Adverse	None	Moderate Adverse (pre-restoration)	None
Public access to the coast	Temporary diversions or traffic management	Minor	Low	Minor Adverse	None	Minor Adverse	None
Public access to Access Land	Temporary diversions or traffic management	Minor	High	Minor Adverse	None	Minor Adverse	None
Disruption to recreational resources		Major	Medium	Moderate Adverse	None	Moderate Adverse	None
Disruption to the use of PRoWs	Temporary diversions or traffic management	Major (Peddars Way/Norfolk Coast Path)	High	Major Adverse	None	Major Adverse	None
Disruption to the use of PRoWs	Temporary diversions or traffic management	Low (other routes)	Low	Minor Adverse	None	Minor Adverse	None
			Low (other routes)	Minor Adverse	None	Minor Adverse	None
Operation phase							
Agricultural Land	None proposed						
Agricultural land	None proposed	Minor	Medium	Minor Adverse	None	Minor Adverse	None
Farm holdings	None proposed	Negligible-Minor	Medium	Negligible to Minor Adverse	None	Negligible to Minor Adverse	None
Decommissioning phase							
Agricultural land	Soil Management Strategy	Minor	Medium	Minor Adverse	None	Minor Adverse	None
Farm holdings	None proposed	Negligible-Minor	Medium	Negligible to Minor Adverse	None	Negligible to Minor Adverse	None

6.17 References

- British Geological Survey (n.d.) View maps. [Online]. Available at: <http://www.bgs.ac.uk/data/mapViewers/home.html?src=topNav>.
- Corbett, W. and Tatler, W. (1974) Soils in Norfolk II. Harpenden: Soil Survey of England and Wales.
- Department for Communities and Local Government (2012) National Planning Policy Framework. London, DCLG.
- Department of Energy and Climate Change (2011a) Overarching National Policy Statement for Energy (EN-1). London, The Stationery Office.
- Department of Energy and Climate Change (2011b) National Policy Statement for Renewable Energy Infrastructure (EN-3). London, The Stationery Office.
- Department of Energy and Climate Change (2011c) National Policy Statement for Electricity Networks Infrastructure (EN-5). London, The Stationery Office.
- Department of Food and Rural Affairs (2011) Construction Code of Practice for the Sustainable Use of Soils on Construction Sites. London, Defra.
- Department of Food and Rural Affairs (2016) Structure of the agricultural industry in England and the UK at June. [Online]. Available at www.gov.uk/government/statistical-data-sets/structure-of-the-agricultural-industry-in-england-and-the-uk-at-june.
- Department of Food and Rural Affairs (n.d.) Statistics at Defra. [Online]. Available at: <http://www.defra.gov.uk/statistics/foodfarm/>.
- [Eldridge, D. \(1980\) Soils in Norfolk V. Harpenden, Soil Survey of Great Britain.](#)
- [MAFF \(1988\) Agricultural Land Classification of England and Wales. Alnwick, MAFF Publications.](#)
- [Meteorological Office \(1990\). Climatological Data for Agricultural Land Classification. London, Her Majesty's Stationery Office.](#)
- Natural England (n.d.) Magic. [Online]. Available at: <http://www.natureonthemap.naturalengland.org.uk/>.
- [Norfolk Coast AoNB \[online\] available at http://www.landscapesforlife.org.uk/norfolk-coast-aonb.html](http://www.landscapesforlife.org.uk/norfolk-coast-aonb.html)
- [Norfolk Coast Partnership \[online\] available at http://www.norfolkcoastaonb.org.uk/](http://www.norfolkcoastaonb.org.uk/)
- Norfolk County Council (n.d.) Norfolk Highways. [Online] .Available at: <https://maps.norfolk.gov.uk/highways/>.
- [Soil Survey of England and Wales \(1983\) Sheet 4, The Soils of Eastern England, 1:250 000 scale. Harpenden, Soil Survey of England and Wales.](#)
- Sustrans (n.d.) Sustrans. [online] Available at <http://www.sustrans.org.uk/>.

Visit Norfolk (n.d.) Visit Norfolk. [online] Available at: <http://www.visitnorfolk.co.uk/>.