WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Chapter 16: Onshore Ecology and Ornithology

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Glossary of Acronyms

Acronym	Definition
AoS	Area of Search
BNG	Biodiversity Net Gain
BTO	British Trust for Ornithology
CEMP	Construction Environmental Management Plan
CEA	Cumulative Effect Assessment
CIEEM	Chartered Institute of Ecology and Environmental Management
CWS	County Wildlife Site
DBRC	Devon Biodiversity Records Centre
Defra	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
DN	Devon Notable
DWT	Devon Wildlife Trust
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EPSL	European Protected Species Licence
ES	Environmental Statement
ETG	Expert Topic Group
GHB	Greater horseshoe bat
Ha	Hectare
HDD	Horizontal Directional Drilling
HRA	Habitats Regulation Assessment
IEMA	Institute of Environmental Management and Assessment
INNS	Invasive Non-Native Species
IPC	Infrastructure Planning Commission
IUCN Red List	The International Union for Conservation of Nature's Red List of Threatened Species
JNCC	Joint Nature Conservancy Council
Km	Kilometre
Km^2	Square kilometre
LNR	Local Nature Reserve
LPA	Local Planning Authority
m	Metre
MAGIC	Multi-Agency Geographic Information for the Countryside
MCZ	Marine Conservation Zone
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MMO	Marine Management Organisation

Acronym	Definition
NDC	North Devon Council
NE	Natural England
NERC	Natural Environment Research Council
NNR	National Nature Reserve
NPS	National Policy Statement
NPPF	National Planning Policy Framework
NSIP	Nationally Significant Infrastructure Project
NVC	National Vegetation Classification
OS	Ordnance Survey
PDE	Project Design Envelope
PEA	Preliminary Ecological Appraisal
RIAA	Report to Inform an Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCI	Site of Community Importance
SNCB	Statutory Nature Conservation Body
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
UK	United Kingdom
UKHPI	United Kingdom Habitats of Principal Importance
UWS	Unconfirmed Wildlife Site
WCA	Wildlife and Countryside Act 1981 (as amended)
WCOWL	White Cross Offshore Windfarm Limited
WTG	Wind Turbine Generator
WeBS	Wetland Bird Survey
WWT	Wildfowl and Wetlands Trust
ZoI	Zone of Influence

Glossary of Terminology

Defined Term	Description
Applicant	White Cross Offshore Windfarm Limited
Cumulative effects	The effect of the Project taken together with similar effects from a number of different projects, on the same single receptor/resource. Cumulative Effects are those that result from changes caused by other past, present or reasonably foreseeable actions together with the Project.
Environmental Impact Assessment (EIA)	Assessment of the potential impact of the proposed Project on the physical, biological and human environment during construction, operation and decommissioning.
Export Cable Corridor	The area in which the export cables will be laid, either from the Offshore Substation or the inter-array cable junction box (if no offshore substation), to the NG Onshore Substation comprising both the Offshore Export Cable Corridor and Onshore Export Cable Corridor.
In-combination effects	In-combination effects are those effects that may arise from the development proposed in combination with other plans and projects proposed/consented but not yet built and operational.
Landfall (to MLWS)	Where the offshore export cables come ashore
Link boxes	Underground chambers or above ground cabinets next to the cable trench housing electrical earthing links
Mean high water springs	The average tidal height throughout the year of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.
Mean low water springs	The average tidal height throughout a year of two successive low waters during those periods of 24 hours when the range of the tide is at its greatest.
Mean sea level	The average tidal height over a long period of time.
Mitigation	Mitigation measures have been proposed where the assessment identifies that an aspect of the development is likely to give rise to significant environmental effects, and discussed with the relevant authorities and stakeholders in order to avoid, prevent or reduce impacts to acceptable levels. For the purposes of the EIA, two types of mitigation are defined: • Embedded mitigation: consisting of mitigation measures that are identified and adopted as part of the evolution of the project design, and form part of the project design that is assessed in the EIA • Additional mitigation: consisting of mitigation measures that are identified during the EIA process specifically to reduce or eliminate any predicted significant effects. Additional mitigation is therefore subsequently adopted by OWL as the EIA process progresses.

Defined Term	Description
National Grid Onshore Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of the electrical transformers.
National Grid Connection Point	The point at which the White Cross Offshore Windfarm connects into the distribution network at East Yelland substation and the distributed electricity network. From East Yelland substation electricity is transmitted to Alverdiscott where it enters the national transmission network.
Onshore Development Area	The onshore area above MLWS including the underground onshore export cables connecting to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland. The onshore development area will form part of a separate Planning application to the Local Planning Authority (LPA) under the Town and Country Planning Act 1990.
Onshore Export Cables	The cables which bring electricity from MLWS at the Landfall (to MLWS) to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland.
Onshore Export Cable Corridor	The proposed onshore area in which the export cables will be laid, from MLWS at the Landfall (to MLWS) to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland.
Onshore Infrastructure	The combined name for all infrastructure associated with the Project from MLWS at the Landfall (to MLWS) to the NG grid connection point at East Yelland. The onshore infrastructure will form part of a separate Planning application to the Local Planning Authority (LPA) under the Town and Country Planning Act 1990
Onshore Transmission Assets	The aspects of the Onshore Project related to the transmission of electricity from MLWS at the Landfall (to MLWS) to the NG grid connection point at East Yelland including the Onshore Export Cable, the White Cross Onshore Substation and onward connection to the NG grid connection point at East Yelland.
the Onshore Project	The Onshore Project for the onshore TCPA application includes all components onshore of MLWS. This includes the infrastructure associated with the offshore export cable (from MLWS), landfall (to MLWS), onshore export cable and associated infrastructure and new onshore substation (if required).
White Cross Offshore Windfarm Ltd	White Cross Offshore Windfarm Ltd (WCOWL) is a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy Ltd
the Project	the Project is a proposed floating offshore windfarm called White Cross located in the Celtic Sea with a capacity of up to 100MW. It encompasses the Project as a whole, i.e. all onshore and offshore infrastructure and activities associated with the Project.
Project Design Envelope	A description of the range of possible components that make up the Project design options under consideration. The Project Design Envelope, or 'Rochdale Envelope' is used to define the Project for Environmental Impact Assessment (EIA) purposes when the exact parameters are not yet known but a bounded range of parameters are known for each key project aspect.

Defined Term	Description
White Cross Offshore Windfarm	Up to 100MW capacity offshore windfarm including associated onshore and offshore infrastructure
White Cross Onshore Substation	A new substation built specifically for the White Cross project. It is required to ensure electrical power produced by the offshore windfarm is compliant with NG electrical requirements at the grid connection point at East Yelland.
Works completion date	Date at which construction works are deemed to be complete and the windfarm is handed to the operations team. In reality, this may take place over a period of time.

16. Onshore Ecology and Ornithology

16.1 Introduction

1. This chapter of the Environmental Statement (ES) presents the potential impacts on onshore ecology and ornithology of the White Cross Offshore Windfarm Project (the Onshore Project). Specifically, it considers impacts landward of Mean Low Water Springs (MLWS) during its construction, operation and maintenance, and decommissioning phases.

2. The ES has been finalised with due consideration of pre-application consultation to date (see **Chapter 7: Consultation**) and the ES will accompany the application to North Devon Council (NDC) for planning permission under the Town and Country Planning Act 1990.

3. The components of the White Cross Offshore Windfarm Project seaward of MHWS ('the Offshore Project') are subject to a separate application for consent under Section 36 of the Electricity Act 1989, and for Marine Licences under the Marine and Coastal Access Act 2009. These applications are supported by a separate ES covering all potential impacts seaward of MHWS.

4. This assessment has been undertaken with specific reference to the relevant policy, legislation and guidance, which are summarised in **Section 16.2** of this chapter. Further information on the international, national and local planning policy and legislation relevant to the Project is provided in **Chapter 3: Policy and Legislative Context**.

5. Details of the methodology used for the Environmental Impact Assessment (EIA) and Cumulative Effect Assessment (CEA), are presented in **Section 16.3** of this chapter and with reference to **Chapter 6: EIA Methodology**.

6. This assessment has been informed by assessments in the following linked ES chapters:

   - Chapter 8: Marine and Coastal Processes
   - Chapter 10: Benthic and Intertidal Ecology
   - Chapter 12: Ground Conditions and Contamination
   - Chapter 13: Air Quality
   - Chapter 14: Water Resources and Flood Risk
   - Chapter 18: Noise and Vibration
   - Chapter 19: Traffic and Transport Chapter
   - Chapter 20: Onshore Landscape and Visual Amenity Chapter

7. Inter-relationships with these chapters are described in **Section 16.10**.

8. Additional information to support the onshore ecology and ornithology assessment includes specialist ecological surveys undertaken for the Project, as presented in **Appendices 16.A-16.R**.

9. This ES chapter:

   - Presents the existing environmental baseline established from desk studies, and consultation
   - Presents the potential environmental effects on onshore ecology and ornithology arising from the Project, based on the information gathered and the analysis and assessments undertaken
   - Identifies any assumptions and limitations encountered in compiling the environmental information
   - Highlights any necessary monitoring and/or mitigation measures which could prevent, minimise, reduce or offset the possible environmental effects identified in the EIA process.

16.2 Policy, Legislation and Guidance

10. **Chapter 3: Policy and Legislative Context** describes the wider policy and legislative context for the Project. The principal policy and legislation used to inform the assessment of potential impacts on onshore ecology and ornithology for the Project are outlined in this section.

16.2.1 National Planning Policy Framework

11. The National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, updated July 2021) is the primary source of national planning guidance in England. Sections relevant to this aspect of the ES are summarised below in **Table 16.1.**

Table 16.1 Summary of NPPF Policy relevant to onshore ecology and ornithology

Summary	How and where this is considered in the ES
”Planning policies and decisions should contribute to and enhance the natural and local environment by: a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan) b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural	The project design has taken into account these policy requirements. Avoidance measures and embedded mitigation has to be used wherever possible to avoid impacts on ecological features.

Summary	How and where this is considered in the ES
capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate." - **NPPF, paragraph 174**	Possible impacts on designated sites, protected species, and habitats and species of principal importance are included in **Section 16.5**. The assessment identifies mitigation measures (both embedded and/or additional) to prevent significant impacts on these receptors.
"Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries" - **NPPF, paragraph 175**	Whilst not a plan, the consideration of this hierarchy is included within the assessment, which considers impacts on designated sites present in the ZoI **Sections 16.5.1** to **16.5.8**, and other ecological features within **Sections 16.5.9** to **16.5.14.**
"Great weight should be given to conserving and enhancing landscape and scenic beauty in National Parks, the Broads and Areas of Outstanding Natural Beauty which have the highest status of protection in relation to these issues. The conservation and enhancement of wildlife and cultural heritage are also important considerations in these areas and should be given great weight in National Parks and the Broads. The scale and extent of development within all these designated areas should be limited, while development within their setting should be sensitively located and designed to avoid or minimise adverse impacts on the designated areas." - **NPPF, paragraph 176**	See **Chapter 4: Site Selection and Assessment of Alternatives** and **Chapter 20: Onshore Landscape and Visual Amenity**.

Summary	How and where this is considered in the ES
"To protect and enhance biodiversity and geodiversity, plans should: a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity; wildlife corridors and steppingstones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation; and b) Promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity." - **NPPF, paragraph 179**	Biodiversity receptors are identified in **Section 16.4**, and sites and species at all levels assessed within **Section 16.5**. The outcomes of the assessments identify mitigation measures (both embedded and/or additional) to avoid significant impacts to any of these receptors.
"When determining planning applications, local planning authorities should apply the following principles: a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused; b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest; c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons, and a suitable compensation strategy exists; and d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for	The mitigation hierarchy has been considered throughout the assessment. Impacts on protected species, and habitats and species of principal importance are assessed within **Section 16.5**. The outcomes of the assessments identify mitigation measures (both embedded or additional) to avoid significant impacts to any of these receptors. Mitigation measures that are embedded in the Onshore Project or additional are summarised in **Section 16.3.6**.

Summary	How and where this is considered in the ES
biodiversity or enhance public access to nature where this is appropriate." - **NPPF, paragraph 180**	
"The following should be given the same protection as habitats sites: a) potential Special Protection Areas (pSPAs) and possible Special Areas of Conservation (pSACs); b) listed or proposed Ramsar sites; and c) sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites" - **NPPF, paragraph 181.**	There are no SPAs or pSPAs, pSACs, or Ramsar Sites screened into this assessment; there are none located within the ZoI of the Onshore Project.
"The presumption in favour of sustainable development does not apply where the plan or project is likely to have a significant effect on a habitats site (either alone or in combination with other plans or projects), unless an appropriate assessment has concluded that the plan or project will not adversely affect the integrity of the habitats site." - **NPPF, paragraph 182.**	Impacts on internationally designated sites are assessed within **Sections 16.5.1** to **16.5.3**, and in more detailed in the supporting Report to Inform the Appropriate Assessment (**Appendix 6.A: Report to Inform Appropriate Assessment**) which accompanies the application. The outcomes of the assessments identify embedded mitigation measures to prevent adverse effects on the integrity of any of these sites.

16.2.2 Local Policies

12. This section considers local policies and their relevance to the onshore ecology and ornithology assessment. A summary of the local policies is provided in **Table 16.2**.

Table 16.2 Summary of Local Policies relevant to onshore ecology and ornithology

Policy Name	Summary	How and where this is considered in the ES
North Devon and Torridge Local Plan 2011 - 2031		
Policy ST09: Coast and Estuary Strategy	The Coastal and Estuarine Zone is identified on the Policies Map where: (5) The integrity of the coast and estuary as an important wildlife corridor will be protected and enhanced. The importance of the undeveloped coastal, estuarine and	Assessments on the effects of the Onshore Project on coastal habitats are presented at **Section 16.5.1** and **Chapter 20: Onshore**

Policy Name	Summary	How and where this is considered in the ES
	marine environments, including the North Devon Coast Areas of Outstanding Natural Beauty, will be recognised through supporting designations, plans and policies. The undeveloped character of the Heritage Coasts will be protected.	**Landscape and Visual Amenity**.
Policy ST14: Enhancing Environmental Assets	The quality of northern Devon's natural environment will be protected and enhanced by ensuring that development contributes to: (a) providing a net gain in northern Devon's biodiversity where possible, through positive management of an enhanced and expanded network of designated sites and green infrastructure, including retention and enhancement of critical environmental capital; (b) protecting the hierarchy of designated sites in accordance with their status; (c) conserving European protected species and the habitats on which they depend;	Impacts on designated sites, protected species and habitats and species of principal importance are identified in **Appendix 16.B: Preliminary Ecological Appraisal Report**, and features and sites assessed within **Section 16.5**. The outcomes of the assessments identify mitigation measures (both embedded and/or additional) to prevent significant impacts to any of these receptors. The Applicant is committed to achieving a biodiversity gain. **Appendix 16.A: Biodiversity Net Gain Assessment** presents the Biodiversity Net Gain Assessment.
Policy DM08: Biodiversity and Geodiversity	(8) Development should conserve, protect and, where possible, enhance biodiversity and geodiversity interests and soils commensurate with their status and giving appropriate weight to their importance. All development must ensure that the importance of habitats and designated sites are taken into account and consider opportunities for the creation of a local and district-wide biodiversity network of wildlife corridors which link County Wildlife Sites and other areas of biodiversity importance.	Impacts on designated sites, protected species and habitats and species of principal importance are identified in **Appendix 16.B: Preliminary Ecological Appraisal Report** and features and sites assessed within **Section 16.5**. The outcomes of the assessments identify mitigation measures (both embedded and/or additional) to prevent significant impacts to any of these receptors.

Policy Name	Summary	How and where this is considered in the ES
	(2) The highest level of protection will be given to potential and existing Special Protection Areas, candidate and existing Special Areas of Conservation and listed or proposed Ramsar sites. Proposals having an adverse impact on the integrity of such areas that cannot be avoided or adequately mitigated to remove any adverse effect will not be permitted other than in exceptional circumstances. These circumstances will only apply where there are: (a) no alternative solutions (b) imperative reasons of overriding public interest; and (c) necessary compensatory provisions secured to ensure that the overall coherence of the Natura 2000 network of European sites is protected. (3) Development will only be supported where any necessary mitigation is included such that, in combination with other plans or projects, there will be no adverse effects on the integrity of European Nature Conservation Sites. (4) Development proposals within or outside a Site of Special Scientific Interest or Marine Conservation Zone which would be likely to affect the designation adversely, either individually or in combination with other developments, will not be supported unless the benefits of the development at this site clearly outweigh both the adverse impacts on the site and any adverse impacts on the wider network of Sites of Special Scientific Interest and Marine Conservation Zones. (5) Development likely to affect adversely locally designated sites, their features or their function as part of the ecological network, including County Wildlife Sites, County Geological Sites and sites	The Applicant is committed to achieving a positive biodiversity net gain as measured using the BNG metric, through opportunities to enhance existing habitats and create new habitats of value where practicable. **Appendix 16.A: Biodiversity Net Gain Assessment** presents the Initial Biodiversity Net Gain Assessment.

Policy Name	Summary	How and where this is considered in the ES
	supporting Biodiversity Action Plan habitats and species, will only be permitted where the need for and benefits of the development clearly outweigh the loss, and the coherence of the local ecological network is maintained. (6) Adverse impacts on European and UK protected species and Biodiversity Action Plan habitats and species must be avoided wherever possible, subject to: i. the legal tests afforded to them where applicable; or otherwise unless ii. the need for and benefits clearly outweigh the loss. (7) Development must avoid the loss or deterioration of ancient woodland and veteran trees, unless the need for, or benefits of development on that site clearly outweigh the loss. (8) Development should avoid adverse impact on existing features as a first principle and enable net gains by designing in biodiversity features and enhancements and opportunities for geological conservation alongside new development. Where adverse impacts are unavoidable they must be adequately and proportionately mitigated, If full mitigation cannot be provided, compensation will be required as a last resort.	

Policy Name	Summary	How and where this is considered in the ES
Braunton Parish Neighbourhood Plan 2022 to 2031		
NE1 Locally Valued Sites of Biodiversity and Habitat	1. Our locally valued areas of biodiversity, geodiversity and habitat [identified on maps E, F, G, H, I and J] will be protected as areas critical in supporting wildlife habitats, biodiversity and geodiversity and their role within the wider network of green infrastructure. Their loss will not normally be supported. 2. Development proposals which result in the unavoidable loss of these areas (in whole or in part) will only be supported where: i) There are no other suitable sites for the proposed development; ii) The areas (quality, land area and habitat, biodiversity and geodiversity value) can be replaced in close proximity to their original location with a minimum 10% net gain in biodiversity; iii) A funded Landscape and Ecological Management Plan (LEMP) is agreed between the applicant and Local Planning Authority to ensure that a minimum net gain of 10% in biodiversity is realised; iv) The proposal would not have adverse impacts on the site's wider landscape setting which is integral to habitat retention and enhancement (with regards to biodiversity and geodiversity) or such impacts can be mitigated.	
NE2 Protection of the Caen Valley Bats SSSI and the Parish Bat Population	Development will not be permitted where it would harm the Braunton bat sustenance zone, bat locations and flight routes unless: i) Consideration of cumulative effect of their proposal on habitat loss, encroachment and light pollution in respect of the wide parish bat population. ii) The economic or social benefits of the development significantly and demonstrably outweigh the identified value of the site iii)Any damage to the identified value of the site is minimized	This is considered in **Section 16.5** Impacts 8 and 12.

Policy Name	Summary	How and where this is considered in the ES
	iv)There are no reasonable alternatives and v) Appropriate compensatory measures are undertaken. 2. Any development affecting an element of the SSSI should be demonstrating enhancements to site habitat and ecologically sensitive lighting in accordance with the BCT lighting guidance.	
NE3 Protecting and Increasing the Parish's Biodiversity	1. All new development proposals should provide at least 10% net gain in biodiversity from the pre-development baseline on the proposed site. 2. Where a development has an impact on biodiversity developers should provide an increase in appropriate natural habitat and ecological features over and above that being affected in such a way that the loss of biodiversity through development will be halted and the site can contribute towards the restoration of ecological networks.	The Applicant is committed to achieving a positive biodiversity net gain as measured using the BNG metric, through opportunities to enhance existing habitats and create new habitats of value where practicable. **Appendix 16.A: Biodiversity Net Gain Assessment** presents the Initial Biodiversity Net Gain Assessment.
NE4 Protecting Devon Banks, Hedgerows and Trees	Proposals for development which have an adverse impact on traditional Devon hedges, established hedgerows, banks and treelines should demonstrate that: i) Alternative options are impractical and the proposal is the least damaging option (to the hedgerow/bank, setting in the landscape, biodiversity and habitats) ii) They have taken the most up to date Highways Authority standards and guidance relating to changes to hedgerows iii) Existing trees will be protected from loss for the contribution they make to reducing air pollution, softening the urban aspects of the parish, providing shade in the summer (natural environment cooling), and biodiversity. iv) Where the loss of a tree, trees and/or hedgerows and/or banks is unavoidable proposals should replace these features to an equivalent scale, effect or massing	This is considered in **Section 16.5.10** of this Chapter.

Policy Name	Summary	How and where this is considered in the ES
	to ensure at a minimum 10% net gain to local biodiversity on site or within close proximity within the parish if onsite mitigation is not feasible. Any proposed hedgerow mitigation or enhancement should be in line with guidance provided by the Devon Hedges Organisation.	

16.2.3 National Policy Statement

13. The assessment of potential impacts upon onshore ecology and ornithology has been made with specific reference to the relevant National Policy Statement (NPS). NPSs are statutory documents which set out the government's policy on specific types of Nationally Significant Infrastructure Projects (NSIPs) and are published in accordance with the Planning Act 2008.

14. Although the Offshore Project is not an NSIP, it is recognised that due to its size of up to 100MW and its location in English waters, certain NPS are considered relevant to the Offshore Project. Therefore, to align with the approach to the assessment of the Offshore Project, certain NPS will also be considered as part of the Onshore Project.

15. Those relevant to onshore ecology and ornithology are set out within the overarching NPS for Energy (EN-1), NPS for Renewable Energy Infrastructure (EN-3) and NPS for Electricity Networks Infrastructure (EN-5), which are summarised in **Table 16.3**.

16. It is noted that the NPS for Energy (EN-1), the NPS for Renewable Energy Infrastructure (EN-3) and the NPS for Electricity Networks Infrastructure (EN-5) are in the process of being revised. The most recent draft versions were published for consultation in March 2023 (Department for Energy Security and Net Zero, (DESNZ), (2023a), DESNZ, (2023b) and DESNZ (2023c) respectively). A review of these draft versions has been undertaken in the context of this ES chapter.

17. **Table 16.3** includes a section for the draft version of NPS (EN-1, EN-3 and EN-5) in which relevant additional NPS requirements not presented within the current NPS (EN-1, EN-3 and EN-5) have been included. A reference to the requirement's location within the draft NPS and to where within this ES chapter or wider ES it has been addressed has also been provided.

18. Minor wording changes within the draft version which do not materially influence the NPS (EN-1, EN-3, EN-5) requirements have not been reflected in **Table 16.3**.

Table 16.3 Summary of NPS EN-1, EN-3 and EN-5 provisions relevant to onshore ecology and ornithology

Summary	How and where this is considered in the ES
EN-1 NPS for Energy (EN-1)	
"Where the development is subject to EIA [Environmental Impact Assessment] the applicant should ensure that the ES [Environmental Statement] clearly sets out any effects on internationally, nationally and locally designated sites of ecological or geological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity. The applicant should provide environmental information proportionate to the infrastructure where EIA is not required to help the Infrastructure Planning Commission (IPC) consider thoroughly the potential effects of a proposed project." - **EN-1, paragraph 5.3.3**	Potential impacts on internationally, national and locally designated sites of ecological conservation importance, on protected species and on habitats and other species identified as being of principal importance for the conservation of biodiversity are considered in **Section 16.5**.
"The applicant should show how the Onshore Project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests." - **EN-1, paragraph 5.3.4**	Embedded mitigation measures are provided in **Section 16.3.6** and where applicable, further mitigation measures are outlined in **Section 16.5**.
"When considering the application, the IPC will have regard to the Government's biodiversity strategy as (sic) set out in 'Working with the grain of nature', which aims to halt or reverse declines in priority habitats and species; accept the importance of biodiversity to quality of life. The IPC will consider this in relation to the context of climate change. As a general principle, and subject to the specific policies below, development should aim to avoid significant harm to biodiversity and geological conservation interests, including through mitigation and consideration of reasonable alternatives (as set out in Section 4.4 above); where significant harm cannot be avoided, then appropriate compensation measures should be sought. In taking decisions, the IPC should ensure that appropriate weight is attached to designated sites of international, national and local importance; protected species; habitats and other species of principal importance for the conservation of biodiversity; and to biodiversity and geological interests within the wider	Site selection decisions and embedded mitigation measures have sought to minimise impacts to features of biodiversity and geological interest. Embedded mitigation measures are provided in **Section 16.3.6** and where applicable, further mitigation measures are outlined in **Section 16.5**.

Summary	How and where this is considered in the ES
environment." - **EN-1, paragraphs 5.3.5, 5.3.7 and 5.3.8**	
"For the purposes of considering development proposals affecting them, as a matter of policy the Government wishes pSPAs to be considered in the same way as if they had already been classified. Listed Ramsar Sites should, also as a matter of policy, receive the same protection". – **EN-1, paragraph 5.3.9**	There are no pSPAs or Ramsar Sites screened into the assessment as there are none located within the Zone of Influence (ZoI) of the Onshore Project.
"Many SSSIs are also designated as sites of international importance and will be protected accordingly. Those that are not, or those features of SSSIs not covered by an international designation, should be given a high degree of protection." - **EN-1, paragraph 5.3.11**	Designated sites are presented in **Section 16.4.1**. Site selection decisions have sought to minimise impacts to interest features within designated sites.
"Where a proposed development on land within or outside a Site of Special Scientific Interest (SSSI) is likely to have an adverse effect on a SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect, after mitigation, on the site's notified special interest features is likely, an exception should only be made where the benefits (including need) of the development at this site clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs." - **EN-1, paragraph 5.3.11**	An assessment of the impacts of the proposed Onshore Project on SSSIs in the ZoI are presented in **Section 16.5**.
"Sites of regional and local biodiversity and geological interest, which include Regionally Important Geological Sites, Local Nature Reserves and Local Sites, have a fundamental role to play in meeting overall national biodiversity targets; contributing to the quality of life and the well-being of the community; and in supporting research and education. The IPC should give due consideration to such regional or local designations. However, given the need for new infrastructure, these designations should not be used in themselves to refuse development consent." - **EN-1, paragraph 5.3.13**	Designated sites are presented in **Section 16.4.1**. Site selection decisions have sought to minimise impacts to interest features within designated sites.
"Ancient woodland is a valuable biodiversity resource both for its diversity of species and for its longevity as woodland. Once lost it cannot be recreated. The IPC should not grant development consent for any development that would result in its loss or deterioration unless the benefits (including need) of the development, in that location outweigh the loss of the woodland habitat.	Ancient woodland in the ZoI is considered at **Section 16.5.14** in relation to air quality impacts arising from construction-phase traffic.

Summary	How and where this is considered in the ES
Aged or 'veteran' trees found outside ancient woodland are also particularly valuable for biodiversity and their loss should be avoided. Where such trees would be affected by development proposals the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons why." - **EN-1, paragraph 5.3.14**	There are no ancient or veteran trees located within or adjacent to the Onshore Development Area.
"The IPC will aim to maximise opportunities to build in beneficial biodiversity features when considering proposals as part of good design." - **EN-1, paragraph 5.3.15**	Biodiversity Net Gain (BNG) has been considered separately as a stand-alone evaluation of the overall biodiversity impact of the Onshore Project, using the Biodiversity 4.0 metric. The Applicant is committed to achieving a biodiversity gain. The Initial Biodiversity Net Gain Assessment Report (**Appendix 16.A: Biodiversity Net Gain Assessment**) presents the biodiversity net gain assessment that has been undertaken.
"The IPC shall have regard to the protection of legally protected species and habitats and species of principal importance for nature conservation. The IPC should refuse consent where harm to the habitats or species and their habitats would result, unless the benefits (including need) of the development outweigh that harm. In this context, the IPC should give substantial weight to any such harm to the detriment of biodiversity features of national or regional importance which it considers may result from a proposed development." - **EN-1, paragraphs 5.3.16 – 5.3.17**.	Baseline information on protected species and habitats is provided in **Section 16.4.2** and the assessment process is provided in **Section 16.5.9** to **Section 16.5.14**.

Summary	How and where this is considered in the ES
"The applicant should include appropriate mitigation measures as an integral part of the proposed development and demonstrate that: • During construction, they will seek to ensure that activities will be confined to the minimum areas required for the works; • During construction, operation and maintenance best practice will be followed to ensure that risk of disturbance or damage to species or habitats is minimised, including as a consequence of transport access arrangements; • Habitats will, where practicable, be restored after construction works have finished; and • Opportunities will be taken to enhance existing habitats and, where practicable, to create new habitats of value within the site landscaping proposals." - **EN-1, paragraph 5.3.18**	Embedded mitigation measures are presented in **Section 16.3.6**. Mitigation measures associated with potential impacts are presented in **Section 16.5**. The Applicant is committed to achieving a biodiversity gain. **Appendix 16.A: Biodiversity Net Gain Assessment** presents the Biodiversity Net Gain Assessment.
"The IPC will need to take account of what mitigation measures may have been agreed between the applicant and whether Natural England has granted or refused or intends to grant or refuse, any relevant licences, including protected species mitigation licences." - **EN-1, paragraph 5.3.20**	The potential requirement for mitigation protected species is discussed in **Section 16.3.6** and where relevant in **Section 16.5** has been informed by the findings of the baseline ecology surveys undertaken to date.
EN-3 NPS for Renewable Energy Infrastructure (EN-3)	
"Proposals for renewable energy infrastructure should demonstrate good design in respect of landscape and visual amenity, and in the design of the project to mitigate impacts such as noise and effects on ecology." - **EN-3, paragraph 2.4.2**	Project design has avoided sensitive features where possible. Embedded mitigation measures are presented in **Section 16.3.6** and further mitigation measures are set out in **Section 16.5**.
"Ecological monitoring is likely to be appropriate during the construction, operational and maintenance phases to identify the actual impact so that, where appropriate, adverse effects can then be mitigated and to enable further useful information to be published relevant to future projects." - **EN-3, paragraph 2.6.71**	Monitoring requirements are set out in **Section 16.12**.
"There may be some instances where it would be more harmful to the ecology of the site to remove components of the development, such as the access tracks or underground cabling, than to retain them." - **EN-3, paragraph 2.7.15**	Decommissioning is discussed in **Section 16.7**.

16.2.4 Other legislation and guidance

19. In addition to NPS, NPPF and local policy, there are a number of pieces of legislation and guidance relevant to the assessment of onshore ecology. These include:

- The Conservation of Habitats and Species Regulations 2017 (also known as 'the Habitats Regulations 2017')
- The Wildlife and Countryside Act 1981 (as amended)
- The Protection of Badgers Act 1992
- Natural Environment and Rural Communities (NERC) Act 2006
- The Hedgerows Regulations 1997.
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland (Terrestrial, Freshwater, Coastal and Marine)
- Natural England Standing Advice.

20. Further detail is provided in **Chapter 3: Policy and Legislative Context**, and **Table 16.4** for those not covered in that chapter.

Table 16.4 Policy and legislation specifically relating to onshore ecology and ornithology (which is not included in Chapter 3)

Policy / Legislation	Summary
The Protection of Badgers Act 1992	The Act makes it an offence to wilfully kill, injure or take, or attempt to kill, injure or take a badger *Meles meles*; and to cruelly ill-treat a badger. The Act makes it an offence to intentionally or recklessly damage, destroy or obstruct a badger sett, or to disturb a badger whilst in a sett.
The Hedgerows Regulations 1997	The Regulations make it an offence to remove or destroy certain hedgerows without permission from the local planning authority and the local planning authority is the enforcement body for such offences.

16.3 Assessment Methodology

16.3.1 Study Area

21. Details of the location of the Project and the onshore components are set out within **Chapter 5: Project Description**.

22. The onshore ecology and ornithology study area incorporates all areas where significant effects could have potential to occur throughout the life of the Onshore Project, and where appropriate has been extended for certain components of the baseline assessment (obtaining desk study data) to take into consideration populations of more mobile species (such as birds and bats within the local area).

It includes consideration of possible impacts of all the onshore project components (i.e. Landfall, Onshore Export Cable Corridor, Compounds, Access Routes and Onshore Substation). The study area varies between ecological and ornithological receptors as follows:

- Bats: consideration of records from within and up to 5km from the Onshore Development Area
- Birds: consideration of records within and up to 5km from the Onshore Development Area
- Great crested newt: consideration of local records from up to 2km
- Other protected / notable species: consideration of records from within and up to 2km from the Onshore Development Area
- Statutory and non-statutory designated sites: consideration of sites within and up to 2km from the Onshore Development Area
- UK Habitats of Principal Importance (UKHPI): consideration of habitats within and up to 2km from the Onshore Development Area.

23. This study area been determined using a combination of professional judgement and with reference industry guidance (CIEEM, 2018) and is shown in **Figure 16.1**. Baseline survey work has been carried out within this study area, the areas or features included within the surveys, as above, vary between ecological receptors and are detailed below:

- Bats: Surveys of bat activity within the Onshore Development Area
- Birds: Surveys of breeding bird activity within the Onshore Development Area
- Great crested newt: consideration of ponds within and up to 250m from the Onshore Development Area
- Other protected / notable species: survey work within the Onshore Development Area
- Habitat survey within the Onshore Development Area.

24. The baseline survey work also encompassed adjacent land including land within other parts of Braunton Burrows. This was included within the survey area at an earlier stage before the final Onshore Development Area was confirmed. As a consequence, some of the baseline survey work includes land which is now outside of the Onshore Development Area boundary.

16.3.2 Approach to Assessment

25. **Chapter 6: EIA Methodology** provides a summary of the general impact assessment methodology applied to the Project. The following sections outline the

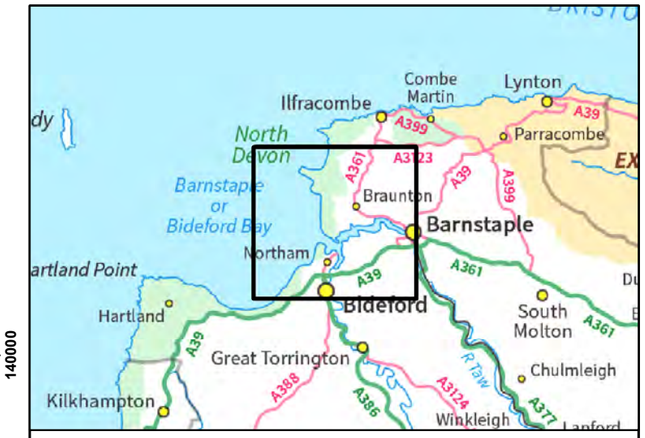
methodology used to assess the potential effects on onshore ecology and ornithology.

240000 245000 250000 255000

140000 135000 130000

N

0 2 4 Kilometres



Legend:

- Onshore Development Area
- 2km Study Area
- 5km Study Area

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title: Onshore Ecology and Ornithology Study Area

Figure: 16.1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0712

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
P01	03/08/2023	AB	CB	A3	1:68,546

Co-ordinate system: British National Grid

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16.3.2.1 Approach to onshore ecology and ornithology assessment

26. The approach used in this chapter deviates from the general guidance as it uses the CIEEM guidance *(Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018)), which is the industry guidance for Ecological Impact Assessment (EcIA).

27. The general guidance is referred and cross referenced where relevant and comment is provided on how the terms used in both approaches interrelate. The following sections describe more specifically the assessment method.

16.3.2.2 Important Ecological Features

28. A first step in EcIA is the determination of which ecological features (habitats, species, ecosystems and their functions/processes) are important (i.e. Sensitive in general EIA terms). Important features should then be subject to detailed assessment if they are likely to be affected by the Proposed Development. It is not necessary to carry out detailed assessment of features that are sufficiently widespread, unthreatened and resilient to project effects, such that there is no risk to their viability.

29. Ecological features can be important for a variety of reasons, and the rationale used to identify these is explained below. Importance may relate, for example, to the quality or extent of designated sites or habitats, to habitat/species rarity, to the extent to which they are threatened throughout their range, or to their rate of decline.

30. The importance of an ecological feature should be considered within a defined geographical context. The following frame of reference has been used in this case:

Table 16.5 Ecological importance and sensitivity

Ecological Importance (CIEEM)	Equivalent Sensitivity (General guidance; Chapter 6: EIA Methodology)
International (European)	High
National	High
Regional (South-west)	High
County (Devon	Medium
District (North Devon)	Medium
Local	Low
Site (the Site boundary)	Negligible

31. Taking into account the CIEEM Guidelines, it is considered that the effects on features of less than County importance are generally considered unlikely to trigger a mitigation or policy response in EcIA terms. However, where it is helpful to characterise and evaluate features within the Application Site, this assessment also uses the term "Site importance". This includes features which are assessed to be of value only in the context of the Site (and its immediate zone of influence). Features of Site importance are typically unlikely to require further assessment for the reasons set out above.

16.3.2.3 Characterising and Quantifying Effects and Assessing their Significance

32. The CIEEM Guidelines state that ecological effects should be characterised in terms of ecosystem structure and function and reference should be made to beneficial, adverse or neutral effects; extent; magnitude; duration; reversibility; timing and frequency; and cumulative effects (this is the equivalent of assigning magnitude in general EIA terms). The guidelines provide a list of "aspects of ecological structure and function to consider when predicting impacts and effects" (Box 16).

33. Following the characterisation of effects, an assessment of their ecological significance is made. The CIEEM Guidelines promote a transparent approach in which a beneficial or adverse effect is determined to be significant or not, in ecological terms, in relation to the integrity of the defined site or ecosystem(s) and/or the conservation status of habitats or species within a given geographical area, which relates to the level at which it has been valued.

34. The judgement about whether an effect is significant or not, is independent of the value of the ecological feature; the value of any feature that will be significantly affected is then used to determine the implications, in terms of legislation and / or policy (CIEEM, 2018). Significance is a concept related to the weight that should be attached to effects when decisions are made.

16.3.2.4 Significant Effects

35. For the purposes of this assessment, a 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features'. A significant effect is simply an impact that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. The CIEEM Guidelines state that a significant effect does not necessarily equate to an impact so severe that consent for a development project to be refused planning permission. For example, many projects with significant adverse ecological effect

can be lawfully permitted following EIA procedures. The assessment of significance is based on professional judgement.

36. The CIEEM Guidelines encourage the expression of significance of ecological effects with reference to a geographic frame of reference, as described above. Since other disciplines within this Environmental Statement use criteria based on an expression of severity of significance to describe the significance of environmental effects, **Table 16.6** provides a means of relating the two approaches and is provided to allow the ecological impact assessment to be integrated into the wider EIA approach without compromising the CIEEM approach.

Table 16.6 Effect significance (showing relationship between ecological impact assessment (EcIA) and wider EIA assessment of significance

Effect significance criteria (CIEEM EcIA)	Effect significance (general guidance; Chapter 6: EIA Methodology)
Ecological effects assessed as being significant at the Regional scale or above, and that have triggered a response in development control terms. Within the ES these are considered to represent effects that are of major significance.	Major
Residual ecological effects assessed as being significant at the County scale and that have triggered a response in development control terms. These are considered to represent effects that are of moderate significance	Moderate
Residual ecological effects that have been assessed as being significant at the Site to Local scale and are unlikely to trigger a response in development control terms. These are considered to represent effects that are of minor significance.	Minor
Residual ecological effects that are considered to be not significant at any geographical level and are unlikely to trigger a response in development control terms. These are considered to represent effects that are of no (neutral) / negligible significance.	Negligible

16.3.2.5 Mitigation

37. Where significant effects have been identified, the mitigation hierarchy has been taken into account, as suggested in the CIEEM Guidelines. Once avoidance and mitigation measures, and any necessary compensation measures, have been applied, and opportunities for enhancement incorporated, residual significant effects have then been identified.

38. Where mitigation and compensation has been proposed, this is proportionate with the geographical scale at which an effect is significant, 'For example, mitigation and compensation for effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved…' (CIEEM, 2018).

16.3.2.6 Cross-referencing EIA terminology in the general guidance; Chapter 6: EIA Methodology

39. For guidance, the wider EIA impact assessment approach also includes assessment of magnitude, and uses a matrix approach by correlating magnitude and sensitivity as set out in **Table 16.7** , to determine the significance of an effect (see **Table 16.8**) on a particular receptor.

40. An assessment using this approach is also referred to in the impact assessment section where relevant and to show how the terms used in both approaches interrelate.

Table 16.7 Definitions of terminology in general guidance relating to magnitude of an impact

Magnitude	Definition
High	The impact is likely to have an adverse effect on the integrity of a site or the conservation status of a species or species assemblage.
Medium	The impact adversely affects an ecological receptor but is unlikely to adversely affect its integrity or conservation status.
Low	The impact adversely affects an ecological receptor but would not adversely affect its integrity or conservation status.
Negligible	There would be minimal effect on the ecological receptor.

Table 16.8 Significance of an effect (general EIA terminology) - resulting from each combination of receptor sensitivity and the magnitude of the impact upon it

		Negative Magnitude				Beneficial Magnitude			
		High	**Medium**	**Low**	**Negligible**	**Negligible**	**Low**	**Medium**	**High**
Sensitivity	**High**	Major	Major	Moderate	Minor	Minor	Moderate	Major	Major
	Medium	Major	Moderate	Minor	Minor	Minor	Minor	Moderate	Major
	Low	Moderate	Minor	Minor	Negligible	Negligible	Minor	Minor	Moderate
	Negligible	Minor	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor

16.3.3 Cumulative Effect Assessment

41. **Chapter 6: EIA Methodology** provides a general methodology with regards to the CEA. This chapter includes those cumulative effects that are specific to onshore ecology.

42. The key consideration used in relation to linear development such as the Onshore Project is whether there is spatial or temporal overlap of effects from multiple projects on the same receptors. Therefore, for habitats and non-mobile species, unless there is a spatial overlap there is no pathway for cumulative effect between spatially separated projects. There may however be potential for a cumulative effect upon the overall habitat resource at a regional or national level. Where potentially significant regional or national level effects are identified and considered to be relevant they are highlighted in the CEA.

43. For mobile species there is only a pathway for cumulative effect if there is spatial overlap of potential receptor ranges and a temporal overlap with the activity or its resultant effect i.e. where developments follow on from one another before the species has recovered from displacement (or other effects). Other consented development may be subject to mitigation measures designed to reduce impacts, however, there may still be residual effects, which may be of only minor significance, however, it is accepted that when considered in combination such projects may contribute to a wider cumulative effect.

44. In cases where this project has negligible (or no) effect on a receptor (through for example avoidance measures) it is considered that there is no pathway for a cumulative effect.

45. Further details of the methods used for the CEA for onshore ecology and ornithology are provided in **Section 16.8**.

16.3.4 Habitats Regulations Assessment

46. A Report to Inform the Appropriate Assessment (RIAA) to support the Habitats Regulations Assessment (HRA) has been prepared for the project and has been submitted as part of the consent application (**Appendix 6.A: Report to Inform Appropriate Assessment**). The RIAA contains considers in detail whether or not the project will have an adverse effect upon the integrity of a European site (i.e. SPA, SAC or Ramsar sites), either alone or in combination with other projects.

47. This chapter draws on the information considered within the RIAA where relevant, i.e. where potential impacts upon on European sites and their qualifying features

have been identified. Further detail regarding the HRA assessment is set out within the RIAA (**Appendix 6.A: Report to Inform Appropriate Assessment**).

16.3.5 Worst-Case Scenario

48. In accordance with the assessment approach to the 'Rochdale Envelope' set out in **Chapter 6: EIA Methodology**, the impact assessment for onshore ecology and ornithology has been undertaken based on a realistic worst-case scenario of predicted impacts. The Project Design Envelope for the Project is detailed in **Chapter 5: Project Description**.

49. Using the project design envelope approach means that receptor-specific potential effects draw on the options from within the wider envelope that represent the most realistic worst-case-scenario. It is also worth noting that under this approach the combination of project options constituting the realistic worst-case scenario may differ from one receptor to another and from one effect to another.

50. **Table 16.9** presents the realistic worst-case scenario components considered for the assessment of onshore ecology and ornithology.

Table 16.9 Definition of realistic worst-case scenario details relevant to the assessment of impacts in relation to onshore ecology and ornithology

Impact	Realistic worst-case scenario	Rationale
Construction		
Direct physical damage and disturbance to Braunton Burrows SSSI/SAC (intertidal area) due to cable installation	Two export cables would be buried in a trench across the northern end of Saunton Sands and into the subtidal. The trench dimensions across the beach would be 0.5m wide and 700m long, = 700m^2 (total plan area for two cables). The cable trench would be at least 1.2m deep, = 840m^3 (volume for two cables). Duration: Less than 5 days	The worst-case scenario represents the greatest potential for disturbance to Braunton Burrows SAC/SSSI (intertidal area).
Onshore Export Cable - trenching	Onshore cable corridor trenching (temporary works) physical parameters: Cable corridor works area = width of 30m (to include haul road, subsoil and topsoil storage areas, construction compounds and drainage) Culverts/ temporary bridges or temporary dams to be installed at	The worst-case scenario represents the greatest potential for disturbance

Impact	Realistic worst-case scenario	Rationale
	open ditch or drain crossings. Where dams are used, pipes will be used to maintain water flow Trench width= 3m Trench depth = 1.9m deep Length of trenching = 10km Transition joint bays with inspection panels = 20m long x 8m wide, installed every 1km Duration: 15 months total. Length of open trench being excavated at any one time = 100m.	
Onshore Export Cable - trenchless technique	Trenchless crossings below major obstructions (temporary works) physical parameters: Cable entry and exit pits will be at least 16m from the edge of the Braunton Burrows SAC/ SSSI, 16m from the Taw-Torridge Estuary SSSI and 8m from any ditches and hedgerows to be crossed using trenchless techniques. Temporary construction compounds to be constructed at entry and exit points. Duration: Trenchless technique duration approximately 1-2 weeks (minor crossings), 165 days each for Golf Course and River Taw trenchless crossings .	
Onshore substation and grid connection	Construction of new onshore substation to include installation of an additional electrical unit, cable trenches, ducts and pits, and installation of underground services and replacement of perimeter fencing. Associated parameters: Construction compound area (temporary works) = 0.5ha Substation footprint = 0.34ha Landscaping area= yet to be determined Duration: Construction period = 10.5 months.	

Impact	Realistic worst-case scenario	Rationale
Operation and Maintenance		
None	There is no ongoing requirement for regular maintenance of the onshore cables following installation, however access to the onshore export cables would be required to conduct emergency repairs, if necessary. Access to each field parcel along the cable corridor would be from existing field entry points where possible or accessing the cable corridor from road crossings.	The worst-case scenario represents the likely activities during the operation and maintenance phase.
Decommissioning		
To be determined	The decommissioning policy for the Project infrastructure is not yet defined however it is anticipated that some infrastructure would be removed, reused or recycled; other infrastructure could be left in situ. The following infrastructure is likely be removed, reused, or recycled where practicable: • Onshore substation • Export Cables The following infrastructure is likely to be decommissioned and could be left in situ depending on available information at the time of decommissioning: • Transition joint bays • Cable joint bays • Cable ducting	The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time. Decommissioning arrangements will be detailed in a Decommissioning Plan, which will be drawn up and agreed with the relevant consenting body/stakeholder prior to decommissioning. For the purposes of the worst-case scenario, it is anticipated that the impacts will be comparable to those identified for the construction phase.

16.3.6 Summary of Mitigation

51. This section outlines the mitigation relevant to the onshore ecology and ornithology assessment, which has been incorporated into the design of the Onshore Project. Further information is detailed in **Chapter 5: Project Description**.

16.3.6.1 Embedded Mitigation

52. The embedded mitigation measures are those defined in the IEMA guidance as either primary or tertiary mitigation. Those measures relevant to the onshore ecology and ornithology assessment are summarised in **Table 16.10**.

53. As these measures have been embedded the assessment of effects is undertaken on the basis that these forms of mitigation will definitely be delivered. Therefore, any effects that might have arisen without these forms of mitigation do not need to be identified as 'potential effects', as there should be no potential for them to arise.

Table 16.10 Embedded mitigation measures relevant to the onshore ecology and ornithology assessment

Component/Activity/Impact	Mitigation embedded into the design of the Project
Designated nature conservation sites **Braunton Burrows SAC/SSSI** **Taw-Torridge Estuary SSSI** **Greenaways and Freshmarsh, Braunton SSSI**	The Onshore Development Area has undergone an extensive site selection process which has involved incorporating environmental considerations in collaboration with the engineering design requirements. The Onshore Export Cable Corridor has been: a) routed to avoid designated nature conservation sites (SAC and SSSIs) wherever possible, and b) where this is not possible, trenchless installation methods (which will involve below ground installation) will be used for the export cables. This approach has been to devised to avoid direct impacts to habitat features within the designated sites within the Onshore Development Area. In relation to trenchless techniques: • Agreement will be obtained on the trenchless technique methodology and response procedures. • Further post-consent geotechnical investigations will be conducted to refine the trenchless technique approach and methods. This will include providing calculations of the pressure required for the relevant sub-surface material the trenchless technique will travel through to prevent frac-out (i.e. the release of inert drilling lubricant to ground surface). • This risk of frac-out is considered to be low based on analysis of historical borehole and desk-based assessment of the geology present in the area, and in view of the measures outlined in **Section 1.5.3** of the **Braunton Burrows and Taw Estuary Crossing Method Statement (Appendix 5.A:**

Component/Activity/Impact	Mitigation embedded into the design of the Project
	Braunton Burrows and Taw Estuary Crossing Method Statement) to prevent fluid drilling break-out, which will be implemented at all trenchless crossing technique stages. • During works continual monitoring of the trenchless technique bore above ground will be undertaken. • In the unlikely event of a frac-out, contingency measures to be adopted at the trenchless crossing technique points will be agreed before drilling operations commence. Possible containment and clean-up steps are detailed in **Section 1.5.4** of the **Braunton Burrows and Taw Estuary Crossing Method Statement (Appendix 5.A: Braunton Burrows and Taw Estuary Crossing Method Statement)**, which will be implemented at all trenchless crossing technique stages. Where open trenching is used (only in the areas outside designated conservation sites), a minimum 5m standoff would be maintained between the Onshore Development Area and adjacent SAC/SSSIs with the exception of one short pinch point where the route is restricted between an existing farm building and the boundary of the SAC/SSSI.
Grassland (lowland floodplain grazing marsh) within Braunton Marsh Unconfirmed Wildlife Site (UWS)	The extent and duration of works within these habitats has been minimised. Topsoil and subsoil will be extracted and stored separately during construction, and reinstated in the correct order following completion of works to maintain soil structure and allow the vegetation to re-establish on completion. Removal and storage of turves will also be carried out, for example, in any localised areas where more diverse vegetation is present. Further details are provided in **Sections 16.3.6** and **16.5.9**.
Cable and haul road crossings: hedgerows	Where the Onshore Export Cable Corridor crosses through hedgerows, with the exception of areas where visibility splays are required (considered below in **Section 16.5.10**), the working corridor will be minimised where possible, commonly reduced from the maximum working width of 30m down to 10-20m. Hedgerows outside the 30m working corridor will be unaffected.
Cable and haul road crossings: watercourses	All ditches falling within the Onshore Export Cable Corridor would either be crossed using trenchless techniques (such

Component/Activity/Impact	Mitigation embedded into the design of the Project
	as HDD), to avoid direct interaction with these watercourses, or culverts/ temporary bridges or temporary dams will be installed at open ditch crossings. Where dams are used, pipes will be used to maintain water flow across the crossing.
All construction activities and sites[1]	A Construction Environmental Management Plan will be implemented to avoid or minimise impacts from all construction activities. This will include ecological site supervision during the works to confirm adherence to constraints and implementation of control measures. The Project will include a pre-commencement site meeting and regular subsequent compliance monitoring visits; these will be undertaken and recorded by a suitably qualified ecologist.
Pollution Prevention	All works will be undertaken in compliance with Statutory Pollution Prevention Guidelines. Spillage kits will be present at all plant and machinery locations. No storage facilities for hazardous liquids or chemicals will be located within or in close proximity to designated areas or sensitive habitats. Refuelling and maintenance of all equipment will take place away from waterbodies, intertidal zones and the estuary.
Equipment	All equipment and vehicles will be fit for purpose and will be subject to daily checks for signs of wear and tear, including leaks of any substance.
Restricted working areas	No personnel, equipment or vehicles are to operate within the inundated tidal areas of the Taw Estuary.
Bats	Direct impacts on known or potential bat roosts are avoided through the positioning of the Onshore Export Cable Corridor. Hedgerow removal on foraging/ commuting routes has been minimised.
Otters	Direct effects on identified holts are avoided through the positioning of the Onshore Export Cable Corridor.
Badgers	Direct effects on identified setts are avoided through the positioning of the Onshore Export Cable Corridor.

[1] The construction programme has developed since the submission of the Offshore Project ES. Due to the need to minimise the construction programme and avoid disruption to local communities, construction activities cannot be limited to summer months. It should be noted that there is a discrepancy between the approach to mitigation between the Onshore Ecology and Ornithology chapters with the separate ESs.

Component/Activity/Impact	Mitigation embedded into the design of the Project
Great crested newt	No great crested newt ponds are within the Onshore Export Cable Corridor. Wherever possible, the route has been designed to avoid suitable terrestrial habitat for great crested newts where ponds are located within 250m of a great crested newt breeding pond.

16.3.6.1 Additional Mitigation

54. In addition to the embedded mitigation measures as outlined above, the Applicant **Table 16.11.** These are those identified within the IEMA guidance as secondary mitigation, and include measures identified where potentially significant effects have been assessed.

Table 16.11 Further mitigation measures relevant to the onshore ecology and ornithology assessment

Component/Activity/Impact	Additional Mitigation
Lighting effects on designated sites and protected and notable species	Artificial lighting requirements associated with the onshore construction works will only be minimised and where it is required and designed with reference to industry guidance for artificial lighting to avoid an impact on bats and other wildlife[2]. The illumination of habitat features will be avoided at times of year when they could be used by foraging or commuting bats. This will be included within the Outline Code of Construction Practice.
Water pollution and physical impacts on watercourses	Appropriate measures which will be applied to all watercourse crossings to ensure best practice is followed and any potential impacts are minimised are detailed in **Chapter 14: Water Resources and Flood Risk** and summarised below.
Effects on neutral and marshy grassland habitats	In grassland affected by trenching within Braunton Marsh, which support semi-improved grassland or marshy grassland (as opposed to improved grassland), additional management will be carried out to promote re-establishment (reseeding/mowing/weed management) vegetation establishment will be monitored to ensure that habitats are restored to the desired condition. Localised areas of wetland habitat within the coastal floodplain grazing marsh will be crossed by bailey bridges,

[2] *Bats and Artificial Lighting in the UK'*, BCT/ILP 2018

Component/Activity/Impact	Additional Mitigation
	and trenchless techniques will be used to minimise the impacts on these features.
Effects on hedgerows	Prior to the commencement of any works to a hedgerow, an Ecological Clerk of Works (ECoW) will be present on site to ensure that the specified protection and mitigation measures are appropriately understood and implemented. Replacement hedgerow planting will be completed following completion of the construction works. This will use of range of locally appropriate native species. Where hedgerow removal is required purely to provide visibility splays, the hedgerow will be coppiced and allowed to re-establish following completion of construction works.
Bats	Where hedgerow removal is required to provide visibility splays, temporary mitigation at these locations will include installation of 'fake hedges' to maintain bat flight lines. Coppicing will allow rapid recovery and growth of hedgerow on completing of the work.
Otters	The proposed route design is considered sufficiently distant from the holts located to avoid the risk of significant disturbance. Precautionary survey will be carried out to ensure that activity status of all nearby holts is understood and kept up to date. An Ecological Clerk of Works (ECoW) will be present on site to ensure that the specified protection and mitigation measures in relation to otters are implemented for any works affecting watercourses. The requirement for obtaining a Natural England licence for any work that could give rise to disturbance will be kept under review, for example, should the status of holts recorded change and breeding holts be located
Badgers	Precautionary updated pre-construction surveys for badger setts will be carried out in advance of development commencing.
Breeding birds	The removal of vegetation suitable for use by nesting birds will be carried out outside of the bird nesting season. For the majority of species this is between March and August. Should any small areas of vegetation require removal during the nesting season they will be preceded by a

Component/Activity/Impact	Additional Mitigation
	precautionary nesting bird check to determine whether nests are present. Should any nests be located these will be avoided until nesting is complete. NB This approach (checking for nests) is only practical for very small areas of habitat that can be thoroughly searched for nests; it is not suitable for dense areas of scrub or hedgerow, or any extensive areas of habitat.
Reptiles	Vegetation clearance work carried out using a phased removal approach (walking through, removing in stages to encourage any reptiles present to leave the working area into adjacent habitat). This will be carried out under an ecological watching brief (by an ECoW) and where there is a risk of encountering reptiles.
Great crested newt	The amount of vegetation clearance work within 250m of breeding ponds is minimal, and the risk of an impact on this species is considered to be very low. It is proposed that vegetation clearance will be carried out under a precautionary method statement approach. Where necessary, this will involve precautionary phased removal of vegetation and destructive search (by an ECoW). The need for Natural England (EPSL) licence will be kept under review.
Invasive species	Three INNS are present within the Onshore Development Area, including Japanese knotweed, three-cornered garlic and Montbretia. An INNS Management Plan will be detailed in the Outline Construction Environmental Management Plan **(Appendix 5.B: Outline CEMP)** which will include the following measures: A plan of all INNS locations and extents; • A protocol for removing INNS and for managing the waste generated • Good site practice measures for managing the spread of invasive species during works at or near to watercourses • A requirement for an Ecological Clerk of Works (ECoW) and details of their responsibilities with respect to non-native invasive species.

16.3.7 Baseline Data Sources

16.3.7.1 Desk Study

55. A desk study was undertaken to obtain information on onshore ecology and ornithology. Data were acquired within the study area through a desk-based review.

56. The sources of information presented in **Table 16.12** were consulted to inform the onshore ecology and ornithology assessment.

Table 16.12 Data sources used to inform the onshore ecology and ornithology assessment

Feature	Source of data	Date of data
European designated sites (SPA, SAC and Ramsar sites)	MAGIC https://magic.defra.gov.uk/ JNCC https://sac.jncc.gov.uk/site/UK0012570 Site citation and conservation objectives.	2023
Nationally designated sites (SSSI, NNR)	MAGIC https://magic.defra.gov.uk/ Natural England SSSI citations	2023
Other statutorily designated sites (LNR)	MAGIC website	2023
UK Habitats of Principal Importance (UKHPI)	MAGIC https://magic.defra.gov.uk/ Natural England	2023
Ecological data including non-statutorily designated sites, protected species, and habitats and species of conservation concern	Devon Biodiversity Records Centre (DBRC) and MAGIC website	2022
Five-year summary data for Wetland Bird Survey (WeBS) core count sectors	British Trust for Ornithology (BTO) website https://www.bto.org/our-science/projects/wetland-bird-survey/data	2014 – 2021 (depending on sector)
Sand lizard survey	Dynamic Dunescapes Survey Report	2021
Great crested newt survey	Dynamic Dunescapes Survey Report	2021
Conservation status of birds in the UK	Birds of Conservation Concern 5 (Stanbury *et al,* 2021)	2021
Breeding, wintering and migratory status of birds in Devon	Devon Bird Report (Devon Birds; published 2022)	2020
Wintering wildfowl high tide roost locations	Identification of Wintering Wildfowl High Tide Roosts & Recreational Disturbance Impacts on the Taw Torridge Estuary (Berridge, 2019)	2019 (Berridge)
Radio tracking of greater horseshoe bats at Caen Valley Bats SSSI	English Nature Research Report (ENRR495)	2002
Ecological surveys at Yelland Quay	Reports of surveys for habitats and protected and notable species completed by EAD Ecology in relation to a separate planning application for development at Yelland Quay. The survey area included the Yelland substation area falling within the Onshore Development Area.	2022

16.3.7.2 Site Specific Survey

57. To provide baseline information the EcIA, surveys were undertaken. The scope of these surveys was discussed and agreed with statutory consultees and stakeholders (see **Table 16.17**). A summary of surveys is outlined in **Table 16.13**.

Table 16.13 Summary of site-specific survey data

Survey name	Year	Summary
Intertidal survey	2022	Biotope survey of intertidal habitats within the Onshore Export Cable Corridor conducted by Ecologic Consultant Ecologists. See **Appendix 10.B: Intertidal Survey**.
Extended Phase 1 habitat survey	2022	Identification and mapping of habitats and presence / potential presence of protected / notable species within the Onshore Export Cable Corridor. Survey conducted by Ecologic Consultant Ecologists. See **Appendix 16.B: Preliminary Ecological Appraisal Report**.
Supplementary habitat surveys	2023	Identification and mapping of habitats and presence / potential presence of protected / notable species within additional access areas at Braunton and Yelland; and site visits to confirm habitat assessment in Braunton Marsh. Survey conducted by BSG Ecology. See **Appendix 16.C: Extended Phase 1 Habitat Technical Report - Braunton and Yelland Proposed Access Routes.**
Bat activity survey	2022	Remote detector and transect surveys targeting suitable commuting / foraging habitats that may be impacted by the Onshore Project. Survey conducted by Ecologic Consultant Ecologists. See **Appendix 16.D: Bat Activity Survey Report**.
Supplementary bat activity survey	2023	Remote detector survey of a hedgerow section to be affected by provision of a construction access route and visibility splay, off Saunton Road. Survey conducted by BSG Ecology. See **Appendix 16.E: Supplementary Bat Activity Survey Interim Report (Saunton Road)**.
Bat roost surveys	2022	Preliminary bat roost assessments of trees and buildings within and adjacent to the Onshore Export Cable Corridor, and emergence surveys of trees and buildings that may be impacted by the Onshore Project. Survey conducted by Ecologic Consultant Ecologists. See **Appendix 16.F: Bat Emergence & Activity Survey Report – Buildings** and **Appendix 16.G: Inspection & Bat Emergence Survey Report – Trees**.
Water vole *Arvicola amphibius* and	2022	Survey of all suitable watercourses and aquatic habitats that may be impacted by the Onshore Project. Survey conducted by Ecologic Consultant Ecologists. See **Appendix 16.H: Otter and Water Vole Survey Report**.

Survey name	Year	Summary
otter *Lutra lutra* survey		
Dormouse *Muscardinus avellanarius* survey	2022	Nest tube survey of hedgerow, scrub, and woodland habitats within and adjacent to the Onshore Export Cable Corridor. Survey conducted by Ecologic Consultant Ecologists. See **Appendix 16.I: Dormouse Survey**.
Badger survey	2023	Badger survey of land around Yelland substation. Survey conducted by BSG Ecology. See **Appendix 16.J: Yelland Substation Badger Survey Report**.
Breeding bird survey	2022	Twice-monthly transect surveys between April and July to record bird numbers, species, distribution, and activity within and adjacent to the Onshore Export Cable Corridor. The survey area was sub-divided into four transects (Saunton / Sandy Lane, Braunton Marshes, Braunton Burrows and East Yelland) and covered all suitable habitats that may be impacted by the Onshore Project and / or afforded protection for breeding birds. Survey conducted by Ecologic Consultant Ecologists. See **Appendix 16.K: Breeding Bird Survey Report**.
Great-crested newt *Triturus cristatus* survey	2022	A Habitat Suitability Index (HSI) survey of all ponds within at least 250m of the Onshore Development Area, followed by environmental DNA (eDNA) surveys of all suitable ponds to determine the presence or likely absence of great crested newts, and population size class assessments of all positive ponds. Survey conducted by Ecologic Consultant Ecologists. See **Appendix 16.L: Great Crested Newt Survey Report**.
Reptile survey	2022	Transect and refugia surveys of habitats considered to have potential to support significant populations of reptiles which may be impacted by the Onshore Project. Survey conducted by Ecologic Consultant Ecologists. See **Appendix 16.M: Reptile Survey Report**.
Invertebrate survey (terrestrial and aquatic)	2022	Survey of terrestrial and aquatic habitats which may support rare or notable invertebrates, and which may be impacted by the Onshore Project. Both surveys included the entirety of the onshore Development Area. Surveys conducted by Ecologic Consultant Ecologists. See **Appendix 16.N: Terrestrial Invertebrate Survey Report** and **Appendix 16.O: Aquatic Macro-Invertebrate Survey Report**.
Terrestrial vegetation survey	2022	National Vegetation Classification (NVC) survey of terrestrial habitats which may support rare or notable flora, and which may be impacted by the Onshore Project. Survey conducted by Ecologic Consultant Ecologists. See **Appendix 16.P: National Vegetation Classification**. NB this survey work was primarily within the SAC and SSSI

Survey name	Year	Summary
		areas, which are now avoided by the design and methods employed.
Aquatic vegetation survey	2022	A botanical survey of all aquatic habitats crossed by the Onshore Development Area. NB this survey work also included additional waterbodies in the vicinity of the Onshore Development Area which are now avoided by the design and methods employed. See **Appendix 16.Q: Aquatic Vegetation Survey**.

16.3.8 Data Limitations

58. Data limitations are discussed in this section; the significance of any limitation is discussed below. This section draws upon information set out in the technical appendices supporting this chapter.

59. The limitations described below are not considered to significantly affect the assessment.

60. A summary of the survey limitations is provided below:

- As a general point, the lack of evidence or records of protected species and/or habitats provided by the desk study or field survey does not preclude their possible presence from the Onshore Development Area (i.e. it is possible that further species may be present, but were not previously recorded or identified at the time of the survey). The survey work carried out has been devised to identify and characterise the features that need to be considered in the assessment
- Access was not provided to undertake internal bat inspections of the off-site Saunton Golf Clubhouse and associated buildings, Braunton Barn or South Barrow Farmstead. This is not considered to be a significant limitation since it was possible to characterise the nature of bat roosts during emergence surveys of these buildings, and also since none of these buildings will be impacted
- The dormouse survey was affected by disturbance to some of nest tubes along public footpaths at Yelland. The surveys still achieved an adequate score overall with regard to recommended survey effort (in Bright *et al.*, 2006) and the results are considered to be sufficient to determine presence/ likely of this species
- The reptile survey area sampled habitat suitable for reptiles across the survey area however it was only practical and possible to survey a proportion of this area. The survey results are considered to give a good indication of the species present and the likely distribution of reptiles across the Onshore Development Area; the survey effort is considered to be sufficient/proportionate to adequately

inform the assessment and devise an appropriate/proportionate approach to mitigation, taking into account the temporary and localised impacts

- During the otter and water vole survey, the presence of cattle prevented direct access to one of the ditches on the south side of the Taw Estuary, and access to the steep southern bank of a nearby large pond was not safely possible. In these two areas, surveys were instead conducted with binoculars. It is not unusual to encounter some inaccessible areas during a survey, and the significance of this limitation is considered to be minor, given the extensive coverage from other parts of the site and the use of binoculars
- The otter and water vole survey did not cover drainage ditches that were dry during the period of survey. As above the significance of this limitation is considered to be very minor, as they are low suitability habitats.

16.3.9 Consultation

61. Consultation has been a key part of the development of the Project. Consultation regarding onshore ecology and ornithology has been conducted throughout the EIA, with Natural England, North Devon Council, Devon Wildlife Trust and MMO. An overview of the Onshore Project consultation process is presented within **Chapter 7: Consultation**.

62. A summary of the key issues raised during consultation specific to onshore ecology and ornithology is outlined in **Table 16.14**, together with how these issues have been considered in the production of this ES.

Table 16.14 Consultation responses

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
Scoping Opinion Responses			
MMO	30/05/2022 Scoping opinion (Case reference: EIA/2022/00002) , Section 7.4.1	The ES should assess the impact of all phases of the proposal on protected species (including, for example, great crested newts, reptiles, birds, water voles, badgers, dormice and bats). The MMO are aware of a population of great crested newts on Braunton Burrows.	Potential impacts discussed within **Sections 16.4.4** and **16.5**.
ETG Meetings and related correspondence			
Natural England	Email correspondence on 16/06/2023 (NE), 30/06/2023 (Project team) and 13/07/2023 (NE)	• This correspondence was to follow up points raised at previous meeting relating to the removal/coppicing of hedgerows along Saunton Road, and the need for bat monitoring work and mitigation for Greater horseshoe (GHS) bats.	Potential impacts discussed within **Section 16.5.8** and **16.5.12**.
North Devon Council	07/06/2023. Onshore ecology meeting	• The EIA needs to consider disturbance of wintering birds on the Taw Estuary and the possibility of impacts from emissions. • The possibility of water leakage into local drain network during trenchless techniques boring needs to be mitigated. • Greater horseshoe (GHS) bats have been known to commute distances of up to 5km and should be considered in assessment of impacts on Caen Valley Bats SSSI. There is a known satellite GHS roost at Saunton Farm close to the proposed haul road access. Any hedgerow to be lost at this access point should be replaced in better quality and condition to aid BNG.	Potential impacts discussed within **Section 16.5**.
Natural England	25/05/2023, Onshore cabling meeting	Main NE concerns for potential impacts:	Potential impacts discussed within **Section 16.5**.

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
		• The possibility of bentonite breakout risking effects on the SAC and other sensitive ecological features. • Haul road access off Saunton Road – coppicing hedgerow would be preferable to removal to allow later regeneration. The EIA should include precautionary mitigation to retain any existing bat commuting routes along the hedgerow line during construction in respect of the Caen Valley Bats SSSI. A full rationale for survey and impact assessment for this area is required within the EIA.	
Natural England	20/05/2022, Onshore ecology ETG	Route across Braunton Burrows has potential to cause the most environmental harm. Recommend considering biodiversity net gain as early as possible. Main NE concerns: • Landfall (to MLWS): disturbance to birds, mudflats and sandflats and component communities; sediment composition and important to look at topography hydrodynamic regime and turbidity. • Onshore cabling route: habitat damage/ loss and fragmentation. • Cable laying: routing along the path is avoiding surface vegetation communities, but there are certain substrate properties that would still need consideration. • Community compositions, species compositions, would need to look at any natural zonation and transitions as well. • The need to consider sand movement and stability, vascular plant assemblies as well geomorphological processes.	Trenching route across central Braunton Burrows has now been discounted and is no longer being considered. Potential impacts raised by Natural England to be included within the ES assessments. Consideration of sand lizards to remain within assessment (scoped out in **Section 16.4.4**). To include embedded biodiversity net gain considerations. Potential impacts discussed within **Section 16.5**.

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
		• Topography needs to be included which will link to how resilient the dune system is. • Need to consider the impacts on those long-term monitoring results of the dunes because this is a nationally important site. • Hydrology impacts should be included too, including subsurface hydrology and the knock-on effects. Consider groundwater dependent habitats and species. • For the Taw/Torridge estuary SSSI, you already have those impacts scoped in. To highlight that sand lizards are known to be present within the survey area and despite them not having been recorded during the surveys to date, consideration of this species should remain.	
Natural England	09/09/2022 Ornithology ETG	Uncertain about the cable route across Braunton Burrows, but yet to provide a formal response to the short list report.	Trenching route across central Braunton Burrows has now been discounted and is no longer being considered.
Devon Wildlife Trust	09/09/2022 Ornithology ETG	Not supportive of the preferred cable route option through Braunton Burrows.	Trenching route across central Braunton Burrows has now been discounted and is no longer being considered.

16.4 Existing Environment

63. This section describes the existing environment in relation to onshore ecology and ornithology associated with the White Cross study area. It has been informed by a review of the sources listed in **Section 16.3.7**.

16.4.1 Designated sites

64. Statutory designated sites that are located within 2km of the Onshore Development Area, and non-statutory designated sites located within 1km of the Onshore Development Area are presented in **Table 16.15**. **Table 16.15** also provides a summary of the qualifying features/reasons for notification of these designated sites.

Table 16.15 Designated nature conservation sites summary

Designated site name	Location and proximity to/ relationship with Onshore Development Area	Qualifying features/reasons for notification (Source unless otherwise stated: JNCC, 2023)
Statutory designated sites		
Braunton Burrows SAC	Partly within the Onshore Development Area	Annex I habitats that are primary reason for designation: • 2120 "Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")" • 2130 "Fixed coastal dunes with herbaceous vegetation ("grey dunes")" • 2170 Dunes with Salix repens ssp. *Argentea Salicion arenariae* • 2190 Humid dune slacks Annex I habitats present as a qualifying feature, but not a primary reason for designation: • 1140 Mudflats and sandflats not covered by seawater at low tide Annex II species that are a primary reason for designation: • 1395 Petalwort Petalophyllum ralfsii
Braunton Burrows SSSI	Partly within the Onshore Development Area	Designated for its large dune slack system and the associated rare / vulnerable plants species present within the system. Supports a variety of breeding birds including whitethroat *Sylvia communis*, skylark *Alauda arvensis,* meadow pipit *Anthus pratensis*, wheatear

Designated site name	Location and proximity to/ relationship with Onshore Development Area	Qualifying features/reasons for notification (Source unless otherwise stated: JNCC, 2023)
		Oenanthe oenanthe and shelduck *Tadorna tadorna.* The SSSI units within and adjacent to the Onshore Development Areaare: • 101 – Saunton Golf Club (unfavourable – recovering condition) • 102 – The Roughs and Strawberry Ridge (unfavourable – recovering condition) • 103 – Fox Slack, Soay Plain & Lamprey's Plot enclosure (unfavourable – recovering condition) • 104 – Northern Training Area (unfavourable – recovering condition) • 105 – Southern Training Area (unfavourable – recovering condition • 106 – The Flats enclosure (unfavourable – declining condition) • 107 – Crow Point & Broad Sands (unfavourable – declining condition) • 108 – Saunton Sands (favourable condition).
Taw-Torridge Estuary SSSI	Partly within the Onshore Development Area	Comprises large areas of mudflats, sandbanks and areas of saltmarsh and beaches, and is of major importance for its overwintering and migratory populations of wading birds. Over 20,000 waders may be present at any one time, including nationally important numbers of curlew *Numenius arquata*, golden plover *Pluvialis apricaria* and lapwing *Vanellus vanellus*. Redshank *Tringa tetanus*, dunlin *Calidris alpina* and oystercatcher *Haematopus ostralegus* are also abundant. Estuarine plants include common saltmarsh-grass *Puccinellia maritima*, cord-grass *Spartina* spp., sea aster *Aster tripolium*, annual seablite *Suaeda maritima*, rock sea-lavender *Limonium binervosum* and great sea-stock *Matthiola sinuata*. Other estuarine species include mullet *Mugil* sp., bass *Dicentrarchus labrax*, pollack *Pollachius pollachius*, eel *Anguilla* anguilla and a diversity of invertebrates. The SSSI unit within the Onshore Development Area is: • 103 – River Taw (favourable condition)

Designated site name	Location and proximity to/ relationship with Onshore Development Area	Qualifying features/reasons for notification (Source unless otherwise stated: JNCC, 2023)
Greenaways and Freshmarsh, Braunton SSSI	Immediately east of the Onshore Development Area	Comprises herb-rich marshy grasslands, with rich water-plant communities occurring in the drainage ditches. The site supports breeding reed bunting *Emberiza schoeniclus* and sedge warbler *Acrocephalus schoenobaenus*. The SSSI unit immediately adjacent to the Onshore Development Area is: • 2 – Freshmarsh (favourable condition)
Saunton to Baggy Point Coast SSSI	Immediately north of the Onshore Development Area	Designated for its cliffs and associated botanical features of maritime heathland, grassland and lichens. The SSSI unit within the Onshore Development Area is: • 104 – Saunton Cliffs and Foreshore (unfavourable – declining condition)
Braunton Swanpool SSSI	0.25km west of the Onshore Development Area	Important for its herb-rich marshy grasslands, mire, and swamp habitats. A characteristic bird community is present, with reed warbler *Acrocephalus scirpaceus*, sedge warbler, grasshopper warbler *Locustella naevia* and reed bunting breeding here regularly.
Caen Valley Bats SSSI	1.7km north-east the Onshore Development Area	The site is notified as a nationally important summer maternity roost and winter hibernacula for the greater horseshoe bat *Rhinolophus ferrumequinum*.
Northam Burrows SSSI	2.0km west of the Onshore Development Area	Comprises a wide range of coastal habitats (including 'yellow' dunes, wet grassland, dune slack, and extensive coastal grassland), and supports a range of rare and local plants. The site also supports many bird species, including over-wintering golden plover, curlew, wigeon *Anas penelope* and brent goose *Branta bernicla*, and breeding shelduck, wheatear, stonechat, whitethroat, grasshopper warbler and sedge warbler.
Bideford to Foreland Point MCZ	Partly within the Onshore Development Area	Protected features are: Low energy intertidal rock, Moderate energy intertidal rock, High energy intertidal rock, Intertidal coarse sediment, Intertidal mixed sediments, Intertidal sand and muddy sand, Intertidal underboulder communities, Littoral chalk communities, Low energy infralittoral rock, Moderate energy infralittoral rock, High energy infralittoral rock, Moderate energy circalittoral rock, High energy circalittoral rock, Subtidal coarse sediment, Subtidal mixed sediments, Subtidal sand, Fragile sponge &

Designated site name	Location and proximity to/ relationship with Onshore Development Area	Qualifying features/reasons for notification (Source unless otherwise stated: JNCC, 2023)
		anthozoan communities on subtidal rocky habitats, Honeycomb worm *Sabellaria alveolata* reefs, Pink sea-fan *Eunicella verrucosa*, and Spiny lobster *Palinurus elephas*. NB The assessment of impacts on the Bideford to Foreland Point MCZ are considered and addressed in **Chapter 10: Benthic and Intertidal Ecology**.
Fremington Local Nature Reserve (LNR)	3.0km to the east of the Onshore Development Area	Fremington LNR is comprised of two separate units: Lovell's Field (4.1ha) of low-lying wet grassland that is grazed adjacent to the Taw-Torridge Estuary, and Leat Meadow (3ha) which includes woodland, scrub, wetland and grassland.
Non-statutory designated sites		
Horsey Island County Wildlife Site (CWS)	Immediately adjacent to the Onshore Development Area	Saltmarsh and mudflat, including recolonising saltmarsh following breach in sea wall. Saltmarsh (brackish) site supporting 16 Devon Notables & 1 NS plant. The wetter areas of saltmarsh are exceptionally species-rich (DBRC, 2022)
Braunton Marsh Unconfirmed Wildlife Site (UWS)	Partly within the Onshore Development Area	Semi-improved neutral grassland (DBRC, 2022)
Sandy Lane (W) UWS	Partly within the Onshore Development Area	Semi-improved neutral grassland (DBRC, 2022)
Blind Acre Lane UWS	Partly within the Onshore Development Area at Braunton access road only	Semi-improved neutral grassland (DBRC, 2022)
Lane End UWS	Partly within the Onshore Development Area at Instow access road only	Sand dune system (DBRC, 2022)
Instow Barton Marsh UWS	Partly within the Onshore Development Area	Grazing marsh (DBRC, 2022)

Designated site name	Location and proximity to/ relationship with Onshore Development Area	Qualifying features/reasons for notification (Source unless otherwise stated: JNCC, 2023)
Saunton Down UWS	Immediately north of the Onshore Development Area	Semi-improved neutral grassland & scrub (DBRC, 2022)
Yelland Ash Beds CWS	Immediately east of the Onshore development Area	Species-rich grassland forming a mosaic with marshy grassland and scrub (DBRC, 2022)
Saunton Court Wood UWS	0.1km north of the Onshore Development Area	Broadleaved woodland (DBRC, 2022)
Saunton Down (S) UWS	0.15km north of the Onshore Development Area	Unimproved neutral grassland with scattered scrub (DBRC, 2022)
Lankham Brake UWS	0.2km north of the Onshore Development Area	Broadleaved woodland (DBRC, 2022)
Venn Close UWS	0.2km east of the Onshore Development Area	Semi-improved neutral grassland (DBRC, 2022)
Boundary Drain Fields UWS	0.3km east of the Onshore Development Area	Semi-improved neutral grassland (DBRC, 2022)
Sir Arthur's Pill UWS	0.3km east of the Onshore Development Area	Semi-improved neutral grassland (DBRC, 2022)
Saunton Field UWS	0.3km north of the Onshore Development Area	Unimproved grassland & scrub (DBRC, 2022)
Knills Farm UWS	0.35km north of the Onshore Development Area	Rush-pasture (DBRC, 2022)
Spring Wood UWS	0.5km north of the Onshore Development Area	Broadleaved woodland (DBRC, 2022)
Willowfield UWS	0.5km east of the Onshore Development Area	Marshy grassland (DBRC, 2022)
Unnamed Devon Wildlife Trust (DWT) reserve	0.5km east of the Onshore Development Area	Freshwater reedbed, tall herb vegetation and willow carr (DBRC, 2022). Located within Braunton Swanpool SSSI

Designated site name	Location and proximity to/ relationship with Onshore Development Area	Qualifying features/reasons for notification (Source unless otherwise stated: JNCC, 2023)
Heather Down UWS	0.8km north of the Onshore Development Area	Semi-improved neutral grassland (DBRC, 2022)
Little Snailand & Saunton Down CWS	0.8km north of the Onshore Development Area	MG5 but with calcareous influence (DBRC, 2022)
East Yelland Marsh 2 UWS	0.8km north-east of the Onshore Development Area	Saltmarsh (DBRC, 2022)
West Yelland UWS	0.9km east of the Onshore Development Area	Semi-improved neutral grassland (DBRC, 2022)
Ancient Woodland	3.0km to the south of the Onshore Development Area	A small area of ancient woodland adjacent to the B322 road, at Tapeley Park, which is approximately 3km to the south of Yelland. Shown on Magic.gov (considered in relation to the air quality assessment).

65. Several "North Devon Key Network Features" and "Network Features" are located within 2km of the Onshore Development Area. These are described as "*areas of semi-natural habitat likely to make a significant contribution to the overall movement/dispersal of species within the local landscape as wildlife 'stepping stones' or corridors*" (DBRC, 2022). These include areas of marshy grassland, grazing pasture, hedgerows and woodland, all of which are located outside the Onshore Development Area but two of which are located immediately adjacent to the southern end of the Onshore Development Area around Yelland substation.

16.4.2 Habitats

66. Descriptions of the habitats falling within each part of the Onshore Development Area are provided below. The Preliminary Ecological Appraisals (PEAs) (**Appendices 16.B: Preliminary Ecological Appraisal Report, 16.C: Extended Phase 1 Habitat Technical Report - Braunton and Yelland Proposed Access Routes**, intertidal survey (**Appendix 10.B: Intertidal Survey**), National Vegetation Classification (NVC) survey (**Appendix 16.P: National Vegetation Classification**) and aquatic vegetation survey (**Appendix**

16.Q: Aquatic Vegetation Survey) have informed the descriptions below and further details on the habitats present are provided within these reports.

16.4.2.1 Landfall (to MLWS) – Saunton Sands

67. The intertidal area of the Onshore Development Area at the Landfall (to MLWS) falls within Saunton Sands, located within the boundary of Braunton Burrows SAC. The area is part of a mobile intertidal sandflat habitat largely dominated by fine sand, with patches of small rocks scattered intermittently in areas of the upper littoral zone at the northern end. Rocky shore and rockpools also occur adjacent to the northern boundary of the Onshore Development Area.

68. The intertidal sandflat habitat within the Landfall (to MLWS) area forms the Annex I habitat 'Mudflats and sandflats not covered by seawater at low tide', which is a qualifying feature of the SAC. This intertidal area also falls within the Bideford to Foreland Point MCZ. Assessment of the effects of the Project on the MCZ, along with details of the intertidal communities present, are provided in **Chapter 10: Benthic and Intertidal Ecology**, and **Appendix 10.B: Intertidal Survey**.

16.4.2.2 Braunton Burrows

69. To the east of the Landfall (to MLWS) is the extensive sand dune system of Braunton Burrows, which includes Saunton golf course on its eastern side. The dunes and golf course lie within Braunton Burrows SAC and SSSI and support the Priority Habitat 'Coastal Sand Dunes'.

70. Adjacent to the Saunton Beach car park, mobile sand dunes on the seaward edge show evidence of erosion from heavy visitor pressure, resulting in areas of exposed sand and localised 'blow-outs', and represent the SD6 *Ammophila arenaria* (marram grass) mobile dune NVC community. Inland and further south the dunes are more stable and grade into more continuous semi-fixed and fixed dune communities, although still with a substantial component of bare sand.

71. To the east of the car park, extensive scrub has developed over the dune system, forming mosaics with dune grassland but more widely forming dense and impenetrable stands. The scrub is dominated by bramble *Rubus fruticosus*, with abundant wild privet *Ligustrum vulgare*, blackthorn *Prunus spinosa* and traveller's-joy *Clematis vitalba* present on the drier dunes, and grey willow *Salix cinerea* in the damper valleys. A c.1.5ha stand of dense grey poplar *Populus x canescens* has also become established. Other locally frequent non-natives include *Cotoneaster* spp. (at least four taxa present), holm oak *Quercus ilex*, sycamore *Acer pseudoplatanus*, Scots pine *Pinus sylvestris* and other conifers.

16.4.2.3 Saunton Golf Course

72. Saunton golf course has been developed over semi-fixed and older stabilised dunes. Outside of the played areas of the course, which are intensively managed, the major vegetation type is NVC community SD9a. This is a typical community of semi-stable, ungrazed dunes and comprises a relatively species-poor sward dominated by marram grass *Ammophila arenaria,* red fescue *Festuca rubra*, downy oat-grass *Avenula pubescens* and other perennial grasses. This grades into more species-rich grassland around the edges of some played areas where the grassland is mown, and where the dunes are more mobile. Several small dune slacks occur; most of which are relatively dry, but some are wet with substantial populations of marsh helleborine *Epipactis palustris.*

73. Scrub is limited within the golf course and may be cut as part of site management. There are localised stands of bramble and mosaics of this within grassland. There are also patches of mixed hawthorn *Crataegus monogyna* scrub, a screening belt of scrub along the eastern boundary and more extensive stands of grey willow scrub in the south-east. Other habitats on the northern side of the golf course include a reservoir, scattered areas of mixed-broadleaved woodland, several buildings and hardstanding.

16.4.2.4 Sandy Lane agricultural fields

74. The Onshore Development Area to the east of Saunton golf course is formed by a series of arable fields associated with Sandy Lane Farm and New Cross Farm which are bordered by wet and dry ditches and species-rich and species-poor hedgerows. Pature fields included a poor semi-improved grassland sward (which includes bird's foot trefoil *Lotus corniculatus*, creeping buttercup *Ranunculus repens*, creeping thistle *Cirsium arvense*, meadow foxtail *Alopecurus pratensis*, smooth meadowgrass *Poa pratensis*, soft rush *Juncus effusus* and Yorkshire-fog *Holcus lanatus)*. Fool's watercress *Apium nodiflorum* is abundant or dominant in many of the ditches, with common reed *Phragmites communis*, common nettle *Urtica dioica*, great willowherb *Epilobium hirsutum* and cow parsley *Anthriscus sylvestris* also widespread. Frequent hedgerow woody species include elder *Sambucus nigra*, elm *Ulmus procera*, dogwood *Cornus sanguinea*, blackthorn *Prunus spinosa* and hawthorn.

75. To the north of the Sandy Lane car park, the Onshore Development Area borders the central section of Braunton Burrows SAC to the west and Greenaways & Freshmarsh SSSI to the east. This section of Braunton Burrows SAC contains several distinct zones, with the oldest and lowest dunes extending from Sandy Lane and the American Road at the landward end for approximately 1km to the west. Scrub

is frequent, both as small discrete stands, invasive stands, and larger areas of dense, more mature scrub, and is dominated by grey willow and bramble.

76. The Greenaways & Freshmarsh SSSI contains managed grassland fields that correspond most closely to the NVC community MG12a *Festuca arundinacea* grassland, *Lolium perenne-Cynosurus cristatus* sub-community.

16.4.2.5 Braunton Marsh

77. To the south-east of Sandy Lane car park the Onshore Development Area passes through Braunton Marsh an extensive area of pasture with ditches and hedgerows; it is identified on Magic.gov as containing the Priority Habitat 'Coastal and floodplain grazing marsh', and is part of an Unconfirmed Wildlife Site (UWS).

78. The Marsh is bisected by a network of ditches and drains, with hedgerows bordering some fields. An area of marshy grassland and swamp/fen vegetation is present in depressions formed by a former saltmarsh creek on Braunton Marsh within the Onshore Export Cable Corridor, to the south-east of the Sandy Lane car park.

79. Areas of marshy grassland within the Braunton Marsh area include tufted hair-grass *Deschampsia caespitosa*, marsh foxtail *Alopecurus geniculatus*, creeping bent *Agrostis stolonifera*, Yorkshire fog *Holcus lanatus*, soft rush *Juncus effusus*, hard rush *Juncus inflexus*, ragged robin *Silene flos-cuculi*, common fleabane *Pulicaria dysenterica,* yellow iris *pseudacorus*, horsetail *Equisetum* sp., meadowsweet *Filipendula ulmaria*, common knapweed *Centaurea nigra*, marsh thistle *Cirsium palustre,* tufted vetch *Vicia cracca* and greater bird's foot-trefoil *Lotus pedunculatus*. Swamp/fen habitat includes horsetail, yellow iris, club rush *Schoenoplectus lacustris*, hard rush, common reed *Phragmites australis*, bulrush *Typha latifolia*, meadowsweet, lesser celandine *Ficaria verna*, cuckoo flower *Cardamine pratensis*, brooklime *Veronica beccabunga*, common figwort *Scrophularia nodosa*, marsh marigold *Caltha palustris*, creeping willow *Salix repens*, grey willow *Salix cinerea*, goat willow *Salix caprea* and water dropwort *Oenanthe crocata*. Areas of wet woodland include grey willow, goat willow, alder *Alnus glutinosa*, bulrush, yellow iris and horsetail.

80. The aquatic vegetation survey (**Appendix 16.Q: Aquatic Vegetation Survey**) recorded species-rich ditches in Braunton Marsh. Lesser water-parsnip *Berula erecta* is an uncommon plant in Devon (Preston & Croft, 1997) due to the shortage of its preferred ditch habitat, but is fairly common across Braunton Marsh and was recorded in six ditches. Rigid hornwort *Ceratophyllum demersum*, another plant that is scarce across the county for similar reasons (Preston & Croft 1997), was noted in

two ditches, and the uncommon shore horsetail *Equisetum x littorale*, a hybrid of *E. fluviatile* and *E. plaustre*, was recorded in one ditch.

16.4.2.6 Taw-Torridge Estuary

81. The Onshore Development Area crosses the Taw estuary between Crow Beach House in the north and Yelland in the south. The estuary lies predominantly within the Taw-Torridge Estuary SSSI, although a section on the north side forms part of Braunton Burrows SAC and comprises the Annex I habitat 'Mudflats and sandflats not covered by seawater at low tide'. Wider estuarine habitat types include saltmarsh, mudflats, and tidal creeks; the saltmarsh and mudflats are Priority Habitats.

82. A small section of Braunton Burrows SAC and SSSI lies within the Onshore Development Area immediately north of the estuary, in the vicinity of Crow Point car park. The car park itself is sparsely vegetated, although the uncommon milk thistle *Silybum marianum* is present in several places. The car park is surrounded by hawthorn and bramble scrub, and along the seaward edge was a narrow dune ridge dominated by marram grass. Behind the dune ridge, the flatter land has been damaged by vehicles, and there are considerable areas of bare sand. As a result there are also areas of early successional grassland related to coastal dune communities where the vegetation was re-establishing.

83. Much of the upper littoral zone habitat on the north side of the estuary is sand, transitioning to mud leading up to a small channel with flowing water at low tide. The saltmarsh includes plants such as eelgrass *Zostera marina* and common cordgrass *Sporobolus anglicus*.

84. On the south side of the estuary, the intertidal habitat on the eastern side of the Onshore Development Area is dominated by silt and very fine sand with intermittent patches of common cord grass *Spartina anglica* and gutweed on the sand, and occasional seaweeds such as egg wrack *Ascophyllum nodosum*. The upper littoral habitat is shingle overlying sand and mud with patches of salt tolerant vegetation including sea purslane *Halimione portulacoides*, sea beet *Beta vulgaris maritima*, and sea plantain *Plantago maritima*. The central area contains fine sediment with a patch of shale rock substrate along the sublittoral zone, with a thick covering of *A. nodosum*. The western side transitions from sand and mud with small, scattered rocks to rocky shore with underlying sand and mud.

85. The seaward face of the sea wall on the south side of the estuary has a mosaic of species-poor vegetation types including low bramble scrub, the NVC strand-line community SD2 (*Honkenya peploides – Cakile maritima*) and a narrow band of the

saltmarsh community SM24 (*Elymus pycnanthus*). The sea wall itself has more species-rich grassland which is closest to an atypical form of the maritime grassland MC11, more commonly found on the tops of sea-cliffs. To the east of the Onshore Development Area is a large, single-species stand of *Spartina anglica* (SM6 community) and a more extensive area of saltmarsh.

16.4.2.7 Yelland agricultural land

86. The fields to the south of the sea wall at Yelland contain semi-improved agricultural grassland that correspond to the Priority Habitat 'Coastal and floodplain grazing marsh' and the NVC community MG10b *Holcus lanatus-Juncus effusus* rush-pasture, *Juncus inflexus* sub-community. This is a relatively species-poor habitat dominated by the grasses Yorkshire-fog, creeping bent, common bent and red fescue with scattered clumps of hard rush. The ditches contain a range of aquatic species including fool's watercress, compact rush *Juncus conglomeratus*, water mint *Mentha aquatica* and water forget-me-not *Myosotis scorpioides*, but are not considered to be as botanically diverse as those on Braunton Marsh. Ungrazed grassland between the fence along the northern edge of these fields and the sea-wall is species-poor with scattered gorse scrub to the east.

87. To the south of the Tarka Trail are semi-improved and improved (modified) grassland fields bordered by species-rich hedgerows and small stands of mixed woodland. A large pond with a fringe of common reed and surrounded by willow scrub, is present adjacent to the Onshore Export Cable Corridor. Habitats around the existing substation include marshy grassland (dominated by Yorkshire fog, common bent and soft rush), species-poor semi-improved grassland, dense and scattered willow scrub and wet ditches containing a mix of marginal vegetation.

16.4.2.8 Yelland substation area

88. The substation area supports an enclosed area of grassland (a combination of species-poor semi-improved grassland and soft rush-pasture), dense scrub and hedgerows adjacent to the Tarka Trail (goat willow, hawthorn, bramble and small oak *Quercus* sp. trees), a species-poor hedgerow which forms the east boundary, an area of previously developed land that supports poor-semi-improved grassland and scattered willow scrub, a short section of vegetated wet ditch (EAD Ecology, 2022). The additional areas on the north side of the Tarka Trail, which are within a previously developed area, include patches of grassland, scrub and hard-standing areas.

16.4.2.9 Yelland access route

89. The access route at Yelland is currently dominated by an existing hardstanding/ bare ground access track, including a section of the enclosed Tarka Trail at the southern end which is bordered by several buildings/ cabins and formal gardens, and along a less formal track through open fields at the northern end. The route passes through a mix of habitats including closed dune, dune grassland, species-poor semi-improved grassland and scattered scrub. The route passes alongside an area of broadleaved wet woodland to the west, within which two highly shaded small ephemeral ponds are present. Towards the southern end the route also crosses over a flowing wet ditch.

16.4.2.10 Braunton access route

90. The access route at Braunton passes through a series of fields, including a species-poor semi-improved grassland field (dominated by Yorkshire fog with frequent perennial rye-grass and common bent), and intensively cultivated arable fields. The route also passes over two scrub-lined, narrow flowing streams and a series of steep-sided open field drains. The north end of the route includes a section of intact species-rich hedgerow along Saunton Road, situated on a low earth bank, dominated by elm.

16.4.3 Protected and Notable Species

16.4.3.1 Notable plants

16.4.3.1.1 Desk study

91. Data received from DBRC contained 135 records for plant species, including:

- Six Priority Species: dune gentian *Gentianella uliginosa*, early gentian *Gentianella anglica*, water germander *Teucrium scordium*, sea stock *Matthiola sinuate* and round-headed club-rush *Scirpoides holoschoenus* and rock sea-lavender *Limonium binervosum agg*. Many of these records are from Braunton Burrows SAC/ SSSI
- Eight Nationally Scarce (NS) species including sea clover *Trifolium squamosum*, Portland spurge *Euphorbia portlandica* and white horehound *Marrubium vulgare*
- Sixty-two Devon Notable (DN1, DN2, DN3) species including marsh helleborine *Epipactis palustris*, parsley water-dropwort *Oenanthe lachenalii*, pyramidal orchid *Anacamptis pyramidalis* and sharp rush *Juncus acutis*. These records are primarily associated with Braunton Burrows or Horsey Island.

92. The Preliminary Ecological Appraisal (PEA; **Appendix 16.B: Preliminary Ecological Appraisal Report**) provides further details of notable plant records within the study area.

93. Petalwort *Petalophyllum ralfsii* is a primary reason for selection of Braunton Burrows SAC. A large population (around 3000 plants) is recorded from the SAC, one of two sites selected for this species in south-west England, where it is found on extensive open dune slack habitats.

16.4.3.1.1Site survey

94. A range of notable plant species were recorded during the Phase 1 habitat surveys, NVC survey and aquatic vegetation survey, the majority of which were recorded from various dune and wetland habitats within Braunton Burrows SAC/ SSSI, and from saltmarsh locations within Taw and Torridge Estuary SSSI.

95. The notable plant species recorded during the survey that are from within or immediately adjacent to the Onshore Development Area are detailed in **Table 16.16**.

96. Full lists of the notable plant species recorded within the vicinity of the Onshore Development Area are provided at **Appendix 16.B** and **Appendices 16.P** and **16.Q**.

16.4.3.1 Invasive plants

16.4.3.1.1 Desk study

97. Three invasive non-native species (INNS) listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) have been previously recorded in the study area, but these are outside of the Onshore Development Area. Provided for contextual information only: Canadian waterweed *Elodea canadensis* and parrot's-feather *Myriophyllum aquaticum* have been recorded in a central ditch within Braunton Marsh UWS, and Japanese knotweed *Fallopia japonica* has been noted at Instow, adjacent to a public footpath near the cricket ground.

Table 16.16 Notable plant species recorded during the NVC survey

Common name	Scientific name	Status[3]	Location(s) and OS grid reference	Comments
Sea stock	*Matthiola sinuata*	S41, D1, Vu	Saunton Sands landfall (to MLWS) (SS446375)	Also recorded from several off-site locations on Saunton Sands. Associated with sand dunes and sea cliffs. A historically declining species now showing some increases in population in parts of the UK.
Greater pond sedge	*Carex riparia*	D2	Within a ditch in a field proposed for a trenching working compound (SS463352); will not be affected	Associated with lowland wetland areas on the coast and inland, relatively common and widespread within the UK but less common within Devon.
Sand sedge	*Carex arenaria*	D2	Found in open dune habitats in the vicinity of the Yelland access road	Predominantly coastal species associated with dunes and ruderal habitats. Widespread but declining within the UK.
Sea couch	*Elytrigia atherica*	D3	Found in dune grassland in the survey area near to the beach to the north-west of the Yelland access road.	Predominantly coastal species associated with saltmarshes and shingle. Uncommon but increasing within the UK.
Marsh ragwort	*Jacobaea aquatica*	NT	Recorded in wet ditches close to Yelland substation	Associated with lowland wetland areas, Common and widespread but declining in all areas due to drainage and agricultural intensification.
Lesser water parsnip	*Berula erecta*	Uncommon in Devon	Recorded in field boundary ditches in Braunton Marsh UWS (SS46897 33502,	Associated with open water habitats on the coast and inland. Relatively common and widespread but declining

[3] Status: D1, D2 and D3 - Devon Notable Species; S41 - NERC Act Section 41 species; S8 - Wildlife and Countryside Act Schedule 8; Vascular Plant Red List for England (Stroh *et* al, 2014) En Endangered, Vu Vulnerable, NT Near Threatened, Uncommon in Devon (Preston & Croft, 1997).

Common name	Scientific name	Status[3]	Location(s) and OS grid reference	Comments
			SS47089 3341 & SS46885 33184); (NB these will be crossed using trenchless techniques and bailey bridges)	due to drainage and habitat destruction.
Hybrid shore horsetail	*Equisetum x littorale*	Uncommon in Devon	Recorded in a field boundary ditch in Braunton Marsh UWS (SS46885 33184) (NB these will be crossed using trenchless techniques and bailey bridges)	Associated with coastal and inland habitats, relatively widespread throughout the UK.
Rigid hornwort	*Ceratophyllum demersum*	Uncommon in Devon	Recorded in field boundary ditches in Braunton Marsh UWS (SS 46897 33502 & SS 46885 33184) (NB these will be crossed using trenchless techniques and bailey bridges)	Associated with open water habitats, relatively common and widespread, and increasing within the UK.

16.4.3.1.2Site survey

98. Three INNS were identified within the Onshore Development Area. A single stand of Japanese knotweed is present along Burrows Close Lane to the north of New Cross Farm, three-cornered garlic *Allium triquetrum* was identified in one location at Yelland, along a field boundary to the south of the Tarka Trail (**Appendix 16.B: Preliminary Ecological Appraisal Report**) and stands of Montbretia *Crocosmia × crocosmiiflora* were identified close to the access track at the southern end of the Yelland access route (SS47559 31259) and in the vicinity of the Yelland substation (SS 4821032209) (**Appendix 16.C: Extended Phase 1 Habitat Technical Report - Braunton and Yelland Proposed Access Routes**.

16.4.3.2 Badger

16.4.3.2.1 Desk study

99. The information provided by DBRC indicated the presence of Badger in the study area and Onshore Development Area (*Section 3.3.2*; **Appendix 16.B: Preliminary Ecological Appraisal Report**).

16.4.3.2.2 Site survey

100. There are no setts within the Onshore Development Area; [redacted] badger setts have been identified within the adjacent land. These include:

[redacted]

101. A number of badger latrines, foraging signs, badger paths and badger observations were recorded across the Onshore Development Area and immediately adjacent land. The grasslands, scrub, hedgerow basis and arable field margins found throughout the area offer opportunities for foraging and sett building and it is likely that badger use all parts of the Onshore Development Area on at least an occasional basis for foraging and dispersal.

16.4.3.3 Bats

16.4.3.3.1 Desk study

102. The information provided by DBRC indicated 28 bat records within 1km of the Onshore Development Area (***Section 3.3.3***; **Appendix 16.B: Preliminary Ecological Appraisal Report**).

- Barbastelle *Barbastella barbastellus* (3 records)
- Soprano pipistrelle *Pipistrellus pygmaeus* (3 records)
- Noctule *Nyctalus noctula* (2 records)
- Lesser horseshoe bat *Rhinolophus hipposideros* (5 records)
- Greater horseshoe bat *Rhinolophus ferrumequinum* (7 records)
- Common pipistrelle *Pipistrellus pipistrellus* (3 records)
- Brown long-eared bat *Plecotus auritus* (1 record)
- *Myotis* sp. bats (2 records)
- Unconfirmed *Pipistrellus* sp. bats (3 records).

103. In addition, a review of the MAGIC website identified one European Protected Species Licence (EPSL) for common pipistrelle near to the Landfall (to MLWS) at Saunton Sands.

104. The majority of Onshore Development Area to the north of the River Taw lies within 5km of Caen Valley Bats SSSI, and is therefore within the foraging range of greater horseshoe bats associated with this designated site.

16.4.3.3.2 Roost surveys

105. The Onshore Development Area and adjacent land has been the subject of a series of bat roost surveys including Phase 1 bat inspections of buildings and trees, and Phase 2 bat roost surveys of buildings with potential to support bat roosts that were scoped in based on an earlier design but are now outside the Onshore Development Area (**Appendices 16.F** and **16.G**).

106. The Phase 2 bat roost surveys identified two buildings within the vicinity of the Onshore Development Area (**Appendix 16.F: Bat Emergence and Activity Survey Report – Buildings**) as supporting active bat roosts: a) a roost supporting low numbers or individuals of greater horseshoe bat, lesser horseshoe bat, and *Myotis* sp. Bat at Braunton Barn (SS45956 37430), which is located immediately adjacent the Onshore Development Area at Saunton; and b) a roosts with low numbers or individuals of greater horseshoe bat, lesser horseshoe bat, common pipistrelle, soprano pipistrelle and *Myotis* sp. Bat at South Barrow Farmstead (grid reference SS 46814 33714), which is located 40m to the west of the Onshore Development Area.

107. A number of other buildings and trees within the vicinity of the Onshore Development Area have been identified as having potential to support roosting bats (**Appendices 16.E** and **16.F**); these will be retained and not directly affected by the proposed Onshore Project and have therefore not been subject to further survey.

16.4.3.3.3 Activity surveys

108. Bat activity surveys have been conducted across the Onshore Development Area and adjacent land, including a combination of bat activity transect surveys and remote monitoring surveys undertaken monthly between April and October 2022 (**Appendices 16.E** and **16.F**). The surveys included:

- 35 nights of remote survey (five nights per month for seven months) were carried out to sample activity in six different parts of the study area. During each survey period static bat detectors were positioned in five locations across the length of the Onshore Development Area, and one was positioned off-site at Braunton Burrows
- 21 nights of transect survey, spread across five separate transect routes; each route was walked on a monthly basis. The transect routes were devised to

encompass the Onshore Development Area and adjacent land, including boundaries and any features which may be utilised by dispersing or feeding bats.

109. In addition, supplementary remote detector surveys have been undertaken along a hedgerow adjacent to Saunton Road in the north-east of the Onshore Development Area during June and July 2023 in the location of a proposed haul road access which will require temporary removal (by coppicing) of a 90m stretch of hedgerow. These surveys are to inform the approach for mitigation in this area, which will be confirmed one the survey work is completed. In advance of the results, precautionary measures to mitigate any potential effects of the proposals on foraging and commuting bats are provided in **Section 16.5.12** below.

110. At least 10 bat species were recorded within and in the vicinity of the Onshore Development Area during the combined transect and remote detector surveys, including common pipistrelle, soprano pipistrelle, *Myotis* sp. (at least one species), barbastelle, greater horseshoe bat, noctule, serotine *Eptesicus serotinus*, lesser horseshoe bat, long-eared bat sp., and Nathusius' pipistrelle *Pipistrellus nathusii*. Refer to **Appendix 16.D: Bat Activity Survey Report**.

111. It is possible that some of bats recorded may have originated the roosts at Braunton Barn and South Barrow Farmstead (see above), or other roosts in the local area, including Caen Valley Bats SSSI.

112. The remote detector survey recorded the highest overall levels of activity within Braunton Marsh, with 10,174 bat passes recorded over the survey period (i.e. five nights per month between April and October 2022 inclusive). This included 1,428 barbastelle passes, with a peak in activity in October, which may indicate localised foraging behaviour or commuting activity to/from a nearby roost. 154 greater horseshoe bat passes were reported from this location, with a peak in September (68); and eight lesser horseshoe bat passes over the survey period. Braunton Marsh UWS provides suitable foraging habitat for a range of bat species (*Myotis* sp. Bat activity was also highest at Braunton Marsh (1,207 passes), with the hedgerows and ditches likely to be used for both commuting and foraging activities.

113. Greater horseshoe bat was recorded at all remote detector locations, with the highest number of passes (466) from the agricultural fields at Sandy Lane Farm, which lies in close proximity to the Braunton Barn roost (see above). Relatively higher levels of greater horseshoe bat activity were also recorded at Braunton outer dunes (outside of the Onshore Development Area), with a pronounced peak in activity during April (357); possibly in response to a temporary localised prey

abundance in this area. The lowest levels of greater horseshoe bat activity were recorded south of the River Taw at Yelland.

114. Lesser horseshoe bat was recorded at all remote detector locations except the off-site Braunton outer dunes, generally infrequently, in low numbers; the highest number of lesser horseshoe bat passes were recorded from the Braunton inner dunes sample point, where 94 passes were recorded during the period from between August and October.

115. Three records of Nathusius' pipistrelle were made: two at Braunton outer dunes and one at Braunton Marsh, all in October. Other species recorded during the remote detector surveys were soprano pipistrelle, noctule, serotine and *Plecotus* (long-eared) sp. bats.

116. Bat passes recorded during transect surveys were widely distributed, both spatially and temporally; this is likely to indicate general suitable commuting and foraging habitat throughout the survey area. The transect survey recorded the highest number of bat passes (266) at Sandy Lane Farm/agricultural fields, Saunton golf course & Saunton Sands dunes/beach. The number of passes here ranged from 66 during the July survey, to 12 during the September dawn survey.

117. Greater horseshoe bat was recorded on all transect routes, with the highest number of passes on the Sandy Lane Farm transect (36); the lowest number on the Yelland transect (two).

118. Barbastelle and *Myotis* sp. bats were also identified on all transect routes, with a peak of 12 barbastelle passes on the American Road / Sandy Lane transect and 21 *Myotis* sp. passes on the Sandy Lane Farm transect.

119. Lesser horseshoe bat occurred on two of the five transect routes, with five passes at American Road/Sandy Lane and three on Braunton Marsh.

120. The only Nathusius' pipistrelle record came from the Sandy Lane Farm transect in September. Other species recorded during the transect surveys were soprano pipistrelle, noctule, serotine and *Plecotus* (long-eared) sp. bats.

16.4.3.4 Otter

16.4.3.4.1 Desk study

121. The information provided by DBRC included seven records for otter within 1km of the Onshore Development Area (see ***Section 3.3.7*** in **Appendix 16.H: Otter and Water Vole Survey Report**). None of the records provided relate directly to the Onshore Development area and most of these are historical records associated with

the River Caen, however one of the records relates to a point approximately 60m to the east of the proposed haul route leading south from Saunton Road (SS467 374).

16.4.3.4.2 Site survey

122. Surveys for otter within the Onshore Development Area and adjacent land recorded two otter holts at SS46586 34572 and SS46730 34356, both along the boundary drain that separates Braunton Burrows SAC/SSSI from Braunton Marsh UWS and located approximately 40m and 30m west of the Onshore Export Cable Corridor boundary respectively. Otter spraint was also recorded in this area.

123. Evidence of otter was also recorded elsewhere within / adjacent to the Onshore Development Area; at the southern end of Braunton Marsh UWS (spraint, runs, tracks and feeding remains) and at East Yelland pond (spraint and feeding remains). Based on the distribution of otter signs recorded, it can be assumed that all suitable habitat within / adjacent to the Onshore Development Area (estuary, ditches and ponds) could be used by this species for foraging on at least an occasional basis.

16.4.3.5 Water vole

16.4.3.5.1 Desk study

124. No previous records of water vole were returned by DBRC within 1km of the Onshore Development Area. Although water voles were historically abundant in Braunton Marshes, they are now reported to be absent (Derek Gow, North Devon Biosphere, March 2022).

16.4.3.5.2 Site survey

125. Although habitats within and adjacent to the Onshore Development Area are considered to be potentially suitable for water voles, including the pond at East Yelland and the ditches on Braunton Marsh, no evidence of this species was recorded and its presence is considered unlikely. Water vole is therefore not considered further in this assessment.

16.4.3.6 Hazel dormouse

16.4.3.6.1 Desk study

126. No previous records of hazel dormouse were returned by DBRC within 1km of the Onshore Development Area. The MAGIC website indicates the closest granted EPSL (Natural England Development Licence) for hazel dormouse is approximately 5km to the north.

16.4.3.6.2 Site survey

127. Woodland, scrub and hedgerows within and adjacent to the Onshore Development Area provided potentially suitable nesting, foraging and hibernation habitat for hazel

dormouse. However, no evidence of this species was recorded during the hazel dormouse nest tube survey (see **Appendix 16.I: Dormice Survey Report**) and its presence was considered unlikely. Hazel dormouse is therefore scoped out of the assessment.

16.4.3.7 Other notable mammals

16.4.3.7.1 Desk study

128. Data provided by DBRC included single records of two notable mammals. Brown hare *Lepus europaeus* was recorded on Horsey Island in 2007, and harvest mouse *Micromys minutus* was recorded at Swanpool in 2018.

16.4.3.7.2 Site surveys

129. Brown hare, harvest mouse and hedgehog were not recorded during site surveys, however the presence of these species in suitable habitat within the Onshore Development Area is considered possible. Arable and tall grassland fields may support harvest mouse and brown hare, and harvest mouse could also occur in hedgerows, scrub and ditch vegetation, along with hedgehog.

16.4.3.8 Breeding birds

16.4.3.8.1 Desk study

130. Data provided by DBRC (see **Appendix 16.B: Preliminary Ecological Appraisal Report**) included many bird records from within 1km of the Onshore Development Area. A list of the species, for which records were supplied by DBRC, which are considered to have potential to breed within or in the vicinity of the Onshore Development Area is provided in in **Table 16.17**. This list has been prepared using a combination of professional judgement and a review of the various species' breeding status in Devon (based on the most recent Devon Bird Report (2020); Devon Birds, 2022).

Table 16.17 Previous records of notable bird species considered to potentially breed within 1km of the Onshore Development Area

Species name	Legal / conservation status[4]
Barn owl *Tyto alba*	Schedule 1[5]
Bullfinch *Pyrrhula pyrrhula*	Amber[6], Priority Species[7]
Cetti's warbler *Cettia cetti*	Schedule 1

[4] Standard protection / Green-listed (Stanbury *et al.*, 2001) unless stated
[5] Schedule 1 of the Wildlife and Countryside Act 1981 (as amended)
[6] Amber-listed Bird of Conservation Concern (Stanbury *et al.,* 2021)
[7] Species of principal importance in England

Species name	Legal / conservation status[4]
Cuckoo *Cuculus canorus*	Red[8], Priority Species
Dipper *Cinclus cinclus*	Amber
Dunnock *Prunella modularis*	Amber, Priority Species
Grasshopper warbler *Locustella naevia*	Red, Priority Species
Great black-backed gull *Larus marinus*	Amber
Greenfinch *Carduelis chloris*	Red
Greylag goose *Anser anser*	Amber
Grey wagtail *Motacilla cinerea*	Amber
Herring gull *Larus argentatus*	Red, Priority Species
House martin *Delichon urbica*	Red
Kestrel *Falco falcis*	Amber
Kingfisher *Alcedo atthis*	Schedule 1
Lesser black-backed gull *Larus fuscus*	Amber
Linnet *Linaria cannabina*	Red, Priority Species
Mallard *Anas platyrhynchos*	Amber
Meadow pipit *Anthus pratensis*	Amber
Mistle thrush *Turdus viscivorus*	Red
Moorhen *Gallinula chloropus*	Amber
Oystercatcher *Haematopus ostralegus*	Amber
Reed bunting *Emberiza schoeniclus*	Amber, Priority Species
Rook *Corvus frugilegus*	Amber
Sedge warbler *Acrocephalus schoenobaenus*	Amber
Shelduck *Tadorna tadorna*	Amber
Skylark *Alauda arvensis*	Red, Priority Species
Song thrush *Turdus philomelos*	Amber, Priority Species
Spotted flycatcher *Muscicapa striata*	Red, Priority Species
Starling *Sturnus vulgaris*	Red, Priority Species
Swift *Apus apus*	Red
Wheatear *Oenanthe oenanthe*	Amber
Whitethroat *Sylvia communis*	Amber
Willow warbler *Phylloscopus trochilus*	Amber
Woodpigeon *Columba palumbus*	Amber
Wren *Troglodytes troglodytes*	Amber
Yellowhammer *Emberiza citrinella*	Red, Priority Species

16.4.3.8.2 Site surveys

131. A series of surveys for breeding birds was undertaken across the Onshore Development Area and adjacent land, comprising twice-monthly visits between April

[8] Red-listed Bird of Conservation Concern (Stanbury *et al.,* 2021)

and July 2022 to four different transect areas. The transect locations are listed below together with the dates they were surveyed:

- East Yelland: woodland, agricultural fields and coast (surveyed on 15 and 28 April, 2 and 30 May, 15 and 22 June, 8 and 15 July)
- Braunton Marsh & American Road (surveyed on 15 and 28 April, 13 and 29 May, 2 and 29 June, 8 and 19 July)
- Braunton Burrows Dunes & Northern Boundary Track (habitats west of Sandy
- Lane carpark) (surveyed on 15 and 28 April, 2 and 28 May, 15 and 30 June, 8 and 19 July)
- Sandy Lane, Sandy Lane Farm/agricultural fields, Saunton Golf Course & Saunton Sands Dunes/Beach (surveyed on 15 and 30 April, 13 and 28 May, 14 and 23 June, 3 and 28 July).

132. The locations of the survey transects are illustrated in **Appendix 16.K: Breeding Bird Survey Report**.

133. The survey routes were designed to provide full coverage of the Onshore Development Area. The direction of transect routes walked was alternated, and visits made at varying levels of tide (for coastal areas) to reduce temporal bias in recording.

134. The survey visits were undertaken during suitable clear weather conditions, commencing approximately 1 hour after sunrise and before 11:00, when birds are most active.

135. The surveys recorded a total of 66 species within the survey area (see **Appendix 16.K: Breeding Bird Survey Report**). A list of these species, together with their legal / conservation status and breeding status on each of the four transect routes, is provided in **Table 16.18**. The legal/conservation status shown in the tables includes those species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended), those of high or medium conservation concern, listed on the red or amber lists respectively (Stanbury *et al.,* 2021), and those which are species of principal importance (priority species) listed in response to the NERC Act, 2006.

16.4.3.8.3 Landfall (to MLWS) – Saunton Sands

136. The Landfall (to MLWS) is predominantly of fine sand with patches of small rocks which provide limited opportunities for nesting birds. Although the breeding bird survey identified a total of 40 species breeding within the wider Saunton / Sandy Lane survey sector (**Table 16.19**), no evidence of breeding for these species was recorded within the Landfall (to MLWS) or the surrounding 50m buffer.

Consequently, breeding bird receptors are not considered further at the Landfall (to MLWS) area.

Table 16.18 Species recorded during breeding bird survey transects

Species name	Legal / cons. Status	Saunton / Sandy		Braunton Burrows		Braunton Marshes		East Yelland	
		Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding
Barn owl	Schedule 1	✓		✓		✓	✓		
Blackbird *Turdus merula*		✓	✓	✓	✓	✓	✓	✓	✓
Blackcap *Sylvia atricapilla*		✓	✓	✓	✓	✓	✓	✓	✓
Blue tit *Cyanistes caeruleus*		✓	✓	✓	✓	✓	✓	✓	✓
Bullfinch	Amber, Priority species	✓	✓	✓	✓				
Buzzard *Buteo buteo*		✓		✓		✓		✓	
Carrion crow *Corvus corrone*		✓	✓	✓	✓	✓	✓	✓	✓
Cetti's warbler	Schedule 1			✓	✓	✓	✓		
Chaffinch *Fringilla coelebs*		✓	✓	✓	✓	✓	✓	✓	✓
Chiffchaff *Phylloscopus collybita*		✓	✓	✓	✓	✓	✓	✓	✓
Collared dove *Streptopelia decaocto*		✓	✓					✓	✓
Coot						✓	✓		
Curlew	Red, Priority species					✓			
Dunnock	Amber, Priority species	✓	✓	✓	✓	✓	✓	✓	✓

Species name	Legal / cons. Status	Saunton / Sandy		Braunton Burrows		Braunton Marshes		East Yelland	
		Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding
Garden warbler		✓	✓						
Goldfinch		✓	✓	✓	✓	✓	✓	✓	✓
Grasshopper warbler	Red, Priority species					✓	✓		
Great black-backed gull	Amber					✓			
Great spotted woodpecker *Dendrocopos major*		✓	✓	✓		✓	✓	✓	✓
Great tit *Parus major*		✓	✓	✓	✓	✓	✓	✓	✓
Greenfinch	Red	✓	✓	✓	✓	✓	✓	✓	✓
Green woodpecker				✓		✓	✓	✓	✓
Grey heron *Ardea cinerea*		✓				✓		✓	
Herring gull	Red, Priority species	✓	✓	✓		✓		✓	
House martin	Red	✓	✓					✓	✓
House sparrow *Passer domesticus*	Red, Priority species	✓	✓	✓	✓	✓	✓	✓	✓
Jack snipe *Lymnocryptes minimus*						✓			
Jackdaw *Corvus monedula*		✓	✓	✓	✓	✓	✓	✓	✓
Jay *Garrulus glandarius*		✓	✓	✓		✓	✓		

Species name	Legal / cons. Status	Saunton / Sandy		Braunton Burrows		Braunton Marshes		East Yelland	
		Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding
Kestrel	Amber					✓			
Kingfisher	Schedule 1	✓				✓	✓		
Lesser whitethroat *Curruca curruca*		✓	✓	✓	✓	✓	✓	✓	✓
Linnet	Red, Priority species	✓	✓	✓	✓	✓	✓	✓	✓
Little egret *Egretta garzetta*						✓			
Little grebe				✓	✓				
Long-tailed tit *Aegithalos caudatus*		✓	✓	✓	✓	✓	✓		
Magpie *Pica pica*		✓	✓	✓	✓	✓	✓	✓	✓
Mallard	Amber			✓	✓	✓	✓		
Meadow pipit	Amber	✓	✓	✓	✓	✓	✓	✓	✓
Mistle thrush	Red					✓	✓	✓	✓
Moorhen	Amber			✓	✓	✓	✓		
Nuthatch *Sitta europaea*		✓	✓	✓	✓			✓	✓
Pheasant *Phasianus colchicus*		✓	✓	✓	✓	✓	✓	✓	✓
Pied wagtail *Motacilla alba*		✓	✓	✓	✓	✓	✓	✓	✓
Raven *Corvus corax*		✓	✓	✓	✓	✓		✓	✓
Redshank	Amber					✓			
Reed warbler				✓	✓	✓	✓		

Species name	Legal / cons. Status	Saunton / Sandy		Braunton Burrows		Braunton Marshes		East Yelland	
		Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding
Robin *Erithacus rubecula*		✓	✓	✓	✓	✓	✓	✓	✓
Rook	Amber	✓	✓					✓	✓
Sand martin *Riparia riparia*								✓	
Sedge warbler	Amber	✓	✓			✓	✓	✓	✓
Skylark	Red, Priority species	✓	✓	✓	✓	✓	✓	✓	✓
Snipe *Gallinago gallinago*	Amber					✓			
Song thrush	Amber, Priority species	✓	✓	✓	✓	✓	✓	✓	✓
Sparrowhawk *Accipiter nisus*				✓		✓		✓	
Starling	Red, Priority species					✓	✓	✓	✓
Stonechat		✓	✓	✓	✓	✓	✓	✓	✓
Swallow *Hirundo rustica*		✓	✓	✓		✓	✓	✓	✓
Swift	Amber			✓					
Wheatear	Amber	✓	✓	✓	✓	✓	✓		
Whitethroat	Amber	✓	✓	✓	✓	✓	✓	✓	✓
Willow tit *Poecile montanus*	Red, Priority species					✓	✓		
Willow warbler	Amber	✓	✓	✓	✓	✓	✓	✓	✓
Woodpigeon	Amber	✓	✓	✓	✓	✓	✓	✓	✓
Wren	Amber	✓	✓	✓	✓	✓	✓	✓	✓

Species name	Legal / cons. Status	Saunton / Sandy		Braunton Burrows		Braunton Marshes		East Yelland	
		Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding
Yellowhammer	Red, Priority species							✓	✓

Table 16.19 Notable non-breeding wetland species previously recorded within study area and potentially occurring in the vicinity of the Onshore Development Area

Common name	Legal / conservation status
Arctic tern *Sterna paradisaea*	Amber
Barnacle goose *Branta leucopsis*	Amber
Bar-tailed godwit *Limosa lapponica*	Amber
Bewick's swan *Cygnus columbianus*	Red, Priority Species
Black-headed gull *Chroicocephalus ridibundus*	Amber
Black-tailed godwit *Limosa limosa*	Schedule 1, Red, Priority Species
Brent goose *Branta bernicla*	Amber, Priority Species
Common gull *Larus canus*	Amber
Common sandpiper *Actitis hypoleucos*	Amber
Common scoter *Melanitta nigra*	Schedule 1, Red, Priority Species
Common tern *Sterna hirundo*	Amber
Curlew *Numenius arquata*	Red, Priority Species
Curlew sandpiper *Calidris ferruginea*	Amber
Eider *Somateria mollissima*	Amber
Gannet *Morus bassanus*	Amber
Goldeneye *Bucephala clangula*	Red
Great black-backed gull	Amber
Great northern diver *Gavia immer*	Schedule 1, Amber
Greenshank *Tringa nebularia*	Schedule 1, Amber
Green sandpiper *Tringa ochropus*	Schedule 1,
Greylag goose *Anser anser*	Amber
Grey plover *Pluvialis squatarola*	Amber
Herring gull *Larus argentatus*	Red, Priority Species
Iceland gull *Larus glaucoides*	Amber
Kingfisher *Alcedo atthis*	Schedule 1
Knot *Calidris canutus*	Amber
Lapwing *Vanellus vanellus*	Red, Priority Species
Lesser black-backed gull	Amber
Mallard *Anas platyrhyncos*	Amber
Mediterranean gull *Larus melanocephalus*	Schedule 1, Amber
Moorhen *Gallinula chloropus*	Amber
Oystercatcher *Haematopus ostralegus*	Amber
Razorbill *Alca torda*	Amber
Red-necked grebe *Podiceps grisegena*	Red
Red-throated diver *Gavia stellata*	Schedule 1
Ringed plover *Charadrius hiaticula*	Red
Sanderling *Calidris alba*	Amber
Sandwich tern *Sterna sandvicensis*	Amber
Scaup *Aythya marila*	Schedule 1, Red, Priority Species
Shelduck *Tadorna tadorna*	Amber
Shoveler *Anas clypeata*	Amber
Snipe *Gallinago gallinago*	Amber

Common name	Legal / conservation status
Spoonbill *Platalea leucorodia*	Schedule 1, Amber
Spotted redshank *Tringa erythropus*	Amber
Teal *Anas crecca*	Amber
Turnstone *Arenaria interpres*	Amber
Whooper swan *Cygnus cygnus*	Schedule 1, Amber
Whimbrel *Numenius phaeopus*	Schedule 1, Red
Wigeon *Anas penelope*	Amber

16.4.3.8.4 Braunton Burrows, Saunton Golf Course and Sandy Lane fields

137. To the east of the Saunton Sands car park, the Onshore Development Area passes through the northern end of Braunton Burrows and Saunton Golf Course, before entering agricultural fields at Sandy Lane Farm. These areas contain a range of habitats suitable for breeding birds, including sand dunes, grassland, arable, scrub, ditches and hedgerows. 44 species were recorded breeding in this area (**Table 16.19**) including such as bullfinch, herring gull, linnet, skylark and song thrush. Cetti's warbler, which is listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended; WCA), was also recorded is considered to be breeding in this area.

16.4.3.8.4.1 Braunton Marsh

138. South of Sandy Lane car park, the Onshore Development Area continues south-eastwards through Braunton Marsh, which includes grazed fields with marshy grassland, semi-improved grassland, wetland vegetation, scrub, and wet woodland, all of which are suitable habitats for breeding birds. The fields include and are divided by a network of ditches, with some boundary hedgerows, also providing further suitable nesting bird habitat. 44 species were recorded breeding in the Braunton Marsh survey sector (**Table 16.19**) including grasshopper warbler, greenfinch, mallard and mistle thrush. Willow tit, a rapidly declining Red-listed species, was recorded at the southern end, near the Crow Point car park (outside the Onshore Export Cable Corridor). Ground nesting waders (such as redshank or lapwing) were not recorded for the Braunton Marsh area.

139. Three species listed on Schedule 1 of the WCA are considered likely to be breeding on Braunton Marsh. Cetti's warbler and kingfisher are present in / alongside a boundary drain to the west of Crow Beach house (adjacent to the Onshore Export Cable Corridor). Barn owl is considered likely to be breeding at South Burrow Farmhouse (outside the Onshore Export Cable Corridor); this species was also observed hunting over Braunton Marsh and Sandy Lane Farm agricultural fields.

16.4.3.8.4.2 Taw Estuary

140. In addition to the species listed in **Table 16.19**, a further six species were recorded on the Taw-Torridge estuary only: black-tailed godwit, Canada goose, cormorant, oystercatcher, rock pipit and shelduck. Four of these species (Canada goose, cormorant, oystercatcher and shelduck) are considered to be breeding in the estuary, however, given to twice-daily inundation by the tide within the intertidal zone, no suitable nesting bird habitat is present in the Onshore Export Cable Corridor. Consequently, breeding bird receptors are not considered further at the Taw Estuary crossing.

16.4.3.8.4.3 East Yelland

141. After crossing the Taw Estuary the Onshore Development Area continues at East Yelland through mixed agricultural fields with marshy grassland and semi-improved grassland swards, ditches and boundary hedgerows. After passing under the Tarka Trail the cable corridor enters the industrial area formerly occupied by Yelland power station, which includes ephemeral/short perennial vegetation, tall ruderal and scrub, before reaching the sub-station. These habitats are assessed to be suitable for a range of common/widespread breeding bird species.

142. A total of 38 species were recorded in the East Yelland breeding bird survey sector (**Table 16.19**) including species such as house sparrow, rook, starling and yellowhammer. Surveys carried out in the vicinity of Yelland substation in 2022 recorded other birds as breeding or potentially breeding within this area including stock dove, skylark, song thrush, linnet and willow warbler. (EAD Ecology 2022). No Schedule 1 species were recorded breeding at Yelland substation area.

16.4.3.9 Wintering birds

16.4.3.9.1 Desk study

143. Data provided by DBRC (**Appendix 16.B: Preliminary Ecological Appraisal Report**) included many bird records from within 1km of the Onshore Development Area. From a review of previous records, the non-breeding wetland species that are considered to have potential to occur within or in the vicinity of the Onshore Development Area are provided in **Table 16.19**.

144. A recent study to identify overwintering wetland bird high tide roosts and recreational disturbance impacts on the Taw-Torridge Estuary (Berridge, 2019) identified a total of 21 high tide roosts across the wider estuary. Of these, 10 are within Wetland Bird Survey (WeBS) count sectors lying within or adjacent to the Onshore Development Area. Further details are provided below and in **Table 16.20**.

Table 16.20 High tide roosts identified in WeBS sectors within and adjacent to the Onshore Development Area (Berridge, 2019)

WeBS Sector code and name	High tide roosts	Roost types	Distance from Onshore Development Area
11496 Braunton Marshes	Braunton Marshes, Roost 1	Wader (Lapwing roost, golden plover and curlew foraging)	Within the Onshore Development Area
	Braunton Marshes, Roost 2	Wader (Lapwing roost, golden plover and curlew foraging)	Within the Onshore Development Area
	Braunton Marshes, Roost 3	Wader (Lapwing roost, golden plover and curlew foraging)	c. 800m to the east
11497 River Caen and Horsey Island	Horsey Island White House	Mixed: Brent goose, wigeon, teal, curlew, dunlin, golden plover, lapwing, ruff, greenshank, black-tailed godwit, redshank,	c. 80m to the east
	Horsey Island Pills Mouth	Mixed: Turnstone, oystercatcher, dunlin, cormorant, wigeon, grey plover, lapwing.	c. 1km to the east
	Horsey Island fields	Mixed: Shelduck, wigeon, teal, lapwing, golden plover, curlew, black-tailed godwit, ruff, dunlin, greenshank, redshank	c. 900m to the east
11490 White House to Airy	Crow Point saltmarsh	Mixed: oystercatcher, greenshank, redshank, curlew, wigeon, mallard, ringed plover, knot, black-tailed godwit, dunlin, little egret	c. 700m to the west / south-west
	Crow Point beach	Mixed: Curlew, turnstone, oystercatcher, ringed plover, cormorant.	c. 900m to the west / south-west
	Crow Point groynes	Mixed: Black-headed gull, herring gull, lesser black-backed gull, common gull, curlew, sanderling, dunlin, ringed plover	c. 1.2km to the west

WeBS Sector code and name	High tide roosts	Roost types	Distance from Onshore Development Area
11483 Isley to Instow	Yelland	Mixed: Wigeon, teal, oystercatcher, curlew, grey plover, black-tailed godwit, ringed plover, lapwing, dunlin, knot, turnstone, greenshank, redshank, snipe, cormorant, little egret, grey heron.	c. 250m to the east (cabling) c. 100m to the north of substation.
	Isley Marsh	Wigeon, teal, spoonbill, greenshank, redshank, curlew, little egret, grey heron, snipe, black-tailed godwit, dunlin	c. 900m to the east
	The Black Ground	Wigeon, oystercatcher, turnstone, dunlin, ringed plover, curlew, sanderling, little egret	c. 450m to the east
	Cool Stone	Oystercatcher, lapwing, grey plover, ringed plover, dunlin, redshank, turnstone, cormorant, wigeon, gull sp.	c. 300m to the east.

16.4.3.9.2 Landfall (to MLWS) – Saunton Sands

145. No overwintering wetland bird roosts have been identified in or adjacent to the proposed Landfall (to MLWS).

146. The Saunton Sands WeBS sector (sector code 11493), which encompasses the Landfall (to MLWS) close to its northern boundary, is not known to support a consistent high tide roost (Berridge, 2019). However, it is considered to be the most important site in Devon for sanderling (Devon Birds, 2022). Saunton Sands can also be important for ringed plover (Berridge, 2019) and recent WeBS data indicates it is also used by other non-breeding waders (including oystercatcher, dunlin and whimbrel), gulls and cormorant. It is therefore possible that non-breeding sanderling and other wetland species could occur on beach habitats in or near to the Landfall (to MLWS).

147. Other notable non-breeding bird species are considered unlikely to occur in significant numbers in the Landfall (to MLWS) due to a lack of suitable habitat, however individual or small numbers of passerine species such as skylark and snow bunting may occasionally use the beach for foraging.

16.4.3.9.3 Braunton Burrows, Saunton Golf Course and Sandy Lane Farm

148. The main dune system at Braunton Burrows is not considered to be of particular importance for passage or wintering waterfowl and waders from the Taw-Torridge Estuary; it is not covered by WeBS and hasn't been identified by Berridge (2019) as a high tide roost location. As for Saunton Sands, the dunes and adjacent golf course may support small numbers of passerine species such as skylark and snow bunting outside of the breeding season.

149. Habitats in the vicinity of Sandy Lane Farm do not support a high tide roost associated with the Taw-Torridge Estuary (Berridge, 2019). However, agricultural fields may occasionally support small numbers of lapwing, golden plover, snipe and other waders outside of the breeding season; frequency and abundance on these species is likely to be dependent on weather conditions, tidal conditions (very high spring tides may push waders off their usual roost locations on the estuary) and agricultural activities in the fields. Small numbers of waterfowl including mallard and teal may use the ditches that divide the fields, however these habitats are unlikely to be of particular importance for these species.

16.4.3.9.4 Braunton Marsh

150. The majority of Braunton Marsh is located within WeBS count sector 11496; the relevant five-year mean peak counts are provided in **Table 16.21**. The high tide roost identified by Berridge (2019) occurs in three fields just outside the Braunton WeBS count sector, but two of which lie within the Onshore Development Area, these areas are regularly used by lapwing flocks (typical counts of 200-400 birds, with maximum counts of 1000 birds (Berridge, 2019). Golden plover and curlew also use the filed for foraging. The location of the lapwing roost is not consistent and varies depending on the ambient temperature, with the two fields within the Onshore Development Area favoured during warmer conditions. The numbers of lapwing roosting here have declined substantially, with a 30% reduction in the five years to 2019, and 70% decline over ten years (Berridge, 2019). It is also reported that anecdotal observation suggests that a change in land use, from a traditional grazing regime to a more intensive approach has reduced the value of these fields to foraging lapwing (M. Coleman, pers. obs., in Berridge (2019)).

Table 16.21 WeBS five-year mean peak counts

Species	Sector five-year mean peak*				
	Saunton Sands	Braunton Marshes	River Caen and Horsey Island	Whitehouse to Airy	Isley to Instow
Brent goose	-	-	8	14	3
Canada goose	-	63	42	4	70
Barnacle goose	-	<1	<1	-	-
Greylag goose	-	<1	-	-	-
Tundra bean goose	-	<1	-	-	-
Mute swan	-	33	16	-	2
Shelduck	-	4	100	28	17
Shoveler	-	-	2	-	1
Gadwall	-	-	-	-	<1
Wigeon	-	22	112	109	149
Mallard	-	119	55	85	16
Pintail	-	-	2	-	18
Teal	-	31	101	13	286
Scaup	-	-	-	-	<1
Eider	-	-	3	2	<1
Common scoter	-	-	-	3	-
Goosander	-	-	<1	-	-
Red-breasted merganser	-	-	<1	-	-
Little grebe	-	2	15	-	1
Great crested grebe	-	-	-	-	1
Black-necked grebe	-	-	-	-	<1
Glossy ibis	-	-	<1	-	<1
Spoonbill	-	-	2	-	5
Cattle egret	-	<1	-	-	-
Grey heron	-	4	5	2	6
Great white egret	-	-	<1	-	-
Little egret	-	6	23	7	19
Shag	-	-	-	-	<1
Cormorant	4	<1	8	14	6

Species	Sector five-year mean peak*				
	Saunton Sands	Braunton Marshes	River Caen and Horsey Island	Whitehouse to Airy	Isley to Instow
Water rail	-	4	1	-	1
Moorhen	-	21	2	-	3
Coot	-	1	-	-	-
Crane	-	<1	-	-	-
Oystercatcher	49	<1	22	1,215	700
Avocet	-	-	<1	-	<1
Lapwing	-	260	1,139	16	318
Golden plover	-	565	2,520	24	17
Grey plover	-	23	23	3	79
Ringed plover	2	1	99	134	54
Little ringed plover	-	-	-	<1	<1
Whimbrel	2	-	3	5	6
Curlew	1	47	76	85	203
Bar-tailed godwit	-	-	13	-	37
Black-tailed godwit	-	3	43	3	14
Turnstone	-	-	9	2	57
Knot	-	-	11	6	33
Ruff	-	-	8	-	-
Curlew sandpiper	-	-	2	-	<1
Sanderling	192	-	2	25	8
Dunlin	25	1	248	95	394
Little stint	-	-	1	-	<1
Woodcock	-	1	-	-	-
Snipe	-	11	13	-	19
Common sandpiper	<1	<1	4	<1	2
Spotted sandpiper	-	-	<1	-	-
Green sandpiper	-	<1	1	-	-
Redshank	-	8	69	18	67
Spotted redshank	-	-	<1	-	-
Greenshank	-	1	17	<1	15

Species	Sector five-year mean peak*				
	Saunton Sands	Braunton Marshes	River Caen and Horsey Island	Whitehouse to Airy	Isley to Instow
Black-headed gull	10	3	250	1,313	167
Mediterranean gull	<1	-	11	31	82
Common gull	26	65	7	4	10
Great black-backed gull	2	-	3	4	6
Herring gull	58	20	70	173	55
Lesser black-backed gull	<1	-	<1	3	1
Sandwich tern	-	-	1	<1	-
Common tern	-	-	-	<1	-
Little tern	-	-	-	-	1
Kingfisher	-	1	3	<1	1

151. Notable non-wetland bird species are also likely to occur within the Onshore Development Area at Braunton Marsh. This could include widespread resident passerine species including skylark, meadow pipit, linnet and reed bunting, for which the fields are likely to provide suitable foraging habitat, and bullfinch, dunnock and Cetti's warbler, which are more likely to occur in hedgerows, scrub and ditches. Birds of prey including kestrel, merlin, marsh harrier, barn owl and short-eared owl may also use Braunton Marsh for roosting and / or foraging outside of the breeding season.

16.4.3.9.5 Taw Estuary

152. The Onshore Development Area on the north side of the Taw Estuary lies on the boundary of WeBS count sector 11497 (River Caen and Horsey Island) and 11490 (Whitehouse to Airy). On the south side of the estuary, the Onshore Development Area lies within count sector 11483 (Isley to Instow). The relevant five-year mean peak counts are provided in **Table 16.21**.

153. Horsey Island is located to the east of the Onshore Development Area and has been managed as a nature reserve by Devon Wildlife Trust since 2019. The area is former grazing marsh that is now reverting to intertidal habitats following breach of the sea wall in 2017. Use of this area by waders and waterfowl is therefore likely to change as habitats evolve. Three roost areas within the River Caen to Horsey Island have been identified by Berridge (2019):

- *Horsey Island White House:* Small area at the western end of Horsey Island, thought to be recently established as a roost site. Species recorded in numbers >5% of the estuary population: (peak counts from Berridge (2019) in brackets) golden plover (2,800), Lapwing (1,300), Brent goose (46), greenshank (8) and black-tailed godwit (42). This roost is located close to the eastern edge of the Onshore Development Area (c. 80m away)
- *Horsey Island Pills mouth:* This is located at the eastern end of Isley Marsh at the mouth of the River Caen, approximately 1km to the east of the Onshore Export Cable Corridor. Species recorded in numbers >5% of the estuary population: turnstone (30) and dunlin (250)
- *Horsey Island fields:* Species recorded in numbers >5% of the estuary population: shelduck (70), wigeon (40), teal (80), Lapwing (1,500), golden plover (3,000), curlew (60), black-tailed godwit (15), dunlin (200), redshank (70) and greenshank (15). This area is located approximately 900m to the east of the Onshore Development Area.

154. The White House to Airy sector supports three high tide roosts (Berridge, 2019): Crow Point Saltmarsh and Crow Point Beach, which lie approximately 700m west of the Onshore Development Area , and Crow Point Groynes, approximately 1.2m west of the Onshore Development Area:

- *Crow Point saltmarsh:* Species recorded in numbers >5% of the estuary population: (peak counts from Berridge (2019) in brackets) curlew (160), wigeon (100), mallard (60) and ringed plover (50)
- *Crow Point beach:* One species has been recorded in numbers >5% of the estuary population; oystercatcher (peak count 1,300). This is one of the largest roosts for this species on the estuary
- *Crow point groynes:* Usually dominated by gulls, including black-headed gull (peak count 500) and herring gull (150).

155. The Isley to Instow sector supports four high tide roosts: Isley Marsh, Yelland, which lie to the east of the Onshore Export Cable Corridor, The Black Ground, and Cool Stone, which lie to the west of the Onshore Export Cable Corridor. The Isley Marsh roost is considered to be of particular importance to curlew and greenshank, with five-year WeBS max counts of c.200 and 17 respectively. The Yelland roost supports a range of species with five-year WeBS maximum counts including 600+ oystercatcher, 125 wigeon, 150 dunlin, 100+ lapwing and 80 grey plover. The Black Ground and Cool Stone is utilised by up to 900 oystercatcher and smaller numbers of other waders (Berridge, 2019):

- *Yelland:* This is located approximately 250m east of the Onshore Export Cable Corridor, adjacent to the former Yelland power station site. Species recorded in numbers >5% of the estuary population: (peak counts from Berridge (2019) in brackets) wigeon (125), teal (80), oystercatcher (600+), curlew (100+), grey plover (80), lapwing (100+), dunlin (150), turnstone (45), redshank (20) and snipe (10). Berridge (2019) also states that this site is of particular importance to birds disturbed from other roost sites in the vicinity
- *Isley Marsh:* This roost, approximately 900m east of the Onshore Export Cable Corridor, is part of an RSPB reserve and considered to be of particular importance to curlew and greenshank. Species recorded in numbers >5% of the estuary population: wigeon (200), teal (100), spoonbill (10), greenshank (17), curlew (c.200), little egret (28) and grey heron (6)
- *Black Ground* and *Cool Stone:* These two areas are located approximately 450 and 300m, respectively, to the south-west of the Onshore Export Cable Corridor, at the northern end of Instow Beach. Species recorded in numbers >5% of the

estuary population: wigeon (60), oystercatcher (900), turnstone (40), ringed plover (60), curlew (80) and sanderling (8).

156. Wintering bird survey work carried out in in 2016-17 and 2018-19 in support of a planning application at Yelland Quay has provided further information on the Isley Marsh and Yelland roosts. A maximum of 185 curlew and 710 lapwing were recorded in the Isley Marsh roost in January 2017 and January 2019 respectively; this area also supported large numbers of wigeon (max. 500 in October 2016) and teal (max. 460 in January 2019) when submerged by very high spring tides. The Yelland roost was found to support significant numbers of birds in the context of the Taw-Torridge Estuary populations, with maximum counts of 737 dunlin, 540 oystercatcher, 230 lapwing, 93 curlew, 90 grey plover, 52 turnstone, 42 redshank, 32 knot, 24 bar-tailed godwit and 11 greenshank (Yelland Quay Ltd, 2020).

16.4.3.9.6 Yelland

157. To the south of the Taw Estuary, fields at Yelland do not fall within WeBS sectors nor were they identified as supporting high tide roosts (Berridge, 2019). However, fields within the Onshore Development Area may occasionally support small numbers of waders and waterfowl, particularly around high tide when birds on the estuary may be pushed off regular roost locations at Yelland or the Black Ground and Cool Stone. Birds may also use ditches, scrub and other vegetation associated with field margins and the former Yelland power station site, although these areas are unlikely to be of particular importance for non-breeding species.

16.4.3.10 Reptiles

16.4.3.10.1 Desk study

158. The information provided by DBRC included 15 records for reptiles within 1km of the Onshore Development Area, comprising:

- Sand lizard *Lacerta agilis* (three records)
- Common lizard *Zootoca vivipara* (six records)
- Adder *Vipera berus* (four records)
- Grass snake *Natrix natrix* (two records).

16.4.3.10.2 Site survey

159. Within the Onshore Development Area, populations of slow-worm, common lizard, grass snake and adder were recorded. Further details of the locations of reptiles are provided in **Table 16.22** and **Appendix 16.M: Reptile Survey Report**.

Table 16.22 Onshore Development Area reptile survey results

Location	Species			
	Slow-worm	Common lizard	Grass snake	Adder
Saunton Fore Dunes		✓		✓
Braunton Marsh – northern trackway	✓	✓		✓
Braunton Marsh – South Barrow Farmstead	✓		✓	
Braunton Marsh – southern trackway	✓	✓		
Yelland – coastal scrub and grassland	✓	✓	✓	✓

160. In addition to the above species, Braunton Burrows is known to support a (reintroduced) population of sand lizards. A 2021 survey of Braunton Burrows observed 36 sand lizards along the foredune ridge in open marram grass-dominated dunes (Breeds, 2021). Transect surveys in 2022 recorded sand lizards on the mid-dunes of Braunton Burrows (outside of the Onshore Development Area) with a maximum of five individuals observed on 14 May 2021 (see **Table 16.22**, **Appendix 16.M: Reptile Survey Report**).

161. Sand lizard is considered absent from the foredunes at Saunton Sands (**Appendix 16.M: Reptile Survey Report**); it is considered that this may be due to the species not yet colonising the northern extent of the Braunton Burrows, but this may potentially also be linked with a higher level of human activity with this area of the dune system.

162. The presence of sand lizard within the Onshore Development Area (i.e. outside Braunton Burrows) is considered unlikely. This assessment is based on the reptile survey results and the habitats present, which do not offer suitable habitat for this species: this species is dependent on managed heathland and coastal sand dunes in the UK[9].

16.4.3.11 Amphibians

16.4.3.11.1 Desk study

163. The information provided by DBRC included four records of great crested newt as well as records for common toad, common frog, smooth newt and palmate newt.

[9] https://www.arc-trust.org/sand-lizard

The Onshore Development Area lies within a 'consultation zone' for great crested newt based on the known population at Braunton Burrows (see **Appendix 16.B: Preliminary Ecological Appraisal Report**). There were no previous great crested newt records south of the Taw Estuary.

16.4.3.11.2 Site survey

164. All suitable ponds identified within the Onshore Development Area tested negative for great crested newt eDNA. Three ponds within 250m of the Onshore Development Area (Pond 6 located 150m to the west, Pond 8 located 220m to the west and Pond 42 located 20m to the west – see **Appendix 16.L: Great Crested Newt Survey Report**) tested positive for great crested newt eDNA and were found to support 'small' populations of great crested newt (English Nature, 2001). A further 23 ponds within the wider survey area tested positive for great crested newt eDNA and supported either 'small' or 'medium' populations; these were all within Braunton Burrows and more than 250m from the Onshore Development Area.

165. Terrestrial habitats within 250m of ponds that tested positive for great crested newt described above support predominantly arable land or grazed grassland of poor suitability for great crested newt, with more suitable habitat restricted to boundary habitats including hedgerows and ditches. There is plentiful optimal habitat in the vicinity of the great crested newt positive ponds, such as scrub and rough grassland, which suggests that it is unlikely that more distant, sub-optimal habitat will be regularly used by this species. The absence of great crested newt from sampled ponds within and to the east of the Onshore Development Area suggest that it is unlikely that great crested newt are using terrestrial habitats within the Onshore Development Area on a regular basis, or dispersing from the habitats in Braunton Burrows into the suboptimal habitats to the east. In conclusion, it is not possible to rule out the possibility that individual newts may use parts of the Onshore Development Area within 250m of the great crested newt ponds on an occasional basis, although these areas are not considered to provide sub-optimal habitat and the likelihood of regular use is considered to be low.

16.4.3.12 Invertebrates

16.4.3.12.1 Desk study

166. The information provided by DBRC included 761 records for invertebrates within the desk study area, including:

- Priority Species (Species of Principal Importance in England; NERC Act 2006)
- Devon Biodiversity Action Plan Species
- Species that have undergone substantial local decline in Devon

- Red Data Book Species (pRDB1, pRDB2 & RDB3)
- Nationally Notable A (Na) Species
- Nationally Notable B (Nb) Species.

167. These records represent the following invertebrate groups:

- True flies (one record)
- Bees (one record)
- Moths (540 records)
- Butterflies (201 records)
- Crickets (eight records)
- Dragonflies and damselflies (10 records).

168. Priority Species that have been recorded within the desk area, which could be present within the habitats occurring within Onshore Development Area include:

- Brown-banded carder bee *Bombus humilis*
- Butterflies:
    - Dingy skipper *Erynnis tages*
    - Grayling *Hipparchia 85rnate*
    - Grizzled skipper *Pyrgus malvae*
    - Marsh fritillary *Euphydryas aurinia*
    - Pale eggar *Trichiura crataegi*
    - Pearl-bordered fritillary *Boloria euphrosyne*
    - Silver-studded blue *Plebejus argus*
    - Small blue *Cupido minimus*
    - Small heath *Coenonympha pamphilus*
    - Small pearl-bordered fritillary *Boloria selene*
    - Wall *Lasiommata megera.*
- Moths:
    - Grey dagger *Acronicta psi*
    - Knot grass *Acronicta rumicis*
    - Flounced chestnut *Agrochola helvola*
    - Beaded chestnut *Agrochola lychnidis*
    - Ear moth *Amphipoea oculea*
    - Mouse moth *Amphipyra tragopoginis*
    - Dusky brocade *Apamea remissa*
    - Garden tiger *Arctia caja*
    - Minor shoulder-knot *Brachylomia viminalis*
    - Mottled rustic *Caradrina morpheus*
    - Sallow *Cirrhia icteritia*

- Small square spot *Diarsia rubi*
- Small Phoenix *Spilosoma lubricipeda*
- September thorn *Ennomos erosaria*
- Dusky thorn *Ennomos fuscantaria*
- August thorn *Ennomos quercinaria*
- Galium carpet *Epirrhoe galiata*
- Small emerald *Hemistola chrysoprasaria*
- Ghost moth *Hepialus humuli*
- Rustic *Mesapamea secalis*
- Rosy rustic *Hydraecia micacea*
- Shoulder-striped wainscot *Leucania comma*
- Rosy minor *Litoligia literosa*
- Brindled beauty *Lycia hirtaria*
- Lackey *Malacosomaneustria*
- Dot moth *Melanchra persicariae*
- Pretty chalk carpet *Melanthia procellata*
- Oblique carpet *Orthonama vittata*
- Mullein wave *Scopula marginepunctata*
- Chalk carpet *Melanthia procellata*
- Shaded broad bar *Scotopteryx chenopodiata*
- White ermine *Spilosoma lubricipeda*
- Buff ermine *Spilarctia luteum*
- Anomalous *Stilbia anomala*
- Hedge rustic *Tholera cespitis*
- Feathered gothic *Tholera decimalis*
- Cinnabar *Tyria jacobaeae*
- Dark-barred twin-spot carpet *Xanthorhoe ferrugata*
- Sword grass *Xylena exsoleta.*

16.4.3.12.2 Terrestrial invertebrates – site survey

169. The terrestrial invertebrate survey (see **Appendix 16.N: Terrestrial Invertebrate Survey Report**) involved sweep netting and recording of stridulations (insect sounds) at suitable locations that were within or adjacent to the Onshore Development Area at Braunton Burrows and Yelland (from areas that are outside the final red-line boundary). Habitats sampled included sand dunes, dune slacks, grassland, scrub and woodland.

170. A total of 143 terrestrial invertebrates were recorded at Braunton Burrows, and 60 species were recorded at Yelland. This included the following notable species (locations in brackets):

- Cinnabar moth *Tyria jacobaeae* – Priority Species (Yelland)
- Great green bush cricket *Tettigonia viridissima* – Devon Biodiversity Action Plan species (Braunton Burrows and Yelland)

- Grey bush cricket *Platycleis albopunctata* – Nationally Notable B species (Braunton Burrows)
- Cepero's ground-hopper *Tetrix ceperoi* – Nationally Scarce (Braunton Burrows and Yelland).

171. The areas sampled during this survey are no longer within the revised redline boundary, as these areas were excluded as the route was refined. Habitats elsewhere within the Onshore Development Area may have some potential support populations of notable terrestrial invertebrates, although the presence of specially protected species or important populations of scarce/declining species is considered unlikely away from Braunton Burrows and Yelland.

16.4.3.12.3 Aquatic macro-invertebrates – site survey

172. The aquatic macro-invertebrate survey (see **Appendix 16.O: Aquatic Macro-Invertebrate Survey Report**) included 15 sampling locations (sites) within and adjacent to the Onshore Development Area. These included a large pond (S1) and nearby drain (S2) at Yelland; eight drain / ditch sections at Braunton Marsh (S3 – S10); and five stream / ditch sections at Saunton Golf Course and Sandy Lane Farm (S11 – S15). The most diverse aquatic macro-invertebrate assemblages were recorded at S5 (located off-site) and S10 (located on-site close to Sandy Lane car park, with 'Fairly High' Community Conservation Index (CCI; Chadd & Extence, 2004) values; the least diverse site was S1 (located off-site), which supported a limited invertebrate assemblage typical of brackish water.

173. Three beetle species formerly regarded as Nationally Notable (Foster & Eyre, 1992) were recorded: *Helochares lividus* (sites S2 (located on-site at Yelland), S3 (located on-site north of the Taw Estuary and S5 (located off-site), and *Cercyon ustulatus* and *Ochthebius bicolon* (located off-site at S7). Although the conservation status of these species has been downgraded in a more recent review of aquatic *Coleoptera* (Foster, 2010) they are still considered to be indicators of good habitat condition. S3 was a notable location due to the presence of both *H. Lividus* and several larvae of the soldier fly *Odontomyia ornata*, a Red-listed species (Vulnerable) (Falk, 1991) and an indicator of good quality grazing marsh habitat.

16.4.3.12.4 Intertidal invertebrates – site survey

174. Detail of the intertidal invertebrate communities present within the Onshore Development Area are found in **Chapter 10: Benthic and Intertidal Ecology**.

16.4.4 Do Nothing Scenario

175. The Town and Country Planning (Environmental Impact Assessment) Regulations 2017 require that "an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge" is included within the ES (EIA Regulations, Schedule 4, Paragraph 3).

176. From the point of assessment, over the course of the development and operational lifetime of the Project (operational lifetime anticipated to be 50 years), long-term trends mean that the condition of the baseline environment is expected to evolve. This section provides a qualitative description of the evolution of the baseline environment, on the assumption that the Project is not constructed, using available information and scientific knowledge of onshore ecology and ornithology.

16.4.4.1.1 Saunton Sands Landfall (to MLWS)

177. In the previous 14-year period the beach around Saunton Sands and within the Landfall (to MLWS) has experienced a mix of erosion and accretion. This ranges from an increase of 0.5m to a decrease of 0.25m across this frontage (see **Figure 8.7** and **Figure 8.8**, and **Section 8.4.3** in **Chapter 8: Marine and Coastal Processes**). It is noted that greater erosion occurs in the south at the mouth of the Taw-Torridge Estuary. Predicting how this will change in the future due to sea level rise, would indicate that over the next 25 years (or greater) the rate of erosion in areas could be up to 0.5m. However, this is likely to occur in the middle beach area based on past changes, with accretion likely in the lower and upper beach areas.

178. The area immediately landward of the beach at Saunton Sands supports scrub and dunes to the south of the commercial properties, and car park in the north. The Dynamic Dunescapes Project has been carrying out habitat management work to open up dune areas and create more bare sand areas through scrub removal to restore the function of the dune system and improve the condition of the site and its vegetation communities. Works may occur in the Saunton Sands frontage including removal of scrub and woodland, and thus increase the amount of yellow dune / foredune habitat within the corridor and south of the car park.

179. The intertidal changes are considered unlikely to result in significant changes to communities present. However, the work of the Dynamic Dunescapes project will improve habitat quality and is considered likely to improved habitats for species

including reptiles, bats, invertebrates. The timescale of the works in or near to the Landfall (to MLWS) are unknown but are expected in the next two-three years.

16.4.4.1.2 Taw Estuary Crossing

180. Within the area of the Taw Estuary Crossing, sea level rise is likely to result in reduction of intertidal mudflats and any of the small areas of saltmarsh. Coastal retreat and habitat change would occur where not constrained by the tidal embankments.

181. Inland of the tidal embankments (excluding Horsey Island) the habitats are not likely to change significantly, except potential increase in salinity in existing brackish ditches. Overall, species (flora and invertebrates) composition may change in some ditches, but density and distribution of higher fauna such as mammals and reptiles are not predicted to notably change. The area of Horsey Island is already tidally inundated and the extent and duration of inundation would slowly increase over time altering the habitats and subsequent communities within it. However, this lies outside the corridor.

16.4.4.1.3 Terrestrial habitats

182. Outside of the intertidal areas described above, the majority of the baseline conditions identified for the designated sites and agricultural land through which the Onshore Project passes are maintained through ongoing management. With the continued implementation of current management practices, it is not expected that the ecological character of the site would change significantly over the lifetime of the Project.

183. In general, many of the species of conservation concern which have been subject of targeted ecological surveys in relation to the onshore ecology and ornithology assessment are experiencing negative trends in the form of population declines, shifts or contractions in range, habitat loss, fragmentation of habitats and species populations, and from the spread of diseases and non-native species. These long-term trends are associated with various factors including climate change, alterations to land-uses (particularly intensification of farming and increased built development), increased human disturbance and anthropogenic pollution of waters, land and air.

184. However, conversely, legislation regarding protection of species and habitats, changing farming practices and nature conservation efforts are playing a role in limiting the magnitude of some of these negative trends (or in some cases, reversing them). Where a valued ecological receptor is known to be experiencing baseline

natural trends that are relevant to this impact assessment, this is noted in the individual receptor's assessment below.

16.4.5 Scope

185. Upon consideration of the baseline environment described in **Section 16.4.2** above, the project description outlined in **Chapter 5: Project Description**, and Scoping Opinion, potential impacts upon onshore ecological and ornithological features have been scoped in or out. The impacts scoped in or out are outlined, together with a justification, in **Table 16.23** and **Table 16.24** respectively; where relevant, reference is made to the embedded mitigation measures outlined above in **Table 16.10**.

Table 16.23 Summary of impacts scoped in relating to onshore ecology and ornithology

Receptor	Importance (Sensitivity)	Potential Impact	Justification
Braunton Burrows SAC/ SSSI	International (High)	Damage and disturbance of habitats and features for which the site is designated	**Construction** At the landfall (to MLWS), a direct impact will occur through temporary disturbance of the intertidal area through trenching for cable laying. This has potential to impact associated invertebrate and bird communities. Habitats elsewhere within the SAC/ SSSI will not be directly impacted by the Onshore Project; the cable route will be installed below the SAC/SSSI using trenchless techniques. The SAC/SSSI interest features will be protected by a minimum 5m stand-off from the Onshore Development Area with the exception of one short pinch point at SS463357, where the route is restricted between an existing farm building and the boundary of the SAC/SSSI. Scoped in due to the sensitivity of the SAC and because the possible risk of adverse effects needs to be considered in the assessment. This includes risks of harm arising from spillage of contaminants, frac-out leakage of drilling fluid (a chemically inert bentonite clay-based lubricant), and effects of dust

Receptor	Importance (Sensitivity)	Potential Impact	Justification
			during construction operations use of the haul road. Potential adverse effects on air quality have been scoped out as discussed in **Chapter 13: Air Quality**. **Operation** No operational effects are anticipated (see **Section 16.6**).
Taw/ Torridge Estuary SSSI	National (High)	Damage and disturbance of habitats and features for which the site is designated	**Construction** The SSSI will not be directly impcted by the Onshore Project, and the entry and exit pits for the trenchless crossing will be located a minimum of 60m from the SSSI boundary. No works will occur within 40m from the SSSI boundary. Scoped in due to the sensitivity of the SSSI and because the possible risk of adverse effects through spillage of contaminants, leakage of drilling fluid (bentonite clay-based lubricant) and effects of lighting and noise on the species assemblages for which the SSSI is designated. Potential adverse effects on air quality have been scoped out as discussed in **Chapter 13: Air Quality**. **Operation** No operational effects are anticipated (see **Section 16.6**).
Greenaways and Freshmarsh, Braunton SSSI	National (High)	Damage and disturbance of habitats and features for which the sites are designated	**Construction** The SSSI will not be directly impacted by the Onshore Project; it is scoped in because it is adjacent to Onshore Development Area and because the possible risk of adverse effects (such as dust, lighting and noise) need to be considered by the assessment. Potential adverse effects on air quality have been scoped out as discussed in **Chapter 13: Air Quality**.

Receptor	Importance (Sensitivity)	Potential Impact	Justification
			Operation No operational effects are anticipated (see **Section 16.6**).
Saunton to Baggy Point SSSI	National (High)	Damage to habitats and features for which the sites are designated	**Construction** The SSSI will not be directly impacted by the Onshore Project; it is scoped in because it is close to northern part of the Onshore Development Area and because the possible risk of adverse effects (impacts on air quality – see **Chapter 13: Air Quality**) need to be considered by the assessment. **Operation** No operational effects are anticipated (see **Section 16.6**).
Caen Valley Bats SSSI	National (High)	Potential impacts on functionally linked habitats	Caen Valley Bats SSSI is 1.7km from the Onshore Development Area. Greater horseshoe bats from this roost are known to forage in the surrounding area including habitats within and adjacent to the Onshore Development Area, including Braunton Burrows. The assessment needs to consider the significance of the temporary removal of hedgerows on greater horseshoe bats.
Non-statutory designated sites (including Unconfirmed County Wildlife Sites) and associated habitats	County (Medium)	Damage and disturbance of habitat features	**Construction** Braunton Marsh and Instow Barton Marsh Unconfirmed County Wildlife Sites. These UCWS support Coastal and floodplain grazing marsh – typically improved and semi-improved grassland with occasional marshy areas, in fields with ditches. There will be direct temporary loss (and reinstatement) of habitats within these non-statutory designated sites through trenching, soil storage and provision of haul roads (i.e. Braunton Marsh Unconfirmed Wildlife Site). They will be reinstated on completion of the work. **Operation** No operational effects are anticipated (see **Section 16.6**).

Receptor	Importance (Sensitivity)	Potential Impact	Justification
Hedgerow network	Local (Low)	Temporary loss of hedgerow habitats	The evaluation is based on the presence of sections of species-rich hedgerow, since the hedgerows within the Site form part of a habitat network which links wildlife sites within the local area. **Construction** The embedded mitigation ensures that hedgerow losses will be kept to a minimum however there is a risk of temporary habitat loss and fragmentation where hedgerow sections are removed to allow for provision of the haul road. **Operation** No operational effects are anticipated (see **Section 16.6**).
Riparian habitats and water-courses	Local (Low)	Temporary loss of ditch habitats and pollution of retained ditch habitats	**Construction** The embedded mitigation ensures that ditch crossings will be minimised using trenchless techniques where possible; and that where temporary dams are required to create a dewatered working area, water flows will be maintained along the ditches to maintain hydrology. There will be a temporary loss of habitat and fragmentation of the ditch network to accommodate some of the trenching and to allow the construction of the haul road. Trenchless techniques and bailey bridges will be used on the wider watercourse crossings, which includes ditches of higher botanical value. **Operation** No operational effects are anticipated (see **Section 16.6**).
Bats – commuting and foraging	National (High); based on assemblage and present of important nearby roosts Caen Valley SSSI.	Temporary loss and disturbance to bat foraging or commuting habitats	The surrounding area is important for bats, including a nearby population of greater horseshoe bat that forages within the local area; other species of conservation importance include barbastelle and lesser horseshoe bat have been recorded. **Construction**

Receptor	Importance (Sensitivity)	Potential Impact	Justification
			Much of the habitat (arable fields/pasture) to be affected by the Onshore Project is assessed to be of relatively low value for foraging bats; some habitats of higher value, e.g. hedgerows, ditches and marshy grassland will be impacted. Embedded mitigation measures have been devised to ensure that hedgerow losses will be temporary and kept to a minimum. There will however be a temporary loss of bat commuting and foraging habitat where hedgerow sections are removed to allow for provision of the haul road. There will also be some temporary habitat loss in fields which contain areas of marshy grassland. The risk of noise and lighting disturbance to hedgerows will be minimised through imbedded mitigation. **Operation** No operational effects are anticipated (see **Section 16.6**).
Wintering birds	National (High); Based on proximity of SSSI and presents of high-tide roosts within the Onshore Development Area.	Disturbance of wintering birds; temporary habitat loss in high-tide roosts.	**Construction** Embedded mitigation measures ensure that temporary and permanent loss of habitats of value to wintering birds will be kept to a minimum. There will be a localised risk of disturbance of wintering birds during the construction phase. This will occur if construction activities take place close to known roosts in Braunton Marsh, or on either side of the Taw/Torridge Estuary during autumn and winter months. **Operation** No operational effects are anticipated.
Fremington LNR	Local (Low)	Air quality from road traffic emissions	Potential adverse effects on air quality have been considered in the Assessment (and discussed in **Chapter 13: Air Quality).**

Receptor	Importance (Sensitivity)	Potential Impact	Justification
Ancient Woodland (Tapley Park)	Local (Low)	Air quality from road traffic emissions	Potential adverse effects on air quality have been considered in the assessment (and discussed **Chapter 13: Air Quality).**

Table 16.24 Summary of impacts scoped out relating to onshore ecology and ornithology

Receptor	Importance (Sensitivity)	Justification
Braunton Swanpool SSSI	National (High)	This SSSI is c. 0.25km from the onshore development area, and is separated by cultivated fields, a minor road and a ditch. It will not be directly impacted and is considered to be sufficiently distant that the risk of indirect impacts from the proposed work can be ruled out.
Northam Burrows SSSI	National (High)	This SSSI is 2km from the onshore development area. It will not be directly impacted and is considered to be sufficiently distant that the risk of indirect impacts from the proposed work can be ruled out.
Non-statutory Sites (including Unconfirmed County Wildlife Sites) (Blind Acre Lane UWS; Sandy Lane UWS; Lane End UWS)	County-Site (Medium-Negligible) unconfirmed/ out of date.	Blind Acre Lane UWS: This (unconfirmed) non-statutory site is described as Semi-improved neutral grassland (by DBRC); from the survey data and from a review of on-line aerial photographs this area currently is a cultivated arable field. Given the current condition of this site, it is considered unlikely to still meet the non-statutory site criteria and is therefore scoped out of further assessment. Sandy Lane UWS: This (unconfirmed) non-statutory site is described as Semi-improved neutral grassland (by DBRC); this area currently is a cultivated arable field. Given the current condition of this site, it is considered unlikely to still meet the non-statutory site criteria and is therefore scoped out of further assessment. Land End UWS: Sand dune system (DBRC, 2022). This will be used as an access route; which will make use of an existing hard surfaced track. It will not be directly impacted and is scoped out of further assessment. Other non-statutory Sites are scoped out of the assessment based on distance, the lack of direct impacts and/or low risk of indirect impacts.
Habitats falling outside of designated sites	Site (Low)	These habitats are other modified grassland, developed land, and arable land. These habitats are widespread habitats of no higher than Site/Local value.

Receptor	Importance (Sensitivity)	Justification
		Any such habitats to be temporarily impacted during construction will be reinstated following completion of development and therefore no further assessment of effects on these habitats is considered necessary.
Dormouse	n/a	Dormouse is scoped out of the assessment as this species has not been recorded from the Project Development Area and no effects are anticipated.
Water vole	n/a	Water vole is scoped out of the assessment as this species has not been recorded from the Project Development Area and no effects are anticipated.
Reptiles – sand lizard	n/a	Sand lizard is scoped out of the assessment as although this species is present in Braunton Burrows, it is not associated with the habitats present within the Project Development Area. No effects on sand lizards are therefore anticipated.
Invertebrates	Local (Medium)	Invertebrates are scoped out of the assessment as areas likely to be of higher value for invertebrates (e.g. SSSI/SAC vegetation) are not included within the Project Development Area. Where localised habitat loss is required with the Onshore Project it is mostly temporary and will not affect habitats of high value for invertebrate and is expected to have negligible effects on the invertebrate assemblage present.
Other priority species	Local (Low/ Medium)	Other priority species (Hedgehog *Erinaceus europaeus,* brown hare *Lepus europaeus,* harvest mouse *Micromys minutus,* toad *Bufo bufo*) are scoped out of the assessment as the localised habitat loss associated with the Onshore Project is mostly temporary and expected to have negligible effects on these receptors.

186. A number of other ecological receptors have been identified within the ZoI which are not scoped into the assessment, as they do not need to be considered in detail in an EIA context and decision making process, but since they are afforded legal protection (under the provisions of the Wildlife and Countryside Act 1981 (as amended), the Conservation of Habitats and Species Regulations 2017, etc.) they need to be considered in terms of legal compliance and may require the implementation of standard mitigation measures (i.e. removing vegetation suitable for nesting birds outside of the breeding season, carrying out precautionary pre-commencement survey for badger setts to ensure the baseline) in order to avoid conflict with legislation. These receptors which are scoped out of the EIA, but which need to be considered in terms of legal compliance are listed in **Table 16.25**. For

these receptors, precautionary measures to ensure legal compliance will be incorporated within the CEMP.

Table 16.25 Summary of features scoped out of the assessment but which require consideration in terms of legal compliance to be addressed through the CEMP

Receptor	Importance (Sensitivity)	Justification
Otter *Lutra lutra*	Local (Medium)	Otter is present in the ditch network within the Onshore Development Area. Two holts are located approximately 30m and 40m from the edge of the working area. These are not assessed to be breeding holts. They will not be directly affected and are well screened from working areas by scrub and dense vegetation, and will be protected from disturbance during the construction phase. Because of this an impact is not predicted and Otters are scoped out from further assessment with this Chapter. Precautionary measures to ensure legal compliance will be provided in the CEMP. This will include pre-commencement inspections of watercourse sections to be affected by the works by a suitably qualified ecologist in order to confirm the status of identified otter holts, and re-check for any other signs of occupancy.
Bats – roosting	n/a	No bat roosts have been identified within trees or buildings within the Onshore Development Area. A number buildings and trees within the vicinity of the Onshore Development Area have been identified as having potential to support roosting bats; these will be retained and not directly affected by the proposed Onshore Project and have therefore not been subject to further survey. An impact is not predicted, and roosting bats are scoped out from further assessment. Precautionary measures to ensure legal compliance, to be provided in the CEMP, will include a precautionary pre-construction survey of any trees that require removal. This will be carried out to ensure the survey results remain up-to-date and that should any potential bat roost features (i.e. cavities) develop in trees to be removed these are identified in advance of any tree removal operations.
Badger *Meles meles*	n/a	No badger setts are located within 30m of the Onshore Development Area and as such no setts are expected to be affected. The temporary and permanent fences to be installed as part of the proposals, as discussed in **Chapter 5: Project Description**, are not expected to interfere with badger

Receptor	Importance (Sensitivity)	Justification
		movement and connectivity will be maintained between retained. In view of this an impact is not predicted and Badgers are scoped out from further assessment. Badgers are a protected species and therefore need to be considered in terms of a legal compliance. Precautionary measures to ensure legal compliance will be provided in the CEMP, to include a precautionary pre-construction survey to ensure the survey results remain up-to-date and that any newly created badger setts are identified. Relevant avoidance measures to avoid potential risk of killing of or injury to badgers will be identified in the CEMP. For example avoidance of trenches being left open and uncovered overnight, where possible, and if not, then a suitable ramp would be provided if necessary, to enable escape.
Nesting birds	Local (Medium-Low)	Suitable nesting bird habitat is present within a variety of habitats (arable fields, scrub, hedgerows, grassland and marsh habitat) within and adjacent to the Onshore Development Area. The impacts will be very localised and although there will be some temporary habitat loss, this will be reinstated following the installation of the cabling. Any nesting birds affected birds will be displaced into adjacent habitat for the duration of the work. No breeding waders (such as redshank or lapwing have been recorded within or in close proximity to the Onshore Development Area). Given the extent of such habitats within the wider area these impacts are not considered likely to be significant beyond the immediate context (site level significance). In view of this a significant impact is not predicted and breeding birds are scoped out from further assessment in this chapter. However, since birds receive legal protection while nesting, they need to be considered in terms of a legal compliance. Measures to ensure legal compliance will be provided in the CEMP. These will involve removal of any suitable nesting habitat outside of the bird nesting season which for the majority of species is between February and August. NB the timing of this work will need to take into account of other constraints (avoiding disturbance to wintering bird species using the Taw/Torridge SSSI estuary and adjacent habitat).

Receptor	Importance (Sensitivity)	Justification
Reptiles – common and widespread species	Local (Medium)	Populations of slow-worm, common lizard, grass snake and adder have been recorded within the Onshore Development Area; they are generally associated with habitat mosaics of grassland and scrub. The majority of habitat to be affected is assessed to be suboptimal for reptiles, only localised temporary habitat loss will occur (e.g. removal of hedgerow sections for access), they majority of suitable habitat will be unaffected. In view of this a significant impact is not predicted and reptiles are scoped out from further assessment in this chapter. Since reptiles receive legal protection, they still need to be considered in terms of a legal compliance. Measures to ensure legal compliance will be provided in the CEMP. These measures will include the implementation of staged habitat manipulation works at a suitable time of year/suitable weather conditions to temporarily displace reptiles from the proposed construction footprint, with works carried out under supervision of an ECoW.
Great Crested Newt *Triturus cristatus*	Local (Medium)	This species has been recorded in four ponds within 250m of the Onshore Development Area. No known great crested newt ponds will be lost during the construction phase. The ponds are generally distant from the working areas, surrounded by suitable habitat; the working areas are generally in distant suboptimal terrestial habitat. In this situation, the risk of an impact on this species is considered to be low. At one point the trenching route is 20m from the ponds at its closest point, however in this section the route is passing through an arable field (low suitability habitat), while there is extensive suitable terrestrial habitat surrounding the pond and further to the east. Hence, the proportion of available terrestrial habitat for great crested newt to be affected by the trenching rout in proximity to the pond is low. The risk in this area is also low, although the proximity to the pond means that precautionary measures will be required and the possible need for licencing needs to be considered. The risk of an impact on individual great crested newts is low but cannot be completely ruled out; the risk is considered sufficiently low, and of a sufficiently low significance level (i.e.

Receptor	Importance (Sensitivity)	Justification
		Site level) that it can be scoped out from further assessment in this chapter. Since great crested newt is a protected species and it needs to be considered in terms of a legal compliance. Measures to ensure legal compliance will be provided in the CEMP. This will involve clearance of any areas suitable vegetation within 250m of the positive great crested newt ponds during the construction phase under precautionary Reasonable Avoidance Measures (RAMs) supervision of an ECoW, and the avoidance of inadvertent creation of potential great crested newt refugia in nearby construction areas. As a precaution, consideration of the need for a Natural England (EPSL) licence, various licence options are available, will be kept under review; it is considered that, from an ecology perspective, the Habitats Regulations Tests required under licencing, if necessary, would be capable of being passed.
Invasive non-native species	n/a	Without precautionary measures in place there is a risk of inadvertently spreading of Invasive non-native species (INNS) within the Onshore Development Area and off-site during construction through soil movements, and movement of plant and personnel. Measures to ensure legal compliance to avoid spread of INNS will be provided in the CEMP. This will involve: • Ensuring that all contractors have a plan showing all INNS locations and extents • That any areas supporting INNS are marked off/fenced off and protected from vehicle movements • General good practice measures for managing the spread of INNS are followed during construction works • A requirement for an ECoW and details of their responsibilities with respect to INNS.

16.5 Potential impacts during construction

187. The potential impacts during construction of the Project have been assessed for onshore ecology and ornithology. A description of the potential effect on ecological and ornithological receptors caused by each identified impact is given in this section.

16.5.1 Impact 1: Direct physical damage and disturbance of Braunton Barrows SAC/SSSI (intertidal area)

188. The Onshore Development Area lies within the Braunton Barrows SAC/ SSSI at the northern end. At the landfall (to MLWS), direct disturbance of the intertidal area is expected through trenching for the cable laying.

189. A non-displacement type cable plough will be employed to lay the cable across the beach, this will cause relatively little disturbance with the majority of the sediment falling back into the trench as the cable is laid. The process is expected to take less than five days, though it is noted that where the works would extend over more than one day, the tides would be likely to redistribute any excavated sand and partially refill any open trench above the level of surrounding sand. The excavation of the sand would give rise to very localised disturbance to any invertebrate communities within it. The rocky habitat at the northern end of the corridor would not be disturbed, as the cable would need to keep to the south of the existing buried cables in the beach.

190. Where the Onshore Cable Corridor crosses the dune and scrubland habitats of the SAC/SSSI inland of the intertidal area, the use of trenchless technique (HDD) is embedded within the scheme design to avoid any direct impacts on the SAC/SSSI from habitat loss or damage.

191. Outside of the footprint of the SAC/ SSSI, where open trenching is to take place and trenchless technique is not employed, a minimum 5m and in most places, much wider, standoff will be maintained between the construction area and boundary of the SAC/ SSSI. The CEMP will provide details of the extent and location of the standoff. As such, the features of this SSSI and SAC would not be directly affected by the proposed crossing works and no change to Braunton Barrows SAC/ SSSI is predicted.

16.5.1.1 Impact significance

192. The SAC/SSSI is formally identified as being of International Importance. During the trenching works, the area of disturbance for the trench across the intertidal area will typically be 0.5m wide (based on a maximum cable diameter of 250mm for the offshore export cables) with a length of 700m above the MLWS, and a burial depth of 2m. Due to the sequence of working (the sediment is replaced as the cable is laid) the full extent of disturbance would not occur at any one time. Given the short duration of the work and replacement of the sand (both natural and re-instated), as well as the (insignificant scale) of disturbance in relation to the extensive area of the habitat type throughout the intertidal areas at Saunton Sands (which includes

several kilometres of intertidal habitat along the length of the beach), the effect significance is not assessed to be significant; effect significance: **negligible**. There is high confidence in this assessment.

16.5.1.2 Further Mitigation

193. It is possible that the duration of work could be decreased (the best-case scenario is one day). Carrying out the work as rapidly as possible minimises the duration of disturbance but also reduces construction cost. There are however uncertainties such as weather, public access issues, sub-contractors progress, which means that the assessment has assumed that less than 5 days will be required.

194. A potential option for mitigation is the use of trenchless techniques to tunnel/bore underneath the intertidal area (the trenchless technique would usually be up to 10m or below the bed level depending on length and design). This technique would result in a reduction in the extent of surface disturbance. However, some localised disturbance could potentially arise at the exit point and transition with the offshore cable as it is not determined at this point whether this would take place in the subtidal and outside the boundary of the SSSI and SAC. There is therefore uncertainty whether or not this would provide a better solution.

16.5.1.3 Residual Effect

195. The additional mitigation discussed above will not make a significant change to the assessment. Residual effect significance: **Negligible**. There is high confidence in this assessment.

16.5.1.4 Consideration of general EIA terminology

196. The Braunton Burrows SAC is designated at an international level and its sensitivity is therefore considered to be **high**.

197. Given the **negligible** magnitude of the impact but the high sensitivity (and value) of the site within which the habitat disturbed is located, a very short-term, temporary **minor adverse effect** is expected; this is not considered to be significant in the context of the EIA regulations.

198. After mitigation a short-term and temporary **minor adverse effect** would be expected to remain on intertidal habitats (and therefore the Braunton Burrows SSSI and SAC).

16.5.2 Impact 2: Indirect disturbance to Braunton Burrows SSSI / SAC intertidal zone/shore

16.5.2.1 Pollution risk in intertidal zone/shore

199. During construction activity there is potential for indirect effects to arise from the accidental release of pollutants from the plant that are used. Whilst two or three plant would be used within the intertidal zone (likely 2 excavators and 1 vehicle containing the cable roll) there will be potential for accidental leaks and spillages as any refilling would occur within the on-site compound inland. Any accidental pollutant discharges have potential to impact on the flora and fauna within the intertidal zone.

200. The likelihood of a leak occurring is low, given both the short timescale of presence of plant within the vicinity of the SAC/ SSSI, and would be small in scale given the limited capacity of each type of plant and the liquid pollutants they contain (with fuel being the largest in volume). However, given the porosity of the habitats present, in particular the intertidal sands, and subsequent rapid dispersal of liquid if discharged the scale could cover a notable area and volume. Embedded mitigation (**Section 16.3.6**) will be incorporated into the construction requirements including:

- Implementation of CEMP
- Specific checks on vehicles / plant for leaks prior to traversing and working on site (intertidal zone)
- Provision of spillage kits with each item of plant.

201. If trenchless techniques were to be used as an alternative to trenching in the intertidal areas and shore, there is potential for 'frac-out' to occur (see mitigation section above, in relation to Impact 1). This is discussed in more detail below.

202. The risk of significant impacts from dust will be avoided; dust will be controlled by standard dust suppression methods (full details are provided in **Chapter 13: Air Quality**). These will be set out within the CEMP.

16.5.2.2 Impact significance

203. The SAC/SSSI is considered to be of International Importance. Providing that the imbedded mitigation is implemented there will be no impact; Impact significance: **Neutral**.

16.5.2.3 Further mitigation

204. No further mitigation is proposed.

16.5.2.4 Residual effect significance

205. Residual effect significance will remain at: **Neutral**.

16.5.2.5 Consideration of general EIA terminology

206. The Braunton Burrows SAC is designated at an international level and its sensitivity is therefore considered to be **high**.

207. Given the **negligible** magnitude of the impact but the high sensitivity (and value) a **minor adverse effect** would be applied, as there is no option for negligible/neutral (using the matrix in **Table 16.8**), the effect is not considered to be significant in the context of the EIA regulations. Since no further mitigation is proposed, the residual effect will remain unchanged.

16.5.3 Impact 3: Indirect disturbance to Braunton Burrows SSSI / SAC arising from use of trenchless techniques within the SAC

208. Where the Onshore Export Cable corridor crosses Braunton Burrows, from the Saunton Sands Car Park to farmland to the east of the SAC, to the east of Saunton Golf Club trenchless installation methods will be used for the export cables (which will involve below ground installation) will be used. The drilling point will be within Saunton Sands Car Park, which is outside of the SAC. The cables will be installed up to 13m below ground.

209. This approach has been devised to avoid direct impacts to habitat features within the designated sites within Onshore Development Area.

210. Where trenchless techniques are used as an alternative to trenching, there is the potential for 'frac-out' to occur. This is when the down-hole mud pressure exceeds the overburden pressure (i.e. shallow or loose sections of the bore), or the fluid finds a preferential seepage pathway (such as fault lines and fractures, infrastructure or loose material). These fractures can be natural or induced by over pressurising the formation. Most frac-outs usually occur close to the bore entry or exit. The material that can be discharged during a frac-out is inert (drilling lubricant usually bentonite). Where frac-out occurs, it can give rise to very localised smothering of immediately adjacent surface vegetation, in this case it could occur within terrestrial habitats for the SAC/ SSSI is designated.

211. Although the likelihood of frac-out is considered to be low, a variety of embedded mitigation measures are proposed to both prevent and respond to such an event, should it occur. These are set out in detail in **Appendix 5.A: Taw Estuary**

Crossing Method Statement (which includes a hydro-fracture assessment), and are listed in (**Table 16.10**) and include:

- Post-consent geotechnical investigations to refine the trenchless technique design. This will include providing calculations of the pressure required for the relevant subsurface material the trenchless technique will travel through to prevent frac-out. These will be situated in "site fabric" areas of the SAC and will not be situated in areas which support interest features
- Agreement will be obtained from Natural England and NDC on the trenchless technique methodology and response procedures
- In the unlikely event of a pressure drop indicating the commencement of a frac-out, the works will respond immediately and either amend approach or recommence through an alternative line
- During works continual monitoring of the trenchless technique bore above ground will be undertaken. If frac-out occurs and surface discharge occurs, the material will be collected, and reinstatement of the surface area carried out immediately

212. The risk of significant impacts from dust will be avoided; dust will be controlled by standard dust suppression methods (full details are provided in **Chapter 13: Air Quality**). These will be set out within the CEMP.

16.5.3.1 Impact significance

213. If the risk of frac-out is avoided, there will be no impact on the SAC. Effect significance: **Neutral**. There is high confidence that the drilling approach will be suitable and that frac-out will be avoided.

214. Further information on the methods that will be used is set out in **Appendix 5.A: Taw Estuary Crossing Method Statement** (which includes a hydro-fracture assessment).

215. In the unlikely event that frac-out was to occur, taking into account the embedded mitigation approach outlined above, the impact would be very localised and due to the monitoring it would be expected to be identified very rapidly, and were any of the drilling lubricant (inert bentonite and water) to escape and cover vegetation at the exit point, it is expected this could be removed and the vegetation reinstated. This would however give rise to a very localised impact on vegetation. Given the very small scale of the area to be affected this would be unlikely to have an impact on the integrity of the SAC/SSSI; which covers a very extensive area. Effect significance: **Site/Local level**.

16.5.3.2 Further mitigation

216. Further mitigation (and avoidance) measures would involve ceasing drilling operations, removal of any drilling inert lubricant and reinstatement of conditions. Drilling would not be recommenced until a solution was identified to avoid and/or minimise the risk of any further frac out. This would need to be discussed and agreed with statutory consultees (Natural England) and any necessary consenting processes for work within the SSSI would be followed.

217. Further information on the methods that will be used is set out in **Appendix 5.A: Taw Estuary Crossing Method Statement** (which includes a hydro-fracture assessment). The final Method Statement for the crossing (once detailed design is completed) will be agreed with stakeholders.

16.5.3.3 Residual effect significance

218. As above, residual effect significance would remain unchanged. Effect significance: **Site/Local level**.

16.5.3.4 Consideration of wider assessment terminology

219. The Braunton Burrows SAC is designated at an international level and its sensitivity is therefore considered to be **high**. Given the **negligible** magnitude of the impact but the high sensitivity (and value) of the site within which the potential impacts could take place, a very short-term and temporary **minor adverse effect** is expected. The proposed mitigation approach will be kept under review during the drilling operations, to determine if any further mitigation is required to avoid impacts. For the purposes of the assessment, residual effect significance would remain unchanged.

16.5.4 Impact 4: Physical disturbance to intertidal habitats (and Taw-Torridge Estuary SSSI) at the Taw Estuary Crossing

220. The intended crossing of the Taw-Torridge Estuary would be carried out using trenchless techniques underneath the bed of the estuary.

221. The trenchless methods would entail the entry and exit points to be located inland of the coastal defence embankments and thus outside of the subtidal and intertidal areas of the estuary. As such there would be no physical disturbance within the estuary as the trenchless cable route would be located c. 10m or more below the bed of the estuary.

16.5.4.1 Impact significance

222. The SSSI is considered to be of National Importance. There will be no physical impact on the SSSI; the cable will be installed at a depth of c. 10m or more below the bed). Effect significance will be **neutral**. There is high confidence in this assessment.

16.5.4.2 Further Mitigation

223. No additional mitigation measures are identified over and above the embedded mitigation measures.

16.5.4.3 Residual effect significance

224. Residual effect significance will remain at: **Neutral**.

16.5.4.4 Consideration of general EIA terminology

225. The estuarine habitats fall within unit 103 of the Taw-Torridge Estuary SSSI and as such its sensitivity is considered to be **high**. No physical impact is expected – the magnitude of the impact will be **negligible**. No mitigation is proposed and therefore residual effect will be **minor adverse**, as there is no option for negligible/neutral (using the matrix in **Table 16.8**), the effect is not considered to be significant in the context of the EIA regulations.

16.5.5 Impact 5: Indirect disturbance to habitats within the Taw-Torridge Estuary SSSI

226. During construction activity inland of the intertidal zone the potential for indirect effects to arise from the accidental release of pollutants from the trenchless plant that will be used during the cable installation, is addressed through the embedded mitigation. As a result the risk of spillage, fuel storage failure, and leaks within the Taw-Torridge Estuary SSSI is assessed to negligible.

227. The use of trenchless techniques under the estuary has the potential for 'frac-out' (see **paragraph 210**) within the landward / terrestrial habitats. The material that can be discharged during a frac-out is inert (usually bentonite) and the main impact associated with would be localised smothering of adjacent habitat. Within the cable corridor this habitat is intertidal mudflat and sandflat with small outcrops of rock, and saltmarsh at the edges of the corridor. The discharge of a small amount of inert bentonite-based lubricant is unlikely to give rise to a significant effect on any habitats within the estuary, which are subject to twice daily inundation from tidal water flows. As detailed above, measures will be put in place to monitor the drilling and respond immediately to any possible signs of frac out (i.e. post-consent

geotechnical investigations to refine technique design, agreement with Natural England and NDC on the methodology, monitoring, removal of any inert frac out material and any reinstatement required).

228. It is understood that the risk of frac out in this area is assessed to be very low; the trenchless technique will be 10m underneath the bed of the river/estuary. It is understood that it is therefore very unlikely to occur below the river/estuary; the only potential for frac-out could be at the beginning or end of the trenchless approach when the depth is shallower, and which is likely to be outside the SSSI.

229. Further information on the methods is set out in **Appendix 5.A: Taw Estuary Crossing Method Statement** (which includes a hydro-fracture assessment).

230. Fuel spill would not occur as equipment would only be at the work compounds, which are outside of the estuary.

231. Given the small scale of the site works inland and the adoption of embedded mitigation measures listed in **Table 16.10**, the likelihood of an impact from dust generation is considered to be negligible.

232. The likelihood of the increased concentrations of NOx, NH3 and Nitrogen, as identified in **Chapter 13: Air Quality** (i.e. air quality impacts that exceed (1% of) the Critical Load or Level), giving rise to a significant effect on the interest features of the SSSI is considered to be very low, and is scoped out of the assessment, for the reasons outlined below, and also given the temporary nature of the effect.

233. The key interest features of the SSSI are >20,000 non-breeding waterbirds; curlew, golden plover, lapwing, and the habitat littoral sediment. When assessing the possible significance of air pollution of habitats, lower critical loads are applied to more sensitive habitats. For coastal saltmarsh effects are likely to be small as these habitats are inter-tidal and experience large influxes of nutrients; and sensitivity it assessed to be low. Significantly, impacts from pollution or air quality impacts are not identified by Natural England in the unit condition assessments. The botanical interest of the SSSI, does not refer to plant communities that are dependent on low nutrient conditions or those likely to be high sensitivity to air quality impacts.

16.5.5.1 Impact significance

234. The SSSI is considered to be of National Importance. The risk of such impacts occurring can be avoided through the implementation of embedded mitigation and therefore effect significance on the SSSI (intertidal mudflat and sandflat, and more distant saltmarsh) is assessed to be **negligible**. There is moderate confidence in this assessment.

16.5.5.2 Further mitigation

235. No further mitigation is proposed.

16.5.5.3 Residual effect significance

236. As above, residual effect significance would remain unchanged. Effect significance: **negligible**.

16.5.5.4 Consideration of general EIA terminology

237. The Taw-Torridge Estuary SSSI is designated at a national level and is of importance for a range of notable plants, fish and bird species. As such the sensitivity of the receptor is considered to be **high**. Given the **negligible** magnitude of the impact but the high sensitivity (and value) of the Taw-Torridge Estuary SSSI a short-term and temporary **minor adverse effect** is expected (using the matrix in 16.8). No mitigation is proposed and therefore residual effect will be **minor adverse**, as there is no option for negligible/neutral (using the matrix in **Table 16.8**), the effect is not considered to be significant in the context of the EIA regulations.

16.5.6 Impact 6: Indirect impacts to Greenaways and Freshmarsh, Braunton SSSI

238. Greenaways and Freshmarsh, Braunton SSSI is located immediately east of the Onshore Development Area and designated for marshy grassland habitats.

239. This SSSI will be avoided (there will be no direct impact), in the area adjacent to the SSSI the cable route will be situated in arable fields to the west of Sandy lane, before crossing the road and entering pasture fields to the south of the SSSI. Hydrological impacts are not considered likely to occur.

240. Temporary indirect impacts are possible from dust from the haul road and lighting. As set out above, lighting of habitats will be avoided as part of the embedded and additional mitigation. Specifically, any new lighting in the vicinity of the SSSI will be minimised and the design of any necessary lighting will be so as to avoid the illumination of any habitat features within the SSSI. Dust will be controlled by standard dust suppression methods. (full details are provided in **Chapter 13: Air Quality**)

16.5.6.1 Impact significance

241. The SSSI is considered to be of National Importance. There will be no physical impact on the SSSI. Effect significance will be **neutral**. There is high confidence in this assessment.

16.5.6.2 Further Mitigation

242. Given the proximity of the SSSI, monitoring will be carried out by the ECoW during the construction phase to ensure the SSSI is not being affected by dust or lighting or any other effects. This monitoring requirement will be detailed within the CEMP.

243. No further mitigation measures are identified over and above the embedded mitigation measures.

16.5.6.3 Residual effect significance

244. Residual effect significance will remain at: **Neutral**.

16.5.6.4 Consideration of general EIA terminology

245. The SSSI is designated at a national level, as such the sensitivity of the receptor is considered to be **high**. Given the **negligible** magnitude of the impact but the high sensitivity (and value) of the SSSI, a short-term and temporary **minor adverse effect** is expected. No mitigation is proposed and therefore residual effect will be **minor adverse**, as there is no option for negligible/neutral (using the matrix in **Table 16.8**); the effect is not considered to be significant in the context of the EIA regulations.

16.5.7 Impact 7: Indirect impacts to Saunton to Baggy Point Coast SSSI

246. Saunton to Baggy Point Coast SSSI, is designated for its cliff and maritime heathland habitats, at its closest point, is located c. 10m from the northern part of the Onshore Development Area; there will be no direct impacts on the SSSI.

247. One localised section of the SSSI is located close to the Onshore Development Area; the majority of the SSSI, which follows the coastline for 7km to the west and north, is distant.

248. Given the location and physical structure of the cliffs and maritime heathland habitats of Saunton to Baggy Point SSSI, were an accidental fuel discharge to occur it is not considered likely to extend from the construction area into the SSSI. Given the embedded mitigation measures listed in **Table 16.10**, this risk is considered to be very low.

249. Saunton to Baggy Point SSSI has been identified in the Air Quality chapter (**Chapter 13: Air Quality**) as being at possible risk from air quality impacts (i.e. it will experience increases in NOx (nitrogen oxides), NH3 (ammonia) and N-Dep

(nitrogen-deposition) that exceed (1% of) the Critical Load or Level); the possible impact from the exceedance is discussed in this section.

250. The rocks and mineral-rich soils support important lichen communities, which are potentially vulnerable to air pollution impacts. Since the boundary of the SSSI is based on physical features and stretches for several kilometres around the coastline only a very small proportion of the SSSI is within 200m of the Operational Development Area; beyond this distance impacts from air quality can be screened out (see **Chapter 13 Air Quality**).

251. Given the very small area of the SSSI within 200m and given that it will be a temporary effect during construction, it is considered unlikely that effects will arise that would affect the integrity of the SSSI. Logically, it is considered likely that there will also be a wind-driven dispersal/dilution effect given the coastal location which is considered likely to further reduce the likelihood of an effect (see **Chapter 13 Air Quality**).

252. Taking these factors into account the likelihood of effect is considered to be **negligible**. **No change** would occur at this SSSI.

16.5.7.1 Impact significance

253. The SSSI is considered to be of National Importance. Taking the factors described above into account the likelihood of impact is considered to be negligible. Since no change would occur on this SSSI, effect significance is assessment to be neutral. There is moderate/high confidence in this assessment, as the precise location of important lichen communities within the SSSI is not known.

16.5.7.2 Further Mitigation

254. No further mitigation measures are identified over and above the embedded mitigation measures.

16.5.7.3 Residual effect significance

255. Residual effect significance will remain at: **Neutral**.

16.5.7.4 Consideration of general EIA terminology

256. The SSSI is designated at a national level, as such the sensitivity of the receptor is considered to be **high**. Given the **negligible** magnitude of the impact but the high sensitivity (and value) of the SSSI, a short-term and temporary **minor adverse effect** is expected. No mitigation is proposed and therefore residual effect will be **minor adverse**, as there is no option for negligible/neutral (using the matrix in

Table 16.8); the effect is not considered to be significant in the context of the EIA regulations.

16.5.8 Impact 8: Indirect impacts to Caen Valley Bats SSSI

257. Caen Valley Bats SSSI, a complex of buildings which support greater horseshoe bat roosts, is located 1.7km north-east the Onshore Development Area. It is assessed to be of National Importance. The Onshore Development Area is within the core sustenance zone of this roost (i.e. where habitats are of primary importance for foraging to support the roost occur; this is 3km for greater horseshoe bat).

258. The possibility of impact on bats is considered in detail in the section below (Impact 12) that relates to "Disturbance to non-roosting bats, temporary loss of bat foraging or commuting habitats"; this considers impacts on greater horseshoe bats, including bats from the population that roosts within the SSSI.

259. In summary, greater horseshoe bat has been recorded within the Onshore Development Area; in areas that will be impacted the activity levels recorded were generally low, the main impact which could occur will arise from the temporary removal of short sections of hedgerow; these losses will be reinstated afterwards. At the design stage, the width of the hedgerow gaps has been minimised, the majority of gaps are assessed to be of insufficient length (20m of less) to have an impact on use (see (Pinaud *et al.*, 2017), particularly considering the temporary nature of the work. There are five gaps that will be 30m wide, this is considered unlikely to give rise to a significant effect (as discussed in below). However, as a precaution temporary mitigation is proposed (creation of fake hedges – herras fencing with netting) for all gaps greater than 20m, for deployment during the active period. There are also two larger sections of hedgerow (c. 90m) to be removed: i) one of these longer sections is a roadside hedgerow (adjacent to Saunton Road), which is not assessed to be of high value for bats (however precautionary monitoring is being undertaken to confirm this assessment); ii) low levels of activity have been recorded along the other (adjacent to Sandy Lane), which is also adjacent to a parallel hedge which provides suitable habitat for bats; both hedges to be temporarily removed (i.e. cut short by coppicing) are adjacent alternative to flight lines.

260. Lighting of habitats suitable for foraging or commuting bats will be avoided, and where the use of lighting is necessary within the Onshore Development Area, then the lighting will be minimised during the period when bats are active. Details will be provided within the CEMP.

261. There will be a minor temporary loss of habitat for the creation of a haul road, the majority of this is within habitats which are of limited suitability for foraging bats. The route passes through an area of marshy grassland (in Braunton Marsh), where bats have been recorded foraging during a previous study (ENRR495; English Nature, 2002); a small proportion of this field will be temporarily impacted, and restored following the work, and given the small area to be impacted, the effect is not considered likely to be significant.

16.5.8.1 Impact significance

262. The SSSI is considered to be of National Importance. There will be no direct impact on the SSSI. Taking into account the embedded mitigation and factors described above, the likelihood of significant effect on the population of bats using the SSSI (i.e. the integrity of the SSSI) is considered to be negligible. Since no change is predicted to occur, effect significance is assessment to be **neutral**. There is high confidence in this assessment.

16.5.8.2 Further Mitigation

263. Precautionary mitigation to create fake hedges in any larger temporary hedgerow gaps (over 20m) is described below in the section which relates to "Impact 12: Disturbance to non-roosting bats, temporary loss of bat foraging or commuting habitats".

16.5.8.3 Residual effect significance

264. Residual effect significance will remain at: **Neutral**.

16.5.8.4 Consideration of general EIA terminology

265. The SSSI is designated at a national level, as such the sensitivity of the receptor is considered to be **high**. Given the **negligible** magnitude of the impact but the high sensitivity (and value) of the SSSI, a short-term and temporary **minor adverse effect** is expected. No mitigation is proposed and therefore residual effect will be **minor adverse**, as there is no option for negligible/neutral (using the matrix in **Table 16.8**); the impact is not considered to be significant in the context of the EIA regulations.

16.5.9 Impact 9: Temporary habitat loss affecting non-statutory designated sites (and associated habitats)

266. Non-statutory nature conservation sites (including UWS which are considered as if they are non-statutory designations for the purposes of this assessment) are located within 1km of the Onshore Development Area, as presented in **Section 16.4.**

267. This section describes the existing environment in relation to onshore ecology and ornithology associated with the White Cross study area. It has been informed by a review of the sources listed in **Section 16.3.7**.

16.5.10 Designated sites

268. Statutory designated sites that are located within 2km of the Onshore Development Area and non-statutory designated sites located within 1km of the Onshore Development Area are presented in **Table 16.15**. **Table 16.15** also provides a summary of the qualifying features/reasons for notification of these designated sites.

269. The Onshore Development Area passes through five non-statutory Local Wildlife Sites: Blind Acre Lane UWS, Sandy Lane (W) UWS, Braunton Marsh UWS, Instow Barton Marsh UWS, and Lane End UWS. The Onshore Development Area is immediately adjacent to Horsey Island CWS.

270. Impacts on the following two sites are considered in detail below:

- Braunton Marsh UWS: This (unconfirmed) non-statutory site supports "semi-improved neutral grassland" (by DBRC); from the survey work carried out this area also supports improved grassland, marshy grassland, areas of swamp vegetation, and ditches (together forming the components of floodplain grazing marsh).
- Instow Barton Marsh UWS: This (unconfirmed) non-statutory site is described as grazing marsh (by DbRC, 2022).

271. As stated above (see Scope) impacts on the following sites are scoped out for the following reasons:

- Blind Acre Lane UWS: This (unconfirmed) non-statutory site is described as Semi-improved neutral grassland (by DBRC); from the survey data and from a review of on-line aerial photographs this area currently is a cultivated arable field. Given the current condition of this site, it is considered unlikely to still meet the non-statutory site criteria and is therefore scoped out of further assessment.
- Sandy Lane UWS: This (unconfirmed) non-statutory site is described as Semi-improved neutral grassland (by DBRC); this area currently is a cultivated arable field. Given the current condition of this site, it is considered unlikely to still meet the non-statutory site criteria and is therefore scoped out of further assessment.
- Land End UWS: Sand dune system (DBRC, 2022). This will be used as an access route; which will make use of an existing hard surfaced track. It will not be directly affected and is scoped out of further assessment.

272. Horsey Island CWS: The Onshore Development Area is immediately adjacent to Horsey Island CWS, which supports saltmarsh and mudflat. This Site will not be directly impacted but is considered further in relation to possible disturbance impacts on over-wintering birds which are considered in detail in **Section 16.5.14**.

273. Braunton Marsh UWS: Construction impacts to this site will be temporary; it will involve trenching and the construction of a haul road. The vegetation and topsoil will be removed and stored separately from the sub-soil, which will be reinstated separately in the correct profiles following the completion of trenching, and subsequent removal of the haul road.

274. Much of the area to be impacted supports improved and semi-improved grassland which is considered likely to recover within the short-term following the reinstatement work; it is likely that follow up management (reseeding/use of green hay/mowing/weed management) will be required to ensure that the habitats are restored to the desired condition. This will be subject to monitoring to ensure the desired habitat condition is achieved. This would be set out in a separate plan (**Figure 20.13** of **Chapter 20 Onshore Landscape and Visual Amenity**).

275. The approach taken in relation to hedgerows and ditches is assessed in **Section 16.5.11**, below. This approach will also be taken within Braunton Marsh UWS, where hedgerows will be impacted. In summary, this will involve minimising impacts by reducing the working area at crossing points and reinstatement on completion of work, with a range of native/locally appropriate species.

276. The cabling will be installed via trenchless techniques under the majority of ditches in Braunton Marsh; temporary bailey bridges will be used to cross several of the ditches, include those with some botanical interest in the southern park of Braunton Marsh. Other techniques will also be employed to avoid impacts on vegetation in this areas including floating roads, bog mats, and micro-siting the cable.

277. There are some areas of Braunton Marsh which support habitat of botanical value including the ditches and patches of marshy grassland and swamp/fen vegetation; this includes a section of marshy grassland/swamp/fen vegetation in a depression formed by a former saltmarsh creek which is approximately 60m across (located at SS466347); and a connected shorter section, 180m to the south, which is approximately 30m across (located at SS467345). In these areas the haul road will use bailey bridges to cross the wetter areas, to minimise the impact on vegetation; trenchless techniques (HDD) will also be used, where possible, to install the cable in these two areas. The drier grassland in these areas is not of high botanical value.

278. Although there will be a temporary localised impact, it is considered likely that the wetland vegetation affected will re-establish in the short term providing that ground and hydrological conditions are returned to the previous state once the haul road is removed. The areas of drier grassland in this area are considered to be less sensitive.

279. Instow Barton Marsh UWS: A similar approach, to that described above (for Braunton Marsh) will be taken for this area noting that the drilling entry exit point for Taw/Torridge Estuary SSSI crossing point will be in this field, and so part of the route which affects Instow Barton Marsh UWS will already be underground, using trenchless techniques. There will be a temporary impact which affects the semi-improved grassland habitat within the UWS. It is considered likely that the vegetation will re-establish providing that conditions are returned to the previous state on completion of the work.

16.5.10.1 Impact significance

280. The two sites identified above are designated as Unconfirmed Wildlife Sites (UWS). "UWS are sites identified as having potential interest but not fully surveyed [and therefore fully assessed against the County Wildlife Site criteria], some of these sites will be areas of significant wildlife interest" (source: DBRC).

281. The habitats within both UWS are identified on Magic.gov as coastal and floodplain grazing marsh, a Habitat of Principal Importance. Coastal and floodplain grazing marsh habitat typically supports periodically inundated pasture, or meadow with ditches which maintain the water levels, containing standing brackish or fresh water. The grassland habitat can include improved and semi-improved grassland as part of the mosaic, as is the case here. Some of the ditches are rich in plants and invertebrates. Areas of the marshes are of importance for birds, including breeding waders and wintering waders and wildfowl, and the area is used by foraging bats, including barbastelle.

282. In this assessment, a precautionary assessment is used and both UWS are considered to be of **county level importance** (i.e. the equivalent of a confirmed County Wildlife Site).

283. The impact will temporarily affect a small proportion of both UWS and will be reinstated on completion of the work. The effect, although temporary, is therefore assessed to be significant at a **Local level**. There is moderate confidence in this assessment.

16.5.10.2 Further Mitigation

284. Using trenchless techniques in areas of greater botanical richness / under any more diverse areas of marshy grassland vegetation will be used where possible.

285. Where this is not possible, removing and reinstating turves will be carried out where there is any locally more interesting vegetation present (i.e. areas of local species richness in more species-rich areas of semi-improved grassland or marshy grassland). This will be detailed in the CEMP including site attendance for an ECoW prior to the commencement of works to ensure that the specified protection and mitigation measures are appropriately implemented.

286. Monitoring and if necessary remedial action may be required to ensure that the habitats are restored to the desired condition. This would be set out in a separate plan (CEMP/LEMP).

287. Reinstatement to involve ongoing management and remedial management to ensure that the condition of habitats is returned to the pre-development condition. Further details relating to reinstatement of habitats is provided in the Outline Construction Environmental Management Plan (**Appendix 5.B: Outline CEMP**).

16.5.10.3 Residual Effect

288. The mitigation measures set out above will help to further reduce the significance of the impact. The residual effect, which will be temporary is however still considered be significant at a **local level**; once vegetation has had re-established to the desired condition, providing that all necessary post-development mitigation is put into place, residual effect significance would be expected to reduce further, overtime towards Local level/Site level, and once fully re-established, to neutral.

16.5.10.4 Consideration of general EIA terminology

289. The UWS are assessed to be of county level and therefore of **medium** sensitivity. The impact will have an adverse effect on the receptor but is considered unlikely to adversely affect its integrity or conservation status, given the temporary nature of the proposed impacts and reinstatement of habitats on completion of the work. the magnitude of the impact (during the course of the work) is assessed to be **medium**; it will therefore give rise to **moderate adverse** effect. After mitigation, and reinstatement the residual affect is assessed to be **minor adverse**.

16.5.11 Impact 10: Removal of sections of hedgerow

290. The Onshore Development Area crosses approximately 24 hedgerows; this sections within the Onshore Development Area equates to a total of c. 474m in length.

291. Additional lengths of temporary hedgerow removal (through coppicing) are proposed at the following two points:

- The point where the haul road crosses Sandy Lane, just to the north of Sandy Lane car park; this that will require a temporary removal of a 40m stretch of hedgerow on the east side of the road to provide access and to allow for a visibility splay
- The haul road access point off Saunton Road B3231 where a maximum 90m stretch of hedgerow will require temporary removal to allow for a visibility splay.

292. Further detail on the work required is provided in the **Chapter 19: Traffic and Transport**.

293. Coppicing these two sections to facilitate access (visibility) will avoid complete removal and will reduce the time for the hedgerow restoration at these locations.

294. Through the use of trenchless technique, three of these hedgerows have been avoided. The remaining 21 sections of hedgerows will be subject to direct impacts as a result of short-term removal to permit the construction activity involving the excavation of cable trenches and the creation of the temporary haul road.

295. To minimise the impacts of crossing the hedgerows, the working width will be reduced where possible (i.e. five crossing points will be 30m in width; 14 will be 20m in width; 2 will be 12m in width; and 2 will be 10m in width). Further details on hedgerow removal are presented in the Outline Construction Environmental Management Plan (**Appendix 5.B: Outline CEMP**).

296. The removal of short stretches of hedgerow habitat to accommodate the Onshore Export Cable Corridor would result in a temporary loss of the hedgerow habitat and temporarily reduce the ecological function of hedgerows that are retained while they re-establish.

16.5.11.1 Impact significance

297. Hedgerows are a Habitat of Principal Importance, there are a wide-ranging habitat criteria which include the majority of UK hedgerows. Ten of the hedgerows to be removed are species-rich, and six of these are therefore also considered to be "important" when assessed against the wildlife criteria of the Hedgerow Regulations 1997). The hedgerows within and around the Onshore Development Area also provide a network of habitat which provides habitats for other species, including nesting birds and foraging and commuting bats. The hedgerow network is considered to be of Local importance.

298. Without mitigation a permanent adverse effect on hedgerow habitat is assessed to be of **Local** significance. There is high confidence in this assessment.

16.5.11.2 Further Mitigation

299. Where hedgerow works are required, these will be minimised and be in line with the principles detailed in the **Outline Construction Environmental Management Plan** (**Appendix 5.B: Outline CEMP**) and **Figure 20.13** of **Chapter 20 Onshore Landscape and Visual Amenity**. This will also consider to Arboricultural Impact Assessment to avoid mature or higher value trees in sections of hedgerows to be removed.

300. Prior to the commencement of any works to a hedgerow, an Ecological Clerk of Works (ECoW) will be present on site to ensure that the specified protection and mitigation measures are appropriately implemented.

301. Replacement planting of removed hedgerows and trees will be implemented during the first suitable period following completion of the construction works. Gaps in hedges will be present initially until the new planting matures.

302. The species list for re-instatement will be of UK and local provenance species, such as hawthorn, blackthorn, field maple *Acer campestre*, dog-rose *Rosa canina*, hazel *Corylus avellana*, dogwood *Cornus sanguinea*, crab apple *Malus sylvestris* and holly *Ilex aquifolium*. Replanting of hedgerow trees will use either pedunculate oak *Quercus robur* or a like for like replacement if other native species are to be removed, as appropriate. It is likely that the reinstatement will increase the range of species present in some sections of hedgerow which are currently species poor.

303. Ecological enhancement will involve reinstating pre-existing gaps in hedgerows within the Onshore Development Area. Further details on hedgerow and tree removal, retention, replacement and management are presented in the **Outline Construction Environmental Management Plan** (**Appendix 5.B: Outline CEMP**) and **Figure 20.13** of **Chapter 20 Onshore Landscape and Visual Amenity** that will be submitted with the Onshore Project application.

16.5.11.3 Residual Effect

304. The mitigation measures outlined above will reduce the effect significance to **Site level** in the short term. Once the replaced sections of hedgerow are fully established there may be potential for a positive effect as the replaced hedgerows mature, with a greater range of species and additional pre-existing hedgerow gaps are reinstated.

16.5.11.4 Considered of general EIA terminology

305. Hedgerows are assessed to be of **low** sensitivity; the impact is assessed to be of **low** magnitude). Temporary impacts on hedgerows will give rise to a **minor adverse** effect. The residual effect, once all the mitigation is in place, and replaced section of hedgerows are allowed to re-establish, is assessed to be **negligible**.

16.5.12 Impact 11: Temporary loss/disturbance to ditches, riparian habitats and watercourses

306. Along the Onshore Export Cable Corridor, the export cable will traverse a number of ditches and drains. These watercourses will be crossed either using a trenchless technique or open cut trench.

307. Within the Braunton Marsh Area, trenchless techniques will be used for the majority of crossings, and temporary Bailey Bridges will be used to traverse larger ditches, including the ditches which hold more water and support more interesting aquatic and marginal vegetation.

308. Where trenchless crossing techniques such as HDD are used, the cable will be installed below the bed of the watercourse. Although ground disturbance would occur at the trenchless technique entry and exit points, these will be set back 8m from the edge of the watercourse and there would be no direct disturbance to the watercourses crossed using a trenchless technique. Therefore, there is no direct mechanism for impacts to occur to the geomorphology, hydrology, and physical habitats of these watercourses.

309. Where open cut trench is the chosen method, this will temporarily affect the habitats of the watercourses in the immediate vicinity of the work. The majority of the trenched crossings will be in the northern part of the Site, where the route passes through arable fields (outside of Braunton Marshes UWS), some of which were found to hold little water during the surveys.

310. Trenched crossings of watercourses involve installing temporary dams upstream and downstream of the crossing point. The cable trench will then be excavated in the dry area of ditch between the two dams with the river flow maintained using a temporary pump or flume. The banks of the watercourse will be reinstated immediately after cable installation; attention will be given to reinstating the watercourse to its original shape to avoid changing flow characteristics.

311. It will be necessary to install temporary structures to allow haul road access across watercourses. This will include bridges and temporary culverts. These will all be between 10 and 30m wide and in total there will be 26 sections of watercourse crossings affecting c. 456m of the ditch channels. Where culverts and/ or bridges are required to maintain the haul road across watercourses these will remain in place for up to 15 months; and the construction period for trenched crossings would take up to 84 days from start to finish. Further details are provided in the **Chapter 14: Water Resources and Flood Risk**.

16.5.12.1 Impact significance

312. Some of the ditches and watercourses within the Onshore Development Area are known to support a diverse assemblage vegetation, including those within Braunton Marshes UWS, where they form a habitat component of the UWS, and of the priority habitat Coastal and floodplain grazing marsh. They form part of a network of habitat which provides habitats for other species including foraging and commuting bats and otter. The ditches are assessed in general to be of **District importance**. Other ditches within the Site are assessed to be of **Site level importance**.

313. The development will involve crossing 24 ditches, some of which (16) will be impacted by trenching and creation of the haul road. Some of the ditches in Braunton Marshes (the ditches with a recognised ecological value) will be crossed using trenchless techniques and the haul road will be on Bailey bridges, which will help to minimise the risk of impacts.

314. The works will result in localised short-term impact to the habitats within the affected watercourses due to direct disturbance of the banks and bed, and adjacent riparian vegetation.

315. Without mitigation there will be a permanent adverse effect on ditch and watercourse habitat that is assessed to be of at most, **Local significance**. There is high confidence in this assessment.

16.5.12.2 Further Mitigation

316. Full mitigation measures which will be applied to all watercourse crossings to ensure best practice is followed and any potential impacts are minimised are outlined in **Chapter 14: Water Resources and Flood Risk**. These include:

- The time during which temporary dams are in place will be kept to a minimum
- Flumes or pumps would be adequately sized to ensure that flows downstream are maintained whilst minimising upstream impoundment

- Scour protection would also be used to protect the riverbed downstream of the dam from high energy flow at the outlets of flumes and pumps
- Adequately sized culverts will be used to avoid impounding flows and ensure that there is no reduction in flow conveyance (including an allowance for potential increases in winter flows as a result of projected climate change)
- Culverts will be installed below the active bed of the channel, so that sediment continuity and movement of fish and aquatic invertebrates can be maintained
- At trenched crossing locations, the cable will be buried a minimum of 1.5m below the bed level. This will ensure that there is sufficient thickness of natural bed substrates to prevent geomorphologic impacts (e.g. bed scour and channel instability) and avoid exposure during periods of higher energy flow where the bed could be mobilised (allowing for climate-related increases in fluvial flows and erosion in the future). Installation depths at watercourse crossings will be confirmed with the relevant drainage authority post-consent
- Sympathetic reinstatement of channel bed and banks following trenching and/ or removal of any temporary bridges and culverts. This means keeping any coarse substrate separate and reinstating on the bed and recreating a natural profile when the bed and banks are reinstated
- Vegetation would not be removed from the banks unless necessary to undertake the works, in which case removal would be restricted to the smallest practicable footprint
- Preconstruction survey will be carried out at the crossing points, and consideration will be given to moving/translocating any interesting/diverse areas of vegetation outside of the immediate working area, and where feasible reinstating these as part of the restoration work
- Prior to dewatering the area between the temporary dams, a fish rescue would be undertaken (if required)
- Where possible and practical, localised improvements to the geomorphology and in-channel habitats will be implemented where they are crossed using techniques (e.g. by replacing re-sectioned banks with more natural profiles that are typical of the natural geomorphology of the watercourse). Note that any enhancements to directly affected watercourses would be limited to within the Onshore Project red line boundary.

16.5.12.3 Residual Effect

317. The mitigation measures outlined above will reduce help to reduce effect significance, although it is still assessed as being significant at **Local level** in the short term. Once the replaced sections of ditch and watercourse are fully re-

established effect significance is likely to move towards **Site level/negligible significance**.

16.5.12.4 Considered of general EIA terminology

318. Ditches and watercourses are assessed to be of **low** sensitivity; the impact is assessed to be of **low** magnitude. The temporary impact will give rise to a **minor adverse** effect. The residual effect, once all the mitigation is in place, is assessed to be **minor adverse** in the short term; once vegetation has re-established it is considered likely to become **negligible**.

16.5.13 Impact 12: Disturbance to non-roosting bats, temporary loss of bat foraging or commuting habitats

319. Bat activity has been recorded throughout the Onshore Development Area, primarily along linear features such as hedgerows or along watercourses.

320. With regards to foraging and commuting bats, potential impacts will involve temporary disturbance to foraging habitat and commuting routes where hedgerow access points are required. the most likely effect comes from temporary hedgerow removal. Gaps created will be reinstated on completion of the work.

321. While it considers all species, this section of the assessment has focussed particularly on greater horseshoe bats, given the presence of an important nearby roost (Caen Valley Bats SSSI, 1.7km to northeast), and since the Onshore Development Area is within the core sustenance zone of this roost (i.e. where habitats are of primary importance for foraging to support the roost occur; this is 3km for greater horseshoe bat (BCT, 2016).

16.5.13.1 Greater horseshoe bat

322. Minimising the width of crossings is important to reduce the likelihood of an impact on bats, particularly great and lesser horseshoe bats, species which use hedgerows as commuting and foraging habitats. Greater horseshoe bat will use more open habitats for foraging (pasture and meadows) and it is understood that both species will cross open areas but have a preference for flight paths which follow hedgerows (VWT, 2014).

323. Wider gaps (of over 50m) reduce the probability of use by greater horseshoe bats; for narrower gaps (less than 38m), the probably of use is higher (Pinaud *et al.*, 2017). Excluding the two larger sections of hedgerow (discussed separately), the maximum width of most hedgerow crossings will be 30m (there will be five crossing points of this width). The majority of crossings will be narrower: 14 will be 20m-

wide; two will be 12m-wide, and two will be 10m-wide; existing access points will be used where possible.

324. The impacts arising from temporary hedgerow crossings will be temporary, and the hedgerows will be reinstated following the completion of work, and other pre-existing gaps will be planted up.

325. Additional stretches of hedgerow removal are proposed at two following points:

- The point where the haul road crosses Sandy Lane, just to the north of Sandy Lane car park; this will require a temporary removal of a 40m stretch of hedgerow on the east side of the road to provide access and to allow for a visibility splay.
- The haul road access point off Saunton Road B3231 where a maximum 90m stretch of hedgerow will require temporary removal to allow for a visibility splay.

326. Sandy Lane: The survey data from the Sandy Lane crossing point (**Appendix 16.E: Supplementary Bat Activity Survey Interim Report (Saunton Road)**) show that bat activity has been recorded along the impacted hedgerow. Greater horseshoe bat was recorded at this survey point during the remote survey, however, levels of use recorded in this location were generally very low (c.2.5 bat passes per night (B/N), and activity levels are low compared to other areas sampled); five records of this species were made on this transect route during the eight survey visits; the data do not suggest that this is an important foraging area or commuting route for greater horseshoe bat. It is also noted that there is a double hedgerow in this area, only the southern hedgerow will be affected. The northern hedgerow, which will remain, is dense with trees and shrubs and will continue to provide good habitat/habitat connectivity in this area.

327. Radio-tracking work for greater horseshoe bat in the local area has previously been used to map commuting routes from important roosts at Caen Valley SSSI. The original study (ENRR495; English Nature, 2002) found that the scrub habitats to the west of Sandy Lane car park were used by foraging and commuting greater horseshoe bats; and that this hedgerow was not one of the flight paths identified.

328. Saunton Road: The access point off Saunton Road B3231 will impact a roadside hedgerow. It is regularly managed by cutting and does not have a dense bushy structure or trees that would typically provide good foraging habitat. In some areas the structure is poor with gaps occupied by bramble, rather than woody species. It appears to provide a suboptimal habitat for foraging greater horseshoe bats. In terms of bat commuting/use of the hedgerow for flight routes, it is noted that there

is also a parallel hedgerow on the north side of the road, which provides an alternative flight route option. Given the above, the temporary loss of this low suitability hedgerow is considered unlikely to give rise to a significant effect. Monitoring is underway to confirm this assessment.

329. The radio-tracking study (ENRR495, 2002) did not find this hedgerow (the roadside hedgerow) or the adjacent fields to be on a commuting route or within a regular foraging area. The principal flight line recorded in this area is along hedgerows to the north of the road that pass through East Saunton Farm (estimated to be c. 200-250m to the north of the Site). It is also noted that another satellite roost has subsequently been identified in this farm (NDC, pers. comm.).

330. Numerous other flight paths and foraging areas were identified in the Radio-tracking work study (ENRR495, 2002) throughout the countryside around Caen Valley Bats SSSI. It is noted that most of the nearby, regularly used foraging areas identified in the radio-tracking study are within Braunton Burrows SSSI to the west or areas of scrub grassland, or ditches within Braunton Marsh further to the east. These areas are not within the Onshore Development Area and will not be impacted.

331. There are three more flight paths/foraging areas that were identified in this study that are relevant to consider as part of the Onshore Development Area: one follows a drain between Blind Acres Lane and the northern part of Braunton Burrows; there are also two broad-flight paths that cross open habitat where marshy grassland/swamp vegetation is present in Braunton Marsh (SS466347 and SS467345) (the areas described above in **Section 16.5.9**). Given the existing open character of these areas the proposed Development is considered unlikely to significantly reduce habitat connectivity in these parts of the Onshore Development Area. The work within the onshore development area will give rise to a minor temporary reduction of foraging habitat in these two areas; the impacts will be small scale and temporary and are considered unlikely to be significant.

16.5.13.2 Other species of bat

332. In summary, there will be minor temporary habitat loss where temporary hedgerow removal is required, the hedgerows to be impacted will be reinstated afterwards. Lesser horseshoe bat activity within the Onshore Development Area appears to be low and therefore the likelihood of an impact on this species is considered to be low. Those species which forage in more open environments (such as pipistrelle species, serotine, noctule, barbastelle) are considered unlikely to be significantly effected. The conclusions of the assessment for greater horseshoe bat, above, is considered to be similar and applicable for all other species recorded.

16.5.13.3 Impact significance

333. At least ten species of bats have been recorded within and in the vicinity of the Onshore Development Area including three species of high conservation importance: greater horseshoe bat, lesser horseshoe bat and barbastelle (Annex II Species, Habitats Regulations). Greater horseshoe bat is the designated feature of the nearby Caen Valley Bats SSSI; and bats from this roost forage within and commute through the onshore development area to foraging habitats in Braunton Burrows and to the east, in addition to other suitable habitat within the surrounding landscape. Consequently, the Onshore Development Areas is assessed to be of **county importance** for bats.

334. Through the implementation of the embedded mitigation measures, any impact on foraging/commuting bats is predicted to be short term and localised disturbance and/or loss of habitat. The work is not considered likely to give rise to a permanent or long-term impact on habitat features.

335. The width of the gaps will be minimised; the width of the gaps required is considered unlikely to be sufficient to prevent bats crossing the site, or to significantly affect foraging activity. Where wider gaps are required, there is generally alternative connecting habitat nearby. There will be a very minor, localised temporary habitat loss, much of which is considered to be of limited value for foraging bats (arable fields, improved pasture). Habitats will be reinstated on completion of the work.

336. Taking the above factors into account, the effect is considered to be of **Local significance**, but not significant in a wider context. There is moderate/high confidence in this assessment.

16.5.13.4 Further mitigation

337. Additional mitigation measures to those embedded within the Onshore Project include:

- Although the surveys have not demonstrated the existing hedgerows at the longer Saunton Road access point or the longer Sandy Lane crossing point to be of importance for greater horseshoe bats or any other bat species, given the local presence of greater horseshoe bats, precautionary temporary mitigation will be implemented during the construction phase at both locations to maintain connectivity along the hedgerow corridors to be removed, as a best practice measure. At both locations the hedgerow sections requiring purely to provide visibility splays will be coppiced rather than removed, and the vegetation will be maintained at a height of below 0.4m for the duration of the works. This will

allow these two sections of hedgerows to regenerate following completion of construction and removal of the haul road. The reinstated hedgerows would be enhanced through supplementary planting as detailed in the **Outline Environmental Management Plan**

- Precautionary mitigation at the Saunton Road location will also include installation of a temporary 'fake hedge' (i.e. Heras fencing panels covered with netting); this will positioned to provide the linear-shelter-navigable flight lines function of a hedge set will be back further to allow sufficient visibility/access; these will be in place throughout the construction period during the active period for bats (April to October). Given that a dense hedgerow is present to the immediately north of the Sandy Lane access point, that will remain unaffected, not further mitigation is proposed here
- Precautionary mitigation will also include installation of temporary 'fake hedges' (i.e. Heras fencing panels covered with netting) at each of the five crossing points which require gaps of over 20m; these fake hedges will positioned to reduce the width of the minimum gap required for the haul road width only, in order to provide the linear-shelter-navigable flight lines function of a hedge; these will be in place throughout the construction period when it coincides with the active period for bats (i.e. April to October). The fake hedges installed at the end of the work before dusk and removed again in the morning
- Any lighting required during the construction phase will only be used where necessary for operational reasons between the hours of 7am and 7pm. This is unlikely to be required during summer months, and during winter months (November-March) will not affect bats, which will be hibernating. There is therefore a potential period in spring and autumn when both lighting might be required when bats are active (i.e. when dusk or dawn falls within these periods). To ensure there is not an impact the lighting will be designed to avoid the illumination of habitat features (it will be directional, there will be a unlit 10m-wide buffer around all retained habitat features (hedgerows, ditches, areas of marshy grassland, tall herbaceous vegetation and unmanaged grassland), and industry guidance will be followed (ILP/BCT, 2018) with regard to technical information for lighting selection (UV component/warm spectrum/directional lighting), to avoid an impact on bats through lighting
- The lighting scheme will have particular have regard to any areas where higher levels foraging/commuting bat activity has been recorded (including the area around Braunton Marsh, where barbastelle has been regularly recorded, and the field boundaries around Sandy Lane Farm) any works within these areas will be restricted to daylight hours only during the active period for bats.

16.5.13.5 Residual effect significance

338. The mitigation measures outlined above will reduce help to reduce effect significance to **Site level** in the short term. Once the replaced sections of ditch and watercourse are fully re-established effect significance is likely to be neutral.

16.5.13.6 Consideration of general EIA terminology

339. Bats are assessed to be of **high** sensitivity; the impact is assessed to be of **low** magnitude. A temporary impact will give rise to a **moderate adverse effect**. The residual effect will be **minor adverse**, once all the mitigation and habitat reinstatement is in place; once vegetation (in ditches and hedgerows) has re-established, the significance of the effect is likely to become **negligible**.

16.5.14 Impact 13: Disturbance to over-wintering birds, and destruction, damage, or disturbance of over-wintering bird habitats

340. Construction activities have potential to impact wintering or passage waterfowl and waders using areas in the vicinity of the Onshore Development Area through temporary, localised disturbance, and temporary localised habitat loss from the trenching work, construction of the haul road and drilling rig operational area.

341. This could potentially affect birds using Taw-Torridge Estuary SSSI, and other areas used by roosting, loafing and foraging birds along other parts of the route and in adjacent land, including recognised high-tide roosts (see Berridge, 2019), particularly those in:

- Braunton Marsh, where there are two known lapwing roosts that are within two pasture fields that are crossed by the Onshore Development Area; the third Braunton Marsh roost, also in a pasture field, is c. 800m to the east.

342. Other nearby high-tide roosts on the north side of the estuary include:

- Horsey Island (where one roost location Horsey Island White House, is within 80m of the Onshore Development Area; the other know Horsey Island high tide roosts are more distant, being over c.900m to the east)
- Crow Point (Crow Point Saltmarsh is c. 700m to the south-west of the Onshore Development Area's northern estuary crossing point; Crow Point Beach is over 800m from the southern estuary crossing point; the other roost, Crow Point Groynes, is over 1.2kms to the west).

343. Nearby high-tide roosts on the south side of the estuary include:

- Yelland roost; this is c. 280m from the southern estuary crossing point); and c. 100m from the substation area
- Cool Stone roost (this is approximately 300m to the west of the Onshore Development Area)
- Black Ground Roost (this is approximately 450m to the west of the Onshore Development Area)
- Other known high-tide roosts in the area are more distant.

344. There are numerous other high-tide roosts near the estuary, but these are distant from the Site and have been scoped out from further consideration.

345. Saunton Sands is the areas primary site for sanderling and can also be important for ringed plover (Berridge, 2019), although it is not used as a high-tide roost. The shoreline is the primary habitat utilised. Saunton Sands is extremely popular and very busy on a daily basis; a range of recreational activities are popular here throughout the winter, including walking, dog walking, jogging, surfing and kite surfing (Berridge, 2019). The area close to the car park is likely to be the most heavily used part of the beach (for recreation), the southern part of the Saunton Sands is least likely to be impacted. The work to install the cable in the shoreline/intertidal areas will affect habitat suitable for this species, but given the short-duration, the higher baseline disturbance levels in this part of Saunton Sands, given the location close to the parking area, and given the extent of alternative available habitat (the shoreline extends several kilometres southwards), an impact on these species is not anticipated.

346. Direct habitat impacts within the Taw/Torridge Estuary SSSI will be avoided through use of trenchless technique. However, localised disturbance is possible close to the entry/exit points for the trenchless technique. Without mitigation, disturbance could also occur through the trenching, other drilling operations, and construction of the haul road in vicinity of the estuary and know high-tide roosts.

347. Waders vary in their sensitivity to disturbance during the non-breeding season; a recent review is provided in Goodship and Furness (2022) and further local consideration is provided in Berridge (2019); taking this review into account wintering birds species using the estuary or high tide roosts are considered likely to be sensitive to disturbance at distances of between 200m-300m, depending on species, the degree of existing screening, and existing background levels of disturbance.

348. The two Braunton Marsh high-tide roosts used by lapwing which are within the Onshore Project Area, identified above, are considered likely to experience

disturbance during the construction phase, during winter months. These are typically used by 200-400 birds, with maximum counts of 1,000 birds). These areas are not publicly accessible and disturbance is not currently perceived to be a problem. The third roost in the Braunton Marsh used by these birds is distant and unlikely to be affected and has been scoped out from further consideration.

349. The other known roost that is close to the Onshore Development Area Horsey Island White House. Since the Onshore Development area is within 100m of this roost, there may be some potential for disturbing this roost, however, this area is already well-screened from the nearby working area by a building and trees, and the landform which includes an embankment, and scrub. The level of the field which will contain the compound on the north side of the estuary is lower than the embankment, which means visibility into the working area from this roost, and also, notably, other adjacent parts of the adjacent estuary, is already very limited; this is considered likely to significantly reduce the likelihood of disturbance to birds in this area. The other roosts on the north side of the estuary are considered likely to be too distant to be affected.

350. Disturbance impacts could occur between October and March in the period around high-tide (i.e. up to two hours either side of high-water), when birds are more likely to be present close inshore along the estuary, or using roosts in adjacent land. During other states birds are likely to disperse widely across the estuary and therefore less susceptible to disturbance.

351. On the south Side of the Estuary there are no high-tide roosts that will be directly impacted (i.e. within the Onshore Project Area), but there are three that could possibly be impacted by disturbance. Of these, Yelland is considered most likely to be affected because it is closer: it is approximately 280m from the trenchless technique compound which is in an open field adjacent to the estuary and will be visible, although it is noted that there is an existing baseline level disturbance in this area, as the SW Coast Path is between the Onshore Project Area and the roosting area (and other habitats within the estuary). A small part of the Onshore Project Area adjacent to the substation area is closer (within 150m); this is in a previously developed area, with some existing screening from buildings and vegetation, and also in an area that experience existing baseline levels of disturbance from vehicles and work activities (it is adjacent to an existing substation and beside/on the landward side of the Yelland Quay development area), suggesting that the risk of disturbance here is likely to be low (the work in this area is trenching to connect the cable to an existing substation and will be of short duration). The other two roosts

(Black Ground and Cool Stone) are quite distant (>300m) and are considered unlikely to experience to significant disturbance from construction activities.

352. The main source of disturbance is likely to be limited to the working areas, which as described in **Chapter 5: Project Description** will be worked sequentially in 100m sections, meaning that although the route is several kilometres long, only short sections will be affected at any one time.

353. Where disturbance occurs, this could temporarily displace birds from a roost/feeding area within or adjacent to the working areas, causing them to move to an alternative roost or feeding area elsewhere in the estuary or surrounding fields. Frequent, repeated disturbance may result in a reduction in fitness of affected birds, which could potentially, ultimately lead to an increase in mortality from a reduction in the time available to feed and increased energy expenditure. The outcome is however, complex, as behavioural response is not always a reliable means of predicting an effect on a population (Stillman *et al.*, 2007). For example, while a major disturbance event may cause birds to leave the site altogether, it may not be significant if alternative sites are available in the area; and a number of apparently small, insignificant disturbance events can however become cumulatively significant if this leads to an overall critical reduction in available feeding time.

354. Although it is considered likely that although some displacement will occur (to the lapwing high tide roosts at Braunton Marsh (roosts 1 and 2) as a result of localised disturbance and temporary minor loss of habitat, since there are other areas of alternative suitable habitat available in the adjacent land (e.g. other areas of Braunton Marshes and Horsey Island), this will help to reduce the impact of disturbance, particularly when considering the temporary and sequential nature of the work. However, it is difficult to predict exactly how birds behaviour will be affected.

355. It is noted in Berridge (2019), that the roost in Horsey Island, has since 2017 been transformed from reclaimed grazing land to a tidal lagoon with saltmarsh and mudflats becoming following a breach of the sea wall. Recent data (Berridge, 2019 suggests that this area is capable of supporting large numbers of roosting lapwing (maximum count: 1500). This high-tide roost is currently "well insulated from disturbance" (Berridge, 2019).

16.5.14.1 Impact significance

356. The birds that have potential to be affected are one of the specified interest features of the Taw-Torridge Estuary SSSI, the assemblage of wintering birds is therefore considered to be of **National Importance**.

357. Without mitigation, there is the potential for a temporary reduction in the availability of roosting and foraging habitat (i.e. fields in Braunton Marsh or in adjacent coastal habitats) through displacement through disturbance and temporary habitat loss during the duration of the construction work (at periods when wintering birds are likely to be present i.e. October to March).

358. On the north side of the estuary, this is most likely to impact two hightide roosts used by lapwing in Braunton Marsh. The impact would be localised and temporary. The magnitude of the impact is likely to be low given that there are other suitable areas of nearby habitat in Braunton Marsh (including the third recognised high-tide roost, and other fields which are already used, but in lower numbers (Berridge, 2019)) and in other nearby areas, some of which offer extensive areas of habitat (e.g. Horsey Island).

359. On the south Side of the Estuary, the roost at Yelland may also have some potential to be impacted by disturbance from work within the Onshore Project Area being relatively close (within c. 280m), with some visibility to the trenchless technique compound area. Although parts of the Onshore Project area, adjacent to the substation are nearer (within 150m), these are located within a more built-up environment, much of which is partially screened by scrub, trees, vegetation and fencing, with existing baseline of disturbance, and are therefore considered likely to be less sensitive that disturbance in areas of more open habitat adjacent to the estuary.

360. In conclusion, without mitigation the construction work is considered likely to displace lapwing from two established high-tide roosts, and may also have some potential to disturb birds using parts of the estuary that occur within close proximity to the working areas (within 200-300m) where there is poor existing screening. This will be a temporary impact.

361. Only a subset of the SSSI population is likely to be affected, and given the uncertainty of how lapwing might respond, and how significant the displacement would be given the availability of other habitat, a precautionary assessment has been made; the effect is assessed to be significant at a **District/County Level**. There is moderate confidence in this assessment, due to uncertainty in the response of the birds to local displacement from the established roosting areas.

16.5.14.2 Further Mitigation

362. Additional mitigation measures to those embedded within the Onshore Project include:

- Where construction activity is required in the vicinity of the Taw/Torridge Estuary SSSI (i.e. within 200-300m of the estuary) and where these are areas are visible from the estuary and could cause disturbance: wherever possible activities in these areas will be restricted to the periods when birds are unlikely to be present (April – mid-September). This will include some of the trenching activities and work on the substation building. Given the length of the programme for HDD under the estuary, it is understood that the construction period will unavoidably extend into the winter period
- Screening will be used around the HDD drilling compounds. These are the areas where construction staff will be present most frequently in winter months. There is existing natural screening in the area where the drilling compound is proposed on the north side of the estuary from the shore, this is formed by the existing embankments, scrub, a house and tree planting around the house. This already provides a functional screen from the estuary (but not from the lapwing high-tide roosts), but will be improved where necessary to minimise views into the working area from the estuary
- Construction personnel will be required to use their vehicles wherever possible to access or navigate around the construction areas to reduce displacement disturbance
- Construction personnel working in the drilling compounds will be required not to walk in areas that are visible to birds using the estuary between October and March
- Monitoring work will be undertaken to determine whether or not birds are being displaced, where to, and to assess whether the birds are capable of adapting without any deleterious effects
- Precautionary management will be undertaken within another part of the Braunton Marshes to ensure that suitable roosting conditions are available, during the course of the work. This will involve mowing to ensure short sward vegetation is present in these areas, which is a habitat condition likely to be favoured by roosting lapwing. This ability to carry out this temporary management will be secured via a formal legal agreement.
- It is noted in "Identification of Wintering Wildfowl High Tide Roosts & Recreational Disturbance Impacts on the Taw Torridge Estuary" Report (Berridge, 2019) proposed mitigation measures to reduce the impact of recreational disturbance (a primary cause of which is walkers/dog walkers using the shoreline); there are none proposed for Braunton Marsh roosts, but there are recommendations for management and mitigation of visitor access at the nearby Crow Point roosts (including improved signage, and improved wardening

presence). This Onshore Project could make a proportionate contribution to this recommended mitigation as part of the overall mitigation package.

16.5.14.3 Residual effect significance

363. Through the implementation of the mitigation measures set out above, it is considered likely that the effect significance would be reduced to **District/Local level** and it would be a temporary effect only. There is moderate confidence in this assessment, as above, this is due to uncertainty in the response of the birds to local displacement from the established roosting areas. This is a precautionary assessment and, given the apparent availability of other suitable nearby habitat, including other areas of the Braunton Marshes, and Horsey Island, it is possible that the temporary displacement would not be significant.

16.5.14.4 Consideration of general EIA terminology

364. Given that the birds that have potential to be affected are one of the interest features of the Taw-Torridge Estuary SSSI, the assemblage of wintering birds is considered to be of **high** sensitivity. In the absence of mitigation, the magnitude of the impact is assessed to be **low-medium**, and effect is predicted to be of **moderate adverse** significance. The residual effect after mitigation will be reduced to **minor adverse**. The impact will be temporary during the course of the work.

16.5.15 Impact 14: Indirect impacts (air quality) on ancient woodland and Fremington LNR

365. **Chapter 13: Air Quality** considers impacts on air quality from road traffic emissions associated with the construction phase, and also emissions from non-road mobile machinery (NRMM). Where relevant these have been considered above (in the sections that relate to Saunton to Baggy Coast SSSI, and Taw-Torridge Estuary SSSI).

366. Two additional receptors have been identified in **Chapter 13: Air Quality**, that have not been considered elsewhere in the assessment, that have potential to be impacted by increased concentrations of NOx, NH3 and nitrogen-deposition (i.e. air quality impacts that exceed (1% of) the Critical Load or Level), from road traffic emissions:

- A small area of ancient woodland adjacent to the B3233 road, at Tapeley Park, which is approximately 3km to the south of Yelland
- Fremington Local Nature Reserve, which is approximately 3km to the east of Yelland.

367. These two sites have been scoped into the assessment because they are within 200m of routes used by traffic during the construction phase. Beyond 200m, pollution impacts from roads on designated sites can be screened out (Highways Agency *et al.*, 2007 and Natural England, 2018).

368. The ancient woodland occupies a narrow strip (typically 20-30m), the central part of which is immediately adjacent to the B3233 road. The woodland is all within 200m of the road. It adjoins parkland and other more extensive areas of woodland to the east. The current condition of the woodland is not documented, it is open, with a uniform age structure, without well-developed shrub layer, with sycamore forming a significant component of the canopy. The trees are not ancient, they appear to be semi-mature, and may be replanted, although this is not clear from Magic.gov; given their age structure they are considered unlikely to support lichen communities that could be sensitive to air quality impacts.

369. Nitrogen deposition on woodland can lead to increased sensitivity to stress, impacts on roots, reduced species diversity of the ground vegetation, reduced growth (APIS, 2023).

370. Fremington Local Nature Reserve (LNR) is comprised of two separate units: Lovell's Field (4.1ha) of low-lying wet grassland that is grazed adjacent to the Taw-Torridge Estuary, and Leat Meadow (3ha) which includes woodland, scrub, wetland and grassland. This site is considered likely to be of moderate interest; there is no reference to the presence of rare or sensitive species.

371. It is estimated that 1.6ha of Lovell's Field is within 200m of the traffic routes considered within the assessment; Leat Meadow is more distant (over 300m away). Approximately 20% of the LNR is within 200m of the road.

372. Nitrogen deposition can give rise to an increased proportion of productive grasses at expense of fine leaved grasses; a reduction in species richness, especially among forbs; changes in species composition; possible loss of rare or endangered species (APIS, 2023).

373. Management is known to take place within this area of the LNR, including grazing. Since Lovell's Field supports wet grassland, it may experience flooding, which may also have a role in determining the nutrient status of the grassland.

16.5.15.1 Impact significance

374. The LNR and the small area of ancient woodland are assessed to be of **Local Importance**.

375. The section of Fremington LNR within 200m will be affected; since the small strip of ancient woodland is all within 200m, it will all be affected.

376. As detailed in **Chapter 13: Air Quality**, the project contributions are very small, they do not give rise to any exceedance in relation to either receptor. For the ancient woodland there is only an exceedance when the project contribution is combined with existing background levels (NH3 and N-Dep); and also when considered in combination (with background growth and other committed development). For Fremington LNR, there is only an exceedance when considered in combination (with background growth and other committed development).

377. Given the short-term, temporary nature of the effect, and the very small process contribution from the project, the effect is considered likely to be of **Site level/neutral** significance. There is high confidence in this assessment.

16.5.15.2 Further Mitigation

378. No additional mitigation measures are proposed, in either area. This is because the process contribution is very small in relation to the existing baseline exceedances and due to the temporary nature of the impact. This approach is considered to be reasonable and proportion in this case.

16.5.15.3 Residual effect significance

379. Residual effect significance will remain at: a temporary effect of at most **Site level/neutral** significance.

16.5.15.4 Consideration of general EIA terminology

380. The sensitivity of both Sites is assessed to be **low**. No direct physical impact will occur – the magnitude of the impact will be **minor adverse/negligible**. No mitigation is proposed and therefore residual effect will be **minor adverse**/**negligible**, the effect is temporary and is not considered to be significant in the context of the EIA regulations.

16.6 Potential impacts during operation and maintenance

381. Once installed, there will be no requirement for ongoing maintenance of the operational Onshore Export Cables other than periodic visits to the link boxes (one per circuit every c. 1km along the cable corridor), which will be typically located at field boundaries, accessed using lightweight vehicles.

382. During the operational phase maintenance will be required of the substation; this will require frequent visits to be undertaken. Security lighting will be designed with reference to industry guidance relating to artificial lighting and bats (ILP/BCT, 2018); this will be designed to avoid the illumination of retained habitats.

383. Effects during the operational phase are expected to be **negligible** for all ecological receptors and are not assessed any further.

16.7 Potential impacts during decommissioning

384. No decision has been made regarding the final decommissioning policy for the Onshore Project as it is recognised that industry best practice, rules and legislation change over time.

385. The anticipated decommissioning activities are outlined in **Section 5.10** of **Chapter 5: Project Description**. The potential impacts of the decommissioning of the Onshore Project have been assessed for onshore ecology and ornithology on the assumption that decommissioning methods will be similar or of a lesser scale than those deployed for construction. The types of impact are therefore considered likely to be comparable to those identified for the construction phase, described in detail above.

386. The magnitude of impacts is likely to be less than those identified for the construction phase. For ecology, the more significant impacts relate to trenching, haul road construction, and human presence during drilling operations – decommissioning will not require trenching as the cabling can be removed without trenching, and the timescales involved are likely to be shorter, and could potentially be timed more easily around sensitive periods for wintering birds.

387. Accordingly, given the construction phase assessments concluded for onshore ecology and ornithology receptors, it is anticipated that at most, a similar assessment would apply for the decommissioning phase regardless of the final decommissioning methodologies; but in all likelihood, the significance is likely to be lower, given the factors described in the paragraph above.

16.8 Potential cumulative effects

388. The approach to cumulative effect assessment (CEA) is set out in **Chapter 6: EIA Methodology**. Only projects which are reasonably well described and sufficiently advanced to provide information on which to base a meaningful and robust assessment have been included in the CEA. Projects which are sufficiently implemented during the site characterisation for the Project have been considered as part of the baseline for the EIA. Where possible the Applicant has sought to agree with stakeholders the use of as-built project parameter information (if available) as opposed to consented parameters to reduce over-precaution in the cumulative assessment. The scope of the CEA was therefore be established on a topic-by-topic basis with the relevant consultees.

389. The cumulative effect assessment for onshore ecology and ornithology has been undertaken in two stages. The first stage was to consider the potential for the effects assessed as part of the project to lead to cumulative effects in conjunction with other projects.

390. The first stage of the assessment is detailed in **Section 16.3.3**. Potential effects assessed in **Table 16.26**. as being negligible or above (using the general EIA terminology) are considered in the CEA. This means that some effects that are assessed as being "neutral" using the CIEEM assessment approach are still referred to in **Table 16.26**, due to the differences in approach. For clarity, the residual effect significance made using the CIEEM assessment is identified in the table (in brackets); which has also been considered when refining the scope of the cumulative assessment, that follows.

Table 16.26 Potential cumulative effects considered for onshore ecology and ornithology

Impact	Potential for cumulative effect (residual effect significance in brackets)	Rationale
Impact 1: Direct physical damage and disturbance to Braunton Burrows SAC/SSSI (intertidal area)	Yes (Neutral)	Cumulative physical disturbance to habitats may occur where project boundaries overlap and have potential to affect the habitat.
Impact 2: Indirect disturbance to	Yes (Neutral)	Cumulative physical disturbance to habitats may occur where project boundaries overlap and have potential to affect the habitat.

Impact	Potential for cumulative effect (residual effect significance in brackets)	Rationale
Braunton Burrows SSSI / SAC intertidal zone/shore		
Impact 3: Indirect disturbance to Braunton Burrows SSSI / SAC use of trenchless techniques within the SAC	Yes (Site/Local)	Cumulative physical disturbance to habitats may occur where project boundaries overlap and have potential to affect the habitat.
Impact 4: Physical disturbance to intertidal habitats (and Taw-Torridge Estuary SSSI) at the Taw Estuary Crossing	No (Neutral)	No physical disturbance would occur within the estuary intertidal habitats during construction.
Impact 5: Indirect disturbance to habitats within the Taw-Torridge Estuary SSSI	Yes (Neutral)	Cumulative disturbance to habitats may occur where project boundaries overlap or where disturbance influences extend beyond project boundaries and have potential to affect the habitat.
Impact 6: Indirect impacts to Greenaways and Freshmarsh, Braunton SSSI	Yes (Neutral)	Cumulative disturbance to habitats may occur where project boundaries overlap or where disturbance influences extend beyond project boundaries and have potential to affect the habitat.
Impact 7: Indirect impacts to Saunton to Baggy Point Coast SSSI	Yes (Neutral)	Cumulative disturbance to habitats may occur where project boundaries overlap or where disturbance influences extend beyond project boundaries and have potential to affect the habitat.
Impact 8: Indirect impacts to Caen Valley Bats SSSI	Yes (Neutral)	Cumulative disturbance to habitats may occur where project boundaries overlap or where disturbance influences extend beyond project boundaries and have potential to affect the habitat.

Impact	Potential for cumulative effect (residual effect significance in brackets)	Rationale
Impact 9: Temporary habitat loss affecting non-statutory designated sites (and associated habitats)	Yes (Local)	Cumulative disturbance to habitats may occur where project boundaries overlap or where disturbance influences extend beyond project boundaries and have potential to affect the habitat.
Impact 10: Removal of sections of hedgerow	Yes (Site)	Cumulative disturbance to habitats may occur where project boundaries overlap or where disturbance influences extend beyond project boundaries and have potential to affect the habitat.
Impact 11: Temporary loss/disturbance to ditches, riparian habitats and watercourses	Yes (Local/Site)	Cumulative disturbance to habitats may occur where project boundaries overlap or where disturbance influences extend beyond project boundaries and have potential to affect the habitat.
Impact 12: Disturbance to non-roosting bats, temporary loss of bat foraging or commuting habitats	Yes (Site level)	Cumulative disturbance to or loss of habitats may occur where project boundaries overlap.
Impact 13: Disturbance to over-wintering birds, and destruction, damage, or disturbance of over-wintering bird habitats	Yes (District/Local level)	Cumulative disturbance to or loss of habitats may occur where project boundaries overlap.
Impact 14: Indirect impacts (air quality) on ancient woodland and Fremington LNR	Yes (Site level/neutral)	Cumulative effects from air quality; this is not considered in detail here, as in-combination assessment has been carried out as part of the Air Quality assessment: Chapter 13. This has scoped in Fremington LNR and Ancient Woodland (near Tapley Park), which have already been considered above.

391. The second stage of the CEA is to evaluate the projects considered for the CEA to determine whether a cumulative effect is likely to arise. The list of considered projects (identified in **Chapter 6: EIA Methodology**) and their anticipated potential for cumulative effects are summarised in **Table 16.27**. These projects have been reviewed by accessing relevant documents (e.g. ecological reports, environmental statements, stakeholder correspondence) on the planning portal for North Devon Council, or Torridge District Council (planning reference numbers are provided below).

Table 16.27 Projects considered in the cumulative effect assessment on onshore ecology and ornithology

Project	Status	Distance from Onshore Development Area (km)	Included in the CEA?	Rationale
White Cross Offshore Project	Consent application submitted	Directly connected to Landfall and Taw Estuary Crossing	Yes	Connected project may result in direct and / or indirect cumulative effects during construction and operation and maintenance.
Yelland Quay (60823 & 75797)	Approved, on appeal	0.2km from Substation	Yes	Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI during construction phase and from recreational access.
Land off North Lane, Bickington (56351)	Approved	4.58km	Yes*	Residential development: 15 (+ 50) dwellings. Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
Land at Chivenor Cross, Chivenor, Braunton (64000)	Approved	1.7km	Yes*	Residential development: 94 dwellings. Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
Larkbear, Tawstock, Barnstaple (70954)	Pending	6.4km	Yes*	Residential development: 252 dwellings. Cumulative effects predicted in relation to disturbance impacts on

Project	Status	Distance from Onshore Development Area (km)	Included in the CEA?	Rationale
				birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
Land at Chivenor Cross, Chivenor, Braunton (71660 & 75312)	Appeal allowed	2.4km	Yes*	Residential development: 59 dwellings. Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
Lower Yelland Farm Yelland Barnstaple (72253)	Approved	0.76km	Yes*	Seasonal campsite (Mar-Oct) Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
St Johns Garden Centre, Roundswell (72675)	Approved	5.7km	No	No cumulative effects predicted due to distance from the Project and small-scale / nature of the development.
The Red Bunker Sandhills, Instow (73006)	Approved	Within Red line boundary	No	No cumulative effects predicted due to distance from the Project and small-scale / nature of the development.
Sandy Lane Farm Lane Over Swanpool Bridge (73173)	Approved	Within AoS	No	No cumulative effects predicted due to distance from the Project and small-scale / nature of the development.
Land West of Mead Park Bickington (73681)	Approved	3.8km	Yes*	Residential development: 80 dwellings. Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
North Devon Cricket Club The Pavilion Sandhills	Approved	0.07km	No	No cumulative effects predicted due to distance from the Project and small-

Project	Status	Distance from Onshore Development Area (km)	Included in the CEA?	Rationale
Instow (74038)				scale nature of the development.
The Stables South Hole Farm (74583)	Approved	Within AoS	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Land at Yelland Road (74943)	Approved	0.6km	Yes*	Residential development: 80 dwellings. Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
Orchard Lodges Lower Yelland Farm (75047)	Approved	Within AoS	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
20 West Yelland Yelland (75129)	Pending	Within AoS	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Land at Litchardon Cross Newton Tracey (75300)	Approved	3.5km	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Land at Braunton Burrows (75637 & 76411)	Approved	1.3km	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Land at Woolmers Farm, North Lane, Bickington (75689)	Approved	4.58km	No	Residential development: 50 dwellings. Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
Saunton Heath Saunton (76367)	Approved	Within AoS	No	No cumulative effects predicted due to distance from the Project and small-

Project	Status	Distance from Onshore Development Area (km)	Included in the CEA?	Rationale
				scale nature of the development.
ATTURM, Instow, Bideford (76396)	Approved	0.12km	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Long Overdune Lane to Saunton Sands Saunton (76726)	N/A	Within AoS	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Chilpark Fremington (76796)	Pending	2km	Yes*	Residential development: 101 dwellings. Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
Land at Barton Cross Instow Bideford (76811)	Pending	0.24km	Yes*	Residential development: 5 dwellings. Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
Land At Pitt Hill Appledore (1/0652/ 2022/FULM)	Pending	1.7km	Yes*	Residential development: 27 dwellings. Cumulative effects predicted in relation to disturbance impacts on birds using Taw/Torridge Estuary SSSI (recreational disturbance only)*
Sandy Lane dwelling (21/01225/ DOM)	Approved	Within AoS	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.

16.8.1.1 Scope of cumulative assessment

392. From this detailed project review cumulative impacts are only considered in detail relation to:

- Disturbance to birds using the Taw/Torridge Estuary SSSI, including high-tide roosts in functionally linked land.
- Impacts on bats.
- Impacts on Braunton Burrows SAC through disturbance.

393. These have been considered in detail for the Yelland Quay development, for the White Cross Offshore Project, and in more general terms in relation to the strategic approach to mitigation for the various residential developments which have potential to give rise to recreational disturbance impacts on Braunton Burrows SAC and the Taw/Torridge Estuary SSSI.

394. Other cumulative effects are scoped out.

16.8.1.2 White Cross Offshore Project

395. The first project listed is the Section 36 consent application for the offshore components of the White Cross OWF is separate to the onshore Town and Country Planning Application for which this ES is prepared. The specific combined project components (offshore and onshore) are assessed cumulatively first and then cumulatively with all other projects.

396. For the majority of receptors there can be no cumulative effects because of the different features and habitats affected: the Offshore application is primarily concerned with effects within the marine environment; the Onshore application is concerned with the terrestrial habitats and features. There is, however, an overlap in the intertidal zone, where impacts on intertidal features have been considered by both applications. It should be noted that the effects in the intertidal zone will be the same effects for both projects, and do not therefore represent separate impacts that need to be considered cumulatively.

397. One area where there is a difference, however, is in the assessment of impacts on birds associated with the Taw/Torridge Estuary. When the Offshore Section 36 application was submitted, the mitigation approach for avoiding effects on wintering birds through disturbance was going to be achieved through timing of the work in close proximity to the estuary (including high-tide roosts in Braunton Marshes) to avoid the period when wintering waders and wildfowl are present. During the evolution of the design and programme of the Onshore project, it has become apparent that due to the amount of time required to install the cable below the

estuary it will not be possible to avoid this period, and therefore an alternative mitigation approach is needed; this is detailed above in the sections of the chapter that relate to impacts on the Taw/Torridge SSSI and Wintering Birds.

398. As above, this is not considered to represent a cumulative effect, but the two applications do need to be considered in combination, given that they are directly connected.

16.8.1.3 Yelland Quay (60823 & 75797)

399. This project involves the redevelopment of a former power transfer station, it is a hybrid application: Full application for access, scale & layout of site including raising of ground levels, site access works & highway infrastructure, together with purpose-built bat building; Outline application for 250 dwellings, employment, retail, sale of food and drink, service and community space all associated infrastructure including removal of any contamination, roads, footpaths, cycleway, drainage (including attenuation works), flood defence works, landscaping & appearance, public open space, utilities & vehicle parking, including demolition of buildings.

400. An Environmental Impact Assessment was carried out for this project; this involved consultation with a number of consultees that provide detailed comments on ecology, including Natural England, RSPB, Devon Wildlife Trust and North Devon Council, and the issues raised were considered when the planning application was considered initially, and again at appeal by a planning inspector.

401. This project is considered to be of a much bigger scale and duration than the proposed work required for the (White Cross) Onshore Project in the vicinity of the estuary.

402. A key issue for this project involves the potential for disturbance impacts on birds using the Taw/Torridge SSSI.

403. Since the development is immediately adjacent to the estuary, and includes work elements of work along the shoreline (include the use of a jetty), there is potential for disturbance to occur during the construction phase. This effect needs to be considered in combination, as there is potential for an impact on the same receptor (birds using the estuary generally, including birds using the high-tide roost at Yelland; it will not have an impact on the high-tide roosts used by Lapwing in Braunton Marshes, which is over 1km away on the far side of the estuary).

404. A range of mitigation measures are included in the application for the construction phase; these have been referred to in the conditions in the planning consent, including a visual screen, acoustic barriers, timing of certain elements of the work

(i.e. construction of screens outside the September to March period), monitoring of disturbance effects during the construction work (and adapting working methods if necessary, although it is not specified how this would be adapted, only that the approach would need to be agreed with the planning authority). The impact assessment for Yelland Quay considered the residual significance on birds using the estuary to be neutral, although further concerns were raised on the adequacy of the mitigation proposed by consultees. Ultimately, at appeal, the planning inspector considered that the disturbance of birds using the estuary, including high-tide roosts could be adequately mitigated with the identified mitigation measures in place.

405. The White Cross (Onshore Project) is mitigating disturbance impacts as far as possible, to the point where the impact is considered to be of local significance only (minor adverse), and temporary. In itself, this is a precautionary assessment and the approach taken is considered to be proportionate; no further mitigation is proposed in relation to possible cumulative impacts.

406. During the operational phase, there is also potential for impacts on wintering birds using the estuary through recreational disturbance (particularly from walkers and dog walkers), and other disturbance such as lighting. Mitigation is proposed which includes funding for a warden for 2 days/week between September and March, to help manage the risk of recreational disturbance impacts, signage, leaflets and no-go zones.

407. With these measures in place (required by condition) the planning inspector considered that the disturbance of birds using the estuary (i.e. birds using the estuary generally, including birds using the high-tide roost at Yelland, and other nearby high-tide roosts along the south side of the estuary; including Yelland, Isley Marsh, Cool Stone and Black Ground) high-tide roosts could be adequately mitigated. The high tide roosts in Braunton Marsh used by lapwing would not be affected.

408. In conclusion, there could, in theory, be potential for an in-combination effect through the combination of recreational disturbance arising from the Yelland Quay development, and construction activities on the south Side of the estuary in vicinity of the trenchless technique compound, if the two effects were to occur simultaneously. The timescale for the occupancy phase of the Yelland Quay development is, however, considered unlikely to coincide with the construction phase of the White Cross (Onshore Project) and therefore it is considered likely that the in-combination effects would be avoided.

409. The strategic approach to managing recreational disturbance which is required in relation to new residential development in the local area is discussed in more detail below (**paragraph 418**).

410. The potential for the Yelland Quay development to have an impact on Braunton Burrows SAC though increased recreational disturbance impacts is also identified; this is dealt with through a financial contribution as part of the Braunton Burrows Special Area of Conservation Mitigation Strategy (2021), as discussed below in more detail. Given that the approach adopted is in line with the mitigation strategy, it is concluded that the potential for cumulative effects could be avoided. The significance of the effect is therefore considered to be **neutral** and no further mitigation is proposed.

411. The Yelland Quay development will also have an impact on a bat roost in an underground structure that is used by small numbers of greater horseshoe bats (two individuals) and Daubenton's bats in the summer; and lesser horseshoe bats in the winter. The loss of this roost will be mitigated through the creation of a purpose-built bat building, which will need to be carried out under a Natural England (EPSL) development licence.

412. Further mitigation for impacts on bats is achieved though avoiding impacts through lighting on the Tarka Trail, which is used as a flight line by greater horseshoe bats, provision/retention of habitat suitable for bats, a lighting strategy (required by condition) which avoids impacts from light spill.

413. The possibility of the roost being used by greater horseshoe bats connected to the population using Caen Valley SSSI is considered in the assessment; given the numbers recorded, and the mitigation proposed, the impact was considered unlikely to have an effect on the Caen Valley SSSI greater horseshoe bat population.

414. The Yelland Quay environmental impact assessment concluded that for roosting bats there would be a moderate negative effect in the short term (significant at district level) but neutral in the medium term; for foraging bats a minor negative effect (significant at "sub-parish" level; i.e. local/site level) in the short-term, neutral in the long-term; and there would be no disruption of flight lines.

415. In the vicinity of the Yelland Quay, the White Cross (Onshore Project) will give rise to minor temporary habitat loss in fields, but will avoid impacts on the Tarka Trail, by using trenchless techniques, so this flight corridor will not be affected. For the White Cross (Onshore Project), some minor widening of an existing field access will be required, where a small amount of overgrown bramble scrub needs clearing on

either site of the gate to permit vehicle access, but effects on habitats for bats in this area will be **negligible**.

416. When considered in combination, the effects of both projects are considered to, at most, give rise to an effect of local significance (**minor adverse**), this does not increase the assessment of impact significance for either project; noting that the effects will (also) be temporary for White Cross.

16.8.1.4 Residential development located in proximity to the Braunton Burrows SAC

417. For developments marked with an asterisk in **Table 16.27**, there is potential for cumulative effects through recreational disturbance impacts on Braunton Burrows SAC, in the absence of appropriate mitigation. The Joint Local Plan Habitats Regulations Assessment (which is referred to in correspondence from Natural England that relates to these applications) concluded that it would not be possible to reach a conclusion of 'no likely significant effect" for housing in these areas, in combination with other residential/tourist development within the Zone of influence. Given this assessment, North Devon Council and Torridge District Council have adopted the "Braunton Burrows Special Area of Conservation Mitigation Strategy (2021)" whereby impacts can be avoided and mitigated through financial contributions in order to avoid significant effects of recreational impacts on the SAC. This involves 'Appropriate Assessment' (stage 2 of a Habitats Regulations Assessment), and following this agreeing a financial settlement (currently £190/unit), as necessary, in order to avoid an adverse effect on the SAC before planning consent can be granted.

418. Given this requirement, and based on the assumption that this approach would be applied to the developments detailed above, it is concluded that the potential for cumulative effects could be avoided.

419. The significance of the effect is therefore considered to be **neutral** and no further mitigation is proposed.

16.8.1.5 Residential development located in proximity to the Taw Torridge Estuary SSSI

420. For all those developments marked with an asterisk, potential for cumulative effects is through recreational disturbance impacts on the Taw Torridge Estuary; these have been identified through data gathered through the Taw Torridge Estuary High Tide Roost and Recreational Impacts study. This report (Berridge, 2019) provides evidence of recreational impacts on important high tide roosts and on birds feeding through all states of the tide.

421. As described above, the estuary birds are sensitive during the winter and during stopovers on annual migrations, throughout which time they must build up energy reserves. Any disturbance that causes them to take flight, especially repeatedly, reduces foraging time and causes additional energy expenditure. This can result in a reduction in fitness making it a challenge to survive the winter.

422. Plan-led development has the potential to affect the SSSI by virtue of the associated recreational activity on and around the estuary contributing cumulatively to disturbance and displacement effects on the overwintering water birds on the estuary; disturbance by walkers, particularly dog walkers, is already a significant issue and the provision of additional residential development has the potential to contribute to this.

423. Natural England's position, which is set out in the planning correspondence that relates to these various projects, is that "*a strategic approach to recreational disturbance on the estuary would secure better environmental outcomes*" and that where consent is granted "*suitable mitigation measures should be agreed and secured via condition to reduce disturbance to over wintering birds. This should include but not be limited to interpretation packs for all households and information panels on the proposed footpath connection, via the adjacent development, to the Tarka Trail.*"

424. There is therefore potential for a cumulative impact from these developments where there is an overlap between the timing and location of disturbance, or where the same roosts are affected. The report (Berridge, 2019) states that [recreational] "*disturbance on [the Braunton Marsh] roost sites is not perceived to be a problem. There is no public access and the fields are fenced and gated to retain livestock. Vehicular traffic on the toll road and pedestrian traffic on the raised inner bank path around Horsey Island does not appear to directly disturb birds, although may structure their use of specific fields at times.*"

425. There may be potential for birds displaced from the Braunton Marsh high-tide roosts to move to other roost sites which are more at risk from recreational disturbance, however, the proposed mitigation will ensure that suitable habitat is available for displaced birds in adjacent areas that are unlikely to be significantly affected by recreational disturbance.

426. Given the short-term nature of the impacts (from the development) on high tide roosts, and the proposed mitigation (screening/timing of work) that will be put in place to avoid disturbing birds using the estuary, there is likely to be a limited overlap between the impacts from the project and those that could arise from these

other projects (i.e. it is likely that some of these developments will not give rise to impacts until after the project has been completed, meaning there would be no likelihood of cumulative impact).

427. It is also noted that the mitigation required for the residential developments that have potential to give rise to recreational disturbance is needed at a strategic level, this will involve the implementation of measures set out in the report (Berridge, 2019); and it is noted that this issue, and the measures required for mitigation are being considered through the planning system when residential development is being brought forward.

428. In conclusion, however, since the proposed mitigation (detailed in **Section 16.5.14**) has been devised to avoid an impact both on the lapwing high-tide roosts and from disturbance to birds using the estuary, this will help to minimise both the likelihood and significance of cumulative effects during the work. Once the work is complete, there will be no further risk of cumulative effects.

429. No further mitigation is proposed or considered necessary.

16.9 Potential transboundary impacts

430. There are no transboundary impacts with regards to onshore ecology as the proposed Onshore Development Area is not sited in proximity to any international boundaries. Transboundary impacts on onshore ecological receptors are therefore scoped out of this assessment and will not be considered further.

431. Transboundary effects on ornithological receptors were scoped out as the proposed onshore works are not sited in proximity to any international boundaries. Migratory birds present within the Onshore Development Area are not considered to form significant components of internationally important populations nor are they linked to internationally important sites (as qualifying features). All residual effects on birds are either minor adverse or negligible, therefore the risk of any transboundary effect would be extremely low. Transboundary impacts on ornithology receptors are therefore scoped out of this assessment and will not be considered further.

16.10 Inter-relationships

432. Inter-relationship impacts are covered as part of the assessment and consider impacts from the construction, operation or decommissioning of the Project on the same receptor (or group). A description of the process to identify and assess these effects is presented in **Chapter 6: EIA Methodology**. The potential inter-

relationship effects that could arise in relation to onshore ecology and ornithology include both:

- **Project lifetime effects:** Effects arising throughout more than one phase of the Project (construction, operation, and decommissioning) to interact to potentially create a more significant effect on a receptor than if just one phase were assessed in isolation
- **Receptor led effects:** Assessment of the scope for all relevant effects to interact, spatially and temporally, to create inter-related effects on a receptor (or group). Receptor-led effects might be short term, temporary or transient effects, or incorporate longer term effects.

433. **Table 16.28** serves as a sign-posting for inter-relationships.

Table 16.28 Onshore Ecology and Ornithology Inter-relationships

Topic and description	Related chapter	Where addressed in this Chapter	Rationale
Impacts 1-3: Direct and indirect damage and disturbance of Braunton Burrows SAC/ SSSI	**Chapter 8: Marine and Coastal Processes** and **Chapter 10: Benthic and Intertidal Ecology**	**Section 16.5.1**	The disturbance to beach topography and movement of sediment along and up / down the beach could impact on the flora and fauna communities
	Chapter 13: Air Quality	**Sections 16.5.2** and **16.5.3**	Considers effects on air quality resulting from construction activities/traffic.
	Chapter 12: Ground Conditions and Contamination and **Chapter 14: Water Resources and Flood Risk**	**Section 16.5.3**	This considers frac out and other hydrological pollution through impacts on groundwater and surface water.
Impacts 4 and 5: Direct and indirect disturbance of Taw-Torridge Estuary SSSI	**Chapter 12: Ground Conditions and Contamination** and **Chapter 14: Water Resources and Flood Risk**	**Section 16.5.5**	This considers accidental leaks and spills, frac out and other hydrological pollution through impacts on groundwater and surface water.

Topic and description	Related chapter	Where addressed in this Chapter	Rationale
	Chapter 13: Air Quality	**Section 16.5.5**	This considers effects from air quality (i.e. NOx, Nitrogen-deposition on habitats/dusk) resulting from traffic and machinery during construction.
Impact 6: Indirect impacts to Greenaways and Fresmarsh, Braunton SSSI	**Chapter 13: Air Quality**	**Section 16.5.6**	This considers effects from air quality (i.e. NOx, Nitrogen-deposition on habitats/dusk) resulting from traffic and machinery during construction.
Impact 7: Indirect impacts to Saunton to Baggy Point Coast SSSI	**Chapter 13: Air Quality**	**Section 16.5.7**	This considers effects from air quality (i.e. NOx, Nitrogen-deposition/dust) on habitats resulting from traffic and machinery during construction.
Impact 8: Indirect impacts to Caen Valley Bats SSSI	N/A	N/A	No additional inter-related effects on Caen Valley Bats SSSI have been identified.
Impact 9: Temporary habitat loss affecting non-statutory designated sites (and associated habitats)	**Chapter 12: Ground Conditions and Contamination** and **Chapter 14: Water Resources and Flood Risk**	**Section 16.5.12**	This considers potential changes to ground conditions that could affect groundwater and hydrologically-connected surface water receptors, and related habitat that rely on these water sources.
Impact 10: Removal of sections of hedgerow	**Chapter 20: Onshore Landscape and Visual Amenity**	**Section 16.5.11**	Hedgerows to be lost or coppiced during construction will be re-established following completion of the Onshore Project.

Topic and description	Related chapter	Where addressed in this Chapter	Rationale
Impact 11: Temporary loss/disturbance to ditches, riparian habitats and watercourses	**Chapter 12: Ground Conditions and Contamination** and **Chapter 14: Water Resources and Flood Risk**	**Section 16.5.12**	Considers changes to watercourses during construction.
Impact 12: Disturbance to non-roosting bats, temporary loss of bat foraging or commuting habitats	N/A	N/A	No additional inter-related effects on non-roosting bats or bat foraging or commuting habitats have been identified.
Impact 13: Disturbance to over-wintering birds, and destruction, damage, or disturbance of over-wintering bird habitats	**Chapter 18: Noise and Vibration**	**Sections 16.5.14**	Construction activities will result in new sources of noise and ground vibration. These have the potential to impact nearby over-wintering bird assemblages.
Impact 14: Indirect impacts (air quality) on ancient woodland and Fremington LNR	**Chapter 13: Air Quality**	**Section 16.5.15**	This considers effects from air quality (i.e. NOx, Nitrogen-deposition/dust) on habitats resulting from traffic during construction.
Decommissioning			
Inter-relationships and the identified impacts associated with the decommissioning phase would be no greater than those identified for the construction phase.			

16.11 Interactions

434. The impacts identified and assessed in this chapter have the potential to interact with each other, which could give rise to synergistic impacts as a result of that interaction. The areas of interaction between impacts during the construction phase are presented in **Table 16.29**, along with an indication as to whether the interaction may give rise to synergistic impacts. This provides a screening tool for which impacts have the potential to interact.

435. **Table 16.30** then provides an assessment for each receptor (or receptor group) related to these impacts in two ways. Firstly, the impacts are considered within a development phase (i.e. construction, operation, maintenance or decommissioning) to see if, for example, multiple construction impacts could combine. Secondly, a lifetime assessment is undertaken which considers the potential for impacts to affect receptors across development phases. The significance of each individual impact is determined by the sensitivity of the receptor and the magnitude of effect; the sensitivity is constant whereas the magnitude may differ. Therefore, when considering the potential for impacts to be additive it is the magnitude of effect which is important – the magnitudes of the different effects are combined upon the same sensitivity receptor.

16.12 Monitoring

436. Monitoring will be required during the construction phase to ensure that the mitigation measures set out within this chapter, and also set out within the CEMP, are effective and being implemented . This monitoring work will be detailed within the **Outline Construction Environmental Management Plan** (**Appendix 5.B**)., and the monitoring will be undertaken by an ECoW.

437. A programme of further monitoring will be undertaken on completion of the construction phase to ensure that the reinstated habitat features are restored to the desired condition and that further management and remedial measures are implemented as required. The detail of these post-construction monitoring requirements will be set out on **Figure 20.13** of **Chapter 20 Onshore Landscape and Visual Amenity**.

Table 16.29 Interaction between impacts during construction

Construction	Impacts 1-8: Damage and disturbance of statutory designated nature conservation sites	Impact 9: Temporary habitat loss affecting non-statutory designated sites (and associated habitats)	Impact 10: Removal of sections of hedgerow	Impact 11: Temporary loss/ disturbance to ditches, riparian habitats and watercourses	Impact 12: Disturbance to non-roosting bats, temporary loss of bat foraging or commuting habitats	Impact 13: Disturbance to over-wintering birds, and destruction, damage, or disturbance of over-wintering bird habitats	Impact 14: Indirect impacts (air quality) on ancient woodland and Fremington LNR
Impacts 1-8: Damage and disturbance of statutory designated nature conservation sites		High tide roosts in Braunton Marsh used by birds from Taw-Torridge Estuary SSSI	Consideration of impacts on bats – foraging or commuting habitat	Consideration of impacts on bats – foraging or commuting habitat	No	Disturbance of birds using the Taw-Torridge Estuary SSSI or high-tide nearby roosts	No
Impact 9: Temporary habitat loss affecting non-statutory designated sites (and associated habitats)			Consideration of impacts on Braunton Marsh UWS	Consideration of impacts on Braunton Marsh UWS	Consideration of impacts on bats – foraging or commuting habitat	Disturbance to high tide roosts in Braunton Marsh	No
Impact 10: Removal of sections of hedgerow	See columns to the right			Consideration of impacts on Braunton Marsh	Consideration of impacts on bats – foraging or commuting habitat	No	No
Impact 11: Temporary loss/disturbance to ditches, riparian habitats and watercourses					Consideration of impacts on bats – foraging or commuting habitat	No	No
Impact 12: Disturbance to non-roosting bats, temporary loss of bat foraging or commuting habitats						No	No

Construction	Impacts 1-8: Damage and disturbance of statutory designated nature conservation sites	Impact 9: Temporary habitat loss affecting non-statutory designated sites (and associated habitats)	Impact 10: Removal of sections of hedgerow	Impact 11: Temporary loss/ disturbance to ditches, riparian habitats and watercourses	Impact 12: Disturbance to non-roosting bats, temporary loss of bat foraging or commuting habitats	Impact 13: Disturbance to over-wintering birds, and destruction, damage, or disturbance of over-wintering bird habitats	Impact 14: Indirect impacts (air quality) on ancient woodland and Fremington LNR
Impact 13: Disturbance to over-wintering birds, and destruction, damage, or disturbance of over-wintering bird habitats							No
Impact 14: Indirect impacts (air quality) on ancient woodland and Fremington LNR							

Table 16.30 Potential interactions between impacts on Onshore Ecology and Ornithology

Highest level significance					
Receptor	**Construction**	**Operation and Maintenance**	**Decommissioning**	**Phase Assessment**	**Lifetime Assessment**
Braunton Burrows SAC/ SSSI	Minor adverse (non-significant in EIA terms)	Negligible	Minor adverse (non-significant in EIA terms)	**No greater than individually assessed impact** The impacts are considered to have no to minor magnitudes of effects on Braunton Burrows SAC/ SSSI, with impact significances judged at no more than minor adverse during construction. Given the low magnitudes and significances of the predicted impacts and effects, coupled with the avoidance/ mitigation measures due to be adopted, and the anticipated absence of/limited potential for impacts during operation or decommissioning, it is considered that there would either be no interactions between the phases, or that these would not result in	**No greater than individually assessed impact** Impacts to Braunton Burrows SAC/ SSSI during operation are expected to be negligible, and during decommissioning impacts are expected to be equivalent or less than those assessed during construction. It is therefore considered that impacts to Braunton Burrows SAC/ SSSI would not combine over the lifetime of the Project to increase the significance level of any impacts.
Taw/ Torridge Estuary SSSI	Minor adverse (non-significant in EIA terms)	Negligible	Minor adverse (non-significant in EIA terms)		
Greenaways and Freshmarsh, Braunton SSSI	Minor adverse (non-significant in EIA terms)	Negligible	Minor adverse (non-significant in EIA terms)		
Saunton to Baggy Point Coast SSSI	Minor adverse (non-significant in EIA terms)	Negligible	Minor adverse (non-significant in EIA terms)		
Caen Valley Bats SSSI	Minor adverse (non-significant in EIA terms)	Negligible	Minor adverse (non-significant in EIA terms)		
Non-statutory designated sites (and associated habitats)	Minor adverse	Negligible	Minor adverse		
Hedgerows	Negligible	Negligible	Negligible		

Highest level significance					
Ditches, riparian habitats and watercourses	Minor adverse	Negligible	Minor adverse	greater impacts than are assessed individually.	
Non-roosting bats	Minor adverse	Negligible	Minor adverse		
Over-wintering birds	Minor adverse	Negligible	Minor adverse		
Ancient woodland and Fremington LNR (air quality)	Minor adverse / negligible (non-significant in EIA terms)	Negligible	Minor adverse / negligible (non-significant in EIA terms)		

16.13 Summary

438. This chapter has considered the potential effects on onshore ecological and ornithological receptors arising from the Project. The assessment of potential impacts (direct and indirect) and associated effects considered has been informed by the Scoping Opinion, consultation, and agreed through ongoing inter-disciplinary project meetings, as well as reference to existing policy, guidance and wildlife legislation.

439. **Table 16.31** presents a summary of the impacts assessed within this ES chapter, any commitments made, relevant mitigation required and the identification of residual effects. The EcIA has established those onshore ecological receptors that could be affected (with and without mitigation) as a result of direct and indirect impacts during the construction, operational and decommissioning phases. The residual effects on the majority of receptors during these phases will be **neutral**, **negligible** or **minor adverse**.

440. In summary, these minor residual effects are temporary disturbance to birds using the Taw/Torridge Estuary SSSI, including temporary displacement of two high-tide roosts in Braunton Marsh, although it is considered likely that other habitat will be available; temporary hedgerow loss will give rise to a minor reduction foraging habitat for bats (but is not considered likely to significantly affect flight routes); temporary habitat impacts within Braunton Marsh UWS; hedgerows and ditches will be avoided wherever possible, any that will be affected will be reinstated after the work, such that the effect is short-duration. The likelihood of an effect on Braunton Burrows SAC/SSSI is considered to be very low; in the unlikely event that an impact occurred through frac-out, the effect would be very localised (and any inert material could be removed).

441. The assessment of cumulative effects from the Project and other developments and activities concluded that cumulative effects are possible in combination with the Yelland Quay development, noting that the scale of the Yelland Quay development is greater and closer to the estuary. With mitigation it was concluded at appeal that the effects could be mitigated, as proposed. The approach to mitigation taken by the White Cross (Onshore Project) is considered to be proportionate and reasonable; no further mitigation is considered necessary in relation to possible cumulative effects. Other cumulative effects from recreational disturbance from housing development will be dealt with through the application of existing strategic mitigation strategies (Braunton Burrows) or should be addressed by recommendations made in Berridge (2019) (Taw Torridge Estuary); no further mitigation is considered necessary as part of the White Cross (Onshore Project).

Table 16.31 Summary of potential impacts for onshore ecology and ornithology during construction, operation, maintenance and decommissioning of the Onshore Project

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation measure	Residual effect	Cumulative residual effect
Construction							
Impact 1: Direct physical damage and disturbance of Braunton Burrows SAC/SSSI (intertidal area)	Braunton Burrows SAC/SSSI (intertidal area)	High	Negligible	Minor adverse	Minimisation of working period. Potential option for use of trenchless techniques below intertidal area to reduce extent of surface disturbance.	Short-term and temporary **minor adverse** (not significant in context of EIA regulations)	There are numerous projects which have to potential to give rise to cumulative effects on Braunton Burrows SSSI/SAC through recreational disturbance. This is being dealt with through an agreed mitigation strategy. No further mitigation is considered necessary.
Impact 2: Indirect disturbance to Braunton Burrows SSSI/SAC intertidal zone/shore	Braunton Burrows SSSI/SAC intertidal zone/shore	High	Negligible	Minor adverse	Minimisation of risk of accidental pollution through Implementation of Code of Construction Practice, checks on vehicles / plant for leaks prior to use, and provision of spillage kits with each item of plant.	Short-term and temporary **minor adverse** (not significant in context of EIA regulations)	
Impact 3: Indirect disturbance to Braunton Burrows SSSI/SAC use of trenchless	Braunton Burrows SSSI/SAC	High	Negligible	Minor adverse	Post-consent geotechnical investigations will refine the trenchless technique design to reduce risk of frac-out, there will be continual monitoring during works and	Short-term and temporary minor adverse	

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation measure	Residual effect	Cumulative residual effect
techniques within the SAC					immediate clean-up of any surface discharge/ habitat reinstatement.		
Impact 4: Physical disturbance to intertidal habitats (and Taw-Torridge Estuary SSSI) at the Taw Estuary Crossing	Taw-Torridge Estuary SSSI	High	Negligible	Minor adverse	Trenchless technique used to avoid disturbance. Entry and exit points located outside of the subtidal and intertidal areas.	**Minor adverse** (not significant in context of EIA regulations)	Potential for cumulative effect on birds using the Taw-Torridge Estuary SSSI through disturbance (Yelland Quay: construction and future recreational disturbance; other developments through recreational disturbance). No further mitigation is considered necessary.
Impact 5: Indirect disturbance to habitats within the Taw-Torridge Estuary SSSI	Taw-Torridge Estuary SSSI	High	Negligible	Minor adverse	Post-consent geotechnical investigations will refine the trenchless technique design to reduce risk of frac-out, there will be continual monitoring during works and immediate clean-up of any surface discharge/ habitat reinstatement.	Short-term and temporary **minor adverse** (not significant in context of EIA regulations)	

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation measure	Residual effect	Cumulative residual effect
Impact 6: Indirect impacts to Greenaways and Freshmarsh, Braunton SSSI	Greenaways and Freshmarsh, Braunton SSSI	High	Negligible	Minor adverse	Lighting will be minimised and designed to avoid the illumination of any habitat features within the SSSI. Dust will be controlled by standard dust suppression methods.	Short-term and temporary **minor adverse** (not significant in context of EIA regulations)	None predicted
Impact 7: Indirect impacts to Saunton to Baggy Point Coast SSSI	Saunton to Baggy Point Coast SSSI	High	Negligible	Minor adverse	The Project has been routed to minimise effects on the SSSI.	Short-term and temporary **minor adverse** (not significant in context of EIA regulations)	None predicted
Impact 8: Indirect impacts to Caen Valley Bats SSSI	Caen Valley Bats SSSI	High	Negligible	Minor adverse	The width of hedgerow gaps will be minimised and fake hedges will be used for all gaps over 20m wide. Lighting of bat habitats will be avoided/ minimised.	Short-term and temporary **minor adverse** (not significant in context of EIA regulations)	None predicted

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation measure	Residual effect	Cumulative residual effect
Impact 9: Temporary habitat loss affecting non-statutory designated sites (and associated habitats)	Non-statutory designated sites (and associated habitats)	Medium	Medium	Moderate adverse	Use of trenchless techniques and bailey bridges to avoid most botanically rich/ diverse grassland and swamp areas, and where this is not possible, removal and reinstatement of turves	**Minor adverse**	None predicted
Impact 10: Removal of sections of hedgerow	Hedgerows	Low	Low	Minor adverse	Working width will be reduced to the minimum and coppicing of longest sections will be used to avoid loss where possible and speed up reinstatement. Retained hedgerows will be protected and hedgerow gaps will be reinstated following construction	**Negligible**	None predicted
Impact 11: Temporary loss/disturbance to ditches, riparian habitats and watercourses	Ditches, riparian habitats and watercourses	Low	Low	Minor adverse	Trenchless techniques will be used for the majority of crossings, and temporary Bailey Bridges will be used to traverse the most sensitive ditches. Where temporary dams are used, they will be in place for the shortest possible period and existing water flows will	**Minor adverse** (short term) **Negligible** (long term)	None predicted

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation measure	Residual effect	Cumulative residual effect
					be maintained. Vegetation removal will be undertaken only where necessary, and any high value vegetation will be translocated and reinstated following works.		
Impact 12: Disturbance to non-roosting bats, temporary loss of bat foraging or commuting habitats	Non-roosting bats	High	Low	Moderate adverse	Coppicing of hedgerows at Saunton Road and Sandy Lane access points will be used to avoid loss where possible and speed up reinstatement. Fake hedges will be used for all hedgerow gaps over 20m wide. Lighting of bat habitats will be avoided/ minimised.	**Minor adverse** (short term) **Negligible** (long term)	There is potential for cumulative effects on non-roosting bats through temporary habitat loss (hedgerows); effects will be very minor.
Impact 13: Disturbance to over-wintering birds, and destruction, damage, or disturbance of over-wintering bird habitats	Over-wintering birds	High	Low-medium	Moderate adverse	Timing restriction of construction activities within 200-300m of the Taw/Torridge Estuary SSSI and screening maintained around HDD drilling compounds. Management of alternative roost habitat away from the construction works and monitoring of bird	Temporary **minor adverse**	Potential for cumulative effect on birds using the Taw-Torridge Estuary SSSI through disturbance (Yelland Quay: construction

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation measure	Residual effect	Cumulative residual effect
					assemblages during construction. Potential financial contribution to recreational mitigation scheme.		and future recreational disturbance; other developments through recreational disturbance). No further mitigation is considered necessary.
Impact 14: Indirect impacts (air quality) on ancient woodland and Fremington LNR	Ancient woodland and Fremington LNR	Low	Low-negligible	Minor adverse-negligible	None proposed	Temporary **minor adverse-negligible**	None predicted
Operation and Maintenance							
Impacts 1-14	All receptors	Low-high	Negligible	Negligible	None	**Negligible**	None predicted

Potential impact	Receptor	Sensitivity	Magnitude	Significance	Mitigation measure	Residual effect	Cumulative residual effect
Decommissioning							
No decision has been made regarding the final decommissioning policy, as it is recognised that industry best practice, rules and legislation change over time. The decommissioning methodology would need to be finalised nearer to the end of the lifetime of Project so as to be in line with latest and current guidance, policy and legislation at that point. It is assumed that the potential impacts of the decommissioning of the Project will be similar or of a lesser scale than those deployed for construction. The types and magnitude of impacts are therefore considered likely to be comparable to those identified for the construction phase and it is anticipated that at most, a similar assessment would apply for the decommissioning phase regardless of the final decommissioning methodologies; but in all likelihood, as the cabling can be removed without trenching, and the timescales involved are likely to be shorter, and could potentially be timed more easily around sensitive periods for wintering birds, the significance is likely to be lower.							

16.14 References

APIS (2023). Available from: https://www.apis.ac.uk [Accessed 21 July 2023]

BCT (2016). *Core Sustenance Zones: Determining zone size 04.02.16* (https://www.bats.org.uk/our-work/landscapes-for-bats/core-sustenance-zones) Bat Conservation Trust, London.

Berridge, R. (2019). Identification of Wintering Wildfowl High Tide Roosts & Recreational Disturbance Impacts on the Taw Torridge Estuary. Report to Natural England by ECON Ecological Consultancy Ltd, May 2019.

Breeds, J. (2021). Braunton Burrows: A survey of the sand lizard, Lacerta agilis. Dynamic Dunescapes Project.

Chadd, R. and Extence, C. (2004). *The conservation of freshwater macro-invertebrate populations: a community-based classification scheme*. Aquatic Conservation - Marine and Freshwater Ecosystems,14: 597-624.

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland-Terrestrial, Freshwater, Coastal and Marine. CIEEM: Winchester, Hampshire.

Devon Birds (2022). *Devon Bird Report 2020*. Journal of the Devon Birdwatching & Preservation Society, Volume 74 No.3, January 2022.

Department for Energy Security and Net Zero. 2023a. Draft: Overarching National Policy Statement for Energy (EN-1) (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147380/NPS_EN-1.pdf).

Department for Energy Security and Net Zero. 2023b. National Policy Statement for Renewable Energy Infrastructure (EN-3) https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147382/NPS_EN-3.pdf.

Department for Energy Security and Net Zero. 2023c. National Policy Statement for Electricity Networks Infrastructure (EN-5) (https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1147384/NPS_EN-5.pdf).

EAD Ecology (2022). Yelland Quay: Phase 2 Technical Appendix 1: Phase 1 Habitat Plan, target notes and photographs (December 2022).

Infrastructure. Online. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/37048/1940-nps-renewable-energy-en3.pdf [Accessed March 2023].

Institute of Lighting Professionals (ILP) / Bat Conservation Trust (BCT) (2018). *Guidance Note 08/18 Bats and artificial lighting in the UK*. ILP, Rugby.

Falk, S. (1991). *A review of the scarce and threatened flies of Great Britain* (Part 1). Research and Survey in Nature Conservation, 39. Nature Conservancy Council, Peterborough.

Foster, G.N. (2010). A review of the scarce and threatened Coleoptera of Great Britain, Part 3: Water beetles of Great Britain. Species Status 1. Joint Nature Conservation Committee, Peterborough.

Foster, G.N. and Eyre, M.D. (1992). *Classification and ranking of water beetle communities. UK Nature Conservation, No. 1.* Joint Nature Conservation Committee, Peterborough

Goodship, N. and Furness, R. (2022). Disturbance distances Review: An updated literature review of disturbance distances of selected bird species. NatureScot Research Report 1283.

Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf). [Accessed April 2023].

Natural England (2023) Available from: https://www.gov.uk/guidance/protected-species-how-to-review-planning-applications [accessed, April 2023]

Pinaud, D., Claireau, F., Leuchtmann, M., Kerbiriou, C. (2017). Modelling landscape connectivity for greater horseshoe bat using an empirical quantification of resistance. Journal of Applied Ecology 55:2600–2611.

Preston, C.D. and Croft, J.M. (1997). *Aquatic Plants in Britain and Ireland*. Harley Books, Colchester.

Stanbury, A.J., Eaton, M.A., Aebischer, N.J., Balmer.D.E., Brown, A.F., Douse, A., Lindley, P., McCulloch, N., Noble, D.G., & Win, I. (2021). *The status of our bird populations: the 5th Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and 2nd IUCN Red List assessment of extinction risk for Great Britain*. British Birds, 114: 723-747.

Stillman R.A., West A.D., Caldow W.G. and Dit Durrell S, (2007). *Predicting the effect of disturbance on coastal birds*. Ibis, 149 (Suppl. 1), 73-81. BOU, Peterborough.

Stroh PA, Leach SJ, August TA, Walker KJ, Pearman DA, Rumsey FJ, Harrower CA, Fay MF, martin JP, Pankhurst T, Preston CD & Taylor I (2014). *A Vascular Plant Red List for England. Botanica Society of the British Isles and Ireland*, https://bsbi.org/wp-content/uploads/dlm_uploads/England_Red_List_1.pdf

VWT (2014). *Horseshoe bats.* Vincent Wildlife Trust, Ledbury.

Woodward Smith Architects LLP, (2020). *Yelland Quay Regeneration Project – Environmental Statement*. Report on behalf of Yelland Quay Ltd.

Yelland Quay Ltd (2020). Yelland Quay Regeneration Project Environmental Statement - Volume 1: Text and Figures.

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.A Biodiversity Net Gain Assessment

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Glossary of Acronyms

Acronym	Definition
BNG	Biodiversity Net Gain
CEcol	Chartered Ecologist
Defra	Department for Environment, Food and Rural Affairs
EIA	Environmental Impact Assessment
ES	Environmental Statement
FWM-CFGM	Floodplain wetland mosaic / coastal floodplain grazing marsh
GIS	Geographical Information System
ha	Hectare
LPA	Local Planning Authority
MCHLG	Ministry of Housing, Communities and Local Government
MCIEEM	Member of the Chartered Institute of Ecology and Environmental Management
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
MW	Megawatts
NCA	National Character Area
NDC	North Devon Council
NG	National Grid
NPPF	National Planning Policy Framework
WCOWL	White Cross Offshore Windfarm Ltd
SAC	Special Area of Conservation
SSSI	Site of Special Scientific Interest
TCPA	Town and Country Planning Act
UK	United Kingdom
WCOWL	White Cross Offshore Windfarm Limited

Glossary of Terminology

Defined Term	Description
The Applicant	White Cross Offshore Windfarm Limited
Biodiversity unit	Biodiversity units are a proxy to describe biodiversity. There are three types of biodiversity units: area units, hedgerow units and watercourse units. These are calculated in separate 'modules' of the metric.
Condition	A measure of the habitat against its ecological optimum state. Condition is a way of measuring variation in the quality of patches of the same habitat type.
Difficulty	A measure which represents the uncertainty in the effectiveness of management techniques used to enhance or create habitat.
Distinctiveness	A measure based on the type of habitat and its distinguishing features. This includes consideration of species richness, rarity, the extent to which the habitat is protected by designations and the degree to which a habitat supports species rarely found in other habitats.
Linear habitat	Habitats recorded in the metric according to length (kilometres) rather than area (hectares). This includes habitats in the hedgerow and watercourse modules and is taken as a centre line measurement along the length of the feature.
Mean high water springs	The average tidal height throughout the year of two successive high waters during those periods of 24 hours when the range of the tide is at its greatest.
Mean low water springs	The average tidal height throughout a year of two successive low waters during those periods of 24 hours when the range of the tide is at its greatest.
Mitigation	Mitigation measures have been proposed where the assessment identifies that an aspect of the development is likely to give rise to significant environmental effects, and discussed with the relevant authorities and stakeholders in order to avoid, prevent or reduce impacts to acceptable levels. For the purposes of the EIA, two types of mitigation are defined: • Embedded mitigation: consisting of mitigation measures that are identified and adopted as part of the evolution of the project design, and form part of the project design that is assessed in the EIA • Additional mitigation: consisting of mitigation measures that are identified during the EIA process specifically to reduce or eliminate any predicted significant effects. Additional mitigation is therefore subsequently adopted by OWL as the EIA process progresses.

Defined Term	Description
the Offshore Project	The Offshore Project for the offshore Section 36 and Marine Licence application includes all elements offshore of MHWS. This includes the infrastructure within the windfarm site (e.g., wind turbine generators, substructures, mooring lines, seabed anchors, inter-array cables and Offshore Substation Platform (as applicable)) and all infrastructure associated with the export cable route and landfall (up to MHWS) including the cables and associated cable protection (if required).
Onshore Development Area	The onshore area above MLWS including the underground onshore export cables connecting to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland. The onshore development area will form part of a separate Planning application to the Local Planning Authority (LPA) under the Town and Country Planning Act 1990.
Onshore Export Cables	The cables which bring electricity from MLWS at the Landfall to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland.
Onshore Export Cable Corridor	The proposed onshore area in which the export cables will be laid, from MLWS at the Landfall to the White Cross Onshore Substation and onward to the NG grid connection point at East Yelland.
the Onshore Project	The Onshore Project for the onshore TCPA application includes all elements onshore of MLWS. This includes the infrastructure associated with the offshore export cable (from MLWS), landfall, onshore export cable and associated infrastructure and new onshore substation (if required).
White Cross Offshore Windfarm Ltd	White Cross Offshore Windfarm Ltd (WCOWL) is a joint venture between Cobra Instalaciones Servicios, S.A., and Flotation Energy Ltd.
the Project	the Project is a proposed floating offshore windfarm called White Cross located in the Celtic Sea with a capacity of up to 100MW. It encompasses the project as a whole, i.e. all onshore and offshore infrastructure and activities associated with the Project.
Spatial risk	Spatial risk represents the relationship between the location of biodiversity loss (on-site) and where the off-site habitat is being delivered. This is applied to off-site interventions only.
Strategic significance	Describes the local significance of the habitat based on its location and the habitat type.
Time to target condition	The average time taken between starting creation or enhancement of habitats and that habitat reaching its target condition and or distinctiveness.

Appendix 16.A: Biodiversity Net Gain Assessment

1. Introduction

1. This report presents the initial Biodiversity Net Gain (BNG) Assessment for the White Cross Offshore Windfarm Project 'Onshore Project', considering all infrastructure of the project landward of Mean Low Water Springs (MLWS). It is included as part of the Onshore Project ES.

2. This assessment has been made using the Biodiversity Metric 4.0 Calculation Tool (Defra, April 2023) and has been prepared by BSG Ecology. It has been carried out by Principal Ecologist Anna Senior MCIEEM and reviewed by Principal Ecologist Guy Miller CEcol MCIEEM. Anna has over 15 years' professional experience of ecological and environmental consultancy; Guy has over 22 years' experience as a professional ecologist. Both have extensive experience of botanical survey and assessment and have been responsible for numerous BNG assessments.

3. This assessment has been finalised with due consideration of pre-application consultation to date (see **Chapter 7: Consultation**) and the ES will accompany the application to North Devon Council (NDC) for planning permission under the Town and Country Planning Act 1990.

4. The components of the White Cross Offshore Windfarm Project seaward of MHWS ('the Offshore Project') are subject to a separate application for consent under Section 36 of the Electricity Act 1989, and for Marine Licences under the Marine and Coastal Access Act 2009. These applications are supported by a separate ES covering all potential impacts seaward of MHWS. Policy, Legislation and Guidance.

2. Biodiversity Gain Background

5. This section of the report summarises the current status of policy and legislation relating to biodiversity gain:

6. The Environment Act 2021 will require new development in England to achieve a 10% net gain in biodiversity; this will need to be demonstrated with the Biodiversity Metric 4.0 (or subsequent updated version), and this will be mandatory from late 2023. Local Planning Authorities are currently updating local planning policy to accommodate these forthcoming changes during a two-year transition period.

7. Guidance in the National Planning Policy Framework (NPPF) already applies. Paragraph 180 states that: "..opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can

secure measurable net gains for biodiversity" (MHCLG, 2021). It does not identify a specific percentage for biodiversity gain.

8. North Devon and Torridge Local Plan 2011 - 2031 does not currently have a specific policy on Biodiversity Gain. Policy ST14: Enhancing Environmental Assets states that: "The quality of northern Devon's natural environment will be protected and enhanced by ensuring that development contributes to: (a) providing a net gain in northern Devon's biodiversity where possible, through positive management of an enhanced and expanded network of designated sites and green infrastructure, including retention and enhancement of critical environmental capital…".

9. Policy DM08: Biodiversity and Geodiversity of the North Devon and Torridge Local Plan 2011 - 2031 states that "…8) Development should avoid adverse impact on existing features as a first principle and enable net gains by designing in biodiversity features and enhancements and opportunities for geological conservation alongside new development. Where adverse impacts are unavoidable, they must be adequately and proportionately mitigated, if full mitigation cannot be provided, compensation will be required as a last resort.".

10. Relevant policy from the Braunton Parish Neighbourhood Plan 2022 to 2031 includes Policy NE3: Protecting and Increasing the Parish's Biodiversity, which states that: "1. All new development proposals should provide at least 10% net gain in biodiversity from the pre-development baseline on the proposed site…".

11. Planning inspectorate appeals decisions for two sites in Malmesbury, Wiltshire APP/Y3940/W/21/3278256 and APP/Y3940/W/21/3282365, are relevant during the transition period. The decisions stated: "although The Environment Act 2021 has now passed, secondary legislation is required for it to be implemented. Therefore, the 10% biodiversity net gain requirement set out in the Act is not yet law and is not applicable to these appeals. Policy CP50 of the CS [the relevant local plan], and Paragraph 174 of the Framework, both seek a net gain in biodiversity without identifying a specific percentage. A net gain of just 1% would be policy compliant in these circumstances. This could be secured by a planning obligation.".

12. The information above has therefore been provided as an illustration to set out gains and losses and to inform discussion with North Devon Council to identify what approaches would be required to address any residual losses.

3. Methodology

13. The calculation of the baseline biodiversity score of the Onshore Project is based on area (ha) coverage of broad habitats and lengths of linear habitats within the Onshore Export Cable Corridor. It excludes Braunton Burrows Special Area of Conservation (SAC) and the Taw Torridge Estuary Site of Special Scientific Interest (SSSI), as these two sites will be avoided using trenchless techniques (below ground) which will avoid impacts on habitat features.

14. Habitats have been identified through survey work that was carried out by EcoLogic (see **Appendix 16.B: Preliminary Ecological Appraisal**). Habitat condition data from this was compiled by EcoLogic and assigned to the different habitat types. Habitat parcel areas and lengths have been calculated using GIS data by Royal Haskoning DHV; the units are based on the habitat survey and condition assessments of the Onshore Development Area.

15. Additional data for the Braunton and Yelland access routes was obtained during survey work carried out by BSG Ecology (see **Appendix 16.C: Extended Phase 1 habitat technical report - Braunton and Yelland-proposed access routes**). The EcoLogic baseline data has been reviewed and verified using online aerial photographs and, for an area of marsh/fen habitat, subsequent survey data from site visits by BSG Ecology in July 2023.

16. Where necessary, UK Habitat Classification habitat categories were converted to Biodiversity Metric habitat categories, taking into account guidance on the translation table provided in the Defra 4.0 User Guide (Natural England, March 2023). Habitat conditions were assigned using guidance set out in the habitat condition tables provided in the Technical Annex (the latest version of this guidance is Natural England, July 2023).

17. The pre-development baseline calculation uses existing habitat areas / lengths, condition scores, distinctiveness and strategic significance. This is used to derive the biodiversity score of the Onshore Development Area, which is expressed in biodiversity units.

18. The post-development calculation takes into account habitat loss and any habitat retention, enhancement and creation measures, including the strategic significance, distinctiveness, spatial risk, temporal and difficulty multipliers for each habitat type.

19. Rule 3 trading rules are automatically applied by the metric and set minimum habitat creation and enhancement requirements to compensate for specific habitat losses (see Table 3-2 of the Defra 4.0 User Guide (Natural England, March 2023)). These

requirements are based on habitat type and distinctiveness and generally require that losses of habitat are compensated for on a "like for like" or "like for better" basis. Losses of irreplaceable or very high distinctiveness habitat cannot adequately be accounted for through the metric.

20. Given the nature of the project which includes trenchless techniques to install cabling below ground (meaning that in some parts of the red line boundary, there will be no impact on habitat features, and only temporary impacts much of along the cabling route). Other assumptions have been used in the calculations these are set out below.

21. The post-development calculation is based on the developable area as shown in **Annex A: Figures**. This was defined by the following plans and documents:

- Biodiversity Net Gain Working Width plans (Royal HaskoningDHV drawing ref. PC2978-RHD-ZZ-XX-DR-Z-0668, P03)
- Onshore Crossing Schedule (Stockton ref. 20230518 (1.0))
- Outline Landscape and Ecological Mitigation Plan (see **Chapter 16: Onshore Landscape and Visual Amenity Figure 16.13: Outline Landscape and Ecology Mitigation Plan**).

3.1 Assumptions used in the calculation

22. Areas that are drilled under using trenchless techniques are excluded (they are not included in either the baseline calculation or the post-development calculation). This includes the route where it passes under Braunton Burrows SAC and the Taw-Torridge Estuary SSSI.

23. Certain work activities will give rise to only temporary impacts where affected habitats can be restored to the same conditions within two years of works commencing, as set out in the Biodiversity Metric 4 Case Study: Cabling for offshore wind development (Natural England, July 2023). As such, temporary impacts on certain habitats are not included within the metric calculation. These work components include:

- Cabling, compounds and haul road provision within arable fields and improved pasture (modified grassland)
- Works within more sensitive habitats (e.g., marsh/fen) but where the haul roads will use bailey bridges to protect ground vegetation
- Working areas in other areas of pasture that will only be affected by short-duration cable trenching, and will be reinstated sequentially, and will be capable of returning to the desired condition within two years (N.B. this excludes all areas

that will be affected by haul road or compound construction which will be in situ for the duration of the project). See **paragraph 26** below for further details

- Hedgerows that have been coppiced to create visibility splays, which will be allowed to grow back naturally on completion of the work.

24. The biodiversity gain calculation includes habitats that will be temporarily impacted by the trenching/cable installation (short duration), but which will take longer than two years to be restored to target condition (including some areas of other neutral grassland, scrub and hedgerows) and all areas affected by the haul road and construction compound (both of which will be in place for the duration of the project). For these areas the habitat impacts are treated initially as a loss and then as habitat creation in the metric.

25. The only permanent habitat loss will occur in the substation area. New habitat (woodland, scrub, grassland, and detention basin) will be created in this area as part of the landscape design as outlined in **Chapter 16: Onshore Landscape and Visual Amenity Figure 16.13: Outline Landscape and Ecology Mitigation Plan**.

26. For scrub and floodplain grazing marsh habitat parcels that will be affected by both haul road provision and cable trenching, the calculation assumes that 60% of the working width will be temporarily lost under the haul road and will take more than two years to be restored to target condition. It is assumed that the remaining 40% of each of these areas will only have temporary impacts from cabling works and will re-establish within two years.

27. The condition assessments and calculations of watercourse and hedgerow modules have been assigned on a precautionary basis. In line with the Biodiversity Metric 4.0 User Guide (Natural England, March 2023), any ditches within recorded "floodplain wetland mosaic / coastal floodplain grazing marsh" (FWM-CFGM) habitats have formed part of the FWM-CFGM condition assessment and have not been recorded separately in the watercourse assessment.

28. Post-development habitat conditions have been assigned based on realistic aspirations for habitat management within the Onshore Development Area.

29. Habitat creation proposals assume a 2-year delay between habitat loss and the start of habitat creation works, in line with the guidance in the Biodiversity Metric 4.0 User Guide (Natural England, March 2023).

4. Biodiversity Metric Results

30. Baseline and post-development habitat condition and distinctiveness have been assessed using the Biodiversity Metric 4.0 User Guide (Natural England, March 2023). The full data can be viewed in the Metric excel spreadsheet, which is supplied at **Annex B: White Cross Biodiversity Metric 4.0 Calculation Tool**.

31. No irreplaceable habitats will be lost as a result of the Onshore Project.

32. The Rule 3 trading rules within the metric are not currently met as habitats will be lost that have not yet been replaced within the proposed Onshore Development on a like-for-like or like-for better basis. The implications of this are considered in the recommendations below.

33. The overall metric results are summarised in **Table 1**, and detailed summaries for each habitat type are given in **Table 2**, **Table 3** and **Table 4** below.

Table 1 BNG Metric results

Baseline	Units
Broad habitats	
Broad habitat baseline score (habitat units)	250.45
Post-development score (habitat units)	189.79
Gain/deficit	**-60.66 units**
Biodiversity gain/loss (%)	**-24.22%**
Hedgerows	
Hedgerow baseline score (hedgerow units)	34.41
Post-development score (hedgerow units)	21.84
Gain/deficit	**-12.56 unit**
Biodiversity gain/loss (%)	**-36.52%**
Watercourses	
Watercourse baseline score (watercourse units)	10.77
Watercourse post-development score (watercourse units)	10.44
Gain/deficit	**-0.33 units**
Biodiversity gain/loss (%)	**-3.03%**

4.1 Broad habitat summary

34. **Table 2** below summarises the extent of change for each broad habitat group within the Site as a result of the Onshore Project.

Table 2 On-site change by broad habitat type

	Baseline		Post-development on-site		On-site change	
Habitat group	On-site existing area	On-site existing value	On-site proposed area	On-site proposed value	On-site area change	On-site unit change
Cropland	16.44	33.62	16.44	33.62	0.00	0.00
Grassland	22.71	184.19	21.78	122.92	-0.93	-61.27
Heathland and shrub	0.40	4.62	0.43	4.61	0.04	-0.01
Lakes	0.02	0.16	0.02	0.16	0.00	0.00
Sparsely vegetated land	0.39	2.43	0.39	2.43	0.00	0.00
Urban	1.44	3.38	2.05	3.56	0.61	0.18
Wetland	0.51	14.17	0.51	14.17	0.00	0.00
Woodland and forest	0.57	7.00	0.86	7.44	0.29	0.44
Intertidal sediment	0.00	0.01	0.00	0.01	0.00	0.00

35. Post-development, there is a reduction in broad habitat units (60.66 units are lost as result of the development). Overall, there is a percentage change of -24.22% in habitat units.

36. In order to achieve a 10% net gain in broad habitat units, a total Site score of 275.50 habitat units will be required post-development. This equates to **85.71** additional habitat units on top of the habitats already proposed.

4.2 Hedgerow summary

37. **Table 3** below summarises the extent of change for each hedgerow group within the Site as a result of the Onshore Project.

Table 3 On-site change by hedgerow type

	Baseline		Post-development on-site		On-site change	
Hedgerow type	On-site existing length	On-site existing value	On-site proposed length	On-site proposed value	On-site length change	On-site unit change
Species-rich native hedgerow with trees - associated with bank or ditch	0.20	3.69	0.20	3.49	0.00	-0.19
Species-rich native hedgerow with trees	0.14	1.94	0.00	0.00	-0.14	-1.94

	Baseline		Post-development on-site		On-site change	
Species-rich native hedgerow - associated with bank or ditch	0.93	12.78	0.88	11.61	-0.05	-1.17
Native hedgerow with trees - associated with bank or ditch	0.23	3.22	0.23	2.98	0.00	-0.24
Species-rich native hedgerow	0.06	0.28	0.06	0.27	0.00	-0.01
Native hedgerow - associated with bank or ditch	1.23	11.67	0.33	2.77	-0.90	-8.90
Native hedgerow	0.16	0.76	0.16	0.72	0.00	-0.04
Non-native and ornamental hedgerow	0.07	0.07	0.00	0.00	-0.07	-0.07

38. Post-development, there is a reduction in hedgerow units (12.56 units are lost as result of the development). Overall, there is a percentage change of -36.52% in hedgerow units.

39. In order to achieve a 10% net gain in hedgerow units, a total Site score of 37.85 hedgerow units will be required post-development. This equates to **16.00** additional hedgerow units on top of the hedgerows already proposed.

4.3 Watercourse summary

40. **Table 4** below summarises the extent of change for each watercourse group within the Site as a result of the Onshore Project.

Table 4 On-site change by watercourse type

	Baseline		Post-development on site		On-site Change	
Watercourse type	On-site existing length	On-site existing value	On-site proposed length	On-site proposed value	On-site length change	On-site unit change
Other rivers and streams	0.0	0.1	0.0	0.1	0.0	-0.1
Ditches	1.0	10.6	1.0	10.4	0.0	-0.3

41. Post-development, there is a reduction in watercourse units (0.33 units are lost as result of the development). Overall, there is a percentage change of -3.03% in watercourse units.

42. In order to achieve a 10% net gain in watercourse units, a total Site score of 11.85 watercourse units will be required post-development. This equates to **1.40** additional watercourse units on top of the watercourses already proposed.

5. Recommendations

43. The client is committed to achieving an overall 10% biodiversity net gain in all three habitat modules (broad habitats, hedgerows and watercourses) through the Onshore Project and the approach to securing net gain is detailed within the proposed Section 106 obligation to be agreed with North Devon Council.

44. There are two main approaches to providing post-development habitat units to compensate for habitat losses, these are habitat creation and habitat enhancement. Creation and enhancement of habitats can be carried out on-site as well as off-site. Under the Environment Act 2021, any on or off-site habitat creation and enhancement following development requires a 30-year maintenance period to reach and uphold the target condition of the habitats (the 'biodiversity value'). This responsibility falls on the landowner, so funding and practicalities of this will need to be considered alongside the viability of habitat creation and enhancement options.

45. A specific BNG plan has not been generated for the proposed development at the time of writing this report, and such a plan will need to be prepared prior to the delivery of BNG for the proposed development. At this stage, options that could be taken forward following construction have been provided which can be used as the basis for any future BNG plan. The biodiversity units required to deliver 10% BNG will differ depending on the compensation route followed for habitat creation or enhancement.

46. In line with the requirements of BNG, the BNG plan should follow the mitigation hierarchy by avoiding harm to biodiversity wherever possible and, where not possible, minimising any effects. Compensation and offsetting should be a last resort.

47. Enhanced or new compensatory habitats should include sufficient like-for-like or like-for-better habitats (in respect of distinctiveness and condition) in order for the metric Rule 3 trading rules to be met.

5.1 On-site

48. Options to overcome the biodiversity unit deficit on-site include future management of retained habitats within the Onshore Development Area to deliver further enhancement and increase the biodiversity unit score. For example:

- Enhancement of retained modified grasslands to higher distinctiveness grasslands through modification of the grassland management regimes (e.g., reseeding/mowing a hay crop/grazing) and avoidance of agricultural enrichment
- Creation of new hedgerows on field boundaries where none currently exist
- Reinstatement of pre-existing gaps in hedgerows and supplementary planting of existing species-poor hedgerows to increase diversity
- Enhancement of ditches and streams through localised improvements to the geomorphology and in-channel habitats (e.g., by replacing re-sectioned banks with more natural profiles that are typical of the natural geomorphology of the watercourse) to increase structural diversity
- Enhancement and management of woodland and scrub habitats, including (where appropriate) selective thinning of existing trees and planting of new understorey trees to improve structural diversity, creation of glades, and enhancement of standing and fallen deadwood habitats
- Creation and management of new areas of woodland and native scrub habitat on areas of existing low distinctiveness habitat.

5.2 Off-site

49. Alternative options to overcome the habitat unit deficit include off-site habitat creation and management, potentially through collaboration with a third-party organisation, and/or a financial settlement with the Local Planning Authority or another credit provider. As a last resort, should the development be unable to use on-site or off-site units to deliver BNG, once BNG becomes mandatory there will be an option purchase biodiversity credits through the emerging statutory biodiversity credits scheme. Prices of credits in the scheme vary depending on the habitat type affected. Further details on the statutory scheme are available on the gov.uk website (Defra, August 2023).

50. Where off-site habitat compensation is used, the number of biodiversity units gained reduces where the compensation area is located at a distance from the Onshore Development Area. It is therefore generally preferable to provide habitat compensation in close proximity to the Site, i.e., within the same Local Planning Authority (LPA) or National Character Area (NCA) (for broad habitats or hedgerows), or within the same waterbody catchment (for watercourses). Where this is not

possible, more units are gained for habitat creation/ enhancement within the neighbouring LPA/NCA (for broad habitats and hedgerows) or within the same operational catchment (for watercourses). Habitat creation/ enhancement outside of these areas gain the least habitat units. Units under the statutory credit scheme are also subject to an additional spatial risk multiplier.

6. References

Defra (April 2023) *Biodiversity Metric 4.0 Calculation Tool*.

Defra (August 2023) *Statutory biodiversity credit prices* [Online] Available from: Statutory biodiversity credit prices - GOV.UK (www.gov.uk). [Accessed: 15th August 2023].

Ministry of Housing, Communities and Local Government (2021). National Planning Policy Framework. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf

Natural England (March 2023) *The Biodiversity Metric 4.0 User Guide. Natural England* Joint Publication JP039

Natural England (July 2023) *The Biodiversity Metric 4.0 User Guide – Technical Annex 2*. Natural England Joint Publication JP039

Natural England (July 2023) *Biodiversity Metric 4 Case Study: Cabling for offshore wind development.*

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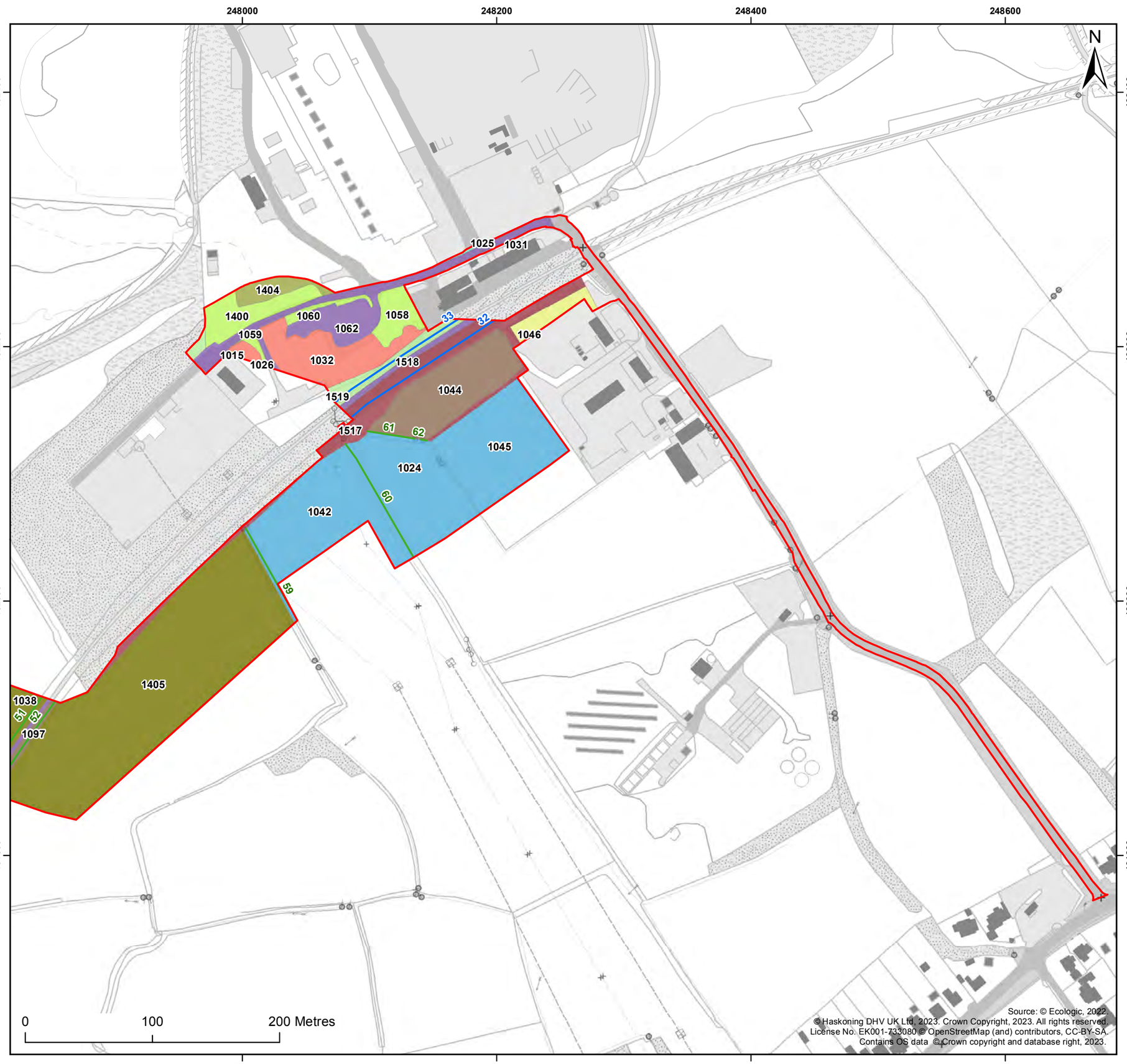
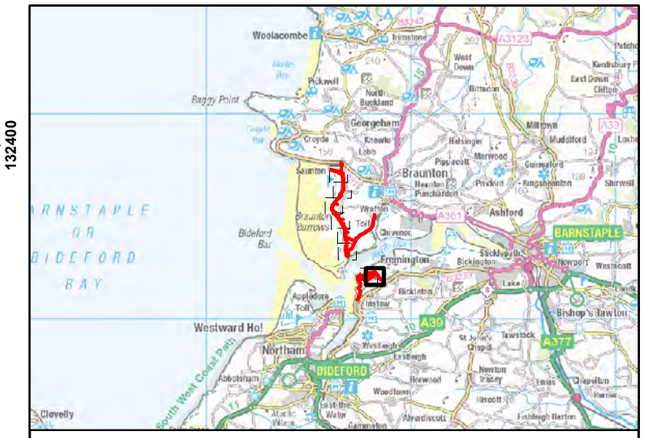
White Cross Offshore Windfarm Environmental Statement

Annex A: Figures





Legend:

- Onshore Development Area
- **Baseline Habitat Type**
- Ditches
- Native Species Rich Hedgerow - Associated with bank or ditch
- Artificial unvegetated, unsealed surface
- Built linear features
- Developed land; sealed surface
- Floodplain Wetland Mosaic (CFGM)
- Mixed scrub
- Modified grassland
- Open Mosaic Habitats on Previously Developed Land
- Other neutral grassland
- Other woodland; broadleaved
- Ruderal/Ephemeral
- Wet woodland

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title:

Biodiversity Net Gain Baseline
Sheet 1 of 9

Figure: 1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0667

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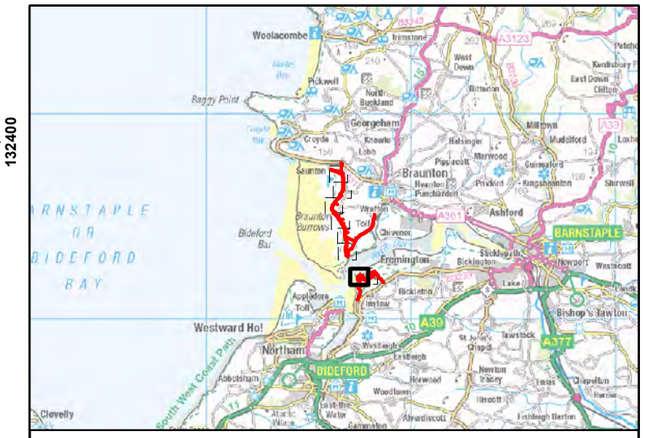

Legend:

- Onshore Development Area

Baseline Habitat Type

- Ditches
- Native Species Rich Hedgerow - Associated with bank or ditch
- Native hedgerow
- Built linear features
- Coastal sand dunes
- Floodplain Wetland Mosaic (CFGM)
- Gorse scrub
- Littoral muddy sand
- Low energy littoral rock
- Modified grassland
- Other woodland; broadleaved
- Vacant/derelict land/ bareground

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Biodiversity Net Gain Baseline
Sheet 2 of 9

Figure:	Drawing No:
1	PC2978-RHD-ZZ-XX-DR-Z-0667

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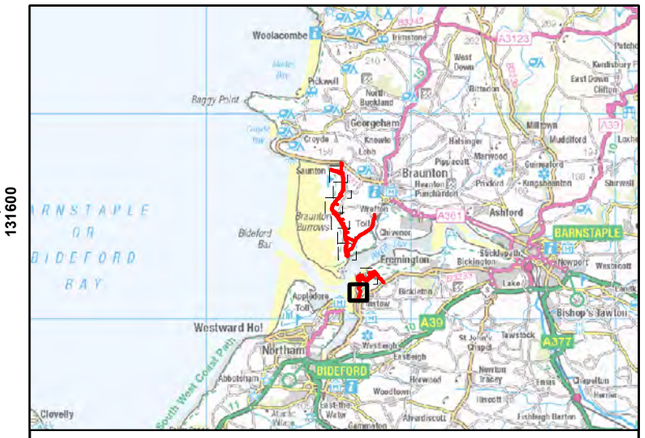

Legend:

- Onshore Development Area
- Native hedgerow associated with bank or ditch
- Coastal sand dunes
- Developed land; sealed surface
- Mixed scrub
- Modified grassland
- Vacant/derelict land/ bareground
- Wet woodland

Client: Offshore Wind Ltd.

Project: White Cross Offshore Windfarm

Title: Biodiversity Net Gain Baseline
Sheet 3 of 9

Figure: 1

Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0667

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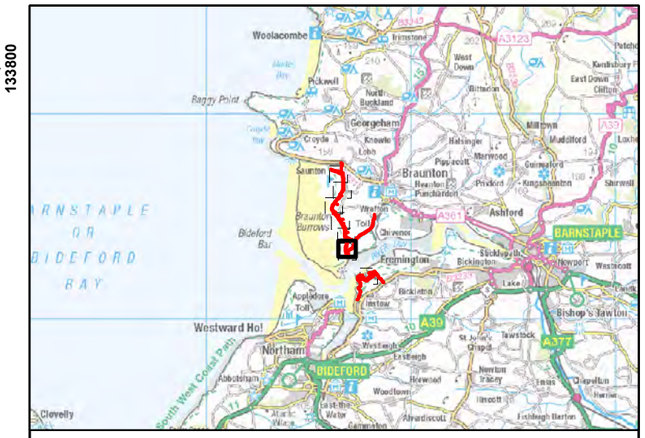

Legend:

- Onshore Development Area
- **Baseline Habitat Type**
- Ditches
- Native Hedgerow with trees - Associated with bank or ditch
- Native hedgerow
- Native hedgerow associated with bank or ditch
- Built linear features
- Floodplain Wetland Mosaic (CFGM)
- Mixed scrub
- Modified grassland
- Saltmarshes and saline reedbeds

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title:

Biodiversity Net Gain Baseline
Sheet 4 of 9

Figure: 1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0667

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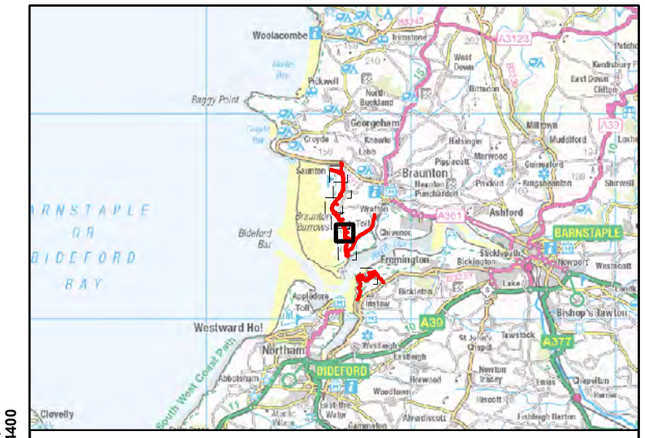

Legend:

- Onshore Development Area
- Native Species Rich Hedgerow - Associated with bank or ditch
- Native Species Rich Hedgerow with trees - Associated with bank or ditch
- Native hedgerow associated with bank or ditch
- Fens (upland and lowland)
- Floodplain Wetland Mosaic (CFGM)
- Modified grassland

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title:

Biodiversity Net Gain Baseline
Sheet 5 of 9

Figure: 1	Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0667

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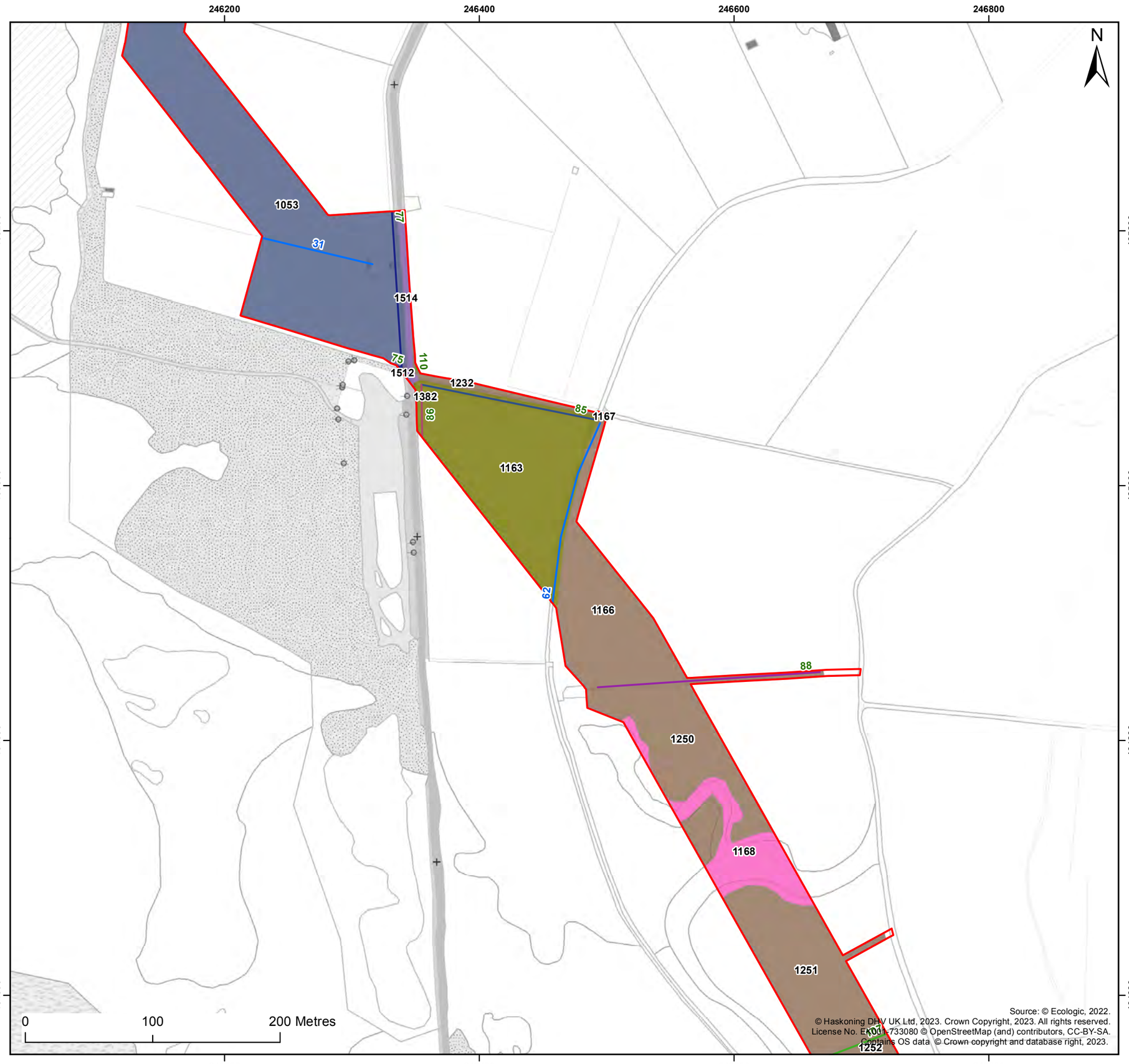

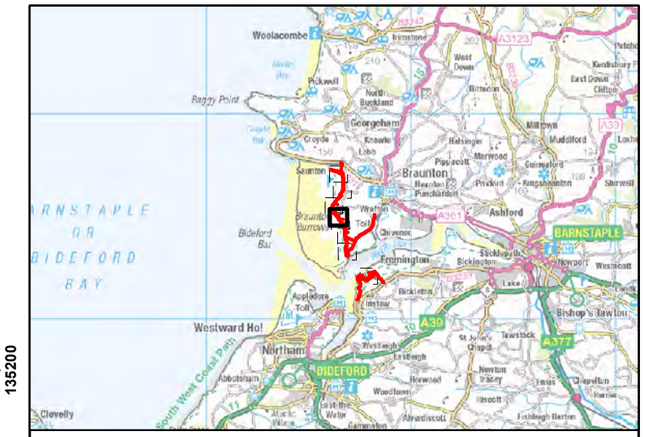

Legend:

- Onshore Development Area

Baseline Habitat Type

- Ditches
- Native Hedgerow with trees - Associated with bank or ditch
- Native Species Rich Hedgerow - Associated with bank or ditch
- Native Species Rich Hedgerow with trees
- Native Species Rich Hedgerow with trees - Associated with bank or ditch
- Native hedgerow associated with bank or ditch
- Built linear features
- Cereal crops
- Coastal sand dunes
- Fens (upland and lowland)
- Floodplain Wetland Mosaic (CFGM)
- Modified grassland
- Ponds (Non- Priority Habitat)

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title:

Biodiversity Net Gain Baseline
Sheet 6 of 9

Figure:	Drawing No:
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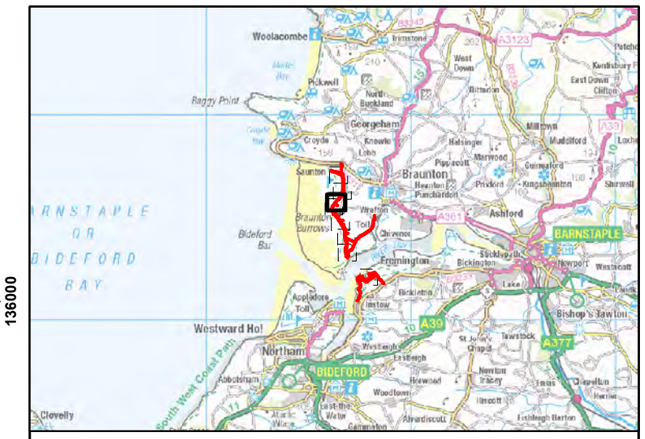

Legend:

- Onshore Development Area
- Cereal crops

Baseline Habitat Type

- Ditches
- Native Species Rich Hedgerow - Associated with bank or ditch
- Native hedgerow associated with bank or ditch
- Built linear features

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title:

Biodiversity Net Gain Baseline
Sheet 7 of 9

Figure:	Drawing No:
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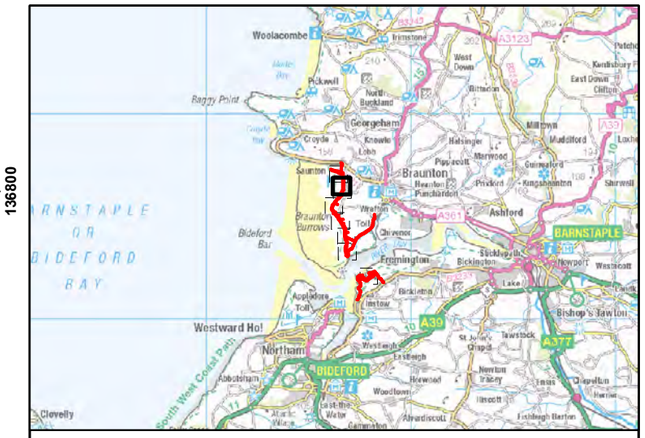

Legend:

- Onshore Development Area
- Native Species Rich Hedgerow - Associated with bank or ditch
- Native hedgerow associated with bank or ditch
- Built linear features
- Cereal crops

Client:	Project:
Offshore Wind Ltd.	White Cross Offshore Windfarm

Title:

Biodiversity Net Gain Baseline
Sheet 8 of 9

Figure: 1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0667

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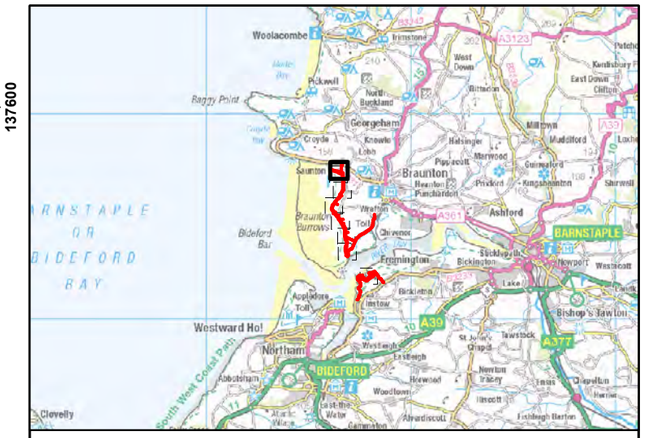

Legend:

- Onshore Development Area

Baseline Habitat Type

- Ditches
- Other Rivers and Streams
- Native Species Rich Hedgerow
- Native Species Rich Hedgerow - Associated with bank or ditch
- Native hedgerow associated with bank or ditch
- Built linear features
- Cereal crops
- Developed land; sealed surface
- Mixed scrub
- Modified grassland
- Ponds (Non- Priority Habitat)

Client: Offshore Wind Ltd.	Project: White Cross Offshore Windfarm

Title:

Biodiversity Net Gain Baseline
Sheet 9 of 9

Figure: 1 | Drawing No: PC2978-RHD-ZZ-XX-DR-Z-0667

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WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Annex B: White Cross Biodiversity Metric 4.0 Calculation Tool

The Biodiversity Metric 4.0 - Calculation Tool
Start page

Project details			
Planning authority:	North Devon		
Project name:	White Cross onshore cabling		
Applicant:			
Application type:			
Planning application reference:			
Completed by:	Anna Senior, BSG Ecology		
Date of metric completion:	11th August 2023		
Reviewer:			
Version control:	v2		
Consenting body reviewer:			
Date of consenting body review:			
Target % net gain:	10%		
Irreplaceable habitat present on-site at baseline:	No		
Total site area (including irreplaceable habitat area):	42.52	Irreplaceable habitat area at baseline:	0.00

Instructions

Main menu

Results

Cell style conventions	
⚠	Attention required
▲	Input error/rules and principles not met
	Use of this cell is not appropriate
	Enter data
	Automatic lookup
	Result

View all

Reset view

On-site baseline map — Insert

On-site baseline map reference number	

On-site post intervention map — Insert

On-site post-intervention map reference number	

Off-site baseline map — Insert

Off-site baseline map reference number	

Off-site post intervention map — Insert

Off-site post-intervention reference number	

The Biodiversity Metric 4.0 - Calculation Tool Main menu

Key

Area habitats

Hedgerows and lines of trees

Watercourses

Start page | Instructions | Technical data | Results

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Tree helper						
Tree size	Number of trees and area (ha) for each condition state					
	Poor	Area	Moderate	Area	Good	Area
Small		0.0000		0.0000		0.0000
Medium		0.0000		0.0000		0.0000
Large		0.0000		0.0000		0.0000
Total	0	0.0000	0	0.0000	0	0.0000

On-site baseline

- A-1 On-site Area Habitat Baseline
- B-1 On-site Hedge Baseline
- C-1 On-site Watercourse Baseline

On-site post development

- A-2 On-site Area Habitat Creation
- A-3 On-site Area Habitat Enhancement
- B-2 On-site Hedge Creation
- B-3 On-site Hedge Enhancement
- C-2 On-site Watercourse Creation
- C-3 On-site Watercourse Enhancement

Off-site baseline

- D-1 Off-site Area Habitat Baseline
- E-1 Off-site Hedge Baseline
- F-1 Off-site Watercourse Baseline

Off-site post development

- D-2 Off-site Area Habitat Creation
- D-3 Off-site Area Habitat Enhancement
- E-2 Off-site Hedge Creation
- E-3 Off-site Hedge Enhancement
- F-2 Off-site Watercourse Creation
- F-3 Off-site Watercourse Enhancement

The Biodiversity Metric 4.0 - Calculation Tool Results

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Headline results

Detailed results

Habitat trading summaries

Off-site summary

White Cross onshore cabling

Headline Results

Scroll down for final results ⚠

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On-site baseline	*Habitat units*	250.45		
	Hedgerow units	34.41		
	Watercourse units	10.77		
On-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	189.79		
	Hedgerow units	21.84		
	Watercourse units	10.44		
On-site net change (units & percentage)	*Habitat units*	-60.66	-24.22%	On-site net gain is less than target set ⚠
	Hedgerow units	-12.56	-36.52%	On-site net gain is less than target set ⚠
	Watercourse units	-0.33	-3.03%	On-site net gain is less than target set ⚠
Off-site baseline	*Habitat units*	0.00		
	Hedgerow units	0.00		
	Watercourse units	0.00		
Off-site post-intervention (Including habitat retention, creation & enhancement)	*Habitat units*	0.00		
	Hedgerow units	0.00		
	Watercourse units	0.00		
Off-site net change (units & percentage)	*Habitat units*	0.00	0.00%	
	Hedgerow units	0.00	0.00%	
	Watercourse units	0.00	0.00%	
Combined net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	-60.66		
	Hedgerow units	-12.56		
	Watercourse units	-0.33		
Spatial risk multiplier (SRM) deductions	*Habitat units*	0.00		
	Hedgerow units	0.00		
	Watercourse units	0.00		

FINAL RESULTS

Total net unit change (Including all on-site & off-site habitat retention, creation & enhancement)	*Habitat units*	-60.66
	Hedgerow units	-12.56
	Watercourse units	-0.33

Total net % change (Including all on-site & off-site habitat retention, creation & enhancement)			
	Habitat units	-24.22%	Total net gain achieved is less than target set ⚠
	Hedgerow units	-36.52%	Total net gain achieved is less than target set ⚠
	Watercourse units	-3.03%	Total net gain achieved is less than target set ⚠

Trading rules satisfied?	No - Check Trading Summaries ▲

Unit Type	Target	Baseline Units	Units Required	Unit Deficit
Habitat units	10.00%	250.45	275.50	85.71
Hedgerow units	10.00%	34.41	37.85	16.00
Watercourse units	10.00%	10.77	11.85	1.40

Project Name: White Cross onshore cabling Map Reference:

A-1 On-Site Habitat Baseline

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

Area habitat summary	
Total Net Unit Change	-60.66
Total Net % Change	-24.22%
Trading Rules Satisfied	No - check trading summaries ▲

A 'Fairly' Category has been used - check evidence to ensure this is appropriate ⚠

	Existing area habitats			Distinctiveness	Condition	Strategic significance	Required Action to Meet Trading Rules	Ecological baseline	Retention category biodiversity value						Bespoke compensation agreed for unacceptable losses	Comments		
Ref	Broad Habitat	Habitat Type	Area (hectares)	Distinctiveness	Condition	Strategic significance		Total habitat units	Area retained	Area enhanced	Baseline units retained	Baseline units enhanced	Area habitat lost	Units lost		User comments	Consenting body comments	GIS reference number
1	Urban	Developed land; sealed surface	0.00293574	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0029357		0.00	0.00	0.00	0.00		Within working width but no effects expected.		1015
2	Grassland	Other neutral grassland	0.555414591	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	4.44	0		0.00	0.00	0.56	4.44		Permanent loss.		1024
3	Urban	Artificial unvegetated, unsealed surface	0.006236881	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0062369		0.00	0.00	0.00	0.00		Outside working width, no effects.		1025
4	Heathland and shrub	Mixed scrub	0.027418323	Medium	Fairly Good	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.27	0.0274183		0.27	0.00	0.00	0.00		Partially within working width, no effects.		1026
5	Urban	Developed land; sealed surface	0.006418773	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0064188		0.00	0.00	0.00	0.00		Outside working width, no effects.		1031
6	Heathland and shrub	Mixed scrub	0.332521216	Medium	Good	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	3.99	0.2840722		3.41	0.00	0.05	0.58		Partial loss during construction then reinstated		1032
7	Grassland	Modified grassland	1.465963039	Low	Poor	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	3.37	1.465963		3.37	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1038
8	Grassland	Other neutral grassland	0.667879407	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	5.34	0.2302864		1.84	0.00	0.44	3.50		Partially within working width. Asumed partial loss during haul road construction then reinstated		1042
9	Grassland	Floodplain wetland mosaic and CFGM	0.462901417	High	Moderate	Location ecologically desirable but not in local strategy	Same habitat required =	6.11	0.0799014		1.05	0.00	0.38	5.06		Partial permanent loss, assumes retention of area outside substation development.		1044
10	Grassland	Other neutral grassland	0.593532404	Medium	Good	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	7.12	0.156947		1.88	0.00	0.44	5.24		Not considered OMH due to absence of ponds and bare ground and presence of scrub. Partial permanent loss.		1045
11	Urban	Developed land; sealed surface	0.084557608	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0445576		0.00	0.00	0.04	0.00		Partial permanent loss.		1046
12	Cropland	Cereal crops	2.231764488	Low	Condition Assessment N/A	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	5.13	2.2317645		5.13	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1053
13	Sparsely vegetated land	Ruderal/Ephemeral	0.113343183	Low	Fairly Good	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.57	0.1133432		0.57	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1058
14	Sparsely vegetated land	Ruderal/Ephemeral	0.015005068	Low	Fairly Good	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.08	0.0150051		0.08	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1059
15	Sparsely vegetated land	Ruderal/Ephemeral	0.033734886	Low	Fairly Good	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.17	0.0337349		0.17	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1060
16	Urban	Built linear features	0.379294857	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.3792949		0.00	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1062
17	Grassland	Floodplain wetland mosaic and CFGM	0.052863435	High	Moderate	Location ecologically desirable but not in local strategy	Same habitat required =	0.70	0.0413434		0.55	0.00	0.01	0.15		Partial loss during construction then reinstated. Asumes 60% of working width affected by haul road, remainder assumed to re-establish within 2 yrs		1097
18	Grassland	Floodplain wetland mosaic and CFGM	0.005997255	High	Moderate	Location ecologically desirable but not in local strategy	Same habitat required =	0.08	0.0059973		0.08	0.00	0.00	0.00		Outside working width, no effects.		1101
19	Rocky shore	Low energy littoral rock	0.006534339	High	Good	Location ecologically desirable but not in local strategy	Same habitat required =	0.13	0.0065343		0.13	0.00	0.00	0.00		Outside working width, no effects.		1103
20	Intertidal sediment	Littoral muddy sand	0.000587317	High	Good	Location ecologically desirable but not in local strategy	Same habitat required =	0.01	0.0005873		0.01	0.00	0.00	0.00		Outside working width, no effects.		1104
21	Grassland	Floodplain wetland mosaic and CFGM	0.000230132	High	Moderate	Formally identified in local strategy	Same habitat required =	0.00	0.0002301		0.00	0.00	0.00	0.00		Outside working width, no effects.		1109
22	Grassland	Modified grassland	2.590932948	Low	Poor	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	5.96	2.5909329		5.96	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1123
23	Grassland	Modified grassland	0.706760036	Low	Poor	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	1.63	0.70676		1.63	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1125
24	Grassland	Floodplain wetland mosaic and CFGM	0.800448634	High	Good	Formally identified in local strategy	Same habitat required =	16.57	0.5533697		11.45	0.00	0.25	5.11		Partial loss during construction then reinstated. Assumes 60% of working width affected by haul road, remainder assumed to re-establish within 2 yrs		1126
25	Grassland	Modified grassland	4.406654412	Low	Poor	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	10.14	4.4066544		10.14	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1127
26	Urban	Built linear features	0.221067629	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.2210676		0.00	0.00	0.00	0.00		Outside working width, no effects.		1128
27	Urban	Built linear features	0.085415934	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0854159		0.00	0.00	0.00	0.00		Outside working width, no effects.		1133
28	Heathland and shrub	Mixed scrub	7.87911E-06	Medium	Good	Formally identified in local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.00	7.879E-06		0.00	0.00	0.00	0.00		Outside working width, no effects.		1134
29	Coastal saltmarsh	Saltmarshes and saline reedbeds	0.036391266	High	Good	Formally identified in local strategy	Same habitat required =	0.75	0.0363913		0.75	0.00	0.00	0.00		Outside working width, no effects.		1136
30	Grassland	Modified grassland	1.292166297	Low	Poor	Location ecologically desirable but not in local strategy	Same distinctiveness or better habitat required ≥	2.84	1.2921663		2.84	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1163
31	Grassland	Floodplain wetland mosaic and CFGM	0.807236911	High	Good	Location ecologically desirable but not in local strategy	Same habitat required =	15.98	0.5258909		10.41	0.00	0.28	5.57		Partial loss during construction then reinstated. Assumes 60% of working width affected by haul road, remainder assumed to re-establish within 2 yrs		1166
32	Grassland	Floodplain wetland mosaic and CFGM	0.000904588	High	Good	Location ecologically desirable but not in local strategy	Same habitat required =	0.02	0.0009046		0.02	0.00	0.00	0.00		Assumed protected from works, no effects.		1167
33	Wetland	Fens (upland and lowland)	0.513338467	V.High	Good	Formally identified in local strategy	Bespoke compensation likely to be required ☐	14.17	0.5133385		14.17	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1168
34	Cropland	Cereal crops	1.117884667	Low	Condition Assessment N/A	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	2.24	1.1178847		2.24	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1172
35	Urban	Built linear features	0.001505899	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0015059		0.00	0.00	0.00	0.00		Outside working width, no effects.		1183
36	Cropland	Cereal crops	2.042307587	Low	Condition Assessment N/A	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	4.08	2.0423076		4.08	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1218
37	Cropland	Cereal crops	0.786432656	Low	Condition Assessment N/A	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	1.57	0.7864327		1.57	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1219
38	Cropland	Cereal crops	0.80794429	Low	Condition Assessment N/A	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	1.62	0.8079443		1.62	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1220
39	Cropland	Cereal crops	0.494136353	Low	Condition Assessment N/A	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.99	0.4941364		0.99	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1225
40	Cropland	Cereal crops	0.951365556	Low	Condition Assessment N/A	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	1.90	0.9513656		1.90	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1226
41	Cropland	Cereal crops	1.037142286	Low	Condition Assessment N/A	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	2.07	1.0371423		2.07	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1227
42	Grassland	Floodplain wetland mosaic and CFGM	0.074534434	High	Good	Formally identified in local strategy	Same habitat required =	1.54	0.0298138		0.62	0.00	0.04	0.93		Partial loss during construction then reinstated. Assumes 60% of working width affected by haul road, remainder assumed to re-establish within 2 yrs		1232
43	Grassland	Floodplain wetland mosaic and CFGM	1.222600942	High	Good	Formally identified in local strategy	Same habitat required =	25.31	0.8608009		17.82	0.00	0.36	7.49		Assumed HDD and bailey bridge to achieve no effects and re-established within 2yrs.		1233
44	Grassland	Floodplain wetland mosaic and CFGM	0.840979996	High	Good	Formally identified in local strategy	Same habitat required =	17.41	0.622652		12.89	0.00	0.22	4.52		Partial loss during construction then reinstated. Assumes 60% of working width affected by haul road, remainder assumed to re-establish within 2 yrs		1250
45	Grassland	Floodplain wetland mosaic and CFGM	0.836876149	High	Good	Formally identified in local strategy	Same habitat required =	17.32	0.610553		12.64	0.00	0.23	4.68		Partial loss during construction then reinstated. Assumes 60% of working width affected by haul road, remainder assumed to re-establish within 2 yrs		1251
46	Grassland	Floodplain wetland mosaic and CFGM	0.210346477	High	Good	Formally identified in local strategy	Same habitat required =	4.35	0.1435725		2.97	0.00	0.07	1.38		Partial loss during construction then reinstated. Assumes 60% of working width affected by haul road, remainder assumed to re-establish within 2 yrs		1252
47	Urban	Built linear features	0.002474933	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0024749		0.00	0.00	0.00	0.00		Outside working width, no effects.		1255
48	Cropland	Cereal crops	6.735170431	Low	Condition Assessment N/A	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	13.47	6.7351704		13.47	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1314
49	Lakes	Ponds (non-priority habitat)	0.013401188	Medium	Moderate	Formally identified in local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.12	0.0134012		0.12	0.00	0.00	0.00		Assumed protected from works, no effects.		1380
50	Lakes	Ponds (non-priority habitat)	0.001381228	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.01	0.0013812		0.01	0.00	0.00	0.00		Assumed protected from works, no effects.		1382
51	Sparsely vegetated land	Ruderal/Ephemeral	0.175852047	Low	Moderate	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.70	0.175852		0.70	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1400
52	Urban	Open mosaic habitats on previously developed land	0.08556954	High	Moderate	Location ecologically desirable but not in local strategy	Same habitat required =	1.13	0.0855695		1.13	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1404
53	Grassland	Modified grassland	1.940798048	Low	Poor	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	3.88	1.940798		3.88	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1405
54	Heathland and shrub	Gorse scrub	9.40967E-05	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.00	9.41E-05		0.00	0.00	0.00	0.00		Outside working width, no effects.		1406
55	Grassland	Modified grassland	1.124504173	Low	Poor	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	2.59	1.1245042		2.59	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1407
56	Grassland	Floodplain wetland mosaic and CFGM	1.393832274	High	Good	Formally identified in local strategy	Same habitat required =	28.85	0.0641217		1.33	0.00	1.33	27.53		Partial loss during construction then reinstated		1505
57	Sparsely vegetated land	Coastal sand dunes	0.003129396	High	Fairly Good	Location ecologically desirable but not in local strategy	Same habitat required =	0.05	0.0031294		0.05	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1512
58	Urban	Built linear features	0.099829616	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0998296		0.00	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1514
59	Woodland and forest	Other woodland; broadleaved	0.437252054	Medium	Fairly Good	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	4.37	0.3962521		3.96	0.00	0.04	0.41		Assumed protected from works, no effects.		1517
60	Urban	Built linear features	0.072786703	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0727867		0.00	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1518
61	Woodland and forest	Wet woodland	0.126553447	High	Good	Location ecologically desirable but not in local strategy	Same habitat required =	2.51	0.1265534		2.51	0.00	0.00	0.00		Assumed protected from works, no effects.		1519
62	Heathland and shrub	Mixed scrub	0.01204174	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.10	0.0001242		0.00	0.00	0.01	0.10		Partial loss during construction then reinstated		1600
63	Heathland and shrub	Mixed scrub	0.005432702	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.04	0		0.00	0.00	0.01	0.04		Loss during construction then reinstated		1601
64	Grassland	Modified grassland	0.024317896	Low	Moderate	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.10	0.0243179		0.10	0.00	0.00	0.00		Within working width but no effects expected.		1602
65	Grassland	Modified grassland	0.564373941	Low	Moderate	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	2.26	0.5643739		2.26	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1603
66	Grassland	Modified grassland	0.006307276	Low	Moderate	Location ecologically desirable but not in local strategy	Same distinctiveness or better habitat required ≥	0.03	0.0063073		0.03	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1604
67	Grassland	Modified grassland	0.002939932	Low	Moderate	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.01	0.0029399		0.01	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1605
68	Grassland	Modified grassland	0.001690483	Low	Moderate	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.01	0.0016905		0.01	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1606
69	Lakes	Ponds (non-priority habitat)	0.001512823	Medium	Moderate	Formally identified in local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.01	0.0015128		0.01	0.00	0.00	0.00		Assumed protected from works, no effects.		1607
70	Lakes	Ponds (non-priority habitat)	0.000652445	Medium	Moderate	Formally identified in local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.01	0.0006524		0.01	0.00	0.00	0.00		Assumed protected from works, no effects.		1608
71	Lakes	Ponds (non-priority habitat)	0.000414746	Medium	Moderate	Formally identified in local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.00	0.0004147		0.00	0.00	0.00	0.00		Assumed protected from works, no effects.		1609
72	Urban	Developed land; sealed surface	0.04933128	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0493313		0.00	0.00	0.00	0.00		Within working width but no effects expected.		1610
73	Cropland	Cereal crops	0.234657452	Low	Condition Assessment N/A	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	0.54	0.2346575		0.54	0.00	0.00	0.00		No effects, assumed re-established within 2yrs.		1611
74	Heathland and shrub	Mixed scrub	1.6386E-05	Medium	Moderate	Formally identified in local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.00	1.639E-05		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1612
75	Heathland and shrub	Mixed scrub	0.013771275	Medium	Good	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.17	0.0137713		0.17	0.00	0.00	0.00		Access track verge, no effects expected		1613
76	Heathland and shrub	Mixed scrub	0.004071863	Medium	Good	Area/compensation not in local strategy/ no local strategy	Same broad habitat or a higher distinctiveness habitat required (≥)	0.05	0.0040719		0.05	0.00	0.00	0.00		Access track verge, no effects expected		1614
77	Woodland and forest	Wet woodland	0.009172142	High	Moderate	Location ecologically desirable but not in local strategy	Same habitat required =	0.12	0.0091721		0.12	0.00	0.00	0.00		Access track verge, no effects expected		1615
78	Grassland	Modified grassland	0.012191251	Low	Moderate	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.05	0.0121913		0.05	0.00	0.00	0.00		Access track verge, no effects expected		1616
79	Grassland	Modified grassland	0.000159324	Low	Moderate	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.00	0.0001593		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1617
80	Grassland	Modified grassland	0.043888577	Low	Moderate	Area/compensation not in local strategy/ no local strategy	Same distinctiveness or better habitat required ≥	0.18	0.0438886		0.18	0.00	0.00	0.00		Access track verge, no effects expected		1618
81	Sparsely vegetated land	Coastal sand dunes	0.018046517	High	Good	Formally identified in local strategy	Same habitat required =	0.37	0.0180465		0.37	0.00	0.00	0.00		Access track verge, no effects expected		1619
82	Sparsely vegetated land	Coastal sand dunes	0.007221884	High	Good	Formally identified in local strategy	Same habitat required =	0.15	0.0072219		0.15	0.00	0.00	0.00		Access track verge, no effects expected		1620
83	Sparsely vegetated land	Coastal sand dunes	0.000308263	High	Moderate	Location ecologically desirable but not in local strategy	Same habitat required =	0.00	0.0003083		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1621
84	Sparsely vegetated land	Coastal sand dunes	0.00277881	High	Moderate	Formally identified in local strategy	Same habitat required =	0.04	0.0027788		0.04	0.00	0.00	0.00		Access track verge, no effects expected		1622
85	Sparsely vegetated land	Coastal sand dunes	0.001471576	High	Moderate	Formally identified in local strategy	Same habitat required =	0.02	0.0014716		0.02	0.00	0.00	0.00		Access track verge, no effects expected		1623
86	Sparsely vegetated land	Coastal sand dunes	0.002328212	High	Moderate	Formally identified in local strategy	Same habitat required =	0.03	0.0023282		0.03	0.00	0.00	0.00		Access track verge, no effects expected		1624
87	Sparsely vegetated land	Coastal sand dunes	9.13701E-06	High	Moderate	Location ecologically desirable but not in local strategy	Same habitat required =	0.00	9.137E-06		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1625
88	Sparsely vegetated land	Coastal sand dunes	0.002002037	High	Moderate	Location ecologically desirable but not in local strategy	Same habitat required =	0.03	0.002002		0.03	0.00	0.00	0.00		Access track verge, no effects expected		1626
89	Sparsely vegetated land	Coastal sand dunes	0.000869556	High	Moderate	Formally identified in local strategy	Same habitat required =	0.01	0.0008696		0.01	0.00	0.00	0.00		Access track verge, no effects expected		1627
90	Sparsely vegetated land	Coastal sand dunes	0.012171868	High	Moderate	Formally identified in local strategy	Same habitat required =	0.17	0.0121719		0.17	0.00	0.00	0.00		Access track verge, no effects expected		1628
91	Sparsely vegetated land	Coastal sand dunes	0.002687431	High	Moderate	Formally identified in local strategy	Same habitat required =	0.04	0.0026874		0.04	0.00	0.00	0.00		Access track verge, no effects expected		1629
92	Urban	Developed land; sealed surface	0.002621679	V.Low	N/A - Other	Formally identified in local strategy	Compensation Not Required	0.00	0.0026217		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1630
93	Urban	Developed land; sealed surface	0.007882224	V.Low	N/A - Other	Formally identified in local strategy	Compensation Not Required	0.00	0.0078822		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1631
94	Urban	Vacant or derelict land	0.186667067	Low	Good	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	1.29	0.1866671		1.29	0.00	0.00	0.00		Access track, no effects expected		1632
95	Urban	Vacant or derelict land	0.139622969	Low	Good	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	0.96	0.139623		0.96	0.00	0.00	0.00		Access track, no effects expected		1633
96	Urban	Vacant or derelict land	0.000181791	Low	Good	Formally identified in local strategy	Same distinctiveness or better habitat required ≥	0.00	0.0001818		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1634
97	Urban	Developed land; sealed surface	0.003388271	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Compensation Not Required	0.00	0.0033883		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1635
98	Urban	Developed land; sealed surface	0.000661632	V.Low	N/A - Other	Formally identified in local strategy	Compensation Not Required	0.00	0.0006616		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1636
99	Urban	Developed land; sealed surface	0.000122135	V.Low	N/A - Other	Formally identified in local strategy	Compensation Not Required	0.00	0.0001221		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1637
100	Urban	Developed land; sealed surface	0.000343463	V.Low	N/A - Other	Formally identified in local strategy	Compensation Not Required	0.00	0.0003435		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1638
101	Urban	Developed land; sealed surface	0.001264657	V.Low	N/A - Other	Formally identified in local strategy	Compensation Not Required	0.00	0.0012647		0.00	0.00	0.00	0.00		Access track verge, no effects expected		1639
102																		
103																		
104																		
105																		
106																		
		Total habitat area	42.52					250.45	37.78	0.00	173.72	0.00	4.75	76.73				
		Site Area (Excluding area of Individual trees and Green walls)	42.52															

Total area lost (excluding area of Individual trees and Green walls)	4.75

M² to hectares conversion tool:	Select a unit	Hectares	M²

Project Name: White Cross onshore cabling Map Reference:

A-2 On-Site Habitat Creation

Condense / Show Columns | Condense / Show Rows

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Area habitat summary	
Total Net Unit Change	-60.66
Total Net % Change	-24.22%
Trading Rules Satisfied	No - check trading summaries ▲
Area Check (excluding individual trees and green walls)	Area Acceptable ✓

Note; Habitat selected has a time to target condition greater than 30 years. Non-standard agreement may be

Post development/ post intervention habitats												
			Distinctiveness	Condition	Strategic significance	Temporal multiplier		Difficulty		Comments		
Broad Habitat	Proposed habitat	Area (hectares)	Distinctiveness	Condition	Strategic significance	Standard or adjusted time to target condition	Final time to target condition (years)	Final difficulty of creation	Habitat units delivered	User comments	Consenting body comments	GIS reference number
Heathland and shrub	Mixed scrub	0.048449027	Medium	Good	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	12	Low	0.38	Assume like-for-like reintatement of lost habitat		1032
Grassland	Other neutral grassland	0.437592967	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	2.73	Assume like-for-like reintatement of lost habitat		1042
Grassland	Floodplain wetland mosaic and CFGM	0.01152	High	Moderate	Location ecologically desirable but not in local strategy	Check details- Delay in starting habitat in required condition? ⚠	12	High	0.03	Assume like-for-like reintatement of lost habitat		1097
Grassland	Floodplain wetland mosaic and CFGM	0.247078949	High	Good	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	22	High	0.77	Assume like-for-like reintatement of lost habitat		1126
Grassland	Floodplain wetland mosaic and CFGM	0.3618	High	Good	Formally identified in local strategy	Standard time to target condition applied	20	High	1.21	Assume like-for-like reintatement of lost habitat		1233
Grassland	Floodplain wetland mosaic and CFGM	0.281346	High	Good	Location ecologically desirable but not in local strategy	Standard time to target condition applied	20	High	0.90	Assume like-for-like reintatement of lost habitat		1166
Grassland	Floodplain wetland mosaic and CFGM	0.04472066	High	Good	Formally identified in local strategy	Standard time to target condition applied	20	High	0.15	Assume like-for-like reintatement of lost habitat		1232
Grassland	Floodplain wetland mosaic and CFGM	1.329710567	High	Good	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	22	High	4.15	Assume like-for-like reintatement of lost habitat		1505
Heathland and shrub	Mixed scrub	0.011917579	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.07	Assume like-for-like reintatement of lost habitat		1600
Heathland and shrub	Mixed scrub	0.005432702	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.03	Assume like-for-like reintatement of lost habitat		1601
Heathland and shrub	Mixed scrub	0.036	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.22	Substation landscape, assumes native species-rich planting mix and management to pass criteria A, C, D and E		
Grassland	Other neutral grassland	0.212	Medium	Good	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	12	Low	1.66	Substation landscape, assumes native species-rich planting mix and management to pass criteria A, B, D, E and F		
Woodland and forest	Other woodland; mixed	0.332	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	30+	Low	0.85	Substation landscape, assumes native species-rich planting mix and management to meet criteria A2, B3, C3, D3, E3, F3, G2, H3, I1, J2, K1, L2, M1 = condition score 29		
Urban	Developed land; sealed surface	0.59	V.Low	N/A - Other	Area/compensation not in local strategy/ no local strategy	Standard time to target condition applied	2	Medium	0.00	Substation hardstanding and access track		
Urban	Sustainable drainage system	0.057356	Low	Good	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Medium	0.18	Substation detention basin, assumes species-rich planting mix and management to meet criteria A, B and C		
Grassland	Modified grassland	0.233517	Low	Good	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	9	Low	1.02	Substation embankment, assumes species-rich lawn mix and management to meet criteria A, B, C, D, F and G		
Grassland	Floodplain wetland mosaic and CFGM	0.218328	High	Good	Formally identified in local strategy	Standard time to target condition applied	20	High	0.73	Assume like-for-like reintatement of lost habitat		1250
Grassland	Floodplain wetland mosaic and CFGM	0.226323109	High	Good	Formally identified in local strategy	Standard time to target condition applied	20	High	0.76	Assume like-for-like reintatement of lost habitat		1251
Grassland	Floodplain wetland mosaic and CFGM	0.066774	High	Good	Formally identified in local strategy	Standard time to target condition applied	20	High	0.22	Assume like-for-like reintatement of lost habitat		1252
	Total habitat area	4.75							16.07			

Site Area (Excluding area of Individual trees and Green walls)	4.75		
M² to hectares conversion tool:	Select a unit	Hectares	M²

Project Name: White Cross onshore cabling Map Reference:

B-1 On-Site Hedge Baseline

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

Hedgerow summary	
Total Net Unit Change	-12.56
Total Net % Change	-36.52%
Trading Rules Satisfied	No - check trading summary ▲

	Existing hedgerow habitats			Distinctiveness	Condition	Strategic significance	Required Action to Meet Trading Rules	Ecological baseline	Retention category biodiversity value						Comments		
Baseline ref	Hedge number	Hedgerow type	Length (km)	Distinctiveness	Condition	Strategic significance		Total hedgerow units	Length retained	Length enhanced	Units retained	Units enhanced	Length lost	Units lost	User comments	Consenting body comments	GIS reference number
1	42	Native hedgerow	0.054299	Low	Moderate	Formally identified in local strategy	Same distinctiveness band or better	0.25	0.05429893		0.25	0.00	0.00	0.00	Outside working width, no effects.		42
2	45	Species-rich native hedgerow - associated with bank or ditch	0.002653	High	Moderate	Formally identified in local strategy	Like for like or better	0.04	0.00265326		0.04	0.00	0.00	0.00	Outside working width, no effects.		45
3	47	Species-rich native hedgerow - associated with bank or ditch	0.099453	High	Moderate	Formally identified in local strategy	Like for like or better	1.37	0.09945344		1.37	0.00	0.00	0.00	Within working width but no effects expected.		47
4	49	Species-rich native hedgerow - associated with bank or ditch	0.085733	High	Moderate	Formally identified in local strategy	Like for like or better	1.18	0.06573275		0.91	0.00	0.02	0.28	Partial loss during construction then reinstated		49
5	50	Species-rich native hedgerow - associated with bank or ditch	0.006886	High	Moderate	Formally identified in local strategy	Like for like or better	0.10	0.00688557		0.10	0.00	0.00	0.00	Within working width but no effects expected.		50
6	51	Species-rich native hedgerow - associated with bank or ditch	0.08835	High	Moderate	Formally identified in local strategy	Like for like or better	1.22	0.07835026		1.08	0.00	0.01	0.14	Partial loss during construction then reinstated		51
7	52	Species-rich native hedgerow - associated with bank or ditch	0.088127	High	Moderate	Formally identified in local strategy	Like for like or better	1.22	0.0781275		1.08	0.00	0.01	0.14	Partial loss during construction then reinstated		52
8	59	Species-rich native hedgerow - associated with bank or ditch	0.070848	High	Moderate	Formally identified in local strategy	Like for like or better	0.98	0.05084788		0.70	0.00	0.02	0.28	Partial loss during construction then reinstated		59
9	60	Species-rich native hedgerow - associated with bank or ditch	0.104231	High	Moderate	Formally identified in local strategy	Like for like or better	1.44	0.08423129		1.16	0.00	0.02	0.28	Partial loss during construction then reinstated		60
10	61	Species-rich native hedgerow - associated with bank or ditch	0.037435	High	Moderate	Formally identified in local strategy	Like for like or better	0.52	0		0.00	0.00	0.04	0.52	Permanent loss		61
11	62	Species-rich native hedgerow - associated with bank or ditch	0.004844	High	Moderate	Formally identified in local strategy	Like for like or better	0.07	0		0.00	0.00	0.00	0.07	Permanent loss		62
12	63	Native hedgerow - associated with bank or ditch	0.051223	Medium	Moderate	Formally identified in local strategy	Same distinctiveness band or better	0.47	0.02122303		0.20	0.00	0.03	0.28	Partial loss during construction then reinstated		63
13	64	Species-rich native hedgerow - associated with bank or ditch	0.139593	High	Moderate	Formally identified in local strategy	Like for like or better	1.93	0.11959322		1.65	0.00	0.02	0.28	Partial loss during construction then reinstated		64
14	65	Native hedgerow - associated with bank or ditch	0.012831	Medium	Moderate	Formally identified in local strategy	Same distinctiveness band or better	0.12	0.00583106		0.05	0.00	0.01	0.06	Partial loss during construction then reinstated		65
15	66	Native hedgerow - associated with bank or ditch	0.06377	Medium	Moderate	Formally identified in local strategy	Same distinctiveness band or better	0.59	0.0437703		0.40	0.00	0.02	0.18	Partial loss during construction then reinstated		66
16	67	Species-rich native hedgerow - associated with bank or ditch	0.103672	High	Moderate	Formally identified in local strategy	Like for like or better	1.43	0.07367212		1.02	0.00	0.03	0.41	Partial loss during construction then reinstated		67
17	71	Native hedgerow - associated with bank or ditch	0.299533	Medium	Moderate	Formally identified in local strategy	Same distinctiveness band or better	2.76	0		0.00	0.00	0.30	2.76	Within working width but no effects expected.		71
18	72	Species-rich native hedgerow - associated with bank or ditch	0.003242	High	Moderate	Formally identified in local strategy	Like for like or better	0.04	0		0.00	0.00	0.00	0.04	Within working width but no effects expected.		72
19	73	Species-rich native hedgerow - associated with bank or ditch	0.007327	High	Moderate	Formally identified in local strategy	Like for like or better	0.10	0		0.00	0.00	0.01	0.10	Within working width but no effects expected.		73
20	75	Native hedgerow - associated with bank or ditch	0.040838	Medium	Moderate	Formally identified in local strategy	Same distinctiveness band or better	0.38	0.01083843		0.10	0.00	0.03	0.28	Partial loss during construction then reinstated		75
21	77	Native hedgerow - associated with bank or ditch	0.127457	Medium	Moderate	Formally identified in local strategy	Same distinctiveness band or better	1.17	0.11545676		1.06	0.00	0.01	0.11	Partial loss during construction then reinstated		77
22	78	Species-rich native hedgerow - associated with bank or ditch	0.003487	High	Moderate	Formally identified in local strategy	Like for like or better	0.05	0.00348735		0.05	0.00	0.00	0.00	Outside working width, no effects.		78
23	80	Native hedgerow - associated with bank or ditch	0.077903	Medium	Good	Formally identified in local strategy	Same distinctiveness band or better	1.08	0		0.00	0.00	0.08	1.08	Within working width but no effects expected.		80
24	85	Species-rich native hedgerow with trees	0.140322	High	Moderate	Formally identified in local strategy	Like for like or better	1.94	0		0.00	0.00	0.14	1.94	Within working width but no effects expected.		85
25	86	Species-rich native hedgerow with trees - associated with bank or ditch	0.041191	V.High	Moderate	Formally identified in local strategy	Like for like	0.76	0.0311913		0.57	0.00	0.01	0.18	Partial loss during construction then reinstated		86
26	88	Native Hedgerow with trees - Associated with bank or ditch	0.174901	High	Moderate	Formally identified in local strategy	Like for like or better	2.41	0.14490082		2.00	0.00	0.03	0.41	Partial loss during construction then reinstated		88
27	92	Native hedgerow	0.06229	Low	Moderate	Formally identified in local strategy	Same distinctiveness band or better	0.29	0.0422902		0.19	0.00	0.02	0.09	Partial loss during construction then reinstated		92
28	93	Native hedgerow	0.047999	Low	Moderate	Formally identified in local strategy	Same distinctiveness band or better	0.22	0.02799876		0.13	0.00	0.02	0.09	Partial loss during construction then reinstated		93
29	94	Native Hedgerow with trees - Associated with bank or ditch	0.058252	High	Moderate	Formally identified in local strategy	Like for like or better	0.80	0.03825182		0.53	0.00	0.02	0.28	Partial loss during construction then reinstated		94
30	102	Species-rich native hedgerow with trees - associated with bank or ditch	0.067689	V.High	Moderate	Formally identified in local strategy	Like for like	1.25	0.05768879		1.06	0.00	0.01	0.18	Partial loss during construction then reinstated		102
31	103	Species-rich native hedgerow with trees - associated with bank or ditch	0.091492	V.High	Moderate	Formally identified in local strategy	Like for like	1.68	0.0814918		1.50	0.00	0.01	0.18	Partial loss during construction then reinstated		103
32	105	Native hedgerow - associated with bank or ditch	0.031276	Medium	Moderate	Formally identified in local strategy	Same distinctiveness band or better	0.29	0.01127615		0.10	0.00	0.02	0.18	Partial loss during construction then reinstated		105
33	107	Species-rich native hedgerow - associated with bank or ditch	0.057881	High	Moderate	Formally identified in local strategy	Like for like or better	0.80	0.03788089		0.52	0.00	0.02	0.28	Partial loss during construction then reinstated		107
34	110	Species-rich native hedgerow - associated with bank or ditch	0.003046	High	Moderate	Formally identified in local strategy	Like for like or better	0.04	0		0.00	0.00	0.00	0.04	Loss during construction then reinstated		110
35	115	Species-rich native hedgerow - associated with bank or ditch	0.019357	High	Moderate	Formally identified in local strategy	Like for like or better	0.27	0		0.00	0.00	0.02	0.27	Outside working width, no effects.		115
36	131	Native hedgerow - associated with bank or ditch	0.363122	Medium	Moderate	Formally identified in local strategy	Same distinctiveness band or better	3.34	0		0.00	0.00	0.36	3.34	Outside working width, no effects.		131
37	150	Species-rich native hedgerow	0.06145	Medium	Poor	Formally identified in local strategy	Same distinctiveness band or better	0.28	0.04144988		0.19	0.00	0.02	0.09	Partial loss during construction then reinstated. Coppiced section assumed will re-establish within 2yrs.		150
38	151	Non-native and ornamental hedgerow	0.065054	V.Low	Poor	Formally identified in local strategy	Same distinctiveness band or better	0.07	0		0.00	0.00	0.07	0.07	Coppiced section assumed will re-establish within 2yrs.		151
39	152	Native hedgerow - associated with bank or ditch	0.161415	Medium	Moderate	Formally identified in local strategy	Same distinctiveness band or better	1.49	0		0.00	0.00	0.16	1.49	Outside working width, no effects.		152
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Project Name: White Cross onshore cabling Map Reference:

B-2 On-Site Hedge Creation

Condense / Show Columns | Condense / Show Rows

Main Menu | Instructions

Hedgerow summary	
Total Net Unit Change	-12.56
Total Net % Change	-36.52%
Trading Rules Satisfied	No - check trading summary ▲

		Proposed habitats		Distinctiveness	Condition	Strategic significance	Temporal multiplier		Difficulty risk multipliers	Hedge units delivered	Comments		
Baseline ref	New hedge number	Habitat type	Length (km)	Distinctiveness	Condition	Strategic significance	Standard or adjusted time to target condition	Final time to target condition (years)	Final difficulty of creation		User comments	Consenting body comments	GIS reference number
1	49	Species-rich native hedgerow - associated with bank or ditch	0.02	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.22	Assume like-for-like reintatement of lost habitat		49
2	51	Species-rich native hedgerow - associated with bank or ditch	0.01	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.11	Assume like-for-like reintatement of lost habitat		51
3	52	Species-rich native hedgerow - associated with bank or ditch	0.01	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.11	Assume like-for-like reintatement of lost habitat		52
4	59	Species-rich native hedgerow - associated with bank or ditch	0.02	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.22	Assume like-for-like reintatement of lost habitat		59
5	60	Species-rich native hedgerow - associated with bank or ditch	0.02	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.22	Assume like-for-like reintatement of lost habitat		60
6	63	Native hedgerow - associated with bank or ditch	0.03	Medium	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.22	Assume like-for-like reintatement of lost habitat		63
7	64	Species-rich native hedgerow - associated with bank or ditch	0.02	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.22	Assume like-for-like reintatement of lost habitat		64
8	65	Native hedgerow - associated with bank or ditch	0.007	Medium	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.05	Assume like-for-like reintatement of lost habitat		65
9	66	Native hedgerow - associated with bank or ditch	0.02	Medium	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.14	Assume like-for-like reintatement of lost habitat		66
10	67	Species-rich native hedgerow - associated with bank or ditch	0.03	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.32	Assume like-for-like reintatement of lost habitat		67
11	75	Native hedgerow - associated with bank or ditch	0.03	Medium	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.22	Assume like-for-like reintatement of lost habitat		75
12	77	Native hedgerow - associated with bank or ditch	0.012	Medium	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.09	Assume like-for-like reintatement of lost habitat		77
13	86	Species-rich native hedgerow with trees - associated with bank or ditch	0.01	V.High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	12	Low	0.12	Assume like-for-like reintatement of lost habitat		86
14	88	Native Hedgerow with trees - Associated with bank or ditch	0.03	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	12	Low	0.27	Assume like-for-like reintatement of lost habitat		88
15	92	Native hedgerow	0.02	Low	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.07	Assume like-for-like reintatement of lost habitat		92
16	93	Native hedgerow	0.02	Low	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.07	Assume like-for-like reintatement of lost habitat		93
17	94	Native Hedgerow with trees - Associated with bank or ditch	0.02	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	12	Low	0.18	Assume like-for-like reintatement of lost habitat		94
18	102	Species-rich native hedgerow with trees - associated with bank or ditch	0.01	V.High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	12	Low	0.12	Assume like-for-like reintatement of lost habitat		102
19	103	Species-rich native hedgerow with trees - associated with bank or ditch	0.01	V.High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	12	Low	0.12	Assume like-for-like reintatement of lost habitat		103
20	105	Native hedgerow - associated with bank or ditch	0.02	Medium	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.14	Assume like-for-like reintatement of lost habitat		105
21	107	Species-rich native hedgerow - associated with bank or ditch	0.02	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.22	Assume like-for-like reintatement of lost habitat		107
22	110	Species-rich native hedgerow - associated with bank or ditch	0.03	High	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	0.32	Assume like-for-like reintatement of lost habitat		110
23	150	Species-rich native hedgerow	0.02	Medium	Poor	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	3	Low	0.08	Assume like-for-like reintatement of lost habitat		150
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Project Name: White Cross offshore cabling Map Reference:

C-1 On-Site WaterC' Baseline

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

Watercourse summary	
Total Net Unit Change	-0.33
Total Net % Change	-3.03%
Trading Rules Satisfied	No - check trading summary ▲

tegory has been used - check evidence to ensure this is app

Existing watercourse type			Distinctiveness	Condition	Strategic significance	Watercourse encroachment	Riparian encroachment	Required Action to Meet Trading Rules	Ecological baseline	Retention category biodiversity value						Bespoke compensation agreed for unacceptable losses	Comments		
Baseline ref	Watercourse type	Length (km)	Distinctiveness	Condition	Strategic significance	Extent of encroachment	Extent of encroachment for both banks		Total watercourse units	Length retained	Length enhanced	Units retained	Units enhanced	Length Lost	Units Lost		User Comments	Consenting body comments	GIS reference number
1	Ditches	0.0004	Medium	Fairly Good	Formally identified in local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.00	0.0004		0.00	0.00	0.00	0.00		Outside working width so no effects		29
2	Ditches	0.0025	Medium	Fairly Good	Formally identified in local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.03	0.0025		0.03	0.00	0.00	0.00		Outside working width so no effects		30
3	Ditches	0.0894	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.72	0.0594		0.48	0.00	0.03	0.24		Partial loss during construction then reinstated		31
4	Ditches	0.142	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	1.14	0.142		1.14	0.00	0.00	0.00		No effects		32
5	Ditches	0.117	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.94	0.117		0.94	0.00	0.00	0.00		No effects		33
6	Ditches	0.021	Medium	Moderate	Formally identified in local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.19	0.001		0.01	0.00	0.02	0.18		Partial loss during construction then reinstated		35
7	Ditches	0.0675	Medium	Moderate	Formally identified in local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.62	0.0675		0.62	0.00	0.00	0.00		Outside working width so no effects		36
8	Ditches	0.0086	Medium	Moderate	Formally identified in local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.08	0.0086		0.08	0.00	0.00	0.00		Outside working width so no effects		37
9	Ditches	0.0357	Medium	Fairly Good	Formally identified in local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.41	0.0157		0.18	0.00	0.02	0.23		Partial loss during construction then reinstated		38
10	Ditches	0.0784	Medium	Fairly Good	Area/compensation not in local strategy/ no local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.78	0.0684		0.68	0.00	0.01	0.10		Partial loss during construction then reinstated		43
11	Ditches	0.1218	Medium	Good	Formally identified in local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	1.68	0.1118		1.54	0.00	0.01	0.14		Partial loss during construction then reinstated		59
12	Ditches	0.1656	Medium	Good	Formally identified in local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	2.29	0.1656		2.29	0.00	0.00	0.00		Outside working width so no effects		60
13	Ditches	0.1472	Medium	Good	Area/compensation not in local strategy/ no local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	1.77	0.1372		1.65	0.00	0.01	0.12		Partial loss during construction then reinstated		62
14	Other rivers and streams	0.0026	High	Poor	Area/compensation not in local strategy/ no local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.02	0.0026		0.02	0.00	0.00	0.00		No effects		80
15	Other rivers and streams	0.0159	High	Poor	Area/compensation not in local strategy/ no local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.10	0.0039		0.02	0.00	0.01	0.07		CHECK ON CREATION TAB		81
16	Other rivers and streams	0.003	High	Poor	Area/compensation not in local strategy/ no local strategy	No Encroachment	No Encroachment/ No Encroachment	Same habitat required =	0.02	0		0.00	0.00	0.00	0.02		CHECK ON CREATION TAB		85
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Project Name: White Cross onshore cabling Map Reference:

C-2 On-Site WaterC' Creation

Condense / Show Columns | Condense / Show Rows | Main Menu | Instructions

Watercourse summary	
Total Net Unit Change	-0.33
Total Net % Change	-3.03%
Trading Rules Satisfied	- check trading summar

A 'Fairly' Category has been used - check evidence to ensure this is appropriate ⚠

	Proposed habitats		Distinctiveness	Condition	Strategic significance	Temporal multiplier		Difficulty multipliers	Watercourse encroachment	Riparian encroachment	Watercourse units delivered	Comments		
Baseline ref	Watercourse type	Length (km)	Distinctiveness	Condition	Strategic significance	Standard or adjusted time to target condition	Final time to target condition (years)	Final difficulty of creation	Extent of encroachment	Extent of encroachment for both banks		User comments	Consenting body comments	GIS reference number
1	Ditches	0.03	Medium	Moderate	Area/compensation not in local strategy/ no local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	No Encroachment	No Encroachment/ No Encroachment	0.19	Assume like-for-like reintatement of lost habitat		31
2	Ditches	0.02	Medium	Moderate	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	7	Low	No Encroachment	No Encroachment/ No Encroachment	0.14	Assume like-for-like reintatement of lost habitat		35
3	Ditches	0.02	Medium	Fairly Good	Formally identified in local strategy	Check details- Delay in starting habitat in required condition? ⚠	10	Low	No Encroachment	No Encroachment/ No Encroachment	0.16	Assume like-for-like reintatement of lost habitat		38
4	Ditches	0.01	Medium	Fairly Good	Area/compensation not in local strategy/ no local strategy	Standard time to target condition applied	8	Low	No Encroachment	No Encroachment/ No Encroachment	0.08	Assume like-for-like reintatement of lost habitat		43
5	Ditches	0.01	Medium	Good	Formally identified in local strategy	Standard time to target condition applied	10	Low	No Encroachment	No Encroachment/ No Encroachment	0.10	Assume like-for-like reintatement of lost habitat		59
6	Ditches	0.01	Medium	Good	Area/compensation not in local strategy/ no local strategy	Standard time to target condition applied	10	Low	No Encroachment	No Encroachment/ No Encroachment	0.08	Assume like-for-like reintatement of lost habitat		62
7	Other rivers and streams	0.012	High	Poor	Area/compensation not in local strategy/ no local strategy	Standard time to target condition applied	1	High	No Encroachment	No Encroachment/ No Encroachment	0.02	Assume like-for-like reintatement of lost habitat		81
8	Other rivers and streams	0.003	High	Poor	Area/compensation not in local strategy/ no local strategy	Standard time to target condition applied	1	High	No Encroachment	No Encroachment/ No Encroachment	0.01	Assume like-for-like reintatement of lost habitat		85
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WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.B Preliminary Ecological Appraisal Report

Appendix 16.B Preliminary Ecological Appraisal

White Cross Windfarm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 PEA rev02		
Client:	Offshore Wind Ltd. (OWL)		
Architect/Agent:	Royal HaskoningDHV		
Survey Date/s:	April & May 2022		
Report Date:	November 2022	**OS Grid Ref:**	SS 47933 32109 SS 46854 33424 SS 45734 34813 SS 45544 37296
Report Author/s:	Erin Reardon BSc PhD MCIEEM Dominic Sheldon BSc PgCert ACIEEM TechArborA Andrew Charles BSc (Hons) MSc MCIEEM		
GIS Mapping:	Erin Reardon BSc PhD MCIEEM		
Approved By:	Andrew Charles BSc (Hons) MSc MCIEEM		
Surveyor/s & Licence N°:	Andrew Charles	**Bats:** 2015-13738-CLS-CLS (Level 2) **Dormouse:** 2016-21680-CLS-CLS **GCN:** 2016-20368-CLS-CLS **Barn owl:** CL29/00098	
	Dominic Sheldon	**Bats:** 2015-13738-CLS-CLS (Level 2) **Dormouse:** 2015-18348-CLS-CLS **Badger:** CL35/0067 **FISC:** Level 5	

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Disclaimer

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake a Preliminary Ecological Appraisal (PEA) along the proposed onshore cable corridor routes for the White Cross Windfarm ("the Project").

The proposed onshore export cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1-1). There are two potential onshore export cable corridor routes. The first onshore export cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a second route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final preferred route is to be determined; see Figure 1.1).

The survey area consisted of the proposed onshore export cable corridor routes (see Figure 1.1).

The total survey area is approximately 400 ha and has been sub-divided into five areas, namely:

- Yelland – woodland, agricultural fields and coast;
- Braunton Marsh;
- Inland dunes, America Road & Sandy Lane;
- Outer dunes & Northern Boundary Track (habitats west of Sandy Lane carpark); and
- Sandy Lane Farm/agricultural fields & Saunton Sands dunes.

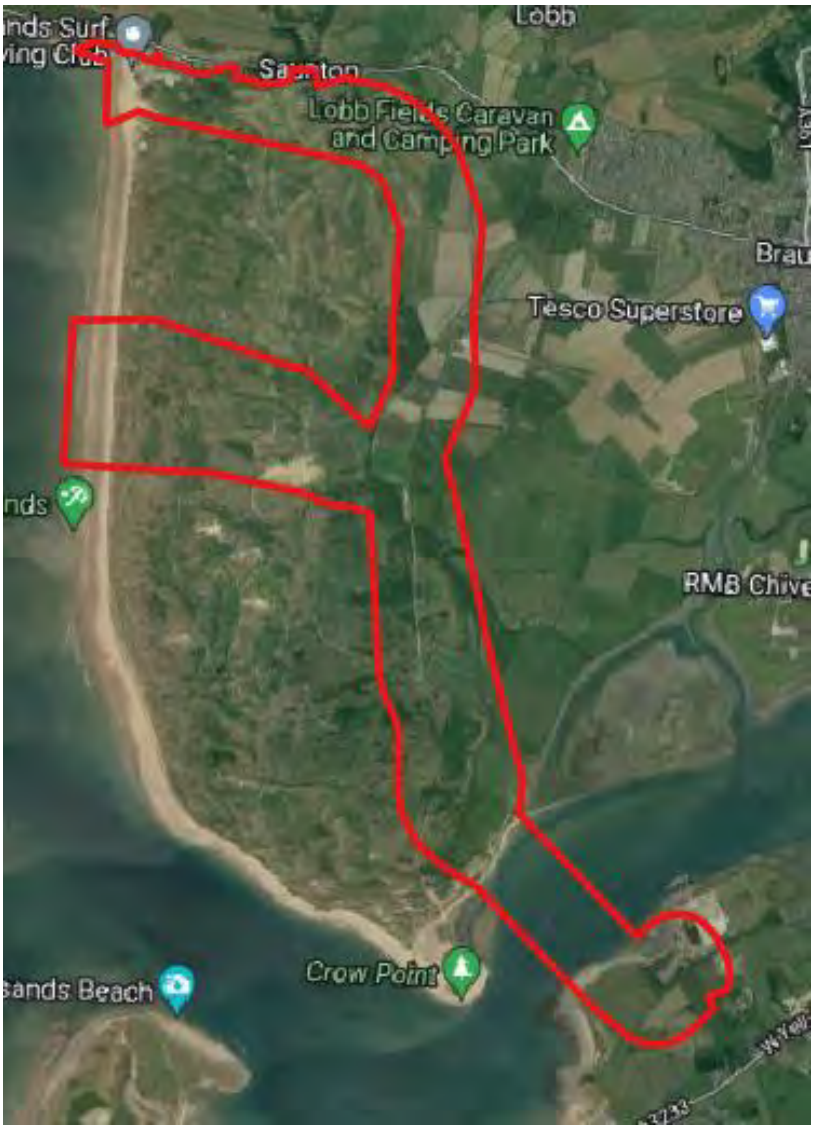

Figure 1-1. The proposed Onshore Export Cable Corridor PEA survey area

2. Survey Methods

2.1 Desk Study

An ecological desk study was undertaken for the survey area and its surroundings, including:

- Pre-existing ecological survey reports;
- Ecological data purchased from Devon Biodiversity Records Centre (DBRC); and,
- Review of the Government's mapping website MAGIC (www.magic.gov.uk).

DBRC

Data from DBRC included a search of the survey area, and all areas within 1 km of the PEA survey area boundary, which included details of statutory and non-statutory sites designated for nature conservation or interest, together with records pertaining to protected species and habitats and/or species and habitats of conservation concern.

MAGIC

Review of the Magic website (www.magic.gov.uk – April 2022) included a search of

- Priority Habitats – within the survey area and within 1 km of the survey area's boundaries;
- International & European designated sites (Natura 2000 sites[1]) – within the survey area and within 10 km of the survey area boundaries; and,
- Protected species license records issued by Natural England since 2009 – within the survey area and within 5 km of the survey area boundaries.

2.1.2 Field Survey

The field survey comprised of a walkover assessment of the survey area using UK Habitat Classification (UKHab) (2018). This is a standard technique for classifying and mapping British habitats.

Landowner access was granted for the field survey that was undertaken during April and May 2022. All areas within the survey area were surveyed and assessed for the habitats present, indicators of ecological value, including the presence or signs of any protected or rare habitats and species.

[1] Natura 2000 is a European Union-wide network of nature conservation sites established under the EC Habitats and Birds Directives comprising Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

2.1.3 Survey Limitations

Care has been taken to ensure that balanced advice is provided on the information available and collected during the study period, and within the resources available for the project.

The survey was undertaken in late spring, which will have precluded annual vegetative species with summer and autumn growing/flowering periods.

It is noted that the lack of evidence or records of protected species and/or habitats provided by the desk study or field survey does not preclude their presence from the survey area (i.e. further species may be present, but not previously recorded, and/or identified at the time of the survey).

The study area includes an extent of private properties (dwellings and gardens), agricultural buildings and Saunton Golf Clubhouse and associated buildings. These areas and buildings were not directly/internally accessed.

3. Results

3.1 Desk Study

3.1.1 International & European Statutory Designated Sites

The desk study identified one site with international and European designation for nature conservation within the PEA survey area, consisting of:

- Braunton Burrows Special Area of Conservation (SAC).

The majority of the proposed onshore cable corridor lies within this European designated site.

Braunton Burrows SAC

Braunton Burrows (~1,357 ha) is one of the largest dune systems in the UK, ~5 km long north-south and 1.5 km wide, with lime-rich dunes up to 30 m high, and an extensive system of variably flooded slacks, grassland and scrub, inland of a wide sandy foreshore. There is thus a variety of habitats for many flowering and lower plants, and for many birds and invertebrates. Several species are nationally rare or vulnerable and a large sand dune site extending from the north of the Taw Estuary to Saunton Road with agricultural fields, Braunton Marshes and the town of Braunton to the east. This site is also designated as a Site of Special Scientific Interest (SSSI) and forms the centre of the UNESCO North Devon Biosphere Reserve and North Devon Area of Outstanding Natural Beauty (AONB).

This SAC is formed of predominately coastal sand dunes and sand beaches with a mosaic of scrub, broad-leaved deciduous woodland, improved grassland with small areas of sea cliff and inland water bodies. This SAC supports a large assemblage of nationally rare and scarce plant species and invertebrates, including 470 flowering plant species, of which 11 are orchid species, and 33 butterfly species.

Table 3.1: International & European designated sites for nature conservation within 10 km of the PEA survey boundary

Ecological Feature	Importance	Summary	Distance
Braunton Burrows Special Area of Conservation (SAC)	International	Designated for the open dune slack habitat with species rich dune grassland and scrub. Rare petalwort (*Petalophyllum ralfsii*) population supported in this habitat https://sac.jncc.gov.uk/site/UK0012570	The site forms part of this SAC

Annex I habitats that are primary reason for designation:

- Shifting dunes along the shoreline with marram grass (*Ammophila aernaria*) (white dunes). Features of the site are transitions from dune slack to fixed dune with specialist plants such as Portland spurge (*Euphorbia portlandica)*, sea spurge (*Euphorbia paralias*) and sea-holly (*Eryngium maritimum)*;
- Fixed costal dunes with herbaceous vegetation (grey dunes). This is a priority feature because the site is large, virtually still intact and still active. Features of this habitat include areas of species-rich calcareous dune grassland extremely rich in herbs and lichens. Dominant flowering herb plant species include large thyme (*Thymus pulegioides)*, common restharrow (*Ononis repens)* and common bird's-foot-trefoil (*Lotus corniculatus)*;
- Dunes with creeping willow (*Salix repens ssp. argentea*). This habitat is scattered across the site forming a mosaic of vegetation including early and mature successional stages of dune slack vegetation; and,
- Humid dune slacks. Vegetation types range from those with almost permanent water to those dominated by scrub formed in base-rich sand. This habitat is species rich including marsh pennywort (*Hydrocotyle vulgaris)*, marsh helleborine (*Epipactis palustris)* and round-leaved wintergreen (*Pyrola rotundifolia)* and plant communities charactized by creeping willow *(Salix repens ssp. argentea)*, those with bryophytes or those with Yorkshire-fog *(Holcus lanatus).*

Annex I habitats present as a qualifying feature, but not a primary reason for designation:

- Mudflats and sandflats not covered by seawater at low tide.

Annex II species that are a primary reason for designation:

- Petalwort (*Petalophyllum ralfsii*)

3.1.2 National Statutory Designated Sites

The information provided by DBRC identified seven sites with national/statutory designation for wildlife interest within the site, and within 1 km of the site. These are presented in Table 3.2 below:

Table 3.2: Statutory and Non-Statutory sites within 1 km of the PEA survey boundary

Ecological Feature	Importance	Summary	Distance
North Devon AONB	National	Designated for its coastal landscapes http://www.landscapesforlife.org.uk/about-aonbs/visit-aonbs/north-devon-aonb	The proposed and alternative cable routes form part of this AONB
Braunton Burrows SSSI	National	Designated for the open dune slack habitat with species rich dune grassland and scrub. Rare petalwort (*Petalophyllum ralfsii*) population supported in this habitat	The proposed and alternative cable routes form part of this SSSI
Saunton to Baggy Point Coast SSSI)	National	Designated for species rich maritime heath and grassland with rare plant interest.	The alternative cable route site forms part of this SSSI
Taw/Torridge Estuary SSSI	National	Estuary with mudflats, beaches and saltmarsh with bird interest	The proposed cable route site forms part of this SSSI
Greenaways and Freshmarsh, Braunton SSSI	National	Herb-rich marshy grasslands and rich water-plant communities occurring in the drainage ditches	The proposed cable route borders part of this SSSI
Braunton Swanpool SSSI, Devon Willdife Trust (DWT) reserve	National	Reedbeds and herb-rich marshy grassland	Located 0.48 km to the east of the cable route
Caen Valley Bats SSSI	National	Designated for the great horseshoe bat maternity roost, and winter hibernacula	Located 1.8 km to the east of the cable route

Braunton Burrows SSSI

Braunton Burrows SSSI forms the same area as Braunton Burrows SAC, consisting of seven SSSI units, and is designated for its large dune slack system and the associated rare or vulnerable plants species present within the system.

The proposed onshore export cable routes lie within, cross etc. the following Braunton Burrows SSSI unit numbers and condition assessments:

- 101 – Saunton Golf Club (131.51ha): Unfavourable – recovering; Condition threat risk: Medium
- 102 – The Roughs and Strawberry Ridge (120.91 ha): Unfavourable – recovering; Condition threat risk: High
- 103 – Fox Slack, Soay Plain & Lamprey's Plot enclosure (83.82 ha): Unfavourable – recovering: Condition threat risk: High
- 104 – Northern Training Area (349.58 ha): Unfavourable – recovering: Condition threat risk: High
- 105 – Southern Training Area (226.22 ha): Unfavourable – recovering: Condition threat risk: High
- 106 – The Flats enclosure (29.73 ha): Unfavourable – recovering: Condition threat risk: Medium
- 107 – Crow Point & Broad Sands (95.50 ha): Favourable; Condition threat risk: Not assessed
- 108 – Saunton Sands (302.46 ha): Favourable; Condition threat risk: Not identified

See following link for full condition assessment:
https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1000023

Saunton to Baggy Point SSSI

Saunton to Baggy Point SSSI runs along the North Devon coast from Saunton to Putsborough, consisting of four SSSI units, and is designated for its ragged cliffs and associated botanical features of maritime heathland, grassland and lichens.

One of the proposed cable routes includes one unit of Saunton to Baggy Point SSSI, consisting of the following unit number and condition assessment:

- 104 – Saunton Cliffs and Foreshore (36.93 ha): Unfavourable – declining; Condition risk threat: Not identified

See following link for full condition assessment:

https://designatedsites.naturalengland.org.uk/SiteUnitList.aspx?SiteCode=S1002073&SiteName=Saunton%20to%20Baggy%20Point%20Coast&countyCode=&responsiblePerson=&unitId=&SeaArea=&IFCAArea=

Taw-Torridge Estuary SSSI

The Taw-Torridge Estuary SSSI is comprised of large areas of mudflats, sandbanks and areas of saltmarsh and beaches. It is designated for its importance for overwintering and migratory wading birds (curlew (*Numenius arquata*), golden plover (*Pluvialis apricaria*), lapwing (*Vanellus vanellus*), redshank (*Tringa tetanus*), dunlin (*Calidris alpina*), oystercatcher (*Haematopus ostralegus*) and rare plants (glassworts (*Salicornia spp.*), common saltmarsh-grass (*Puccinellia maritima*), cord-grass (*Spartina spp.*), sea aster (*Aster tripolium*), annual seablite (*Suaeda maritima*), rock sea-lavender (*Limonium binervosum*) and great sea-stock (*Matthiola sinuata*). Other estuarine species include mullet (*Mugil sp.*), flat fish, bass (*Dicentrarchus labrax*), pollack (*Pollachius pollachius*), eel (*Anguilla anguilla*), and a diversity of invertebrates. A portion of the Taw/Torridge Estuary lies within the proposed onshore cable corridor.

The proposed onshore cable corridor includes the following Taw-Torridge Estuary SSSI unit number and condition assessment:

- 103 – River Taw (1018.58 ha): Favourable; Condition Risk Threat – medium.

See following link for full condition assessment:

https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1002990&SiteName=Taw&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

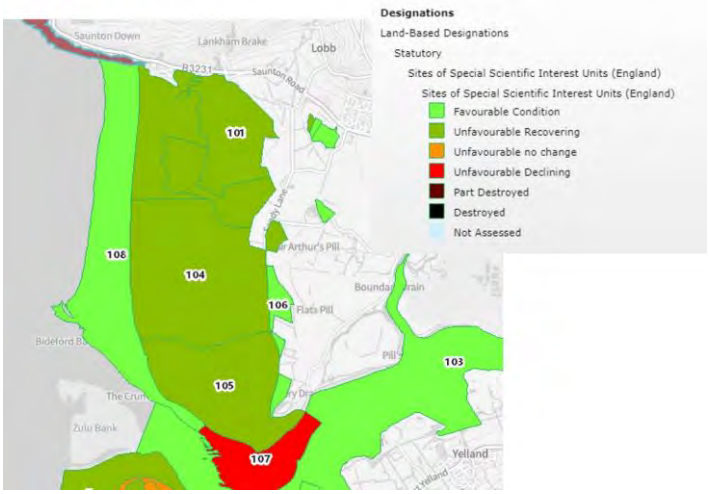

Figure 3-1. Braunton Burrows, Saunton to Baggy Point, Taw/Torridge Estuary, Greenaways and Freshmarsh and Braunton Swanpool SSSI units within the proposed cable route of the site (MAGIC website 06/05/22)

Greenaways & Freshmarsh, Braunton SSSI

The Greenaways and Freshmarsh, Braunton SSSI is located on the northern fringe of Braunton Marshes, and the land is flat, low-lying with a high-water table. It is designated for its herb-rich marshy grasslands and rich water-plant communities occurring in the drainage ditches, which are very restricted in Devon. Plant species present include greater pond-sedge (*Carex riparia*), false fox-sedge (*C. otrubae*), glaucous sedge (*C. flacca*), common sedge (*C. nigra*). Flowing plants found here, typical of wet, unimproved marshlands, include marsh marigold (*Caltha palustris*), meadowsweet (*Filipendula ulmaria*), fleabane (*Pulicaria dysenterica*), silverweed (*Potentilla anserina*), water mint (Mentha aquatica), greater bird's-foot trefoil (*Lotus uliginosus*), meadow vetchling (*Lathyrus pratensis*) and ragged robin (*Lychnis flos-cuculi*). The southern marsh-orchid (*Dactylorhiza praetermissa*) occurs frequently and the site is also a location for marsh arrowgrass (*Triglochin palustris*) which is a rare plant in Devon. In places, there is an abundance of rushes (*Juncus spp.*) and patches of yellow iris (*Iris pseudacorus*). The plant species found in the drainage ditches include common water-starwort (*Callitriche stagnalis*), broad-leaved pondweed (*Potamogeton natans*), common duckweed (*Lemna minor*), ivy-leaved duckweed (*L. trisulca*; restricted distribution in Devon). Flowering plant species in the ditch system includes water-plantain (*Alisma plantago-aquatica*), lesser water-parsnip (*Berula erecta*), gipsywort (*Lycopus europaeus*), parsley waterdropwort (*Oenanthe lachenalia*), branched bur-reed (*Sparganium erectum*), pink water-speedwell (*Veronica catenate*) and marsh woundwort (*Stachys palustris*) and tasteless water-pepper (*Polygonum mite*). Breeding bird species reed bunting (*Emberiza schoeniclus*) and sedge warbler (*Acrocephalus schoenobaenus*) are both found within this SSSI.

The proposed onshore cable corridor borders includes the following Greenaways and Freshmarsh, Braunton SSSI unit number and condition assessment:

- 002 – Freshmarsh (9.114 ha): Unfavourable-recovering; Condition Risk Threat – high.

The alternative onshore cable corridor runs within 500 m of the following Greenaways and Freshmarsh, Braunton SSSI unit number and condition assessment:

- 001 – Greenaways (4.310 ha): Favourable; Condition Risk Threat – medium.

See following link for full condition assessment:
https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1003743&SiteName=green&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

Braunton Swanpool SSSI and Devon Wildlife Trust (DWT) Reserve

The Braunton Swanpool SSSI is comprised of reedbed and herb-rich marshy grassland for which the site is designated.

The alternative onshore cable corridor lies within 500 m of the Braunton Swanpool SSSI, including the following unit numbers and condition assessments:

- 001 – Nicholl (1.478 ha): Unfavourable – recovering; Condition Risk Threat – medium;
- 002 – Dyer (2.203 ha): Favourable; Condition Risk Threat – medium; and,
- 003 – DWT (8.113 ha): Favourable: Condition Risk Threat – medium.

See following link for full condition assessment:
https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1001195&SiteName=braunton&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

Caen Valley Bats SSSI

The Caen Valley Bats SSSI is located ~ 0.5 km north of the town of Braunton. The site is designated for the summer maternity roost and winter hibernacula for greater horseshoe bats (*Rhinolophus ferrumequinum*).

The alternative onshore cable corridor lies 1.8 km west of the Caen Valley Bats SSSI including the following SSSI unit number and condition assessment:

- 001 – Former Stable Buildings (0.111 ha): Unfavourable -declining ; Condition Risk Threat – high (2022).

See following link for full condition assessment:
https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S2000462&SiteName=caen&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=

3.1.3 Non-statutory Designated Sites

The information provided by DBRC identified 24 sites with local/non-statutory designation for wildlife interest within the PEA survey area, and within 1 km of the PEA survey boundary. These are presented in Table 3.3 below:

Table 3.3: Non-statutory sites within 1 km of the PEA survey boundary

Ecological Feature	Importance	Summary	Distance
Horsey Island	County Wildlife site (CWS), DWT reserve	Saltmarsh and mudflat, including recolonising saltmarsh following breach in sea wall. Saltmarsh (brackish) site supporting 16 Devon Notables & 1 NS plant. The wetter areas of saltmarsh are exceptionally species-rich	0.2 km east of the proposed cable route
Yelland Ash Beds	CWS	Species-rich grassland forming a mosaic with marshy grassland and scrub habitats	0.34 km east of the proposed cable route
Little Snailand & Saunton Down	CWS	MG5 but with calcareous influence	0.9 km north of the alternative cable route
West Yelland Farm Orchard	Other Site of Wildlife Interest (OSWI)	Orchard	0.87 km southeast of the proposed cable route
Heather Down	Unconfirmed Wildlife Site (UWS)	Semi-improved neutral grassland	0.9 km north-northwest of the alternative cable route
Saunton Down	UWS	Semi-improved neutral grassland & scrub	0.1 km north of the alternative cable route; north of B3231
Saunton Down (S)	UWS	Unimproved neutral grassland with scattered scrub	0.6 km northwest of the alternative cable route; south of the B3231
Spring Wood	UWS	Broadleaved woodland	0.38 km north of the alternative cable route; north of B3231
Lankham Brake	UWS	Broadleaved woodland	0.24 km north of the alternative cable route; north of the B3231
Saunton Court Wood	UWS	Broadleaved woodland	0.06 km north of the alternative cable route; north of B3231
Sandy Lane (W)	UWS	Semi-improved neutral grassland	The proposed cable route lies within this UWS
Boundary Drain Fields	UWS	Semi-improved neutral grassland	0.26 km east of the proposed cable route
Sir Arthur's Pill	UWS	Semi-improved neutral grassland	0.46 km east of the proposed cable route
Blind Acre Lane	UWS	Semi-improved neutral grassland	0.16 km east of the alternative cable route

Table 3.3: Non-statutory sites within 1 km of the PEA survey boundary

Ecological Feature	Importance	Summary	Distance
Willowfield	UWS	Marshy grassland	0.46 km east of the alternative cable route
Braunton Marsh	UWS	Semi-improved neutral grassland	The proposed cable route lies within this UWS
Lane End	UWS	Sand dune system	0.9 km southwest of the proposed cable route
Venn Close	UWS	Semi-improved neutral grassland	0.71 km south of the proposed cable route
West Yelland	UWS	Semi-improved neutral grassland	0.7 southeast of the proposed cable route
East Yelland Marsh 2	UWS	Saltmarsh	0.84 km northeast of the proposed cable route
Knills Farm	UWS	Rush-pasture	0.87 km northeast of the alternative cable route
Saunton Field	UWS	Unimproved grassland & scrub	0.28 km north of the alternative cable route; north of B3231
Instow Barton Marsh	UWS	Grazing marsh	The proposed cable route lies within this UWS
Isley Marsh	RSPB reserve	Saltmarsh and intertidal mudflats used by wading birds including spoonbills, curlew, greenshank, and dunlin	0.95 km northeast of the proposed cable route

3.1.4 Consultation Zones

The proposed onshore cable corridors lie within a great crested newt consultation zone and a greater horseshoe bat sustenance consultation zone (Figure 3-2).

Figure 3-2. The proposed cable routes lie within great crested newt and greater horseshoe bat sustenance zones (proposed cable route and buffer zone in red, great crested newt in dark purple, greater horseshoe bats in light purple; DBRC desk study 2022)

3.1.5 Priority Habitats

The information provided by DBRC and following a review of the MAGIC website identified priority habitat types within the site, and within 1 km of the site.

Priority habitats identified within the proposed and alternative onshore export cable corridor routes and 250 m buffer zones included coastal sand dunes, costal saltmarsh, mudflats, coastal and floodplain grazing marsh, and deciduous woodland. Priority habitats identified within the alternative cable route and buffer zone includes maritime cliffs and slopes, lowland fens, and reedbeds.

3.2 Field Survey – Habitat Descriptions

The field survey habitat descriptions are sub-divided into the following areas:

- Braunton Burrows;
- Braunton Marsh;
- Sandy Land Agricultural Fields;
- Taw-Torridge Estuary;
- Yelland – Industrial Area & Woodland;
- Yelland – Agricultural Fields; and,
- Yelland – Coastal Strip.

3.2.1 Braunton Burrows

Extensive sand dune system including undulating mosaics of bare sand, mobile and fixed sand dunes (yellow and grey dunes), dune slack, ponds, species rich grassland, scrub and woodland.

The northern extent of the dune system includes Saunton Golf Course, Saunton Sands and residential properties. The golf course includes fairways and greens within the mosaic of dune habitats. Saunton Sands includes holiday accommodation and associated seaside amenities.

The southern tip of Braunton Burrows comprises of Crow Point. The immediate area includes Crow Point House, a carpark, a former carpark (now including no vehicle access), boatyard and the southern extent of American Road. Surrounding habitat types include saltmarsh, sand/mud flats and tidal creeks within the estuary and a mosaic of ephemeral/short perennial, dune grassland and scrub.

American Road continues north/south through the south-eastern extent of Braunton Burrows. A mosaic of mobile and fixed dune grassland, scrub, woodland and ditches further surround the road. Dune grassland to the east, comprised of more tightly grazed grassland with no public access. The dune grassland to the west included large grazing compartments with free roaming public access.

The outer dunes/yellow/mobile dunes included bare sand and dune grassland sea couch-grass, marram grass, sand cats tail, sea holly, sea bindweed, sea spurge, sea rocket, sea sandwort, sea beet, yellow-horned poppy, evening primrose, vipers

bugloss, carline thistle, hounds tongue, hare's foot clover, common centaury, yellowwort, restharrow, stonecrop, bird's foot-trefoil, common broomrape, milkwort, early marsh orchid, early purple orchid and silverweed.

The inner dune/grey dunes/fixed dune grassland included creeping willow, silverweed, sharp rush, St. John's-wort, meadowsweet, common knapweed, tufted vetch, common fleabane, yellow iris, bugle, yellow barista, oxeye daisy, yellow rattle, goat's beard, common agrimony and mullein.

Dune scrub included creeping willow, bramble, hawthorn, blackthorn, grey willow, goat willow and honeysuckle.

Woodland areas were formed from mature scrub, including hawthorn, blackthorn, grey willow and goat willow, with bramble, nettle, male fern, hart's tongue fern, honeysuckle, ivy, lords and ladies and hogweed.

Photograph 3-1. Outer dunes with mosaic of fixed and mobile dune grassland at Crow Point

Photograph 3-2. American Road

Photograph 3-3. Outer dunes with mosaic of fixed and mobile dune grassland, dune slack and scattered scrub

Photograph 3-4. Inner dunes including a dune slack grassland and scrub

Photograph 3-5 Inner dunes with mosaic of fixed dune grassland, scrub and pond (Pond 46)

Photograph 3-6. Mosaic of fixed dune scrub and woodland

Photograph 3-7. Partridge Slack with cluster of ponds (Ponds 26 to 38)

Photograph 3-8. Saunton Sands Golf Course

Photograph 3-9. Saunton Sands carpark, accommodation and beach amenities

3.2.2 Braunton Marsh

Braunton Marsh comprised of grazed fields including marshy grassland, semi-improved grassland, fen, scrub and wet woodland habitat types. The fields include, and are divided, by a network of ditches and rhynes, with some addition boundary hedgerows and tree lines.

The marshy grassland swards included tufted hair-grass, marsh foxtail, creeping bent, Yorkshire fog, soft rush, hard rush, ragged robin, common fleabane, yellow iris, horsetail, meadowsweet, common knapweed, marsh thistle, tufted vetch and greater bird's foot-trefoil.

Fen habitat included horsetail, yellow iris, club rush, hard rush, common reed, typha, meadowsweet, lesser celandine, cuckoo flower, brooklime, common figwort, marsh marigold, creeping willow, grey willow, goat willow and water dropwort.

Areas of wet woodland included grey willow, goat willow, alder, typha, yellow iris, and horsetail.

Photograph 3-10. Marshy grassland fields within Braunton Marsh

Photograph 3-11. Fen vegetation within Braunton Marsh

The fields with semi-improved grassland swards included bird's foot trefoil, creeping buttercup, creeping thistle, hard rush, meadow foxtail, smooth meadow grass, soft rush and Yorkshire-fog.

Photograph 3-12. Semi-improved grassland field northwest of South Barrow Farmstead

A ditch system bounded and divided the fields. Marginal and emergent vegetation included soft rush, hard rush, yellow iris, water parsnip and water dropwort.

Photograph 3-13. Sir Arthur's Pill

Photograph 3-14. The marshy grassland fields with boundary ditch system

Photograph 3-15. The abandoned South Barrow Farmstead

3.2.3 Sandy Lane Agricultural Fields

Agricultural fields are divided by ditch system, stream and boundary hedgerows. The fields are predominantly arable with limited areas of pasture.

Fields including pasture included a poor semi-improved grassland sward, which included bird's foot trefoil, creeping buttercup, creeping thistle, meadow foxtail, smooth meadow grass, soft rush and Yorkshire-fog.

A ditch system, including field margin ponds, bound and divided the fields. Marginal and emergent vegetation included soft rush, hard rush, yellow iris, water parsnip and water dropwort.

A network of hedgerows bound and divide the fields. The hedgerows included blackthorn, hawthorn, grey willow, goat willow, hazel, ash, elder, gorse, bramble,

soft rush, nettle, male fern, hart's tongue fern, honeysuckle, ivy, lords and ladies and hogweed.

Photograph 3-16. Arable field with conservation headland/margin and boundary hedgerow and ditch

Photograph 3-17. Newly seeded arable field

Photograph 3-18. Ditch field margin between two arable fields

Photograph 3-19. A pond within an arable field margin (Pond 50)

3.2.4 Taw-Torridge Estuary

Areas of intertidal sand/mudflats, saltmarsh and rocky shore.

Areas of saltmarsh included glasswort, sea-blite, sea purslane, sea lavender and sea spurrey.

Photograph 3-20. The estuary and extent of saltmarsh at Yelland

Photograph 3-21. The estuary, sand/mud flats and tidal creek at Crow Point

Photograph 3-22. The saltmarsh at Crow Point

3.2.5 Yelland – Industrial Area & Woodland

The industrial area, formally a former power station, now includes a commercial aggregate supplier and the electric sub-station. The area includes areas of bare ground, ephemeral/short perennial, tall ruderal and scrub vegetation, water tank (former power station building) and buildings/structures (various states of use and disrepair).

The mosaic of ephemeral/short perennial, tall ruderal and scrub vegetation included cocks foot, common fleabane, greater mullein, grey sedge, hard rush, hare's foot clover, water-dropwort, evening primrose, soft brome, squirrel-tailed fescue, Yorkshire fog, yarrow, broadleaved willowherb, rosebay willowherb, curled dock, bristly oxtongue, yellow bartsia, yellowwort, wild parsnip, bird's-foot trefoil, pyramidal orchid, carline thistle, restharrow, Canadian fleabane, gorse, bramble, false oat-grass, common centaury, hare's-foot clover, toadflax, weld, sheep's fescue, common cat's-ear and mouse-ear hawkweed.

Photograph 3-23. The mosaic of ephemeral/short perennial, tall ruderal & scrub vegetation at the site of the former power station

Photograph 3-24. The mosaic of ephemeral/short perennial, tall ruderal & scrub vegetation

The proposed onshore substation is surrounded by woodland to the south and west, which is further lined by the 'Tarka Trail' cycleway and footpath along the former railway line. The cycleway and footpath is metaled with boundaries including grass verges, ditches, hedgerows and wooded strips.

The woodland included a dense canopy and shrub layer which comprised of grey willow, goat willow and crack willow with oak, ash, holly, elder, hawthorn and bramble. The western extent of the woodland included scrub patches including dense gorse and bramble. Ground and climbing vegetation included nettle, male fern, hart's tongue fern, honeysuckle, ivy, bryony, lords and ladies and hogweed.

Photograph 3-25. The woodland to the south & west of the electric sub-station

Photograph 3-26. The western extent of the woodland including scrub patches

The Tarka Trail, consisted of former railway line, which has since been converted as a metaled footpath and cycle route. The trail includes grass verge, wet and dry lengths of parallel ditches peripheral hedgerows and woodland edges.

The grass verge included cocks foot, tufted hair-grass, false oat grass, Yorkshire-fog, bird's foot trefoil, creeping buttercup, creeping thistle, hard rush, meadow foxtail, smooth meadow grass, soft rush, bluebell, bramble, nettle, primrose, hemp agrimony and hogweed.

Photograph 3-27. The Taka Trail with grass verge, ditches peripheral hedgerows & woodland edges

3.2.6 Yelland – Agricultural Fields

The area included mixed agricultural fields. The northern extent of the survey area included fields with marshy and semi-improved grassland swards. The southern extent of the survey area included fields with improved grassland swards and sown with arable crops. The fields included, and are divided, by a network of ditches and boundary hedgerows.

The fields with marshy grassland swards included Yorkshire fog, smooth meadow-grass, marsh foxtail, soft rush, compact rush, floating sweet grass, false fox sedge, hemlock water dropwort, toad rush and marsh thistle.

The fields with poor semi-improved grassland swards included bird's foot trefoil, creeping buttercup, creeping thistle, hard rush, meadow foxtail, smooth meadow grass, soft rush and Yorkshire-fog.

Photograph 3-28. Marshy grassland field

The southern extent of the Yelland survey area included fields sown as improved grassland and arable.

Photograph 3-29. Improved grassland field

A ditch system bounded and divided the fields. Marginal and emergent vegetation included soft rush, hard rush, yellow iris, water parsnip and water dropwort.

Photograph 3-30. The ditch network dividing the marshy grassland and agricultural fields

A network of hedgerows bound and divide the fields. The hedgerows included blackthorn, hawthorn, grey willow, goat willow, hazel, ash, elder, gorse, bramble, soft rush, nettle, male fern, hart's tongue fern, honeysuckle, ivy, lords and ladies and hogweed.

Photograph 3-31. Hedgerow with ditches bound and divide the fields marshy grassland and agricultural fields

3.2.7 Yelland – Coastal Strip

The coast along the Yelland extent of the survey area includes a lake and reedbed and coastal grassland and scrub directly adjacent to the estuary.

The Lake (Pond 49) includes a central area of standing water, fringed by reedbeds, including common reed with sea clubrush, typha, grey willow, goat willow, southern marsh orchid, sea couch, yellow iris, water parsnip, water mint, meadowsweet, common fleabane, grey sedge, gorse and water dropwort.

The lake included inflowing water from the agricultural field ditch system at it's western extent, and from the Taka Trail ditch system at it's eastern extent.

The coast included an embankment separating the lake and agricultural fields from the estuary. The embankment included a mosaic of scrub and grassland, including gorse, bramble, blackthorn, Yorkshire fog, sweet vernal-grass, false oat-grass, yellow oat-grass, red fescue, sea couch, crested dogs tail, creeping bent, tufted hair-grass and cocksfoot with common knapweed, common sorel, creeping buttercup, creeping cinquefoil, dandelion, red clover, tufted vetch, sea clubrush and wild carrot.

The intertidal extent of the estuary at Yelland includes a rocky shoreline, saltmarsh and tidal creeks, with extensive mud/sand flats.

Photograph 3-32. The Lake (Pond 49)

Photograph 3-33. The Yelland coastal embankment including coastal grassland & scrub

Photograph 3.34. The Yelland coastal embankment including coastal grassland & scrub

3.3 Species

3.3.1 Amphibians

Great Crested Newt

The survey area falls within a great crested newt consultation zone, which extends from known great crested newt populations within Braunton Burrows.

The information provided by DBRC included four records for great crested newt within the site. MAGIC identified no European Protected Species Licence (EPSL) class licence returns for great crested newt within the PEA survey area.

It is understood that great crested newts were introduced into I Lane Pond and Venner's Pond, within the Braunton Burrows SAC in 1980, and have since spread to ponds throughout Braunton Burrows.

A great crested newt survey (torchlight and egg search survey) identified the presence of great crested newt across 13 pond groups throughout the Braunton Burrows dune system (Richard Green Ecology 2021). This study included confirmation of the population as breeding and defined the combined population as 'exceptional' in terms of numbers.

Accordingly, all areas of the dunes, dune/coastal grassland, scrub, woodland, semi-improved and marshy grassland fields, hedgerows, fen, ponds, ditches and rhynes provide confirmed or suitable terrestrial and aquatic habitat for great crested newt (see Photographs 3-1 to 3-34).

DBRC provided no records of great crested newt on the East Yelland side of the proposed onshore cable corridor or within the ditch systems associated with Braunton Marsh, although these areas are included within the great crested newt consultation zone.

Common & Widespread Amphibian Species

The information provided by DBRC included records for common and widespread amphibian species within 1 km of the PEA survey boundary, including common frog

(two records in Braunton Burrows), common toad (two records in the Yelland area; two records in Braunton Burrows), smooth newts (five records in Braunton Burrows) and palmate newt (five records in Braunton Burrows). Smooth/palmate newt were reported as present in the ponds throughout Braunton Burrows (Richard Green Ecology, 2021).

Accordingly, all areas of the dunes, dune/coastal grassland, scrub, woodland, semi-improved and marshy grassland fields, hedgerows, fen, ponds, ditches and rhynes provide confirmed or suitable terrestrial and aquatic habitat for common and widespread amphibian species (see Photographs 3-1 to 3-34).

3.3.2 Badger

The information provided by DBRC included four records for badger within 1 km of the East Yelland portion of the proposed onshore cable corridor and one record within Braunton Burrows.

During the survey, one badger sett was recorded within Braunton Marshes with a latrine observed 157 m north of the sett. One badger was observed within the agricultural fields west of the power station in East Yelland.

It is considered that both the full extent of the PEA survey area provides sett, dispersal and foraging habitat for badger (see Photographs 3-1 to 3-34).

3.3.3 Bats

<u>Bats – Feeding & Dispersal</u>

The proposed cable routes lie within greater horseshoe bat sustenance zones associated with the Caen Valley Bats SSSI.

The information provided by DBRC included 28 records for bats within 1 km of the Braunton Burrows site, including:

- Brown long-eared bat (1 record);
- Greater horseshoe bat (7 records);
- Noctule (2 records);
- Common pipistrelle (3 records);

- Soprano pipistrelle (3 records); and,
- Unidentified *Myotis* (2 records).

The DBRC data included one unidentified bat species records within 1 km of the East Yelland site area.

MAGIC revealed one EPSLs for bat species within 1 km of the proposed cable routes including:

- An EPSL for common pipistrelle bat within the alternative onshore cable corridor at Saunton Sands.

Accordingly, all areas of the dunes, dune/coastal grassland, scrub, woodland, semi-improved and marshy grassland fields, hedgerows, fen, ponds, ditches and rhynes may provide feeding and dispersal habitat for bat species, including greater horseshoe bats associated with Caen Valley Bats SSSI (see Photographs 3-1 to 3-34).

Bats – Roosting

Trees and buildings/structures are present throughout the PEA survey area and were subsequently assessed (from ground level) for their potential to support roosting bats. No access was provided to individual buildings.

There are areas of wet/willow woodland, and mature scrub/hawthorn/blackthorn woodland, individual trees, and trees associated with boundary hedgerows and ditches/rhynes present within the PEA survey area. Trees in these habitat types included features such as woodpecker holes, splits, hazard fractures, hollows etc. which could support roosting bats.

Buildings and structures included:

- Agricultural buildings (in various states of use and disrepair);
- Dwellings and associated structures (in various states of use and disrepair);
- Saunton Golf Club and associated structures;
- MOD structures (in various states of use and disrepair);
- Stonewalls; and,
- Bridges.

The buildings/structures included potential for roosting bats.

3.3.4 Bird Species

The information provided by DBRC included 547 records for birds within or within 1 km of the site. The bird records included species associated with sand dune, scrub, marshland, agricultural, woodland, and estuarine habitats.

The desk study identified a number of records for species of principal importance (NERC 2006; UKBap) have been recorded within, or in proximity to the site, and are collectively considered as potentially present within the proposed onshore cable corridor:

- Barn owl;
- Common scoter;
- Common bullfinch;
- Curlew;
- Linnet;
- Grasshopper warbler;
- Green woodpecker;
- Skylark;
- Spotted flycatcher;
- Cuckoo;
- Reed bunting;
- Lapwing;
- Scaup; and,
- Yellow hammer.

Records for amber-listed species include arctic tern, sandwich tern, common sandpiper, eider, kestrel, sanderling, turnstone, shelduck, common gull, wheatear, black-headed gull, razorbill, lesser black-backed gull, snow bunting, gannet, moorhen, short-eared owl, whooper swan, spoonbill, woodpigeon, willow warbler, dunnock, whitethroat, wren, green sandpiper, common kingfisher, teal, greylag goose, barnacle goose, bar-tailed godwit, common tern, rook, oystercatcher, grey plover, great black-backed gull, wigeon, mallard, knot, great northern diver, brent goose, curlew sandpiper, shoveler, water pipit, Mediterranean gull, greenshank, Iceland gull, osprey, dipper, mute swan,

snipe, common goldeneye, spotted redshank, marsh harrier, sedge warbler, grey wagtail, and meadow pipit.

Records for red-listed species include whimbrel, ringed plover, house martin, mistle thrush, greenfinch, yellow wagtail, red-necked grebe, black-tailed godwit, starling, swift, whinchat, Bewick's swan and herring gull.

South Barrow Farmhouse provides a roosting/nesting site for barn owl, and barn owl was observed hunting over the fields of Braunton Marshes and Sandy Lane Farm agricultural fields.

The survey area will provide general habitat for a range of bird species, including for spring and summer nesting (vegetative and ground nesting), feeding and local dispersal (see Photographs 3-1 to 3-34). Additionally, the PEA survey area provides overwintering, in addition to spring and autumn migration recovery habitat for bird species.

3.3.5 Dormouse

The information provided by DBRC included no records for dormouse within 1 km of the survey area. MAGIC revealed the closest EPSL for dormouse located 5 km to the north of the survey area.

The woodland, scrub and hedgerows within the survey area may provide nesting, foraging and hibernation habitat for dormouse (see Photographs 3-1 to 3-34).

The likelihood of dormouse being present is increased through the relatively large areas of suitable habitats with good connectivity to additional suitable habitats within and beyond the survey area.

3.3.6 Invertebrates

The information provided by DBRC included 761 records for invertebrates within 1 km of the survey area, including:

The desk study included 761 records for invertebrate species, including:

- UK Priority Species (UK BAP);

- Devon Biodiversity Action Plan Species (D BAP);
- Substantial local decline in Devon;
- Red Data Book Species (pRDB1, pRDB2 & RDB3);
- Nationally Notable A (Na); &,
- Nationally Notable B (Nb).

These records represent the following invertebrate groups:

- True flies (one record);
- Bee (one record)
- Moths (540 records);
- Butterflies (201 records);
- Crickets (eight records); and,
- Dragon and damsel flies (10 records).

Species of Principal Importance (NERC 2006; UKBAP) have been recorded within, or in proximity to the survey area, and are considered as potentially present within the survey area;

- Brown-banded carder bee;
- Butterflies:
    - Dingy skipper;
    - Grayling;
    - Grizzled skipper;
    - Marsh fritillary;
    - Pale eggar;
    - Pearl-bordered fritillary;
    - Silver-studded blue;
    - Small blue;
    - Small heath;
    - Small pearl-bordered fritillary; and,
    - Wall.
- Moths:
    - Grey dagger;
    - Knot grass;
    - Flounced chestnut
    - Beaded chestnut

- Ear moth;
- Mouse moth;
- Dusky brocade;
- Garden tiger;
- Minor shoulder-knot;
- Mottled rustic;
- Sallow;
- Small square spot;
- Small Phoenix;
- September thorn;
- Dusky thorn;
- August thorn;
- Galium carpet;
- Small emerald;
- Ghost moth;
- Rustic;
- Rosy rustic;
- Shoulder-striped wainscot;
- Rosy minor;
- Brindled beauty;
- Lackey;
- Dot moth;
- Pretty chalk carpet;
- Oblique carpet;
- Mullein wave;
- Chalk carpet;
- Shaded broad bar;
- White ermine;
- Buff ermine;
- Anomalous;
- Hedge rustic;
- Feathered gothic;
- Cinnabar;
- Dark-barred twin-spot carpet; and,
- Sword grass

The survey area is considered to provide habitat for a high number of terrestrial and aquatic invertebrate groups and species (see Photographs 3-1 to 3-34). This may include rare and/or notable species associated with:

- Intertidal;
- Dune – bare sand & bare ground/grassland mosaic (yellow & grey dunes);
- Dune slack;
- Dune grassland, scrub & grassland/scrub mosaic;
- Coastal grassland;
- Brownfield;
- Scrub;
- Coastal scrub;
- Coastal/floodplain grazing marsh;
- Woodland;
- Wet woodland; &,
- Rhynes/ditches/ponds.

3.3.7 Otter

The information provided by DBRC included seven records for otter within 1 km of the survey area associated with the Caen River.

The estuary, ditches and rhynes may provide commuting, foraging and holt/resting site habitats for otter (see Photographs 3-1, 3-10, 3-11, 3-13, 3-14, 3-15, 3-18, 3-19, 3-20, 3-21, 3-22, 3-30, 3-32, 3-33 and 3-34.).

3.3.8 Reptiles

The information provided by DBRC included 15 records for reptiles within 1 km of the Braunton portion of the proposed cable route, including:

- Adder (four records);
- Common lizard (five records);
- Grass snake (two records); and,
- Sand lizard (three records).

Grass snake, common lizard and adder were observed during the PEA field survey.

A 2021 sand lizard survey of in Braunton Burrows otter dunes observed 36 sand lizards along the foredune ridge in open marram grass dominated dunes (Breeds, 2021). Other reptile species observed in this study included 91 common lizards and 12 adders.

Accordingly, all areas of the dunes, dune/coastal grassland, scrub, woodland edges, semi-improved and marshy grassland fields, hedgerows, fen, ponds, ditches and rhynes providing confirmed or suitable habitat for reptiles (see Photographs 3-1 to 3-34).

The dunes, dune/coastal grassland and scrub providing habitat for sand lizard.

3.3.9 Water Vole

DBRC provided no records for water vole within 1 km of the survey area.

It is understood that water voles were present within Braunton Marshes historically, but are now considered to be absent (Gow, North Devon Biosphere, March 2022).

The ditches/rhynes and associated bankside vegetation within survey area are suitable to support water vole (see Photographs 3-10, 3-11, 3-13, 3-14, 3-15, 3-18, 3-19, 3-30, 3-32, 3-33 and 3-34.)

3.3.10 Botanical Species

The desk study included 135 records for plant species, including:

- UK Priority Species (UK BAP);
- Devon Notable (DN1, DN2, DN3, NS);
- Devon Rarity (DR); &,
- Vulnerable (vuln).

Within the Braunton Burrows area, four UK BAP plant species were reported: dune gentian (*Gentianella uliginosa*), water germander (*Teucrium scordium*; DR, DN1, vuln), round-headed club rush (*Scirpoides holoschoenus*; DR, DN1, vuln), and early gentian (*Gentianella anglica cornubiensis*). Thirty-five species of Devon Notable and/or Devon Rare plant species were reported: autumn gentian (*Gentianella amarella*; DN1), sand cat's-tail (*Phleum arenarium*; DN1, DR), bee orchid (*Ophrys apifera*; DN1), marsh helleborine (*Epipactis palustris*; DN1), pyramidal orchid (*Anacamptis pyramidalis*; DN2),

blue fleabane (*Erigeron acer;* DN2), sea holly (*Eryngium maritimum;* DN1), Portland spurge (*Euphorbia portlandica;* DN3,NS), fragrant orchid (*Gymnadenia conopsea;* DN1), sand toadflax (*Linaria arenaria;* DN1, DR), round-leaved wintergreen (*Pyrola rotundifolia;* DN1, DR, Nb), wild mignonette (*Reseda lutea*; DN1), knotted pearlwort (*Sagina nodosa;* DN3), early marsh-orchid (*Dactylorhiza incarnata*; DN2), sea spurge (*Euphorbia paralias*; DN1), prickly lettuce (*Lactuca serriola*; DN2), yellow loosestrife (*Lysimachia vulgaris*; DN2), yellow bartsia (*Parentucellia viscosa*; DN2), autumn lady's-tresses (*Spiranthes spiralis*, DN2), common gromwell (*Lithospermum officinale*; DN2), rough clover (*Trifolium scabrum*; DN2), marram (*Ammophila arenaria*; DN1), sand sedge (*Carex arenaria*; DN2), sharp rush (*Juncus acutus,* DN1, NS), common evening-primrose (*Oenothera biennis*; DN1), adder's-tongue (*Ophioglossum vulgatum*; DN1), black bog-rush (*Schoenus nigricans*; DN2), bird's-foot clover (*Trifolium ornithopodioides*; DN1), tall ramping-fumitory (*Fumaria bastardii*; DN1), prickly poppy (*Papaver argemone*; DN1, DR), fen pondweed (*Potamogeton coloratus*; DN1, DR, NS), sea clover (*Trifolium squamosum*, DN1, DR, NS), mare's tail (*Hippuris vulgaris*; DN1), marsh cinquefoil (*Poentilla palustris*; DN3), and great pond sedge (*Carex riparia*; DN2). Within Braunton Marshes, there were records for two Schedule 9 non-native, invasive species: Canadian waterweed (*Elodea canadensis*) and parrot's feather (*Myriophyllum aquaticum*).

The Braunton Burrows SAC and SSSI citations include reference UKBAP liverwort species of petalwort.

Within the Saunton area (including Saunton Cliffs), there were six records for notable plants: sea stock (*Matthiola sinuate*; DN1, vuln, special species), rock sea lavender (*Limonium binervosum agg.*; UK BAP, DN1, special species), sea heath (*Frankenia laevis*; DN1, DR, NS), white horehound (*Marrubium vulgare*; DN1, NS), tree mallow (*Lavatera arborea*; DN3), and galingale (*Cyperus longus*; DN1, DR, NS).

Within Horsey Island area, there were 17 Devon Notable species reported: brookweed (*Samolus valerandi;* DN2), sea couch (*Elytrigia atherica;* DN3), sea rush (*Juncus maritimus*; DN2), parsley water-dropwort (*Oenanthe lachenalia*; DN1), strawberry clover (Trifolium fragiferum; DN1), wild celery (*Apium graveolens*; DN3), sea aster (*Aster tripolium*; DN3), sea purslane (*Atriplex portulacoides*; DN2), distant sedge (*Carex distans*; DN2), long-bracted sedge (*Carex extensa*; DN2), meadow barley

(*Hordeum secalinum*; DN1), saltmarsh rush (*Juncus gerardii*; DN3), corky-fruited water dropwort (*Oenanthe pimpinelloides*; DN3), common saltmarsh grass (*Puccinellia maritima*; DN2), grey club rush (*Schoenoplectus tabernaemontani*; DN2), annual sea blite (*Suaeda maritima*; DN2), and round-leaved crowfoot (*Ranunculus omiophyllus*; DN1).

Seven Devon Notable and/or Devon Rare plant species were reported for the Yelland area: sharp rush (*Juncus acutus,* DN1, NS), henbane (*Hyoscyamus niger,* DN1), yellow wort (*Blackstonia perfoliate*, DN2), autumn lady's tresses (*Spiranthes spiralis*, DN2), sea clover (*Trifolium squamosum*, DN1, DR, NS), yellow bartsia (*Parentucellia viscosa*, DN2), and bird's foot clover (*Trifolium ornithopodioides*, DN1). There was one record of the Schedule 9 non-native, invasive Japanese knotweed (*Fallopia japonica*) adjacent to public footpaths along the Instow flats.

Across the survey area, habitats suitable for supporting rare and notable botanical species of interest, including:

- Intertidal;
- Dune – bare sand & bare ground/grassland mosaic (white & grey dunes);
- Dune slack;
- Dune grassland, scrub & grassland/scrub mosaic;
- Coastal grassland;
- Brownfield;
- Scrub;
- Coastal scrub;
- Coastal/floodplain grazing marsh;
- Woodland;
- Wet woodland; &,
- Rhynes/ditches/ponds.

3.3.11 Other Mammals

The information provided by DBRC included additional records for the following mammal species:

- Eurasian Water Shrew (1 record);
- Eurasian Pygmy Shrew (1 record);
- Weasel (1 record);

- Stoat (1 record);
- Roe deer (1 record);
- Harvest mouse (1 record); and,
- Brown hare (1 record).

European rabbits were observed throughout the survey areas during the survey. Roe deer were observed within Braunton Marsh and Braunton Burrows.

During the survey, mink traps were observed deployed within the ditch/rhyne system of Braunton Marsh.

3.4 Further Survey

Further survey is to be undertaken for:

- Bat Activity (feeding and dispersing bat species);
- Roosting Bats:
    - Build structures; &,
    - Trees.
- Breeding and Ground Nesting Birds;
- Dormice;
- Great Crested Newt and Amphibian Survey;
- Reptile Survey;
- Water Vole & Otter Survey;
- Invertebrate Survey:
    - Terrestrial; &,
    - Aquatic.
- Botanical Survey:
    - NVC;
    - Aquatic Vegetation Survey.

In addition, survey may be required for autumn and spring mitigation and wintering birds.

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.C Extended Phase 1 Habitat Technical Report - Braunton and Yelland Proposed Access Routes

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White Cross OWF Cabling

Extended Phase 1 Habitat Survey Technical report - Braunton and Yelland - proposed access routes

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Client	Royal HaskoningDHV
Project	White Cross OWF Cabling - Extended Phase 1 habitat survey Braunton and Yelland-proposed access routes
Version	FINAL
Project number	P22-827 Braunton and Yelland Cabling routes PEA report

	Name	**Position**	**Date**
Originated	Trevor Fletcher	Senior Ecologist	12 July 2023
Reviewed	Anna Senior	Principal Ecologist	04 August 2023
Approved for issue to client	Anna Senior	Principal Ecologist	11 August 2023
Issued to client	Anna Senior	Principal Ecologist	11 August 2023

Contents

1 Summary

Report purpose	The purpose of this technical report is to provide the results of an Extended Phase 1 habitat survey of two areas of land in regard to access route creation, linking with the proposed main onshore cabling corridor between Braunton and Yelland.
Client and commission date	Royal HaskoningDHV, February 2023.
Date and methods of survey	An extended Phase 1 habitat survey was completed on 02 March 2023 (Braunton Access Route) and 03 March 2023 (Yelland Access Route) by Becky Prudden MCIEEM and Oliver Prudden MCIEEM.
Key findings	**Braunton Access Route** ***Habitats*** Habitats within the Survey Area include dense scrub, poor semi-improved grassland, standing water, running water, arable, intact hedgerow and bare ground. ***Protected species*** The Survey Area has habitats present with suitability to support protected species including bats (foraging and commuting), otter, water vole, dormouse, great crested newt, badger, birds, reptiles and amphibians. No Notable plant species were recorded. No Schedule 9 (Wildlife and Countryside Act 2018) invasive non-native plant species were recorded. **Yelland Access Route** ***Habitats*** Habitats within the Survey Area include semi- natural broadleaved woodland, dense scrub, improved grassland, poor semi-improved grassland, standing water, running water, dune grassland, dune scrub, open dune, amenity grassland and intact hedge (species poor). ***Protected species*** The Survey Area has habitats present with suitability to support protected species bats (roosting, foraging and commuting), dormouse, great crested newt, badger, birds, reptiles and amphibians. Dune habitats have suitability to support Priority invertebrate species. Two Notable (Devon) plant species are present. Schedule 9 (Wildlife and Countryside Act 1981) invasive plant species montbretia was recorded.

2 Introduction

2.1 BSG Ecology was commissioned by Royal HaskoningDHV to undertake an Extended Phase 1 habitat survey of two parcels of land associated with the White Cross OWF Cabling development, identified by Flotation Energy as additional areas that may be required for the construction phase of onshore cabling works.

2.2 One area of land, located in the north of the site, is proposed for a site compound/ storage area and access route (Braunton Access Route), the other is a potential access route to the southwest of the site (Yelland Access Route).

2.3 In combination these routes will be described as the 'Access Routes'. The locations of the Extended Phase 1 habitat survey (Survey Area) are shown on Figures 2 and 3.

2.4 The location of the proposed Access Routes in relation to the main cabling corridor (Cabling Route) are shown on Figure 1.

Site descriptions

Braunton Access Route

2.5 The Braunton Access Route is set within arable and pastoral farmland between the residential area of Braunton 800 m to the east and coastal sands 1.8 km to the west. The site is bounded by hedgerow and scrub. The site has three minor streams within its boundary, running along field margins.

Yelland Access Route

2.6 The Yelland Access Route lies adjacent to the southeastern side of the confluence of the River Torridge and River Taw. The route runs on an east -south axis for approximately 1 km. The southern end of the route commences in the settlement of Instow and follows a pre-existing road and track heading north-east, then passes through arable farmland at the northern extent.

Description of projects

Braunton Access Route

2.7 The Braunton Access Route lies to the northeast of the main Cabling Route (Figure 1) and crosses arable land from the B3231 Saunton Road to join the main Cabling Route to the south. It is proposed to create access to the site from Saunton Road by removing/modifying a stretch of the existing hedgerow and installing a compound/ storage area close to the entrance. An access track will be created from an access point off Saunton Road which will run south through arable farmland to join with the main proposed Cabling Route.

Yelland Access Route

2.8 The Yelland Access Route, at the southwest of the Cabling Route in Yelland, is proposed to follow an existing track off Marine Parade where it will link into the South West Coast Path.

Purpose of this report

2.9 The report describes the habitats and features present and assesses their potential to support protected species either directly or in terms of providing a corridor for dispersal. The report also:

- Assesses all hedgerows within the Access Routes to determine whether they are 'important' under the Wildlife and Landscape Criteria of the Hedgerows Regulations, 1997.
- Assesses the three rhynes (ditches) within the Braunton Access Route for suitability for great crested newt *Triturus cristatus* (GCN), applying a Habitat Suitability Index (HSI) assessment.

3 Methods

Field survey

Extended Phase 1 Habitat Survey

3.1 Phase 1 habitat surveys of Braunton Access Route and Yelland Access Route were completed by Becky Prudden MCIEEM and Oliver Prudden MCIEEM on 02 March and 03 March 2023. The survey followed methods recommended by the Joint Nature Conservation Committee (JNCC) handbook for extended Phase 1 habitat survey (2016). The survey boundary (Survey Area) is shown on Figures 2 and 3.

3.2 The survey was 'extended' to include an assessment of the habitats in the Survey Area for their suitability to support protected species.

3.3 Hedgerows within the Survey Area were assessed using the Wildlife and Landscape criteria set out in The Hedgerow Regulations, 1997, principally to determine whether any hedgerow was considered 'important'. Such hedgerows cannot be removed without prior written consent from the Local Planning Authority.

3.4 Three waterbodies identified within the Braunton Access Route Survey Area were assessed for their suitability to support GCN through application of the Habitat Suitability Index (HSI) assessment method (Oldham *et al*., 2000). The locations of each waterbody (D1, D2 and D3) are provided on Figure 4. A HSI assessment is a quantitative means of evaluating habitat quality for GCN and is measured using ten indices (including location, surface area, desiccation rate, water quality, percentage shade, waterfowl and fish presence, surrounding terrestrial habitat, other ponds within 1m, and macrophyte cover).

3.5 The HSI provides a numerical index between 0 and 1 where scores closer to 0 indicate poor habitat with lower probability of great crested newt presence and those closer to 1 represent optimal habitat with a higher probability of presence. A score of ≥ 0.5 is generally considered indicative that the pond could be suitable to support a population of breeding great crested newts (ARG UK, 2010).

Consideration of Limitations

3.6 A Phase 1 habitat survey can be conducted at any time of year, with the optimal time being between April and September. The Phase 1 Habitat survey was conducted outside of the optimal time however sufficient key species could be identified during the survey for the distinct habitat types present to be accurately classified and spatially mapped. Survey timing in this case is therefore not considered a significant limitation.

3.7 There was no limitation to accessing habitats within the Survey Area for the Braunton Access Route. Access was limited to publicly accessible land within the Survey Area for the Yelland Access Route. Whilst this meant that most of the Survey Area could be readily viewed for habitat classification purposes, there is a possibility that evidence of protected / notable species may have gone undetected.

3.8 Dense and impenetrable dune scrub was recorded at the southern end of the proposed Yelland Access Route which could not be thoroughly checked for evidence of badger *Meles meles* and therefore evidence for the presence of this species may have been missed.

Personnel

3.9 Becky Prudden MCIEEM undertook the Extended Phase 1 habitat survey of the Access Routes. Becky is an experienced ecologist and holds Natural England survey licences for bats, dormouse, great crested newt and barn owl.

3.10 Oliver Prudden MCIEEM undertook the Extended Phase 1 habitat survey of the Access Routes. Oliver is an experienced ecologist and holds Natural England survey licence for bats and dormouse.

3.11 Trevor Fletcher ACIEEM completed this report. Trevor has been a Consultant Ecologist for over 5 years and has experience in carrying out and reporting on Extended Phase 1 habitat surveys. Trevor holds Natural Resources Wales survey licences for dormouse, great crested newt and barn owl and has carried out numerous surveys for priority and protected species including bats, otter, great crested newt, birds, badger, water vole and reptiles.

3.12 Anna Senior MCIEEM reviewed this report. Anna has over 15 years' experience working as a Consultant Ecologist and has extensive experience in co-ordinating and carrying out botanical surveys and protected species surveys as well as assessment and reporting. Anna holds a Natural England survey licence for dormouse and Natural England/ Natural Resources Wales licences for great crested newt.

4 Results

Braunton Access Route

Habitats

4.1 The habitats present within the Braunton Access Route are described as follows and illustrated in Figure 2.

4.2 Photographs showing typical habitat types within the Survey Area are included in Appendix 1.

4.3 Target notes in Appendix 2 should be cross referenced with Figure 2**.**

Dense scrub

4.4 Mixed and single species stands of scrub are present along the streams and in smaller, isolated patches on the earth bank which separates the fields in the north of the site. Bramble *Rubus fructicosus* agg. is the dominant species with localised mature goat willow *Salix caprea* and occasional gorse *Ulex europaeus.*

Poor semi-improved grassland

4.5 Poor semi-improved grassland is present across the site. Short sward grass fields are present in the north of the survey area which appear to be managed for hay / silage, with no evidence of any recent livestock grazing. These areas are on gently sloping ground, slightly above the flood plain. The grass sward is dominated by Yorkshire fog *Holcus lanatus* with frequent perennial rye-grass *Lolium perenne* and common bent *Agrostis capillaris* with occasional soft rush *Juncus effusus* in less well drained areas. Herbs included frequent creeping buttercup *Ranunculus repens*, common sorrel *Rumex acetosella*, dandelion species *Taraxacum* sp. and occasional broad-leaved dock *Rumex obtusifolius.*

4.6 Infrequently managed tussocky poor semi-improved grassland with frequent tall ruderal indicators is present along the ditch banks and the limited areas of unshaded stream banks.

Standing water

4.7 Field drains with no or very low flow, holding eutrophic standing water, are present in the south of the survey area. Typically, the channels are 0.5m to 1.75 m wide and up to 0. 45m deep. Steep earth banks line the ditches (up to 2m in height). Macrophytes are abundant and occasional stands of common reed *Phragmites australis* are present just outside the survey area.

Running water

4.8 Two narrow streams are present within the survey area, both are fast-flowing and shallow (5-10cm depth) flowing over gravel /sand substrates within deep, straightened channels. The streams are lined by dense / mature scrub for much of their lengths with a closed canopy above the channel. Aquatic vegetation is absent and the banks support occasional ferns such as hard fern *Blechnum spicant* and other woodland ground layer species.

Arable

4.9 All arable fields within the survey area are planted with winter barley (crop height c. 15-20cm), with the remains of a previous maize crop still visible in places. Field margins are narrow (<0.5m) and the cultivated area typically runs to the top of the ditch banks, except where field tracks are present.

Intact hedgerow

4.10 Two roadside hedges are present in the north of the Survey Area (see Photographs in Appendix 1). The hedgerows are on low earth banks up to approximately 1m high and appear regularly managed.

Elm *Ulmus* sp. is the dominant tree species in both hedgerows, with additional species only being present in the hedgerow to the south of Staunton Road. Species in this hedgerow include goat willow, hawthorn *Crataegus monogyna*, blackthorn *Prunus spinosa* and gorse. Honeysuckle *Lonicera periclymenum* is locally abundant.

4.11 Neither of the hedgerows within the Survey Area are classified as 'important' under the Wildlife and Landscape criteria of the Hedgerows Regulations 1997. The hedgerow south of Staunton Road is the more species rich of the two but does not meet the required woody species diversity criteria to be classified as 'important'.

Bare ground

4.12 An unsurfaced, regularly used farm track is present in the south of the Survey Area. The track is unvegetated and comprises very sandy, bare soil (see Photographs, Appendix 1).

Protected and Priority Species

Bats

4.13 Scrub-lined streams and steep-sided ditches, as well as the roadside hedges in the north, provide suitable commuting and foraging habitat for bats. Away from field boundaries, the open fields are likely to be exposed to impacts from weather (wind, rain) given the low-lying coastal topography and lack of shelter. These areas are therefore unlikely to be used by bats. Overall, the Survey Area is assessed as being of low-moderate value for foraging / commuting bats.

4.14 No trees or structures with potential bat roosting features are present within the Survey Area.

Otter

4.15 No evidence for the presence of otter *Lutra lutra* was noted during the survey.

4.16 Streams and ditches within the Survey Area are considered too shallow to support otter territories but may potentially provide occasional dispersal routes.

Water Vole

4.17 No evidence of water vole *Arvicola amphibious* presence was recorded during the survey.

4.18 Streams within the Survey Area (Figure 2, TN7 & TN8) are assessed as unsuitable for water vole due to generally shallow water levels, bankside shading and lack of herbaceous cover as the banks are predominantly bare beneath the scrub layer. The fast-flowing stream at the north of the site, running through a culvert under Saunton Road, is also unsuitable for water vole. Field drains are also predominantly unsuitable due to the shallow depth of water. The slightly deeper central drain (TN3 & TN4) offers at best, low suitability for water voles.

Dormouse

4.19 Roadside hedges and connecting scrub–lined streams provide suitable woody cover for dormouse *Muscardinus avellana* and offer good arboreal connectivity, foraging and nesting resources. The survey area also has good connectivity to the surrounding hedgerow network, particularly to the north and east of the site.

Badger

4.20 No badger *Meles meles* setts were recorded within the Survey Area during the survey. Badger field signs were recorded however, these included foraging marks along a field margin in the south of the survey area (TN6) and badger dung and a pathway recorded on the north western boundary of the Survey Area (TN9).

Birds

4.21 Hedges and scrub within the Survey Area offer nesting areas and foraging resources for a wide range of farmland / generalist bird species. The arable fields present may support ground nesting birds and Skylark *Alauda arvensis* was observed displaying over the cereal fields within the Survey Area during the survey. Ditches within the Survey Area are likely to support waterfowl and waders, with Mallard *Anas platyrhynchos* seen within ditches during the survey.

Reptiles

4.22 Suitable habitat for reptiles within the Survey Area is restricted to rough grassland along ditch margins, an earth bank in the northern fields and the bases of hedgerows. Grass snake *Natrix natrix* may be present along ditches as there is some potential for the presence of food resources such as common amphibians.

Amphibians

4.23 Of the three ditches subject to surveys, two of these, D1 and D3, were assessed as unsuitable to support GCN due to the presence of swift flowing water. Ditch D2 was assessed as having 'Below Average' suitability to support GCN (refer to Appendix 5, HSI survey results). Tussocky grassland & scrub associated with ditches and streams, as well as the grass fields in the north of the survey area provide suitable terrestrial habitat for GCN.

4.24 All ditches provide suitable breeding habitat for other common amphibians with little to no water flow and good cover of macrophytes. The tussocky grassland and scrub associated with ditches and streams, as well as the grass fields in the north of the Survey Area, also provide suitable terrestrial habitat for common amphibians.

Other mammals

4.25 Scrub and hedgerows offer suitable cover for nesting sites for West European hedgehog *Erinaceus europaeus* and, together with areas of grassland, provide good opportunities for foraging.

4.26 Cereal crops, tall grassland and stands of reeds within ditches outside the immediate site area, scrub and hedges all offer suitable habitat for harvest mouse *Micromys minutus* to nest, shelter and forage.

4.27 Cereal crops, tall grassland along ditch banks and scrub and hedges offer suitable habitat for European brown hare *Lepus europaeus*.

Invertebrates

4.28 Most of the Survey Area is considered to be of limited value to invertebrates due to the presence of extensive, intensively managed farmland with limited structural diversity. There were also indications of high levels of herbicide and fertilizer input. However, ditches, areas of scrub and hedgerows are likely to be of higher value and offer resources for nectaring species and nesting sites for aculeates (e.g. bees and wasps) within bare sandy substrates. Standing and running water within the ditches / streams respectively also provide opportunities for a range of aquatic invertebrates, including *Odonata* (dragonfly and damselfly species).

Flora

4.29 No notable flora species were recorded during the site visit. Habitats within the site appear heavily modified by farming practices, which include regular applications of herbicides within cereal crops, this reduces the likelihood of notable species occurring.

Invasive species

4.30 No invasive species listed under Schedule 9 of the Wildlife & Countryside Act, 1981 (as amended) were recorded within the survey area.

Yelland Access Route

Habitats

4.31 The habitats present within the Yelland Access Route are described as follows and illustrated in Figure 3.

4.32 Photographs of habitat types within the Survey Area are included in Appendix 3 of this report.

4.33 Target notes (TN) in Appendix 4, should be cross referenced with Figure 3.

Semi-natural broadleaved woodland

4.34 A small area of mature semi-natural broadleaved woodland (wet woodland) is present to the north of the cricket ground. Woodland is dominated by goat willow with occasional elm in the canopy. A dense shrub layer is developing, comprising re-generating willow and suckering elm. Occasional shallow ponds are present (see TN9).

Dense scrub

4.35 Stands of dense bramble and mixed species stands with blackthorn, hawthorn, bramble and elm are present in several locations, mostly associated with overgrown field boundaries on the east side of the Yelland Access Route.

Improved grassland

4.36 Improved pasture, with abundant perennial ryegrass, is present in one field on the east side of the Tarka Trail.

Poor semi-improved grassland

4.37 Poor semi-improved grassland is present in strips running parallel to the Tarka Trail and in low lying pasture fields to the east and west of the trail. Occasional stands of rush species were noted within these fields.

Standing water

4.38 Two pools are present within the woodland to the north of the cricket ground at Grid Reference SS 47447 31452. Only one of these can be clearly viewed from the footpath (TN9), but this appears shallow and likely to dry out at regular intervals. The pond surface is completely over-shadowed by canopy trees and full of decaying leaf litter. No macrophytes are present, however yellow flag iris *Iris pseudacorus* is occasional present around the pool margins.

4.39 A further small area of standing water, colonised by common reed, is adjacent to the Tarka Trail, near an outfall from the adjacent barracks (see TN3).

Running water

4.40 Running water is present on site in the form of a stream which runs through dense scrub, close to the car park immediately east of TN3. This appears to be fast flowing, shallow (c.5-10 cm deep) and narrow (c.30-50 cm wide). No aquatic vegetation was seen along the section visible from the road and scrub has recently been cleared along the banks. The channel is culverted beneath the road / car park.

Dune grassland

4.41 Dune grassland (comprising all closed sward grasslands on levelled / consolidated sand dune) is present in several locations including surrounding the car park, the cricket ground, a strip behind

artificial sea defences, and within sheep-grazed pasture behind open dunes at the northern end of the Survey Area.

4.42 Sward cover is often patchy with areas of bare sand created by footfall and subsequent erosion. Typically, red fescue *Festuca rubra* is abundant, with frequent perennial ryegrass, Yorkshire fog and cock's-foot *Dactylis glomerata*. Herbs include buck's-horn plantain *Plantago coronopus*, common bird's-foot trefoil *Lotus corniculatus* and wild thyme *Thymus serphyllum*. Most areas have a short sward through either management or regular trampling, however, the strip immediately inland of the sea defences has been left unmanaged and a tall sward has developed, dominated by sea couch *Elymus repens*.

Dune scrub

4.43 Dense areas of scrub are present within, and encroaching upon the open dune areas, predominantly the grey dunes. These include areas dominated by mature sea buckthorn *Hippophae rhamnoides* as well as dense bramble and blackthorn thickets.

Open dune

4.44 Open dune habitat is found on the seaward edge of the site and includes areas of yellow dune (undulating dunes dominated by marram grass *Ammophila arenaria*) as well as grey dune on the inland side which has a more closed sward and increased diversity of herbs and grasses. These habitats are typically to the west (seaward) side of the central track.

Amenity grassland

4.45 Narrow strips of regularly mown amenity grassland are present beside the chalets lining the Tarka Trail. The grassland is associated with frequent ornamental shrubs and garden plants.

Intact species-poor hedgerow

4.46 One hedgerow occurs within the Yelland Survey Area which comprises a species-poor, elm dominated hedgerow running alongside the coast path. This hedge has recently been trimmed along both the top and sides for much of its length, and is growing on a 1.5 m high earth bank. At the northern end of the hedge (adjacent to the woodland), the hedgerow elms have been left to grow into a tall hedge / line of trees.

Protected and Priority Species

Bats

4.47 Much of the Survey Area is quite exposed with no tree cover except for the woodland to the north of the cricket grounds. However, dune hollows and scrub offer some sheltered foraging, as do the small woodland, nearby hedgerow and Tarka Trail. Exterior lighting is located on some of the buildings (including flood lighting on the cricket pavilion) and that, together with light spill from internal sources is likely to result in illumination of parts of the site at night. Overall, the Survey Area is considered to offer low-moderate suitability foraging and commuting habitat for bats.

4.48 Several buildings / structures with potential roosting features for bats are present within the Survey Area as follows:

- Cricket pavilion (Grade II listed building) at TN5. Assessed as having high suitability for roosting bats.
- Chalet buildings along the Tarka Trail at TN2. These buildings were not individually assessed but were noted to be of up to moderate suitability for roosting bats.
- A World War II (WWII) shelter / structure TN6 (partially flooded). Assessed as having high suitability for roosting bats (including as a hibernation roost).

- A WWII brick building within sheep-grazed field TN7. Assessed as having low suitability for roosting bats.

4.49 In addition, mature willow trees within the small woodland to the north of the cricket grounds (TN8) were noted to include occasional small knot holes and cracks and were assessed (as a group) to have up to low suitability for roosting bats.

Otter

4.50 Whilst otters are likely to be present along the nearby River Taw and utilise the intertidal areas to the west of the Survey Area for foraging, no suitable habitat or evidence of their presence was recorded within the Survey Area. The stream at the southern end (TN1) is assessed as too shallow and minor to support foraging otters.

4.51 Incidental evidence of otter was recorded approximately 420 m to the north-east of the Survey Area (at its closest point) during a separate survey of Yelland substation by Woodfield Ecology on 03 March 2023. During this survey, spraint was found on the banks of a large pond and indicates the presence of otter in the surrounding landscape.

Water Vole

4.52 The only watercourse recorded within the survey area (TN1) is considered unsuitable to support water vole due to its shallow water levels and high degree of over-shading by surrounding scrub, as well as its relative isolation from other suitable aquatic habitat as a result of culverting.

Dormouse

4.53 Whilst areas of dense scrub, the woodland and hedgerow within the Survey Area all offer suitable habitat for dormouse, these are isolated from other areas of suitable habitat. The network of hedgerows within the surrounding landscape is patchy / fragmented as a result of coastal exposure and historic removal, with field boundaries typically comprising fence lines with low growing / and discontinuous scrub.

Badger

4.54 No badger setts or other signs of badger activity were recorded within the Survey Area. Habitats within the Survey Area suitable for badger use for foraging and commuting include woodland, hedgerow bases and grassland.

Birds

4.55 A timber chalet and old thatched cricket pavilion within the Survey Area offer opportunities for birds to nest. House sparrow *Passer domesticus* and starling *Sturnus vulgaris*, species that regularly use buildings to nest, were recorded nearby. The area of woodland, adjacent hedge and stands of dense scrub also offer nesting areas and foraging resources for a wide range of species. Areas suitable for ground-nesting species are considered limited to open dune habitat, though due to the high numbers of visitors / dog-walkers, these are likely to be sub-optimal given regular disturbance.

Reptiles

4.56 The site provides highly suitable habitat such as tall / tussocky grasslands, scrub edges, banks and dunes for common reptile species such as common lizard *Zootoca vivipara* and slow worm *Anguis fragilis.* Habitat is also suitable for adder *Vipera berus.*

Amphibians

4.57 No formal HSI assessment of the two waterbodies within the Survey Area was carried out but it is considered that they are likely to be of low suitability for GCN due to:

- Small size and shallow depth with high likelihood of drying out;

- Lack of macrophytes and emergent plants;
- Heavy shading by trees (woodland ponds); and
- Likely poor water quality (TN3).

4.58 The two waterbodies recorded within the woodland are also considered to be of low suitability as breeding habitat for other amphibians due to being shallow, shaded and lacking in macrophyte cover. The small area of standing water adjacent to the Tarka Trail (TN3) may however offer some limited aquatic habitat for common / widespread amphibian species.

4.59 Tall grassland, areas of woodland, scrub and hedgerow offer some suitable habitat for GCN and other amphibians in the terrestrial phases.

Other mammals

4.60 Scrub and hedgerow habitats along the coastal footpath offer suitable foraging and cover for nesting sites for West European hedgehog.

4.61 Tall grassland within areas of open dune, together with scrub and the species-poor hedgerow, all offer suitable habitat for harvest mouse.

4.62 Habitat for European brown hare assessed as sub-optimal due to frequent use by people / dog-walkers which would act as a deterrent to the species. There is a lack of extensive areas of open habitat which are preferred by the species.

Invertebrates

4.63 Dune habitats within the survey area offer suitable habitat for coastal specialists, whilst semi -natural grasslands are likely to provide good nectar forage.

Flora

4.64 Two Notable plants for Devon were identified from coastal / dune habitats within the length of the Survey Area.

- Sand sedge *Carex arenaria* (Devon Notable 2: found in 26-50 2 km squares in the Atlas of Devon Flora 1984) was recorded across open dune habitats.
- Sea couch *Elytrigia atherica* (Devon Notable 3: found in 51-100 2 km squares in the Atlas of Devon Flora 1984) found in dune grassland in the survey area near to the beach in the north-west.

Invasive species

4.65 Montbretia *Crocosmia x crocosmiiflora*, an invasive plant species listed under Schedule 9 of the Wildlife & Countryside Act, 1981 (as amended) was recorded from a single location within the Survey Area, along the Tarka Trail at TN4.

5 References

Amphibian and Reptile Groups of the United Kingdom (2010). *ARG UK Advice Note 5: Great Crested Newt Habitat Suitability Index.* ARGUK

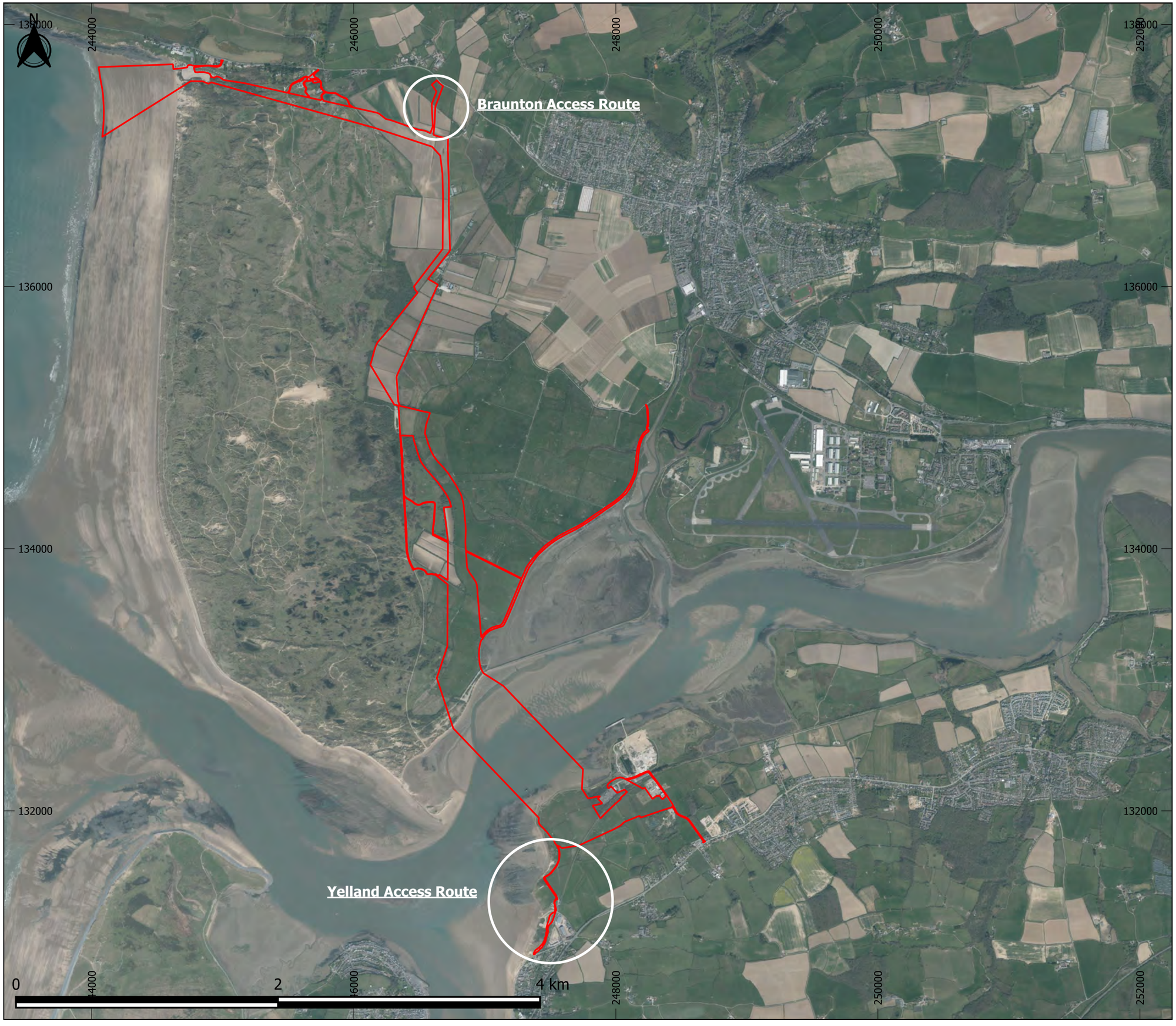
JNCC (2016). *Handbook for Phase 1 habitat survey - a technique for environmental audit*. Joint Nature Conservation Committee, Peterborough.

R. S. Oldham, J. Keeble, M. J. S. Swan and M. Jeffcote (2000). *Evaluating the suitability of habitat for the great crested newt* (*Triturus cristatus*). Herpetological Journal **10** (4): 143-155.

The Hedgerows Regulations (1997). https://www.legislation.gov.uk/uksi/1997/1160/made.

6 Figures

(overleaf)



Legend

Site boundary

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JOB REF: P22-827

PROJECT TITLE

WHITE CROSS OFFSHORE WINDFARM

DRAWING TITLE

Figure 1: Overview of red line boundary with location of access routes

DATE: 23/03/2023 CHECKED: JB SCALE: 1:27,500

DRAWN: BH APPROVED: JB VERSION:1.0

Projection: OSGB 1936/British National Grid - EPSG 27700

Sources: BSG Ecology survey data

Graphics Ref. No.: 03095

Legend

- Site boundary
- Survey boundary
- Scattered Scrub
- Target Note
- Intact hedge - native species-rich
- Earth bank
- Scrub - dense/continuous
- Poor semi-improved grassland
- Standing water - mesotrophic
- Cultivated/disturbed land - arable
- Built up areas inc. hardstanding
- Bare ground
- Running water - mesotrophic

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PROJECT TITLE

WHITE CROSS OFFSHORE WINDFARM

DRAWING TITLE

Figure 2: Braunton Access Route – Phase 1 Habitat Map

DATE: 24/03/2023 CHECKED: JB SCALE: 1:1,750

DRAWN: BH APPROVED: JB VERSION:1.0

Projection: OSGB 1936/British National Grid - EPSG 27700

Sources: BSG Ecology survey data

Graphics Ref No.: 03115

Legend

- Introduced Shrub
- Scattered Broad-leaved Trees
- Scattered Coniferous Trees
- Scattered Scrub
- Target Note
- Intact hedge - native species-rich
- Intact hedge - species-poor
- Fence
- Wall
- Dry ditch
- Earth bank
- Running water - mesotrophic
- Broadleaved woodland - semi-natural
- Scrub - dense/continuous
- Improved grassland
- Poor semi-improved grassland
- Standing water - mesotrophic
- Dune grassland
- Dune scrub
- Open dune
- Cultivated/disturbed land - amenity grassland
- Built up areas inc. hardstanding
- Artificial sea wall
- Buildings
- Bare ground
- Site boundary
- Survey boundary

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JOB REF: P22-827

PROJECT TITLE

WHITE CROSS OFFSHORE WINDFARM

DRAWING TITLE

Figure 3: Yelland Access Route – Phase 1 Habitat Map

DATE: 04/08/2023 CHECKED: AS SCALE: 1:3,250

DRAWN: MSG APPROVED: JB VERSION:1.1

Projection: OSGB 1936/British National Grid - EPSG 27700

Sources: BSG Ecology survey data

Graphics Ref. No.: 04176

Legend

Survey boundary

Site boundary

Ditch Suitability for GCN Survey

Below Average Suitability

Unsuitable

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PROJECT TITLE

WHITE CROSS OFFSHORE WINDFARM

DRAWING TITLE

Figure 4: Braunton Access Route – Great crested newt Habitat Assessment Index (HSI) results

DATE: 24/03/2023 CHECKED: JB SCALE: 1:1,750

DRAWN: BH APPROVED: JB VERSION:1.0

Projection: OSGB 1936/British National Grid - EPSG 27700

Sources: BSG Ecology survey data

Graphics Ref. No.: 03122

Appendices

(overleaf)

Appendix 1: Braunton Access Route-Habitat Photographs

Habitat	Representative Photograph
Arable	
Running water	
Standing water	
Poor semi-improved grassland: ditch banks	See Photograph above.

Habitat	Representative Photograph
Poor semi-improved grassland: fields	
Dense scrub	
Hedgerows Upper image: species rich hedgerow to south side of Saunton Road. Lower image: species poor hedgerow to north side of Saunton Road.	

Habitat	Representative Photograph
	
Bare ground	

Appendix 2: Braunton Access Route Target Notes (TN)

TN	Type	Description	Photograph
1	Habitat	Field ditch – shallow, standing water (c. 5cm deep), slightly deeper (c. 10-15cm) in ponded area to the west of the culverted crossing point. Assessed as unsuitable for water vole due to low water level.	No image
2	Habitat	Water-filled ditch to east of culverted crossing with area of open water up to c. 50cm deep, and up to c. 4m wide x c. 25m long. Emergent and aquatic macrophytes present and shoals of small fish seen. Further east, the drain becomes narrower (c. 0.5m wide) and shallower (c 5cm deep). Whilst section of deeper water offers potentially suitable habitat for water vole, this is small in size and surrounded on both sides by unsuitable habitat within the ditch to the west (TN1) and east.	
3	Habitat	Steep-sided ditch (banks c. 1.5 - 2.0m high) with very slow flow. Water channel between 0.75 - 1.75m wide, generally shallow (c. 5-10cm depth) but becoming deeper (up to c. 45cm) immediately to the west of the culverted ditch crossing. Banks support infrequently managed tussocky grassland with frequent tall herbs. Assessed as having low suitability for water vole due to shallow water levels for most of the ditch and no evidence of their presence was noted.	

TN	Type	Description	Photograph
4	Habitat	Steep-sided ditch (banks c. 1.5 - 2.0m high) with very slow flow. Water 0.75 - 1.75 wide, generally shallow (c. 5-10cm depth). Dense bankside vegetation (rank grassland / tall herbs). Assessed as having low suitability for water vole due to shallow water levels for most of the ditch and no evidence of their presence was seen.	
5	Mammal path	Well-worn mammal path crossing stream. Deer slots only seen.	
6	Badger	Badger foraging marks at top of stream bank and mammal path.	No image
7	Habitat	Swift-flowing, shallow stream with a water depth of 5-10cm and width of c. 0.5m over a gravel / sand substrate. Within a steep- sided channel with banks up to 2m high. Lined by dense bramble or mature willow scrub for most of length. Aquatic vegetation absent. Assessed as unsuitable for water vole due to shallow water depth / over-shading of banks with limited herbaceous cover at ground level. Similarly, too shallow to support otters, but may provide a dispersal corridor.	

TN	Type	Description	Photograph
8	Habitat	Swift-flowing shallow stream within dense scrub (culverted beneath road at northern end). Only limited views possible. Where visible, channel was c. 5cm deep x c. 0.5m wide, within a steep-sided channel up to c. 1m deep. Assessed as unsuitable for water vole due to shallow water depth / over-shading of banks and offers only a dispersal route for Otters.	
9	Badger	Mammal path from streamside scrub running parallel to hedge to the south. Badger dung (scattered) in several locations along path.	No image

Appendix 3: Yelland Access Route Photographs

Habitat	Habitat Description	
Semi-natural broadleaved Woodland	A small area of mature semi-natural broadleaved woodland (wet woodland) was recorded to the north of the cricket ground which was dominated by goat willow with occasional elm in the canopy. A dense shrub layer was noted which was dominated by re-generating willow and suckering elm. Occasional shallow ponds were present (see TN9).	
Dense scrub	Stands of dense bramble and mixed species stands with blackthorn, hawthorn, bramble and elm were recorded in several locations, mostly associated with overgrown field boundaries on the landward side of the survey area.	
Improved grassland	Improved pasture was recorded in one field on the eastern (landward) side of the Tarka Trail which was dominated by perennial ryegrass.	N/A
Poor semi-improved grassland	Strips of occasionally mown, species-poor grassland were recorded alongside the Tarka Trail, as well as within low-lying pasture fields to the east and west of the trail. Occasional stands of rush were also noted within these fields.	N/A

Habitat	Habitat Description	
Standing water	Two pools were recorded within the woodland to the north of the cricket ground. Only one of these could be clearly viewed from the footpath (TN9 – see top image), but this appeared shallow and likely to dry out at regular intervals. The pond surface was completely over-shadowed by canopy trees and full of decaying leaf litter. No macrophytes were noted, however yellow flag was occasional around the margins. A further small area of standing water colonised by common reed was noted adjacent to the Tarka Trail, near an outfall from the adjacent barracks (see TN3).	
Running water	The only running water recorded within the survey area was a stream which runs through dense scrub, close to the car park. This appeared to be fast flowing, shallow (c.5-10 cm deep) and narrow (c.30-50 cm wide). No aquatic vegetation was seen along the section visible from the road and scrub had recently been cleared along the banks. The channel was noted to be culverted beneath the road / car park.	No image

Habitat	Habitat Description	
Dune grassland	Dune grassland (comprising all closed sward grasslands on levelled / consolidated sand dune) was recorded in several locations such as surrounding the car park, the cricket grounds, a strip behind artificial sea defences, as well as within sheep-grazed pasture behind open dunes at the northern end. Sward cover was often patchy with areas of bare sand where heavily trampled and eroded. Typically, Red Fescue was abundant, with frequent Perennial Ryegrass, Yorkshire Fog and Cock's-foot. Herbs included Buck's-horn Plantain, Bird's-foot Trefoil and Wild Thyme. The majority of areas had a short sward through either management or regular trampling; however, the strip immediately inland of the sea defences had been left unmanaged and had a tall sward dominated by Sea Couch.	 
Dune scrub	Dense areas of scrub were recorded within and encroaching upon the open dune areas, predominantly the grey dunes. These included areas dominated by mature Sea Buckthorn as well as dense Bramble and Blackthorn thickets.	

Appendix 4: Yelland Access Route Target Notes (TN)

TN	Type	Description	Photograph
1	Habitat	Stream flowing east – west through dense dune scrub, recently cleared along banks of stream. Fast flowing, shallow (5-10 cm) and narrow (c.30-50 cm) wide. Assessed as unsuitable for Water Vole due to low water level, shading of banks and isolation from other suitable aquatic habitats.	No image
2	Roosting bats	Timber chalet-style buildings lining Tarka Trail with a mix of slate and composite slate roofs, all of which appeared to be well maintained and in good repair (some having been recently renovated). Potential roosting features seen included occasional ridge gaps, as well as gaps in timber cladding and around unsealed roof verges / eaves. The majority of buildings were of either low or negligible suitability for roosting bats; however, some contained multiple features and were up to moderate suitability.	
3	Habitat	Small area of standing water colonised by common reed next to the Tarka Trail near an outfall from the adjacent barracks. No water flow was noted, but higher water levels would appear to drain via a culvert/pipe to the south-east. The water body appeared shallow and may be prone to regular drying.	

TN	Type	Description	Photograph
4	Invasive species	Several scattered clumps of Montbretia growing within a narrow strip of amenity grassland next to the chalets (listed under Schedule 9, Wildlife & Countryside Act, 1981 as amended).	
5	Roosting bats	Thatched cricket pavilion (Grade II Listed Building) – understood to have been most likely originally built as a barn of late-C18 /early-C19 origins and re-modelled as a pavilion in the early-C19. Walls comprised painted stone rubble with a gable-end thatch roof. Gaps were noted under the thatch at wall tops in several locations and some areas of slate roof also provide possible crevice roost sites. High suitability for roosting bats and numerous opportunities for nesting birds.	
6	Roosting bats	WWII structure, currently flooded to c. 1m deep, but with sufficient roost volume retained above the water-line in two dark / undisturbed rooms. No crevice sites were noted from the doorway, and the brickwork appeared to be in good order as far as could be viewed. Assessed as having high suitability as a day and night roost for free-hanging species, with potential for use during the hibernation period also.	

TN	Type	Description	Photograph
7	Roosting bats	Brick building (also presumed to date from WWII) with concrete roof. Open doorway so very light and exposed inside, but suitable for night roosting bats. Some small crevices present in crack in masonry. Assessed as having low suitability for roosting bats overall.	
8	Roosting bats	Trees within woodland noted to contain occasional small cracks and knot holes – tree group assessed as having up to low suitability for roosting bats.	No image
9	Habitat	Shallow ponds within wet woodland with depth of up to 25 cm. Completely shaded and choked with leaf litter. No aquatic plants evident but sparse marginal vegetation including Yellow Iris and sedges. Considered sub-optimal for breeding amphibians due to being likely to dry out at regular intervals, low oxygen levels and lack of macrophyte cover.	

Appendix 5 Great Crested Newt – Habitat Suitability Index (HSI) Survey Form

(cross refer to Figure 4 for locations of each waterbody)

Project Name / No:	**White Cross Devon**	**Waterbody Name / No.**	**D1**
Recorders:	**OP/BP**	**Survey Date:**	**02/02/23**
Photo(s):			
Description of waterbody: Swift flowing shallow stream c. 5-10cm deep. No aquatic vegetation and largely over-grown by dense bramble and willow scrub along both banks. HSI NOT UNDERTAKEN – DITCH UNSUITABLE DUE TO SWIFT FLOWING WATER			

Project Name / No:	White Cross Devon	Waterbody Name / No.	D2
Recorder(s):	OP/BP	Survey Date:	02/02/23

Description of waterbody:

Steep-sided ditch between arable fields. Very slow flow within water channel c. 0.75 – 1.75m wide and from 5 to 50cm depth. Steep banks 1.5-2.0 m high.

											SI Score
SI 1: Location (check map)											
Zone A (1)		Zone B (0.5)				Zone C (0.01)					**0.01**
SI 2: Pond Area											
Max Length: **250m**		Max Width: **1.75m**				Area (to nearest 50m^2): (125x1.75) + (125x0.75) = **300m^2**					(read off graph) **0.6**
SI 3: Pond Drying											
Never (0.9)		Rarely (1)	**X**	Sometimes (0.5)		Annually (0.1)					**1**
SI 4: Water Quality											
Good (1) Invertebrate community abundant & diverse		Moderate (0.67) Invertebrate diversity moderate	**X**	Poor (0.33) Invertebrate diversity low, few submerged plants		Bad (0.01) Clearly polluted, no submerged plants, only pollutant tolerant inverts present.					(read off graph) **0.67**
SI 5: Shade											
Estimate % pond perimeter shaded to at least 1m from shore (May to Sept only). Do not include shading from emergent vegetation.								**0%**			(read off graph) **1**
SI 6: Waterfowl											
Absent (1) No evidence of waterfowl but Moorhen may be present		Minor (0.67) Waterfowl present (but little evidence of impact on pond vegetation, submerged vegetation still present)		**X**		Major (0.01) Severe impact on waterfowl (little or no submerged vegetation, bare banks)					**0.67**

SI 7: Fish								
Absent (1) No records of fish stocking and no fish found during survey		Possible (0.67) No evidence of fish, but local conditions indicate they may be present	**X**	Minor (0.33) Small amount of crucian carp, goldfish or stickleback known to be present		Major (0.01) Dense populations of fish / other predatory species known to be present		**0.67**
SI 8: Pond Density								
No. of ponds within 1km of survey pond (do not include survey pond or ponds separated by major barriers) **Note – 2 ponds on OS mapping, multiple drainage ditches, based on site survey assumed c. 3 hold standing water**							**5**	(Divide by 3.14 and read off graph) **1**
SI 9: Terrestrial Habitat (within 500m of pond, on nearside of major barriers)								
Good (1) Extensive habitat, good foraging and shelter, completely surrounds pond (rough grass, scrub, woodland, brownfield, low intensity farming)		Moderate (0.67) Foraging and shelter recorded but may not be extensive or surround pond	**X**	Poor (0.33) Habitat has poor structure – limited foraging and shelter (amenity grassland, heavily grazed pasture, arable)		None (0.01) Clearly no suitable habitat (arable, barren, urban)		**0.67**
SI 10: Macrophytes								
Estimate % of pond surface area occupied by vegetation cover during March to May. Include emergent, floating plants and submerged plants reaching surface (not including duckweed).							**60%**	(read off graph) **0.9**
OVERALL HSI SCORE HSI = (SI1 x SI2 x SI3 x SI4 x SI5 x SI6 x SI7 x SI8 x SI9 x SI10)1/10 **(0.01x0.6x1x0.67x1x0.67x0.67x1x0.67x0.9)^0.1**								**0.505 = Below Average**

Project Name / No:	White Cross Devon	Waterbody Name / No.	D3
Recorder(s):	OP/BP	Survey Date:	02/02/23
Photo refs.			

Description of waterbody:

Swift flowing shallow stream c. 5-10cm deep. Dense scrub overgrowing the channel on at least one side for the whole length of ditch.

HSI NOT UNDERTAKEN – DITCH UNSUITABLE DUE TO SWIFT FLOWING WATER

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.D Bat Activity Survey Report

Appendix 16.D Bat Activity Survey Report 2022

White Cross Windfarm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 BAS rev00
Client:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal HaskoningDHV
Survey Date/s:	April – October 2022
Report Date:	October 2022
Report Author:	William Corbett BSc, MRes
Approved By:	Andrew Charles BSc (Hons), MSc, MCIEEM
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Disclaimer

It should be noted that this report is context-specific. If any changes are made to the brief and/or the development proposal Ecologic Consultant Ecologists LLP must be informed, as amendments may be required. The information provided in this report must be reviewed and updated in the time following twelve months from the date of survey. This report (including any enclosures and attachments) has been prepared for the exclusive use and benefit of the addressee(s) and solely for the purpose for which it is provided. Unless we provide express prior written consent, no part of this report should be reproduced, distributed or communicated to any third party. Ecologic Consultant Ecologists LLP do not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report.

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake a Bat Activity Survey along the proposed onshore cable corridor routes for the White Cross Windfarm ("the Project").

The proposed onshore cable corridor routes extends from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1). The preferred onshore cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a secondary/alternative route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final route to be determined; see Figure 1-1).

The survey area consisted of the proposed Onshore Export Cable Corridors and an extended 50m buffer (see Figure 1-1).

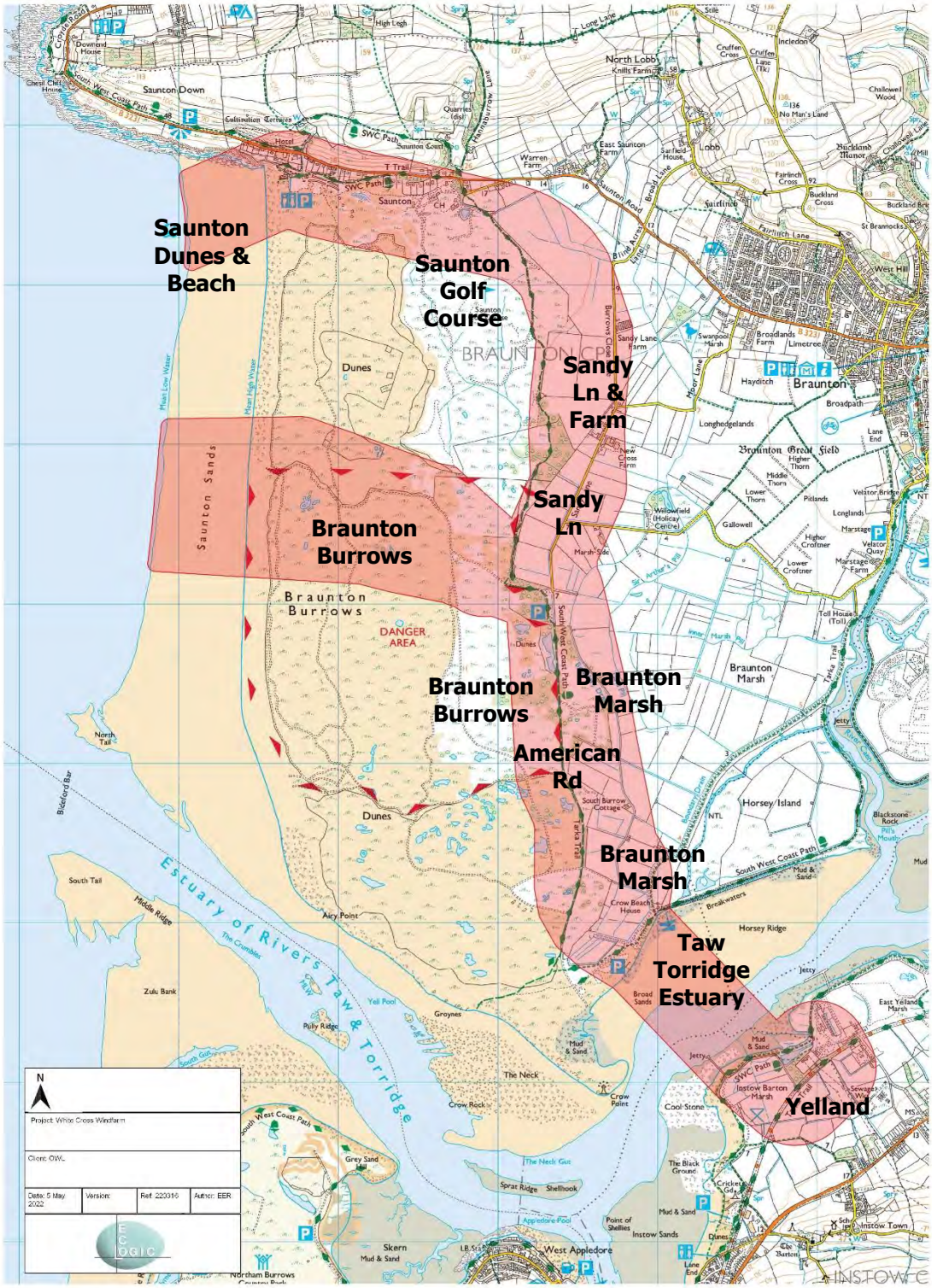

Figure 1-1 The proposed cable corridors and bat activity survey area

2. Survey Methods

The bat activity survey was undertaken in compliance with guidance provided by the Bat Conservation Trust's (BCT) Bat Surveys for Professional Ecologists Good Practice Guidelines 3rd Edition (Collins, 2016), as required for a site with 'moderate' suitability habitat for bats'.

This included the combination of manual bat activity transect surveys and remote monitoring survey periods undertaken monthly from April to October 2022.

2.1 Remote Monitoring Survey

A remote monitoring survey using static automated bat detectors was undertaken monthly from April to October 2022 within the following areas:

- Agricultural Fields;
- Braunton Burrows Outer Dunes;
- Braunton Burrows Inner Dunes;
- Braunton Marsh;
- Saunton Dunes; &,
- Yelland.

See Figure 2-1 for the static automated bat detector positions.

The automated bat detectors deployed consisted of SongMeter Mini & SongMeter 2+ zero crossing frequency division detectors, programmed to commence recording 30 minutes prior to sunset until 30 minutes after sunrise for five consecutive nights per month.

2.2 Manual Bat Activity Transect Survey

The manual bat activity survey area was sub-divided into five transect routes:

- Yelland – woodland, agricultural fields and coast;
- Braunton Marsh;
- American Road & Sandy Lane;
- Braunton Burrows Dunes & Northern Boundary Track (habitats west of Sandy Lane carpark); &,

- Sandy Lane Farm/agricultural fields, Saunton Golf Course & Saunton Sands Dunes/Beach.

The manual bat activity survey comprised dusk transects undertaken on the following evenings:

- 23rd, 27th & 28th April 2022;
- 13th, 14th, 29th, 30th & 31st May 2022;
- 2nd, 6th & 23rd June 2022;
- 5th & 13th July 2022;
- 1st & 17th August 2022;
- 12th, 13th, 17th & 18th September 2022; and,
- 11th & 12th October 2022.

Each dusk transect was walked from 15 minutes prior to sunset, until at least 2-3 hours after sunset. The transects were walked during relatively warm (minimum temperature: 8-15°C) and still (Beaufort Scale 0-4) weather conditions considered suitable to promote bat activity. The transect routes are identified on Figure 2-1.

The transect routes were prior identified during daylight hours to encompass the site, site boundaries and any features which may be utilised by dispersing or feeding bats.

The transect routes were continuously walked throughout the survey visits, with static positions held for at least 3 minutes when a bat was encountered to obtain behavioural information such as, whether the bat was feeding, dispersing, interacting with other bats, etc. The transect routes were walked in a counter directions for sequential survey visits.

All bat activity was recorded using either a Peersonic RPA 3 bat recorder with internal recording capability or an Echo Meter 3 bat detector with internal recording capability.

To aid species identification all recordings were analysed using Kaleidoscope Viewer (version 4.5.5), AnalookW (version 4) and/or BatSound (version 4.03) computer software.

All subsequent ultrasound recordings were analysed using Kaleidoscope Viewer (version 4.5.5), AnalookW (version 4) and/or BatSound (version 4.03) computer software.

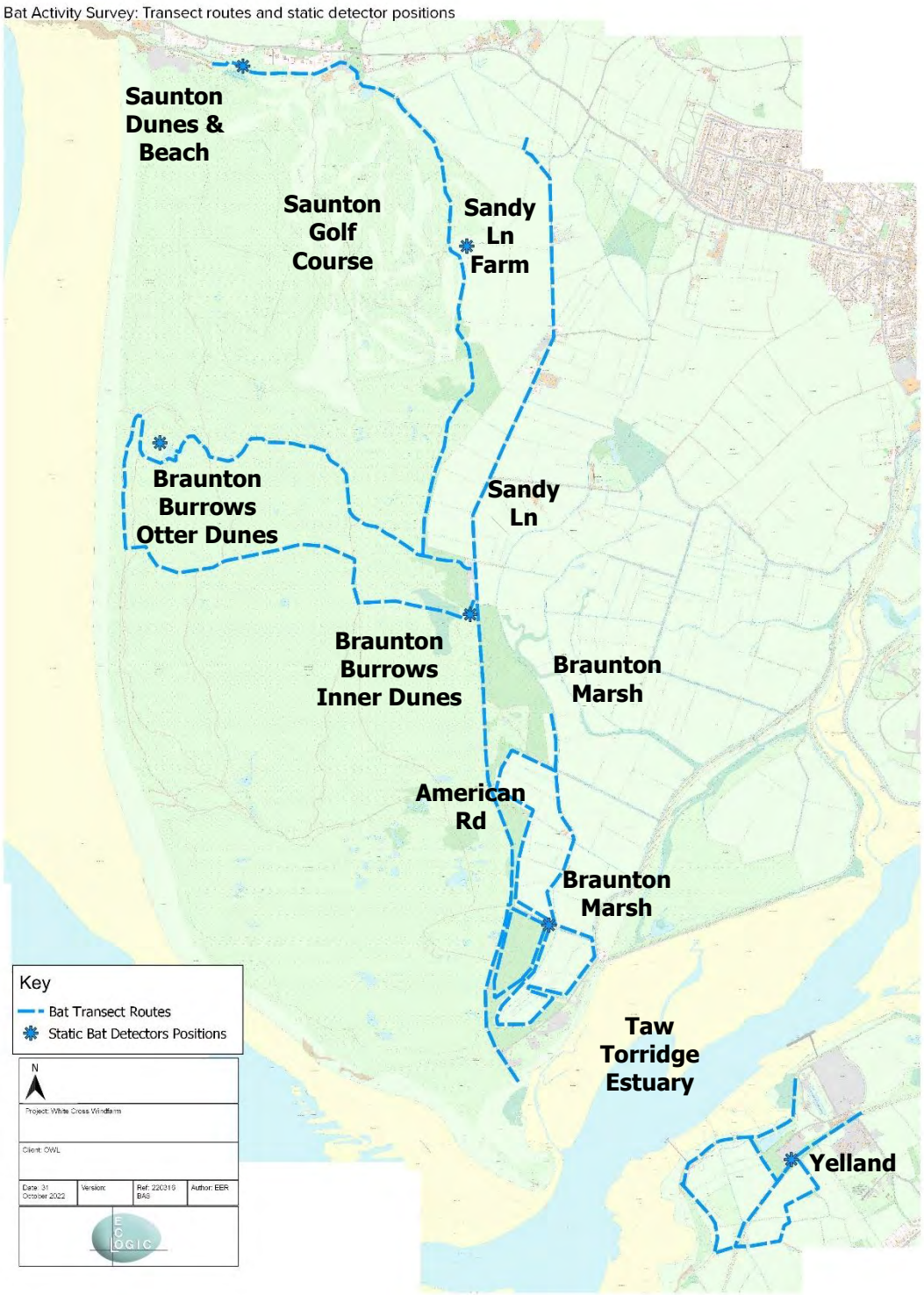

Figure 2-1 The transect routes and static bat detector positions

3. Survey Results

3.1 Remote Monitoring Survey

The remote monitoring survey comprised of two automated bat detectors, deployed in six different positions for five consecutive evenings every month between April & October (See Figure 2-1 for static automated bat detector positions).

See Tables 3.1 to 3.7 for a summary of the recorded bat activity for each recording period at individual recording locations. See Table 3.8 for the overall activity for the site.

The static automated bat detector recorded a high level of bat activity, including a high diversity of bat species, including at least 10 species recorded, in order of frequency:

- Common pipistrelle;
- Soprano pipistrelle;
- Myotis species;
- Barbastelle;
- Greater horseshoe;
- Noctule;
- Serotine;
- Lesser horseshoe;
- Long-eared bat species; &,
- Nathusius' pipistrelle.

Recording Period April 2022	Agricultural Fields						Braunton – Outer Dunes							Braunton – Inner Dunes						
	23rd to 28th April 2022						23rd to 28th April 2022							23rd to 28th April 2022						
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**		1	2	3	4	5	**Sub total**	
Greater horseshoe	48	50	34	32	26	190	87	131	40	46	53	357		2	2	4	3	5	16	
Lesser Horseshoe	0	0	0	0	1	1	0	0	0	0	0	0		0	0	0	0	0	0	
Common Pipistrelle	4	273	184	98	2	561	660	773	651	632	704	3420		5	21	39	15	8	88	
Soprano Pipistrelle	0	3	0	3	0	6	0	1	2	14	2	19		1	2	11	7	0	21	
Nathusius Pipistrelle	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0	
Long-eared	1	4	1	1	0	7	0	2	0	3	3	8		0	3	0	0	0	3	
Barbastelle	1	0	0	0	0	1	1	1	1	0	0	3		2	0	0	0	0	2	
Myotis	0	0	1	0	0	1	1	2	1	11	0	15		1	2	1	1	0	5	
Noctule	45	52	51	38	0	186	0	7	7	8	6	28		2	2	13	7	0	24	
Serotine	0	0	0	0	0	0	0	0	1	0	1	2		0	0	0	0	0	0	
Total	99	382	271	172	29	953	749	917	703	714	769	3852		13	32	68	33	13	159	

Recording Period April 2022	Braunton Marsh						Saunton Dunes							Yelland							
	23rd to 28th April 2022						23rd to 28th April 2022							23rd to 28th April 2022							
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**		1	2	3	4	5	**Sub total**		**Species Total**
Greater horseshoe	1	0	1	0	0	2	2	5	5	3	1	16		0	0	0	0	0	0		567
Lesser Horseshoe	0	0	1	0	0	1	0	0	0	0	0	0		0	0	0	0	1	1		4
Common Pipistrelle	25	227	62	42	7	363	45	42	34	23	27	171		12	8	24	10	4	58		4853
Soprano Pipistrelle	0	2	43	3	0	48	4	2	3	1	1	11		2	7	3	1	5	18		160
Nathusius Pipistrelle	0	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0	0		0
Long-eared	0	5	0	0	0	5	0	6	4	4	1	15		0	0	0	0	0	0		28
Barbastelle	0	0	0	0	0	0	11	9	37	17	4	78		0	0	0	0	0	0		6
Myotis	6	0	6	4	2	18	3	3	4	4	5	19		4	1	0	1	0	6		63
Noctule	0	0	1	3	0	4	7	13	10	2	4	36		30	4	5	9	0	48		294
Serotine	0	0	0	0	0	0	0	1	1	2	0	4		0	0	0	0	0	0		2
Total	32	234	114	52	9	441	72	81	98	56	43	350		48	20	32	21	10	131		5977

Table 3.1. Static Bat Detectors – April: number of bat passes recorded for each location & for each species

Recording Period May 2022	Agricultural Fields						Braunton – Outer Dunes						Braunton – Inner Dunes					
	26th to 31st May 2022						26th to 31st May 2022						26th to 31st May 2022					
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**
Greater horseshoe	32	5	3	1	29	**70**	0	3	2	0	0	**5**	2	0	1	0	3	**6**
Lesser Horseshoe	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Common Pipistrelle	4	49	60	23	124	**260**	0	6	76	62	0	**144**	1	65	23	5	19	**113**
Soprano Pipistrelle	0	1	2	2	4	**9**	0	0	0	0	0	**0**	0	2	0	0	6	**8**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Long-eared	0	2	0	1	1	**4**	0	1	0	0	0	**1**	1	2	3	2	3	**11**
Barbastelle	0	0	0	0	0	**0**	0	3	0	0	0	**3**	0	0	0	0	1	**1**
Myotis	0	2	4	1	1	**8**	0	0	2	1	1	**4**	0	1	0	0	0	**1**
Noctule	2	2	16	7	1	**28**	0	2	2	8	1	**13**	0	0	7	10	1	**18**
Serotine	0	1	1	0	1	**3**	0	1	7	1	5	**14**	0	0	0	0	0	**0**
Total	**38**	**62**	**86**	**35**	**161**	**382**	**0**	**16**	**89**	**72**	**7**	**184**	**4**	**70**	**34**	**17**	**33**	**158**

Recording Period May 2022	Braunton Marsh					Saunton Dunes						Yelland						
	26th to 31st May 2022					26th to 31st May 2022						26th to 31st May 2022						
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	**Species Total**
Greater horseshoe	1	1	1	0	2	**5**	5	14	5	9	7	**40**	0	0	0	0	0	**0**	**126**
Lesser Horseshoe	0	0	2	0	0	**2**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**2**
Common Pipistrelle	289	438	599	96	467	**1889**	3	8	32	24	14	**81**	2	70	34	35	31	**172**	**2659**
Soprano Pipistrelle	13	14	51	10	98	**186**	0	0	0	2	0	**2**	0	7	12	14	11	**44**	**249**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**0**
Long-eared	0	1	0	0	0	**1**	1	1	0	4	0	**6**	0	0	0	0	0	**0**	**23**
Barbastelle	1	2	23	1	17	**44**	3	6	4	1	7	**21**	0	0	0	0	0	**0**	**69**
Myotis	0	100	142	0	379	**621**	0	2	4	0	0	**6**	0	9	16	0	8	**33**	**673**
Noctule	3	4	7	10	2	**26**	5	8	20	10	4	**47**	0	6	7	4	1	**18**	**150**
Serotine	0	0	0	0	0	**0**	7	37	36	31	29	**140**	0	0	0	0	0	**0**	**157**
Total	**307**	**560**	**825**	**117**	**965**	**2774**	**24**	**76**	**101**	**81**	**61**	**343**	**2**	**92**	**69**	**53**	**51**	**267**	**4108**

Table 3.2. Static Bat Detectors – May: number of bat passes recorded for each location & for each species

Recording Period June 2022	Agricultural Fields						Braunton – Outer Dunes						Braunton – Inner Dunes					
	1st to 6th June 2022						1st to 6th June 2022						1st to 6th June 2022					
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**
Greater horseshoe	2	7	1	3	0	**13**	1	6	7	11	0	**25**	0	2	1	2	0	**5**
Lesser Horseshoe	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Common Pipistrelle	5	42	13	49	0	**109**	79	664	1031	1211	2	**2987**	8	13	10	8	34	**73**
Soprano Pipistrelle	0	0	1	0	0	**1**	0	15	17	113	0	**145**	0	0	2	0	7	**9**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Long-eared	1	4	4	3	0	**12**	0	3	0	1	0	**4**	0	4	4	0	0	**8**
Barbastelle	0	0	0	0	0	**0**	0	1	1	1	0	**3**	0	0	0	0	0	**0**
Myotis	2	1	0	15	0	**18**	0	3	2	3	0	**8**	0	0	0	0	0	**0**
Noctule	6	1	4	11	0	**22**	0	0	1	2	1	**4**	3	17	25	6	8	**59**
Serotine	0	0	0	6	0	**6**	5	7	41	27	2	**82**	1	0	0	0	1	**2**
Total	**16**	**55**	**23**	**87**	**0**	**181**	**85**	**699**	**1100**	**1369**	**5**	**3258**	**12**	**36**	**42**	**16**	**50**	**156**

Recording Period June 2022	Braunton Marsh						Saunton Dunes						Yelland						
	1st to 6th June 2022						1st to 6th June 2022						1st to 6th June 2022						
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	**Species Total**
Greater horseshoe	5	3	4	0	1	**13**	5	4	3	25	0	**37**	0	0	0	0	0	**0**	**93**
Lesser Horseshoe	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**0**
Common Pipistrelle	194	260	472	140	144	**1210**	15	37	44	53	28	**177**	0	11	1	2	20	**34**	**4590**
Soprano Pipistrelle	2	32	59	86	33	**212**	0	3	0	1	0	**4**	2	18	10	12	5	**47**	**418**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**0**
Long-eared	0	0	0	0	0	**0**	5	6	2	4	0	**17**	0	0	0	0	0	**0**	**41**
Barbastelle	11	50	128	36	0	**225**	2	6	5	6	7	**26**	0	0	0	0	0	**0**	**254**
Myotis	44	57	30	110	37	**278**	1	5	0	6	3	**15**	0	13	0	1	1	**15**	**334**
Noctule	6	9	14	13	0	**42**	14	9	18	22	4	**67**	3	28	8	10	1	**50**	**244**
Serotine	0	0	0	1	0	**1**	15	56	59	76	10	**216**	0	0	1	0	0	**1**	**308**
Total	**262**	**411**	**707**	**386**	**215**	**1981**	**57**	**126**	**131**	**193**	**52**	**559**	**5**	**70**	**20**	**25**	**27**	**147**	**6282**

Table 3.3. Static Bat Detectors – June: number of bat passes recorded for each location & for each species

Recording Period July 2022	Agricultural Fields						Braunton – Outer Dunes						Braunton – Inner Dunes					
	25th to 30th July 2022						25th to 30th July 2022						25th to 30th July 2022					
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**
Greater horseshoe	17	12	17	12	5	**63**	1	1	1	3	1	**7**	5	1	1	4	1	**12**
Lesser Horseshoe	6	0	3	8	4	**21**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Common Pipistrelle	273	33	24	104	84	**518**	118	25	49	218	261	**671**	94	5	22	118	89	**328**
Soprano Pipistrelle	51	1	1	34	29	**116**	12	0	0	23	21	**56**	29	0	0	41	52	**122**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Long-eared	1	0	0	0	0	**1**	0	0	0	0	0	**0**	3	2	1	1	0	**7**
Barbastelle	11	1	3	2	1	**18**	1	0	0	0	0	**1**	1	0	0	1	0	**2**
Myotis	7	5	5	7	1	**25**	1	0	0	1	4	**6**	0	0	2	4	1	**7**
Noctule	0	0	1	7	16	**24**	0	0	0	1	0	**1**	0	0	0	3	2	**5**
Serotine	8	0	1	167	31	**207**	0	0	0	0	0	**0**	0	0	0	1	0	**1**
Total	**374**	**52**	**55**	**341**	**171**	**993**	**133**	**26**	**50**	**246**	**287**	**742**	**132**	**8**	**26**	**173**	**145**	**484**

Recording Period July 2022	Braunton Marsh					Saunton Dunes							Yelland						
	25th to 30th July 2022					25th to 30th July 2022							25th to 30th July 2022						
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	**Species Total**
Greater horseshoe	0	8	3	0	2	**13**	1	8	4	4	7	**24**	0	0	0	0	0	**0**	**118**
Lesser Horseshoe	0	0	0	0	0	**0**	1	1	0	0	2	**4**	0	0	0	0	0	**0**	**25**
Common Pipistrelle	57	58	77	109	53	**354**	121	96	25	82	61	**385**	100	41	39	210	140	**530**	**2760**
Soprano Pipistrelle	432	44	81	93	50	**700**	0	0	0	3	0	**3**	321	39	67	156	78	**661**	**1080**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**0**
Long-eared	0	0	0	0	0	**0**	1	1	2	0	0	**4**	0	0	0	0	0	**0**	**19**
Barbastelle	19	7	1	3	16	**46**	1	0	6	3	1	**11**	1	0	0	0	1	**2**	**36**
Myotis	0	32	7	19	0	**58**	0	2	2	1	0	**5**	31	139	54	30	36	**290**	**340**
Noctule	0	0	0	0	0	**0**	0	0	0	0	1	**1**	1	1	0	23	0	**25**	**61**
Serotine	0	0	0	0	0	**0**	1	0	1	2	0	**4**	0	0	0	0	0	**0**	**213**
Total	**508**	**149**	**169**	**224**	**121**	**1171**	**126**	**108**	**40**	**95**	**72**	**441**	**454**	**220**	**160**	**419**	**255**	**1508**	**4652**

Table 3.4. Static Bat Detectors – July: number of bat passes recorded for each location & for each species

Recording Period August 2022	Agricultural Fields						Braunton – Outer Dunes						Braunton – Inner Dunes					
	1st to 6th August 2022						1st to 6th August 2022						1st to 6th August 2022					
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**
Greater horseshoe	4	6	13	7	7	**37**	0	0	0	1	0	**1**	4	1	8	19	7	**39**
Lesser Horseshoe	4	0	1	1	0	**6**	0	0	0	0	0	**0**	0	0	3	12	1	**16**
Common Pipistrelle	36	1	26	8	127	**198**	0	0	2	2	60	**64**	124	37	47	31	6	**245**
Soprano Pipistrelle	1	0	3	0	6	**10**	0	0	0	1	1	**2**	3	9	8	0	0	**20**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Long-eared	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Barbastelle	0	2	0	0	6	**8**	0	0	0	0	0	**0**	0	0	2	10	3	**15**
Myotis	2	0	0	2	6	**10**	0	0	0	1	0	**1**	0	0	1	0	0	**1**
Noctule	2	0	0	0	0	**2**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Serotine	0	0	0	0	1	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Total	**49**	**9**	**43**	**18**	**153**	**272**	**0**	**0**	**2**	**5**	**61**	**68**	**131**	**47**	**69**	**72**	**17**	**336**

Recording Period August 2022	Braunton Marsh					Saunton Dunes						Yelland						
	1st to 6th August 2022					1st to 6th August 2022						1st to 6th August 2022						
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	**Species Total**
Greater horseshoe	5	3	5	2	6	**21**	12	0	6	8	10	**36**	0	0	0	0	0	**0**	**134**
Lesser Horseshoe	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	7	17	7	**31**	**53**
Common Pipistrelle	326	152	84	39	18	**619**	31	2	10	75	45	**163**	7	7	66	272	243	**595**	**1884**
Soprano Pipistrelle	313	86	5	7	1	**412**	0	0	0	1	0	**1**	45	56	122	94	111	**428**	**873**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**0**
Long-eared	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**0**
Barbastelle	36	8	97	84	36	**261**	0	0	0	0	1	**1**	0	0	0	3	8	**11**	**296**
Myotis	6	6	19	3	1	**35**	0	0	0	0	0	**0**	4	3	6	44	64	**121**	**168**
Noctule	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	1	0	**1**	**3**
Serotine	0	0	0	0	3	**3**	0	0	1	0	0	**1**	1	0	0	0	0	**1**	**6**
Total	**686**	**255**	**210**	**135**	**65**	**1351**	**43**	**2**	**17**	**84**	**56**	**202**	**57**	**66**	**201**	**431**	**433**	**1188**	**3417**

Table 3.5. Static Bat Detectors – August: number of bat passes recorded for each location & for each species

Recording Period September	Agricultural Fields						Braunton – Outer Dunes						Braunton – Inner Dunes					
	24th to 29th September 2022						24th to 29th September 2022						24th to 29th September 2022					
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**
Greater horseshoe	24	39	3	10	3	**79**	0	0	0	0	0	**0**	2	1	0	1	0	**4**
Lesser Horseshoe	6	0	0	1	0	**7**	0	0	0	0	0	**0**	2	14	46	12	1	**75**
Common Pipistrelle	48	141	52	121	0	**362**	195	0	0	0	1	**196**	3	0	0	0	4	**7**
Soprano Pipistrelle	3	0	0	0	0	**3**	0	0	0	0	0	**0**	1	0	0	0	0	**1**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Long-eared	0	1	0	2	0	**3**	0	0	0	0	0	**0**	2	0	0	2	0	**4**
Barbastelle	10	0	1	45	7	**63**	2	0	0	0	0	**2**	2	0	0	5	1	**8**
Myotis	41	2	0	154	1	**198**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Noctule	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Serotine	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Total	**132**	**183**	**56**	**333**	**11**	**715**	**197**	**0**	**0**	**0**	**1**	**198**	**12**	**15**	**46**	**20**	**6**	**99**

Recording Period September	Braunton Marsh						Saunton Dunes						Yelland						
	24th to 29th September 2022						24th to 29th September 2022						24th to 29th September 2022						
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	**Species Total**
Greater horseshoe	9	43	0	13	3	**68**	0	0	1	0	166	**167**	0	0	0	0	1	**1**	**319**
Lesser Horseshoe	0	0	0	5	0	**5**	0	0	20	0	0	**20**	0	0	0	0	0	**0**	**107**
Common Pipistrelle	60	25	0	444	15	**544**	2	3	0	2	2	**9**	11	3	0	1	0	**15**	**1133**
Soprano Pipistrelle	109	0	0	1	5	**115**	0	0	0	0	0	**0**	6	7	1	15	3	**32**	**151**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**0**
Long-eared	0	0	1	6	4	**11**	5	0	0	0	8	**13**	0	0	0	0	0	**0**	**31**
Barbastelle	79	1	23	88	121	**312**	22	0	0	7	27	**56**	3	0	0	0	0	**3**	**444**
Myotis	26	2	0	122	8	**158**	0	0	0	0	0	**0**	9	0	0	2	2	**13**	**369**
Noctule	0	0	0	1	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**1**
Serotine	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**0**
Total	**283**	**71**	**24**	**680**	**156**	**1214**	**29**	**3**	**21**	**9**	**203**	**265**	**29**	**10**	**1**	**18**	**6**	**64**	**2555**

Table 3.6. Static Bat Detectors – September: number of bat passes recorded for each location & for each species

Recording Period October 2022	Agricultural Fields						Braunton – Outer Dunes						Braunton – Inner Dunes					
	7th to 12th October 2022						7th to 12th October 2022						7th to 12th October 2022					
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**
Greater horseshoe	8	2	1	2	1	**14**	0	5	1	54	7	**67**	2	0	2	3	0	**7**
Lesser Horseshoe	1	0	1	4	0	**6**	0	0	0	0	0	**0**	1	0	0	1	1	**3**
Common Pipistrelle	407	15	55	2	84	**563**	1	78	103	151	139	**472**	5	3	1	0	14	**23**
Soprano Pipistrelle	3	0	0	0	2	**5**	0	5	4	0	6	**15**	0	0	0	0	0	**0**
Nathusius Pipistrelle	0	0	0	0	0	**0**	0	2	0	0	0	**2**	0	0	0	0	0	**0**
Long-eared	1	2	2	2	1	**8**	0	0	0	0	0	**0**	12	5	0	4	5	**26**
Barbastelle	47	6	21	1	0	**75**	0	1	0	0	2	**3**	13	1	0	0	3	**17**
Myotis	89	2	6	3	19	**119**	0	0	0	0	1	**1**	0	0	0	1	0	**1**
Noctule	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	1	0	1	0	**2**
Serotine	0	0	0	0	0	**0**	0	0	0	0	0	**0**	0	0	0	0	0	**0**
Total	**556**	**27**	**86**	**14**	**107**	**790**	**1**	**91**	**108**	**205**	**155**	**560**	**33**	**10**	**3**	**10**	**23**	**79**

Recording Period October 2022	Braunton Marsh					Saunton Dunes						Yelland						
	7th to 12th October 2022					7th to 12th October 2022						1st to 6th October 2022						
Night Number	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	1	2	3	4	5	**Sub total**	**Species Total**
Greater horseshoe	26	4	1	1	0	**32**	1	1	0	0	1	**3**	0	1	0	0	0	**1**	**124**
Lesser Horseshoe	0	0	0	0	0	**0**	5	0	3	1	0	**9**	0	0	0	0	0	**0**	**18**
Common Pipistrelle	251	51	98	7	111	**518**	2	2	4	0	0	**8**	0	18	9	11	0	**38**	**1622**
Soprano Pipistrelle	8	52	21	8	11	**100**	0	0	1	0	0	**1**	5	0	66	5	0	**76**	**197**
Nathusius Pipistrelle	0	1	0	0	0	**1**	0	0	0	0	0	**0**	0	0	0	0	0	**0**	**3**
Long-eared	1	7	1	2	1	**12**	2	0	0	3	0	**5**	0	0	0	0	0	**0**	**51**
Barbastelle	198	23	4	24	291	**540**	2	11	31	0	0	**44**	0	0	0	0	0	**0**	**679**
Myotis	2	4	26	1	6	**39**	1	0	0	0	0	**1**	0	3	0	0	0	**3**	**164**
Noctule	0	0	0	0	0	**0**	1	0	0	0	0	**1**	0	0	0	0	0	**0**	**3**
Serotine	0	0	0	0	0	**0**	0	2	0	0	0	**2**	0	0	0	0	0	**0**	**2**
Total	**486**	**142**	**151**	**43**	**420**	**1242**	**14**	**16**	**39**	**4**	**1**	**74**	**5**	**22**	**75**	**16**	**0**	**118**	**2863**

Table 3.7. Static Bat Detectors – October: number of bat passes recorded for each location & for each species

Recording Position	Agricultural Fields								Braunton – Outer Dunes								Braunton – Inner Dunes							
Recording Period	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Sub total**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Sub total**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Sub total**
Greater horseshoe	190	70	13	63	37	79	14	**466**	357	5	25	7	1	0	67	**462**	16	6	5	12	39	4	7	**89**
Lesser Horseshoe	1	0	0	21	6	7	6	**41**	0	0	0	0	0	0	0	**0**	0	0	0	0	16	75	3	**94**
Common Pipistrelle	561	260	109	518	198	362	563	**2,571**	3420	144	2987	671	64	196	472	**7,954**	88	113	73	328	245	7	23	**877**
Soprano Pipistrelle	6	9	1	116	10	3	5	**150**	19	0	145	56	2	0	15	**237**	21	8	9	122	20	1	0	**181**
Nathusius Pipistrelle	0	0	0	0	0	0	0	**0**	0	0	0	0	0	0	2	**2**	0	0	0	0	0	0	0	**0**
Long-eared	7	4	12	1	0	3	8	**35**	8	1	4	0	0	0	0	**13**	3	11	8	7	0	4	26	**59**
Barbastelle	1	0	0	18	8	63	75	**165**	3	3	3	1	0	2	3	**15**	2	1	0	2	15	8	17	**45**
Myotis	1	8	18	25	10	198	119	**379**	15	4	8	6	1	0	1	**35**	5	1	0	7	1	0	1	**15**
Noctule	186	28	22	24	2	0	0	**262**	28	13	4	1	0	0	0	**46**	24	18	59	5	0	0	2	**108**
Serotine	0	3	6	207	1	0	0	**217**	2	14	82	0	0	0	0	**98**	0	0	2	1	0	0	0	**3**
Total	**953**	**382**	**181**	**993**	**272**	**715**	**790**	**4,286**	**3,852**	**184**	**3,258**	**742**	**68**	**198**	**560**	**8,862**	**159**	**158**	**156**	**484**	**336**	**99**	**79**	**1,471**

Recording Position	Braunton Marsh								Saunton Dunes								Yelland								Species Total
Recording Period	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Sub total**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Sub total**	**Apr**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Sub total**	
Greater horseshoe	2	5	13	13	21	68	32	**154**	16	5	37	24	36	167	3	**288**	0	0	0	0	0	1	1	2	**1,461**
Lesser Horseshoe	1	2	0	0	0	5	0	**8**	0	2	0	4	0	20	9	**35**	1	0	0	0	31	0	0	32	**210**
Common Pipistrelle	363	1889	1210	354	619	544	518	**5,497**	171	1889	177	385	163	9	8	**2802**	58	172	34	530	595	15	38	1442	**21,143**
Soprano Pipistrelle	48	186	212	700	412	115	100	**1,773**	11	186	4	3	1	0	1	**206**	18	44	47	661	428	32	76	1306	**3,853**
Nathusius Pipistrelle	0	0	0	0	0	0	1	**1**	0	0	0	0	0	0	0	**0**	0	0	0	0	0	0	0	0	**3**
Long-eared	5	1	0	0	0	11	12	**29**	15	1	17	4	0	13	5	**55**	0	0	0	0	0	0	0	0	**191**
Barbastelle	0	44	225	46	261	312	540	**1,428**	78	44	26	11	1	56	44	**260**	0	0	0	2	11	3	0	16	**1,929**
Myotis	18	621	278	58	35	158	39	**1,207**	19	621	15	5	0	0	1	**661**	6	33	15	290	121	13	3	481	**2,778**
Noctule	4	26	42	0	0	1	0	**73**	36	26	67	1	0	0	1	**131**	48	18	50	25	1	0	0	142	**762**
Serotine	0	0	1	0	3	0	0	**4**	4	0	216	4	1	0	2	**227**	0	0	1	0	1	0	0	2	**551**
Total	**441**	**2,774**	**1,981**	**1,171**	**1,351**	**1,214**	**1,242**	**10,174**	**350**	**2,774**	**5,59**	**441**	**202**	**265**	**74**	**4,665**	**131**	**267**	**147**	**1,508**	**1,188**	**64**	**118**	**3,423**	**32,881**

Table 3.8. Number of all recorded bat passes for each recording period in each position

3.2 Manual Bat Activity Transect Survey

The manual bat activity survey identified a moderate level of bat activity for a high diversity of bat species – at least 10 species.

Survey dates and subsequent weather conditions experienced during the manual bat activity surveys are provided in Table 3.9. The transect routes are identified on Figure 2-1.

The manual bat activity survey results are quantified in Tables 3.10 – 3.14, with the cumulative distribution and frequency of the results indicated in Figure 3-1 (survey maps for each manual bat activity survey visit are presented in Figures 3-2 to 3-9).

Table 3.9. Timings and environmental conditions relating to the manual bat activity surveys

Bat Transect Date		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %
23rd April 2022 Sunset: 20:25	Start of Survey	14	3	40	None	56
Start Time: 20:10 End Time: 22:45	End of Survey	12	3	20	None	66
27th April 2022 Sunset: 20:32	Start of Survey	10	2	15	None	61
Start Time: 20:17 End Time: 23:17	End of Survey	9	2	<5	None	67
28th April 2022 Sunset: 20:33	Start of Survey	11	1	40	None	67
Start Time: 20:18 End Time: 23:09	End of Survey	9	0	0	None	79
13th May 2022 Sunset: 20:57	Start of Survey	13	2	15	None	81
Start Time: 20:42 End Time: 00:46	End of Survey	11	1	25	None	90
14th May 2022 Sunset: 20:58	Start of Survey	14	1	100	Light rain	90
Start Time: 20:43 End Time: 00:30	End of Survey	12	2	85	None	99
29th May 2022 Sunset: 21:18	Start of Survey	11	1	10	None	81
Start Time: 21:03 End Time: 23:18	End of Survey	10	0	<5	Mist	99
30th May 2022 Sunset: 21:20	Start of Survey	11	1	50	None	69
Start Time: 21:05 End Time: 23:30	End of Survey	10	1	100	None	99
31st May 2022 Sunset: 21:21	Start of Survey	11	2	<5	None	73

Bat Transect Date		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %
Start Time: 21:05 End Time: 23:50	End of Survey	10	1	<5	None	82
2nd June 2022 Sunset: 21:23	Start of Survey	14	3	10	None	67
Start Time: 21:08 End Time: 00:33	End of Survey	10	0	<5	None	99
6th June 2022 Sunset: 21:27	Start of Survey	15	1	50	None	80
Start Time: 21:12 End Time: 23:40	End of Survey	13	0	90	None	99
21st June 2022 Sunset: 21:35	Start of Survey	19	1	<5	None	66
Start Time: 21:20 End Time: 00:30	End of Survey	14	1	<5	None	80
5th July 2022 Sunset: 21:33	Start of Survey	17	2	90	None	78
Start Time: 21:18 End Time: 00:35	End of Survey	15	1	90	None	82
13th July 2022 Sunset: 21:30	Start of Survey	20	3	50	None	66
Start Time: 21:15 End Time: 23:30	End of Survey	16	1	60	None	73
26h July 2022 Sunset: 21:14	Start of Survey	19	2	<5	None	64
Start Time: 20:59 End Time: 23:14	End of Survey	12	0	<5	None	77
1st Aug 2022 Sunset: 21:02	Start of Survey	20	3	100	None	91
Start Time: 20:47 End Time: 23:04	End of Survey	19	3	90	None	84
17th Aug 2022 Sunset: 20:36	Start of Survey	19	1	60	None	75
Start Time: 20:21 End Time: 22:40	End of Survey	18	0	60	None	81
12th Sept 2022 Sunset: 19:38	Start of Survey	22	2	90	None	65
Start Time: 19:23 End Time: 21:38	End of Survey	17	1	90	None	75
13th Sept 2022 Sunrise: 06:49	Start of Survey	22	2	90	None	65
Start Time: 04:49 End Time: 07:04	End of Survey	17	1	90	None	75
17th Sept 2022 Sunset: 19:27	Start of Survey	14	1	10	None	65
Start Time: 19:12 End Time: 21:50	End of Survey	12	0	<5	None	72
18th Sept 2022 Sunrise: 06:54	Start of Survey	9	0	<5	None	90
Start Time: 04:30 End Time: 07:11	End of Survey	6	1	30	None	99
20th Sept 2022 Sunset: 19:20	Start of Survey	18	0	10	None	70

Bat Transect Date		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %
Start Time: 19:05 End Time: 21:20	End of Survey	14	0	10	None	77
21st Sept 2022 Sunrise: 07:01	Start of Survey	10	0	<5	None	80
Start Time: 04:55 End Time: 07:16	End of Survey	11	1	<5	None	75
7th Oct 2022 Sunset: 18:42	Start of Survey	14	3	50	None	80
Start Time: 18:27 End Time: 21:13	End of Survey	13	4	30	None	88
11th Oct 2022 Sunset: 18:32	Start of Survey	16	1	40	None	77
Start Time: 18:17 End Time: 20:35	End of Survey	10	3	30	None	90
12th Oct 2022 Sunset: 18:30	Start of Survey	15	1	100	None	88
Start Time: 18:15 End Time: 20:41	End of Survey	14	0	90	None	89

Yelland	Number of Bat Passes/Encounters									Activity Identified
	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Species Total	
Species Detected	**April 2022**	**May 2022**	**June 2022**	**July 2022**	**August 2022**	**Sept Dusk 2022**	**Sept Dawn 2022**	**Oct 2022**		
Common pipistrelle	21	10	13	16	1	7	0	4	**72**	Foraging & social calls
Soprano pipistrelle	11	6	11	5	3	13	4	12	**65**	Foraging & social calls
Nathusius pipistrelle	0	0	0	0	0	0	0	0	**0**	
Greater horseshoe	0	2	0	0	0	0	0	0	**2**	
Noctule	12	5	6	0	0	0	0	0	**23**	Foraging
Myotis species	0	0	0	0	0	1	0	0	**1**	
Serotine	0	0	0	1	0	0	0	0	**1**	
Lesser horseshoe	0	0	0	0	0	0	0	0	**0**	
Long-eared	1	0	0	0	0	1	0	0	**2**	
Barbastelle	0	0	0	0	0	0	0	2	**2**	
Total (all bats)	**45**	**23**	**30**	**22**	**4**	**22**	**4**	**18**	**168**	

Table 3.10. Summary of bat activity recorded during the manual bat activity transect surveys for Yelland

Braunton Marsh	Number of Bat Passes/Encounters									Activity Identified
	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Species Total	
Species Detected	**April 2022**	**May 2022**	**June 2022**	**July 2022**	**August 2022**	**Sept Dusk 2022**	**Sept Dawn 2022**	**Oct 2022**		
Common pipistrelle	3	9	11	9	6	7	0	1	46	Commuting, foraging & social calls
Soprano pipistrelle	0	1	5	3	5	0	0	0	14	Foraging
Nathusius pipistrelle	0	0	0	0	0	0	0	0	0	
Greater horseshoe	2	1	0	1	1	2	0	7	14	Night roosting at South Barrow
Noctule	0	3	7	0	1	0	0	0	11	
Myotis species	0	1	2	0	0	1	0	0	4	
Serotine	0	0	0	1	0	0	0	0	1	
Lesser horseshoe	0	0	0	0	0	2	0	1	3	Night roosting at South Barrow
Long-eared	0	0	0	0	0	1	0	0	1	
Barbastelle	0	0	0	0	0	2	0	2	4	
Total (all bats)	5	15	25	14	13	15	0	11	98	

Table 3.11. Summary of bat activity recorded during the manual bat activity transect surveys for Braunton Marsh

American Road & Sandy Lane	Number of Bat Passes/Encounters									Activity Identified
	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Species Total	
Species Detected	**April 2022**	**May 2022**	**June 2022**	**July 2022**	**August 2022**	**Sept Dusk 2022**	**Sept Dawn 2022**	**Oct 2022**		
Common pipistrelle	7	22	6	20	9	13	4	14	95	Commuting & foraging
Soprano pipistrelle	6	1	0	8	2	5	1	5	28	Commuting & foraging
Nathusius pipistrelle	0	0	0	0	0	0	0	0	0	
Greater horseshoe	2	0	1	2	0	0	0	0	5	
Noctule	2	0	2	0	0	0	0	0	4	Commuting
Myotis species	0	1	1	1	1	0	0	0	4	
Serotine	0	0	0	1	0	1	1	0	3	
Lesser horseshoe	0	1	0	0	0	1	0	3	5	
Long-eared	0	0	0	0	0	0	0	0	0	
Barbastelle	1	6	0	0	0	2	0	3	12	Foraging
Total (all bats)	18	31	10	32	12	22	6	25	156	

Table 3.12. Summary of bat activity recorded during the manual bat activity transect surveys for American Road & Sandy Lane

Braunton Burrows Dune & Northern Boundary Track	Number of Bat Passes/Encounters									Activity Identified
	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Species Total	
Species Detected	**April 2022**	**May 2022**	**June 2022**	**July 2022**	**August 2022**	**Sept Dusk 2022**	**Sept Dawn 2022**	**Oct 2022**		
Common pipistrelle	8	13	12	4	5	5	0	3	50	Foraging
Soprano pipistrelle	1	4	0	0	1	0	0	0	6	Foraging & social calls
Nathusius pipistrelle	0	0	0	0	0	0	0	0	0	
Greater horseshoe	1	4	1	0	0	0	0	0	6	Foraging
Noctule	0	1	0	0	0	0	0	0	1	
Myotis species	1	1	2	1	0	0	0	0	5	
Serotine	0	3	0	0	0	0	0	0	3	
Lesser horseshoe	0	0	0	0	0	0	0	0	0	
Long-eared	0	0	0	0	0	0	0	0	0	
Barbastelle	3	2	0	0	0	0	0	1	6	
Total (all bats)	14	28	15	5	6	5	0	4	77	

Table 3.13. Summary of bat activity recorded during the manual bat activity transect surveys for Braunton Burrows Dunes & Northern Boundary Track

Sandy Lane Farm/agricultural fields, Saunton Golf Course & Saunton Sands Dunes/Beach	Number of Bat Passes/Encounters									Activity Identified
	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Species Total	
Species Detected	**April 2022**	**May 2022**	**June 2022**	**July 2022**	**August 2022**	**Sept Dusk 2022**	**Sept Dawn 2022**	**Oct 2022**		
Common pipistrelle	19	9	13	55	20	14	9	7	146	Commuting & foraging
Soprano pipistrelle	1	0	2	1	5	4	0	0	13	Foraging
Nathusius pipistrelle	0	0	0	0	0	1	0	0	1	
Greater horseshoe	10	8	7	2	3	1	2	3	36	Foraging and a feeding perch
Noctule	13	0	5	0	0	3	0	0	21	Foraging
Myotis species	1	3	1	5	1	7	1	2	21	
Serotine	0	6	7	0	0	0	0	0	13	Foraging
Lesser horseshoe	0	0	0	0	0	0	0	0	0	
Long-eared	1	1	2	3	0	0	0	0	7	
Barbastelle	2	4	0	0	0	1	0	1	8	
Total (all bats)	47	31	37	66	29	31	12	13	266	

Table 3.14. Summary of bat activity recorded during the manual bat activity transect surveys for Sandy Lane Farm/agricultural fields, Saunton Golf Course & Saunton Sands Dunes/Beach

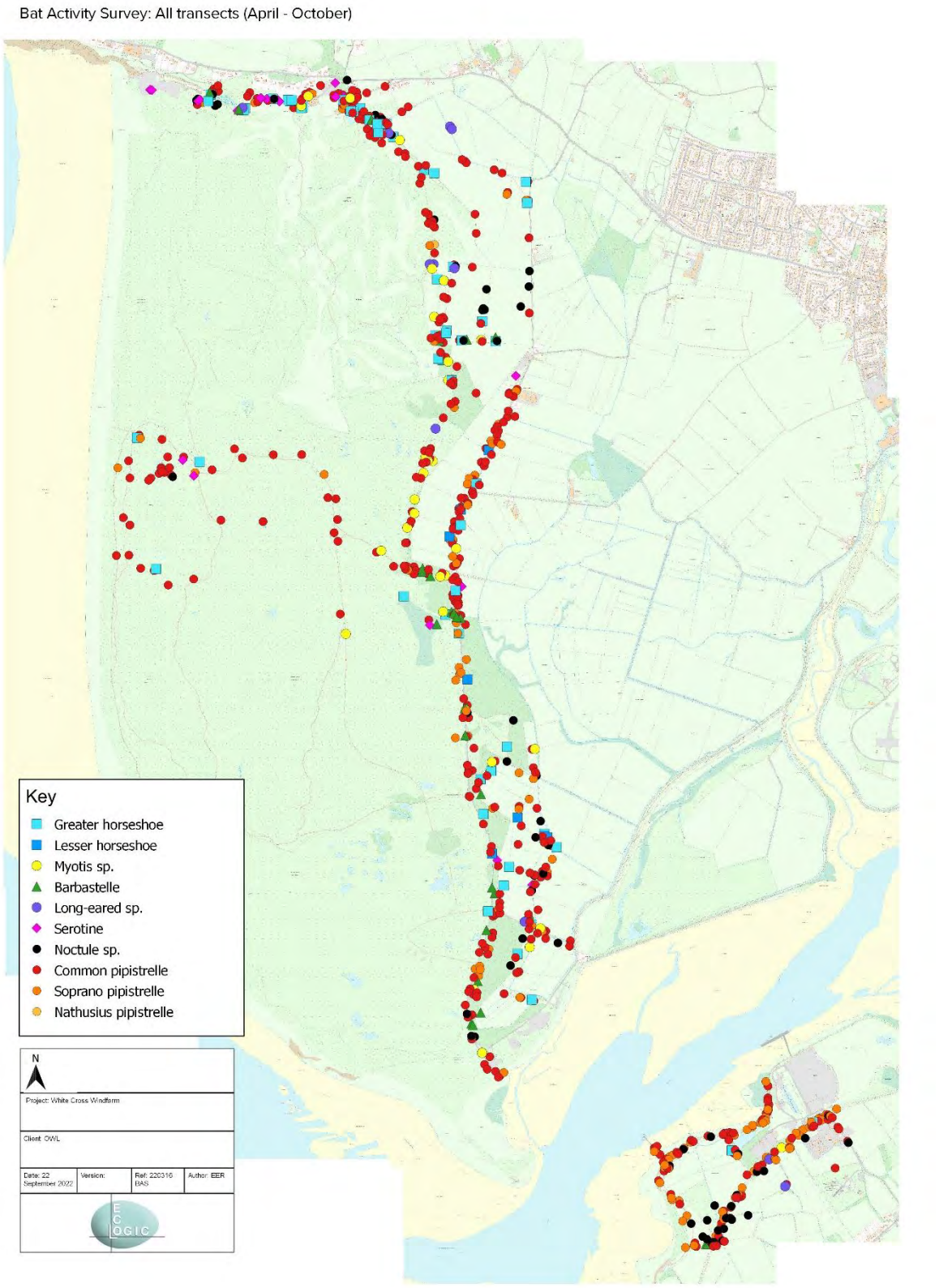

Figure 3-1 Cumulative manual dusk & dawn bat activity survey results for April-October 2022

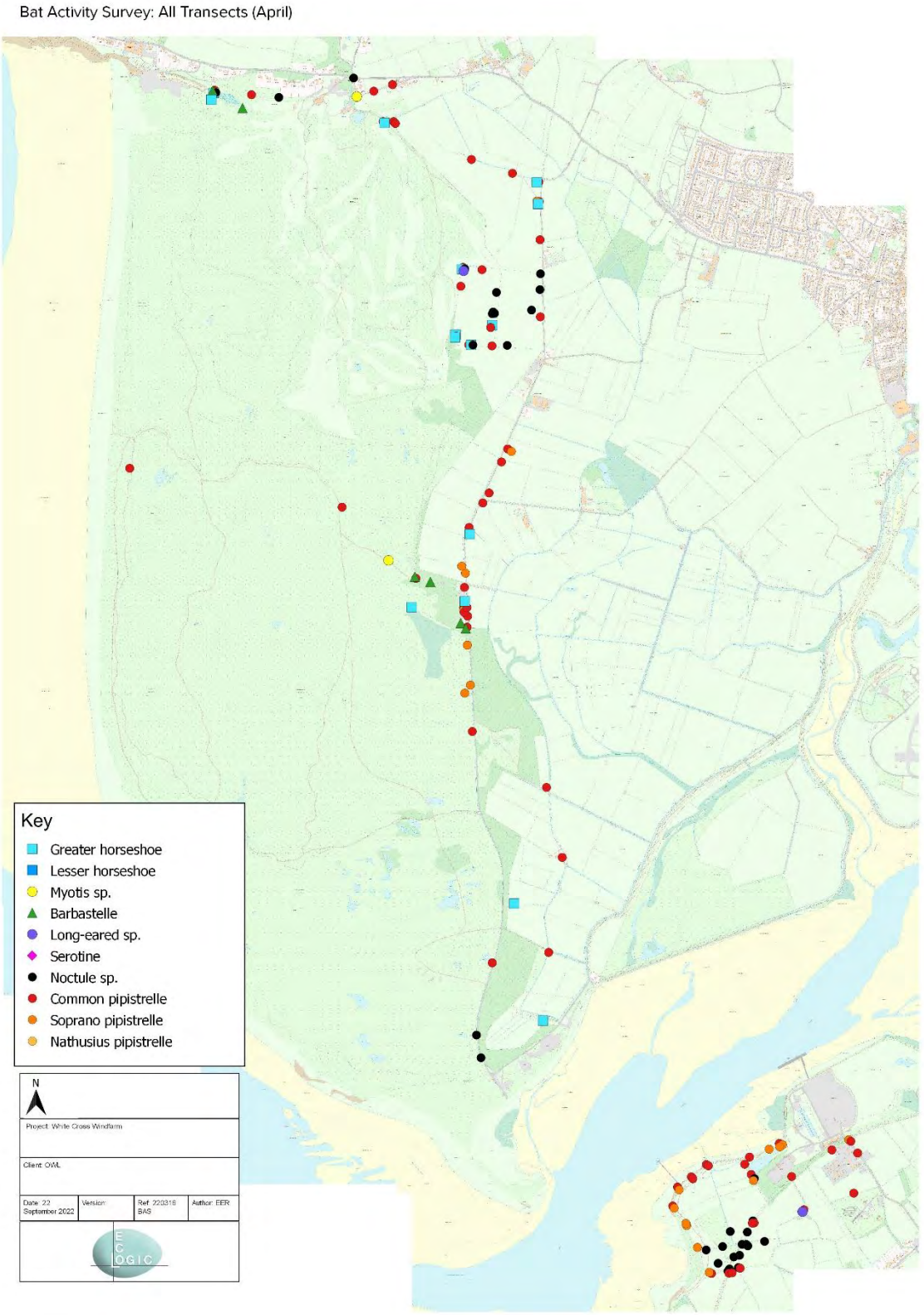

Figure 3-2 Manual dusk bat activity survey results for April 2022

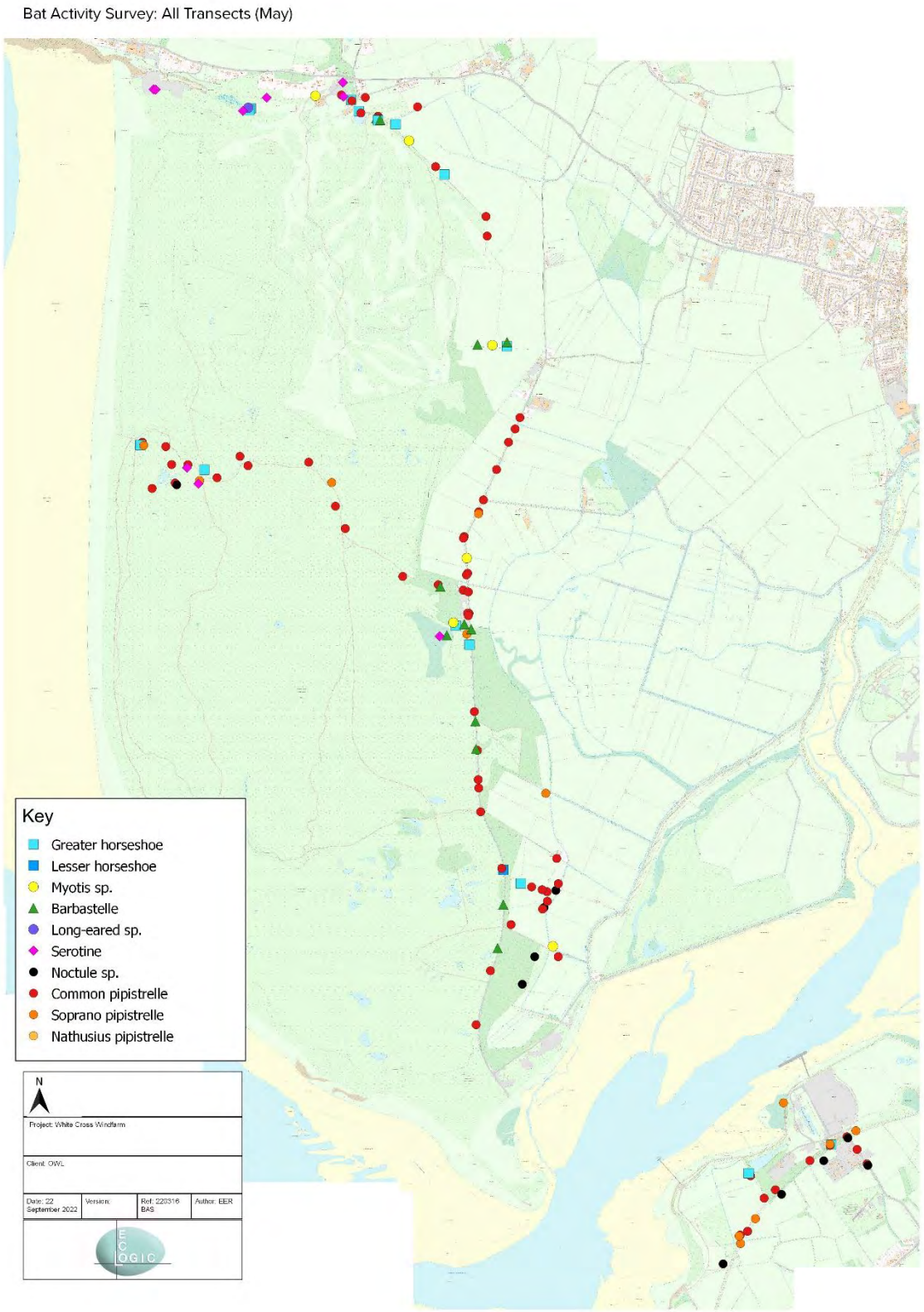

Figure 3-3 Manual dusk bat activity survey results for May 2022

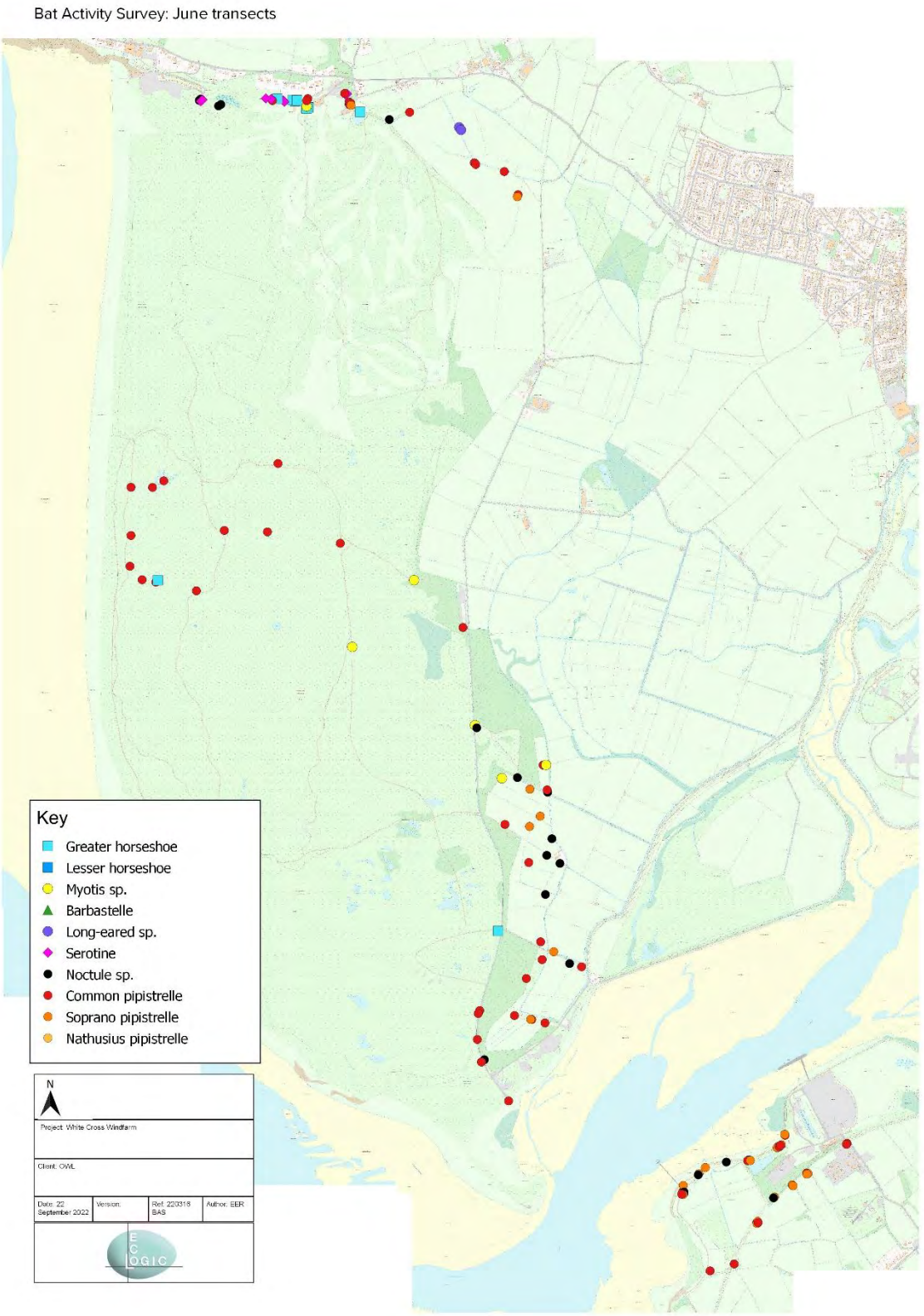

Figure 3-4 Manual dusk bat activity survey results for June 2022

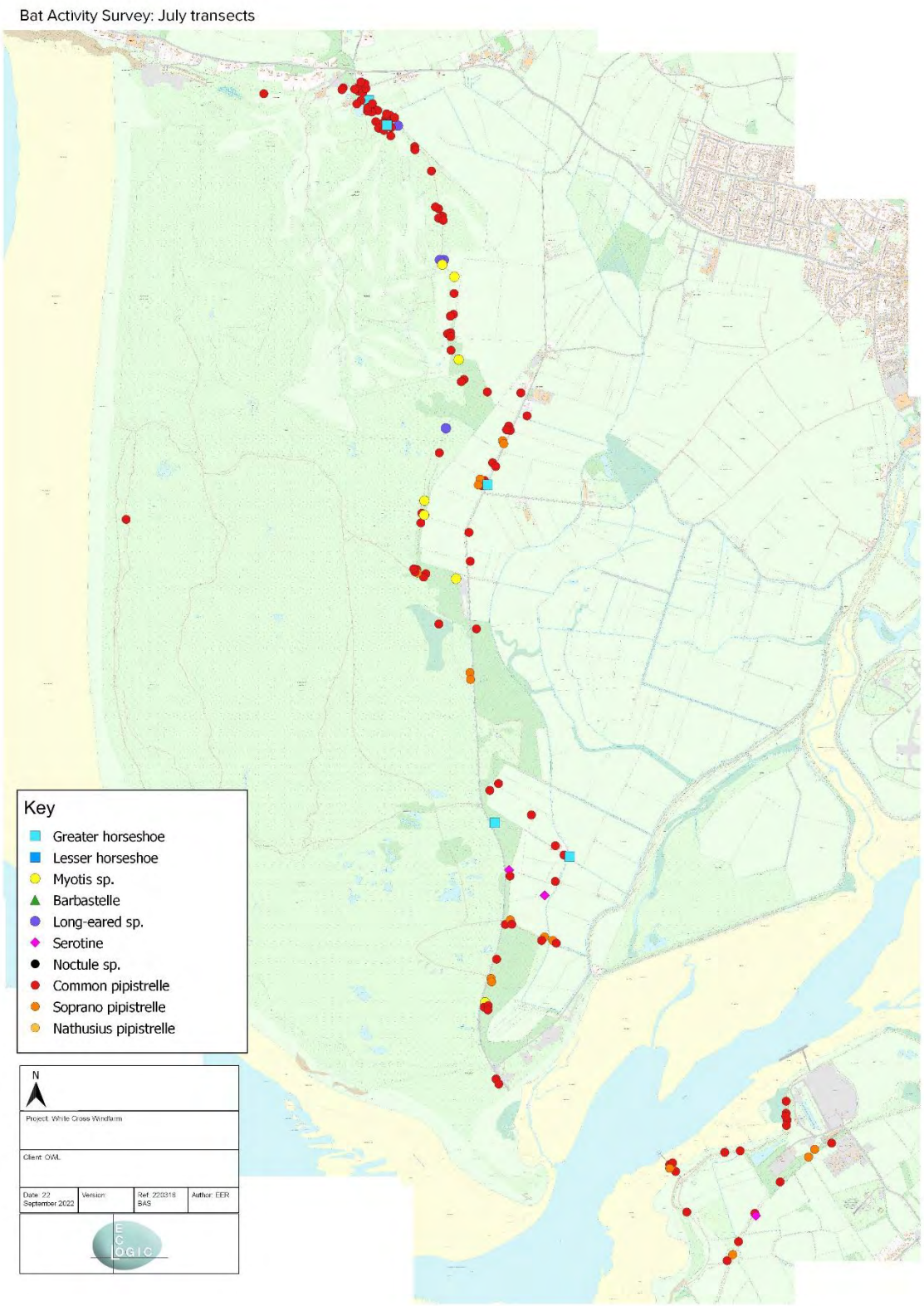

Figure 3-5 Manual dusk bat activity survey results for July 2022

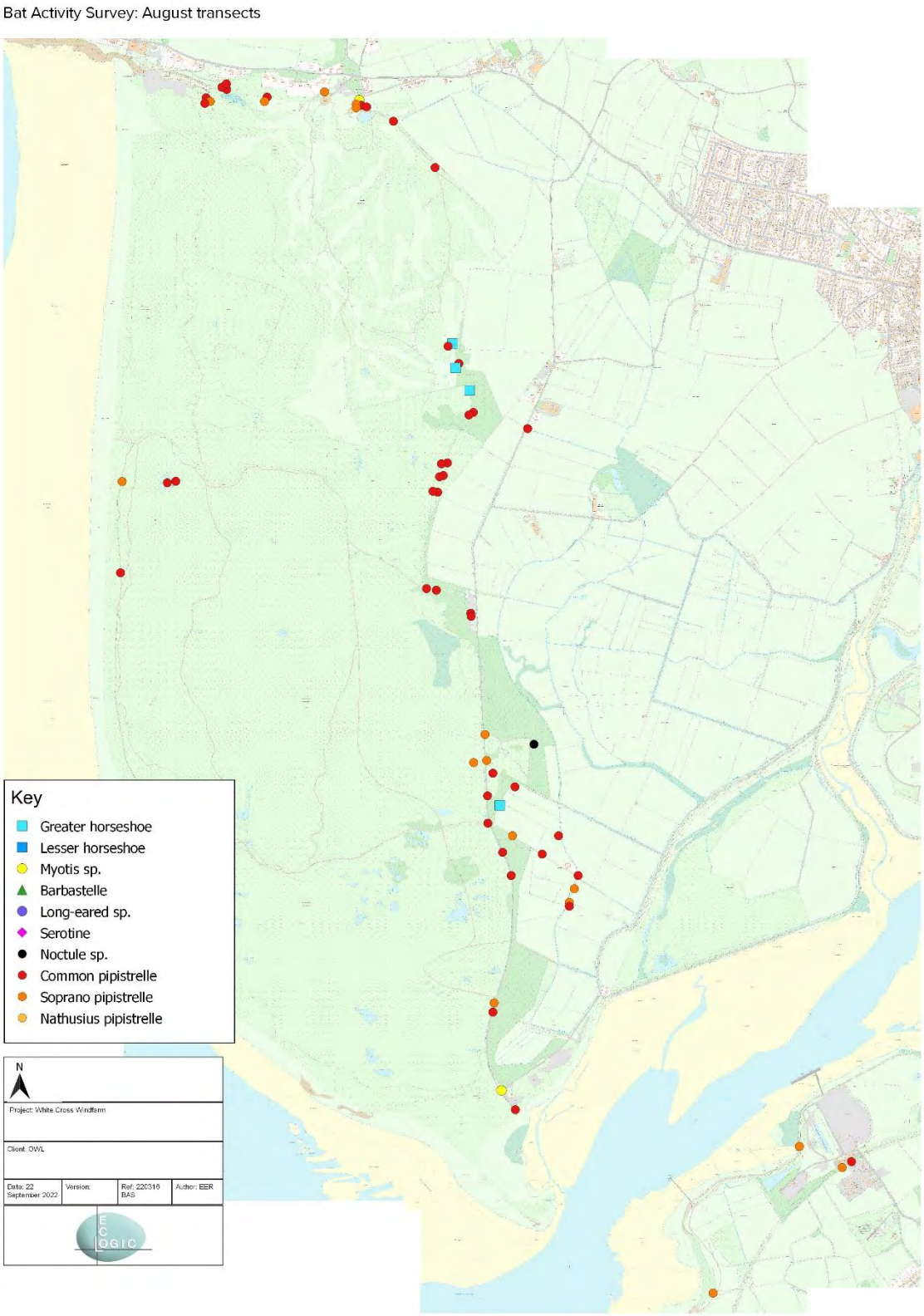

Figure 3-6 Manual dusk bat activity survey results for August 2022

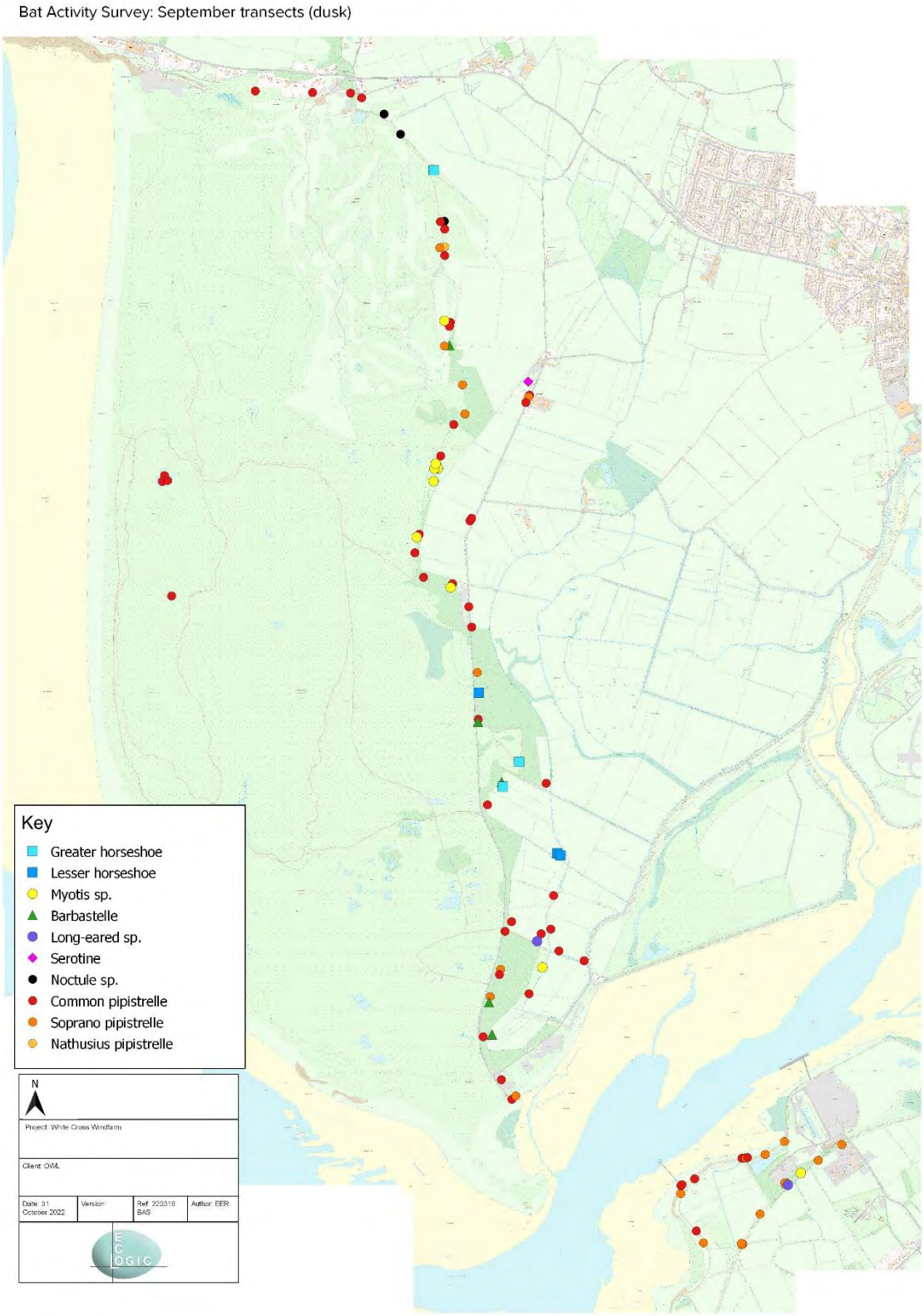

Figure 3-7 Manual dusk bat activity survey results for September 2022

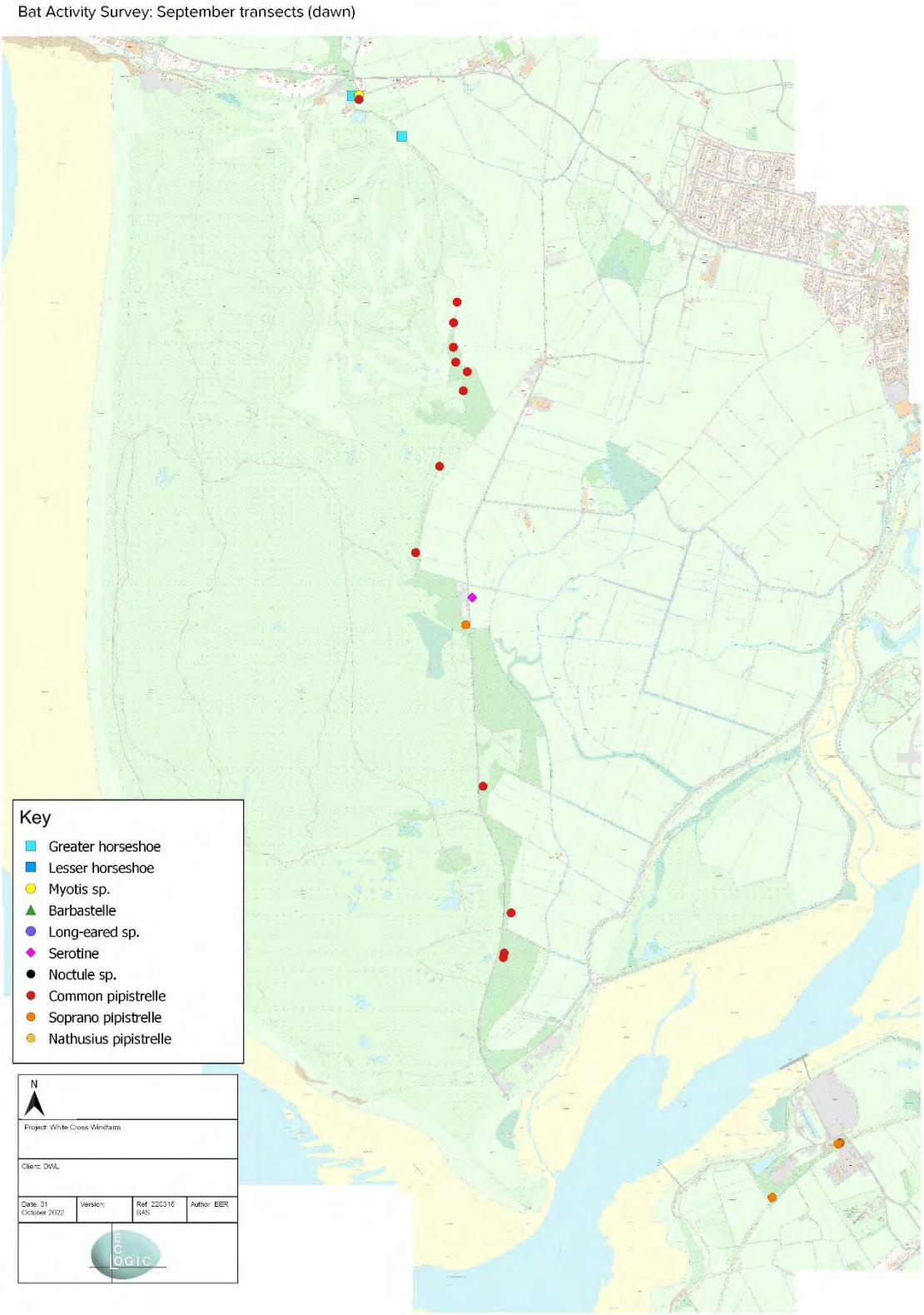

Figure 3-8 Manual dawn bat activity survey results for September 2022

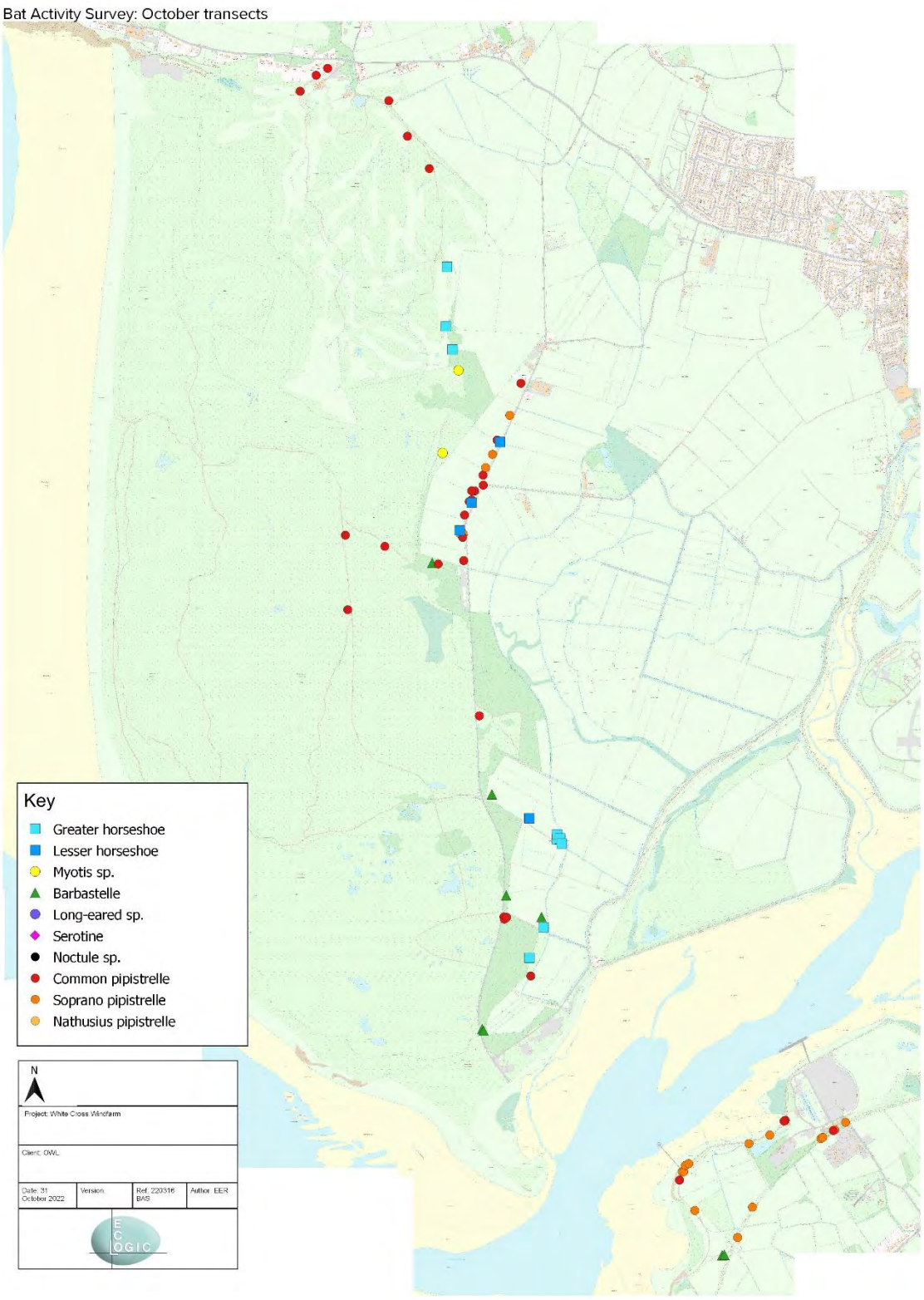

Figure 3-9 Manual dusk bat activity survey results for October 2022

References

Collins, J. 2016 *Bat Surveys for Professional Ecologists Good Practice Guidelines 3rd edition* The Bat Conservation Trust, London.

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.E Supplementary Bat Activity Survey Interim Report (Saunton Road)

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White Cross Offshore Windfarm

Supplementary Bat Activity Survey (Saunton Road)

Interim Report

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Client	HaskoningDHV UK Limited
Project	White Cross , White Cross Offshore Windfarm
Version	DRAFT
Project number	P22-827 White Cross Saunton Road - Supplementary Bat Activity Survey Interim Report

	Name	**Position**	**Date**
Originated	Anna Senior	Principal Ecologist	11 August 2023
Reviewed	Guy Miller	Principal Ecologist	11 August 2023
Approved for issue to client	Guy Miller	Principal Ecologist	11 August 2023
Issued to client	Anna Senior	Principal Ecologist	11 August 2023

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Contents

1 Introduction

1.1 BSG Ecology was commissioned by Royal HaskoningDHV to undertake supplementary bat activity surveys of a section of hedgerow at Saunton Road, Saunton, Devon which will be affected by access road provision associated with delivery of the proposed White Cross Offshore Windfarm.

1.2 The supplementary surveys are underway and this report presents the interim findings of the surveys that have taken place to date.

1.3 The aim of this report is to provide supporting data for the assessment of the effects of the proposed development on bats which has been provided within the **ES Chapter 16: Onshore Ecology and Ornithology** (BSG Ecology, 2023).

2 Methods and Results

2.1 The hedgerow section subject to survey is located on the south side of the B3231 Saunton Road, at OS grid reference SS 46663 37541.

2.2 An automated bat detector, comprising a Titley Scientific Anabat Swift, was deployed at this location between 06 June and 11 June 2023. This detector was deployed for 10 days but due to technical issues, only the first five days was usable.

2.3 A summary of the results of the survey is provided in Table 1 below. The initial results are as follows:

- Some use by greater horseshoe bat *Rhinolophus ferrumequinum* was recorded although activity levels appear to be low (on average 3 bat passes per night (B/n).
- Lesser horseshoe bat *Rhinolophus hipposideros* appears to use the hedgerow for foraging. On average 23 bat passes per night (B/n) were recorded.
- Serotine *Eptesicus serotinus* (36/B/n) and common pipistrelle *Pipistrellus pipistrellus* (15 B/n) also appears to use the hedgerow or nearby areas for foraging.
- Levels of use by other species are low, although a range of species have been recorded.

2.4 A second monitoring period is underway in August 2023. This report will be updated when results are available.

Table 1: Bat passes recorded between June 6th-11th (5 Nights) & distribution over night-time period

	Time Intervals													
Species	**21-40 mins after sunset**	**41-60 mins after sunset**	**61-80 mins after sunset**	**81-100 mins after sunset**	**101-120 mins after sunset**	**Night Period**	**120-101 mins before sunrise**	**100-81 mins before sunrise**	**80-61 mins before sunrise**	**60-41 mins before sunrise**	**40-21 mins before sunrise**	**Grand Total**	**Average no. bat passes per night**	**Average bat passes per hour**
Myotis sp.	0	1	5	0	0	7	0	2	0	0	0	15	3.00	0.43
Pipistrelle 50KHz *Pipistrellus* sp.	0	1	0	0	0	3	0	0	0	0	0	4	0.80	0.11
Common pipistrelle *Pipistrellus pipistrellus*	3	4	4	6	1	47	3	2	3	4	0	77	15.40	2.20
Soprano pipistrelle *Pipistrellus pygmaeus*	0	0	0	0	1	2	0	0	3	2	0	8	1.60	0.23
Serotine *Eptesicus serotinus*	0	25	31	33	24	68	0	1	0	0	0	182	36.40	5.20
Greater horseshoe *Rhinolophus ferrumequinum*	0	0	0	0	0	6	1	1	1	7	1	17	3.40	0.49
Lesser horseshoe *Rhinolophus hipposideros*	0	0	1	1	0	44	9	29	32	0	0	116	23.20	3.31
Barbastelle *Barbastella barbastellus*	0	0	0	1	0	5	0	0	0	0	0	6	1.20	0.17
Leisler's *Nyctalus leisleri*	0	1	3	1	0	4	0	0	0	0	0	9	1.80	0.26
Noctule *Nyctalus noctula*	7	7	0	1	0	1	0	0	0	0	0	16	3.20	0.46
Long-eared bat *Plecotus* sp.	0	0	0	1	2	1	0	1	0	0	0	5	1.00	0.14
Grand Total	**10**	**39**	**44**	**44**	**28**	**188**	**13**	**36**	**39**	**13**	**1**	**455**		

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.F Bat Emergence & Activity Survey Report – Buildings

Appendix 16.F Bat Emergence & Activity Survey Report 2022– Buildings

White Cross Windfarm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 BESB rev02
Client:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal HaskoningDHV
Survey Date/s:	July – September 2022
Report Date:	October 2022
Report Author:	Aby Sampson BSc, ACIEEM
Approved By:	Andrew Charles BSc (Hons), MSc, MCIEEM
Surveyor/s	Andrew Charles BSc (Hons), MSc, MCIEEM Aby Sampson BSc, ACIEEM William Corbett BSc (Hons) Willow West BSc, MSc Paul Lott BSc Ruth Cooper Andy Hobbs Meg Hobbs Martin Clements Katrina Williams Chris McCullough Sam White

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DISCLAIMER

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertaken bat emergence and activity survey of accessible buildings along the proposed onshore cable corridor routes for the White Cross Windfarm ("the Project") that have the potential to support roosting bats.

The proposed onshore cable corridor routes extends from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1). There are two onshore cable corridor routes. The first onshore cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a second route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final preferred route is to be determined; see Figure 1-1).

The survey area consisted of the proposed Onshore Export Cable Corridor routes (see Figure 1-1).

Buildings within the survey area which included access for bat emergence surveys included:

- Braunton Barn (SS 45956 37430); and,
- South Barrow Farmstead (SS 46814 33714).

See Figure 1-1 for surveyed building locations.

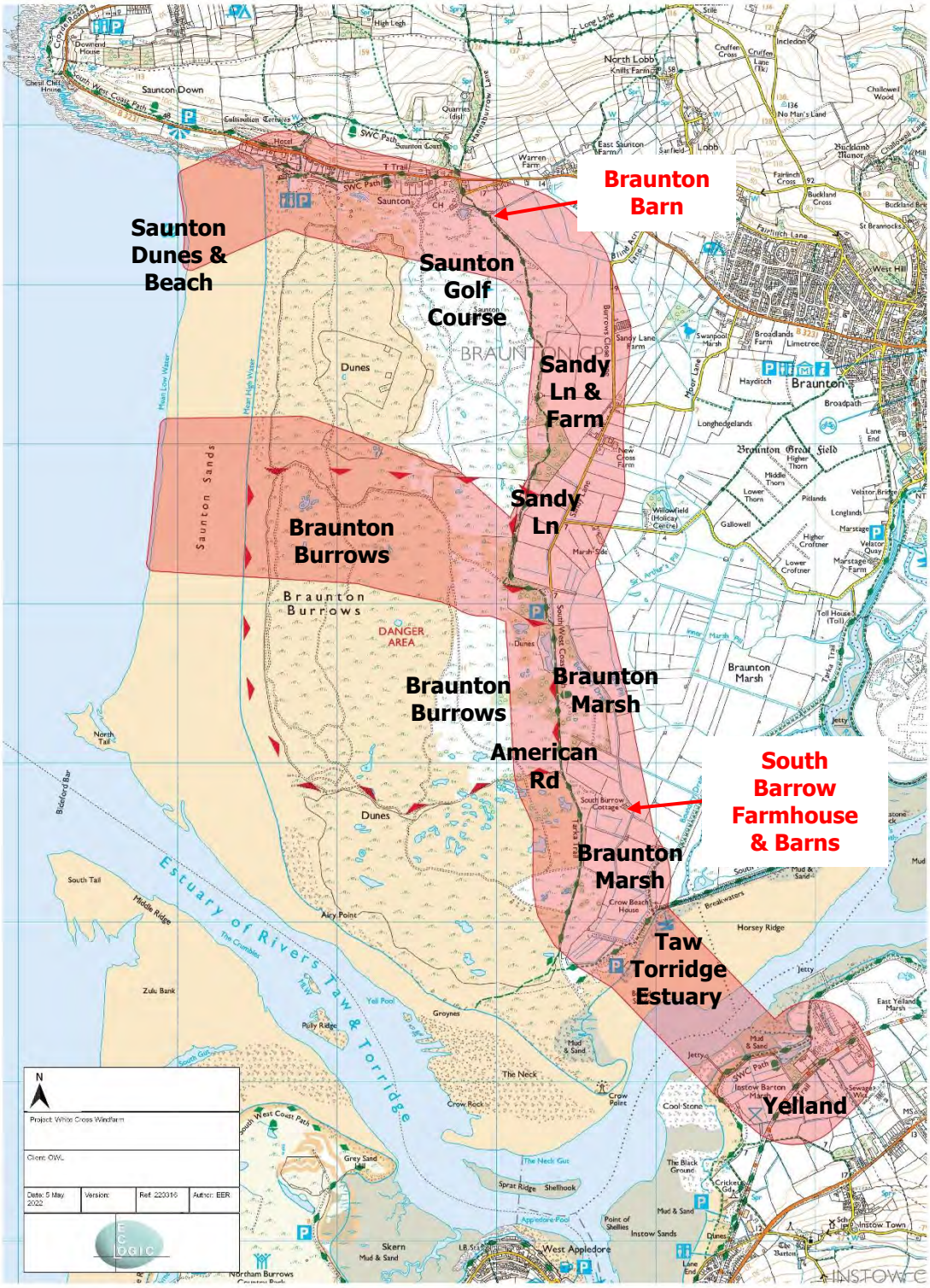

Figure 1-1 The proposed cable corridor routes and the buildings subject to bat emergence survey

2. Survey Methods

2.1 Braunton Barn

The bat emergence survey of Braunton Barn consisted of two evening survey visits and a period of remote monitoring using an automated bat detector.

The evening surveys visits were undertaken on the following dates:

- 19th July 2022 by Ruth Cooper and Meg Hobbs; and
- 2nd August 2022 by Ruth Cooper and Andy Hobbs.

The automated detector was positioned within Braunton Barn for a period of five nights from the 25th to 31st July 2022.

2.2 South Barrow Farmstead

The bat emergence survey of South Barrow Farmstead consisted of two evening survey visits and a period of remote monitoring using automated bat detectors, including one within the barn and one within the lean-to.

The evening surveys visits were undertaken on the following dates:

- 25th August 2022 by Martin Clements, Sam White, Meg Hobbs, Ruth Cooper, Willow West and Paul Lott; and,
- 21st September 2022 by William Corbet, Martin Clements, Katrina Williams, Ruth Cooper, Meg Hobbs and Chris McCullough.

The automated bat detectors were positioned within the barn and lean-to for a period of five nights from the 25th to 31st July 2022.

2.3 Bat Emergence Surveys

The bat emergence surveys were undertaken from 15 minutes prior to sunset until 1½ hours after sunset. The surveyors were positioned to cover all aspects of the buildings, with particular emphasis placed on the areas which had potential to be utilised by emerging bats. When a bat was detected, it was identified with its position and activity noted on a field base plan. The time and position of each bat was recorded, along with its direction of flight (light permitting) and whether the bat was emerging, foraging or commuting. Cloud cover, wind strength, precipitation, humidity and temperature were all recorded at the start and on completion of the survey.

The surveyors were each equipped with a bat detector and recording device, comprising of either an Echo Meter Touch 2 or a Peersonic RPA3 bat detector with internal recording capability.

All ultrasound recordings were analysed using Kaleidoscope Viewer (version 4.5.5), AnalookW (version 4.1) and BatSound (version 3.3) computer software.

2.4 The Automated Bat Detector Survey

The automated bat detector consisted of SongMeter MINI bat zero crossing frequency division detectors, programmed to commence recording 30 minutes prior to sunset until 30 minutes after sunrise.

All ultrasound recordings were analysed using Kaleidoscope Viewer (version 4.5.5), AnalookW (version 4.1) and BatSound (version 3.3) computer software.

2.5 Limitations

Access was not provided for personnel to inspect the internal areas of the surveyed buildings.

Additional buildings within the proposed onshore cable corridor routes were not subjected to inspection or bat emergence survey, due to being within private ownership and/or private occupation with access not provided. Such buildings included:

- Buildings within Yelland sub-station;
- Buildings within Yelland Quay;
- Yelland boat repair yard;
- Crow Point House;
- Animal shelters within private ownership within Braunton Marsh;
- Private dwellings, farmhouses and agricultural buildings associated with Sandy Lane;
- Buildings associated with Saunton Golf Course;
- Residential dwellings and holiday accommodation associated with Saunton Road;
- Buildings/chalets within Saunton Dunes; and,
- Buildings associated with Saunton Sands holiday accommodation and facilities.

3. Survey Results

Table 3.1. Timings and environmental conditions relating to the bat emergence surveys

		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation %	Humidity %
19th July 2022 Sunrise: 21:22 Start Time: 21:05 End Time: 22:37	Start of Survey	21	1	100	0	70
	End of Survey	18	1	100	0	92
2nd Aug 2022 Sunrise: 21:01 Start Time: 20:42 End Time: 22:16	Start of Survey	18	5	100	5	64
	End of Survey	17	5	100	0	75
25th Aug 2022 Sunrise: 20:18 Start Time: 20:03 End Time: 21:30	Start of Survey	16	2	<5	0	72
	End of Survey	15	3	30	0	76
21st Sep 2022 Sunrise: 19:18 Start Time: 19:03 End Time: 20:34	Start of Survey	17	1	30	0	83
	End of Survey	13	0	<5	0	61

3.1 Braunton Barn

Braunton Barn is located at the northern extent of an agricultural field (see Figure 1-1), adjacent to and partially overgrown, by a hedgebank. Dune grasslands of Saunton Sand Golf Course are located to the west, and further agricultural fields bound by hedgebanks and ditches extent to the north, east and south.

Braunton Barn was constructed from stone and roofed with interlocking curved clay tiles (Figure 2.1). There were two openings on the southern elevation and internally the space was separated into the ground floor and a hayloft. The north, south and west elevations included an extensive covering of ivy.

Figure 2.1. The southern elevation of Braunton Barn

3.1.1 Bat Emergence Survey – 19th July 2022

One bat was observed emerging from the building during the bat emergence survey undertaken on the 19th July 2022, details of which are provided within Table 3.2.

Table 3.2. Bat Emergence Survey Results 19th July 2022 – Braunton Barn

Time	Species	Number	Emergence Location	Figure reference
21:57	Greater horseshoe	1	From the western opening on the southern elevation	N/A

3.1.2 Bat Emergence Survey – 2nd August 2022

Two bats were observed emerging from the building during the bat emergence survey undertaken on the 2nd August 2022, details of which are provided within Table 3.3.

Table 3.3. Bat Emergence Survey Results 2nd August 2022 – Braunton Barn

Time	Species	Number	Emergence Location	Figure reference
21:26	Greater horseshoe	1	From the eastern opening on the southern elevation	N/A
21:50	Greater horseshoe	1	From the eastern opening on the southern elevation	N/A

3.1.3 Automated Bat Detector

The automated bat detector, positioned within the barn, recorded the following:

- Greater horseshoe at the typical times of emergence and re-entry and at points during the night;
- Lesser horseshoe at the typical times of emergence and re-entry; and,
- Myotis species at points during the night.

3.2 South Barrow Farmstead

South Barrow Farmstead included the abandoned farmhouse, a pitched roof barn, a free standing lean-to and an outbuilding.

The farmstead is located within Brauton Marsh surrounded by hedgebanks and ryhnes, which in turn are further surrounded by agricultural fields additionally bound by hedgebanks, ryhnes and ditches.

The Farmhouse

The farmhouse was two storey with a pitched roof including a covering with slate tiles (Figures 2.2 & 2.3). A two storey and single storey extension were adjoined to the north-eastern elevation and a single storey extension, was adjoined to the south-western elevation. The building included an extent of covering ivy and bramble and was in a state of disrepair, including broken windows and sections of missing roof tiles.

Figure 2.2. The south-eastern elevation of South Barrow Farmhouse

Figure 2.3. The south and north-western elevations of South Barrow Farmhouse

South Barrow Barn

South Barrow Barn was constructed from stone and brick and the roof was covered with slate tiles and clay ridge tiles (Figures 2.4 & 2.5). The building was divided into two sections accessed from openings on the southern elevation. The building was in a state of disrepair with an open doorway into the southwestern extent, and sections of missing roof tiles.

Figure 2.4. The north and south-western elevations of South Barrow Barn

Figure 2.5. The south-western and south-eastern elevations of South Barrow Barn

South Barrow Lean-to

South Barrow lean-to was constructed of timber and corrugated metal sheet walls and roof (Figure 2.6). The lean-to was open to the northern elevation.

South Barrow Outbuilding

South Barrow outbuilding was constructed of timber and corrugated metal sheet walls and roof (Figure 2.7).

Figure 2.6. The north-western elevation of the Lean-to at South Barrow Farm

Figure 2.7. The northwest elevation of the Outbuilding at South Barrow Farm

3.2.1 Bat Emergence Survey – 25th August 2022

Farmhouse

Four bats emerged from the farmhouse during the bat emergence survey undertaken on the 25th August 2022. The bat emergences are detailed in Table 3.4 and illustrated in Figures 2.8 and 2.9 below.

South Barrow Barn, Lean-to & Outbuilding

There were no bats observed emerging from the Barn, Lean-to or Outbuilding during the bat emergence survey undertaken on the 25th August 2022.

Table 3.4. Bat Emergence Survey Results 25th August 2022 – South Barrow Farmhouse

Time	Species	Number	Emergence Location	Figure reference
20:43	Soprano pipistrelle	1	Verge at the gable end of the two-storey north-eastern extension	A
20:46	Soprano pipistrelle	1	Verge at the gable end of the two-storey north-eastern extension	B
20:46	Common pipistrelle	1	Verge at the gable end of the two-storey north-eastern extension	B
20:50	Common pipistrelle	1	Under lead flashing adjoining the main house and the south-western single storey extension	C

3.2.2 Bat Emergence Survey – 21st September 2022

Farmhouse

Two bats emerged from the Farmhouse during the bat emergence survey undertaken on the 21st September 2022. The bat emergences are detailed in Table 3.5 and illustrated in Figures 2.8 and 2.9 below.

Table 3.5. Bat Emergence Survey Results 21st September 2022 – South Barrow Farmhouse

Time	Species	Number	Emergence Location	Figure reference
19:39	Lesser horseshoe	1	Window opening on south-eastern elevation	D
19:40	Common pipistrelle	1	Verge of main roof where adjoins two-storey north-eastern elevation	E

Figure 2.8. The bat emergence locations from the south and north-eastern elevations of South Barrow Farmhouse

Figure 2.9. The bat emergence location from the south-western elevation of South Barrow Farmhouse

South Barrow Barn & Outbuilding

There were no bats observed emerging from the Barn or Outbuilding during the bat emergence surveys undertaken on the 21st September 2022.

South Barrow Farm Lean-to

One bat emerged from the lean-to during the bat emergence survey undertaken on the 21st September 2022, details are provided in Table 3.6.

Table 3.6. Bat Emergence Survey Results 21st September 2022 – South Barrow Lean-to

Time	Species	Number	Emergence Location	Figure reference
19:38	Common pipistrelle	1	Opening on north-eastern elevation	N/A

3.2.3 Automated Bat Detectors

South Barrow Barn

The automated bat detector, positioned within the barn, recorded greater horseshoe activity at the typical time of emergence on the 26th and 27th August 2022.

South Barrow Lean-to

The automated bat detector, positioned within the lean-to, recorded the following:

- Greater horseshoe at the typical times of emergence and re-entry and at points during the night;
- Lesser horseshoe at the typical times of emergence and at points during the night; and,
- Myotis species at the typical times of emergence and re-entry.

3.3 Roost Characterisations

Braunton Barn

The combined survey results confirm that the barn supports the following bat roosts:

- Greater horseshoe summer day and night roosts (low numbers or individual/s);
- Lesser horseshoe summer day roost (low numbers or individual/s); and,
- *Myotis* species night roost (low numbers or individual/s).

South Barrow Farmhouse

The combined survey results confirm that the farmhouse supports the following bat roosts:

- Soprano pipistrelle summer day roost (peak count: 2);
- Common pipistrelle summer day roosts (3 roosts, each with peak count: 1); and,
- Lesser horseshoe summer day roost (peak count: 1).

South Barrow Farm Barn

The combined survey results confirm that the barn supports the following bat roosts:

- Greater horseshoe summer day roost (low numbers or individual/s).

South Barrow Farm Lean-to

The survey results confirm that the shed supports the following bat roosts:

- Greater horseshoe summer day and night roosts (low numbers or individual/s);
- Lesser horseshoe summer day and night roosts (low numbers or individual/s); and,
- *Myotis* species summer day roost (low numbers or individual/s).

South Barrow Farm Outbuilding

The survey recorded no bats emerging from South Barrow Farm Outbuilding. However, it is noted that this building was no access internal and it is possible that the building could include occasional and or seasonal roost/s, which remain unconfirmed.

References

Collins, J. (2016). *Bat Surveys for Professional Ecologist: Good Practice Guidelines* (3rd ed.) The Bat Conservation Trust, London.

Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

Wildlife & Countryside Act 1981, as amended. HMSO

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.G Inspection & Bat Emergence Survey Report – Trees

Appendix 16.G Inspection & Bat Emergence Survey – Trees

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 BEST rev01	
Client:	Offshore Wind Ltd. (OWL)	
Architect/Agent:	Royal HaskoningDHV	
Survey Date/s:	September 2022	
Report Date:	November 2022	
Report Author:	Aby Sampson BSc, ACIEEM	
Approved By:	Andrew Charles BSc (Hons), MSc, MCIEEM	
Surveyor/s & Licence N°:	Andrew Charles	Bats: 2015-13738-CLS-CLS (WML-A34 Level 2)
	Aby Sampson	Bats: 2019-40487-CLS (WML-A34 Level 2)
	William Corbett	Bats: 2022-10213-CL18-BAT (WML-A34 Level 2)
	John Polley	Bats: 2015-11916-CLS-CLS (WML-A34 Level 2)

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Disclaimer

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake bat surveys of the trees along the proposed onshore cable corridor routes for the White Cross Wind Farm ("the Project") that have the potential to support roosting bats.

The proposed onshore cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1-1). There are two onshore cable corridor routes. The first onshore cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a second route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final preferred route is to be determined; see Figure 1-1).

The survey area consisted of the proposed Onshore Export Cable Corridors and an extended 50m buffer (see Figure 1-1).

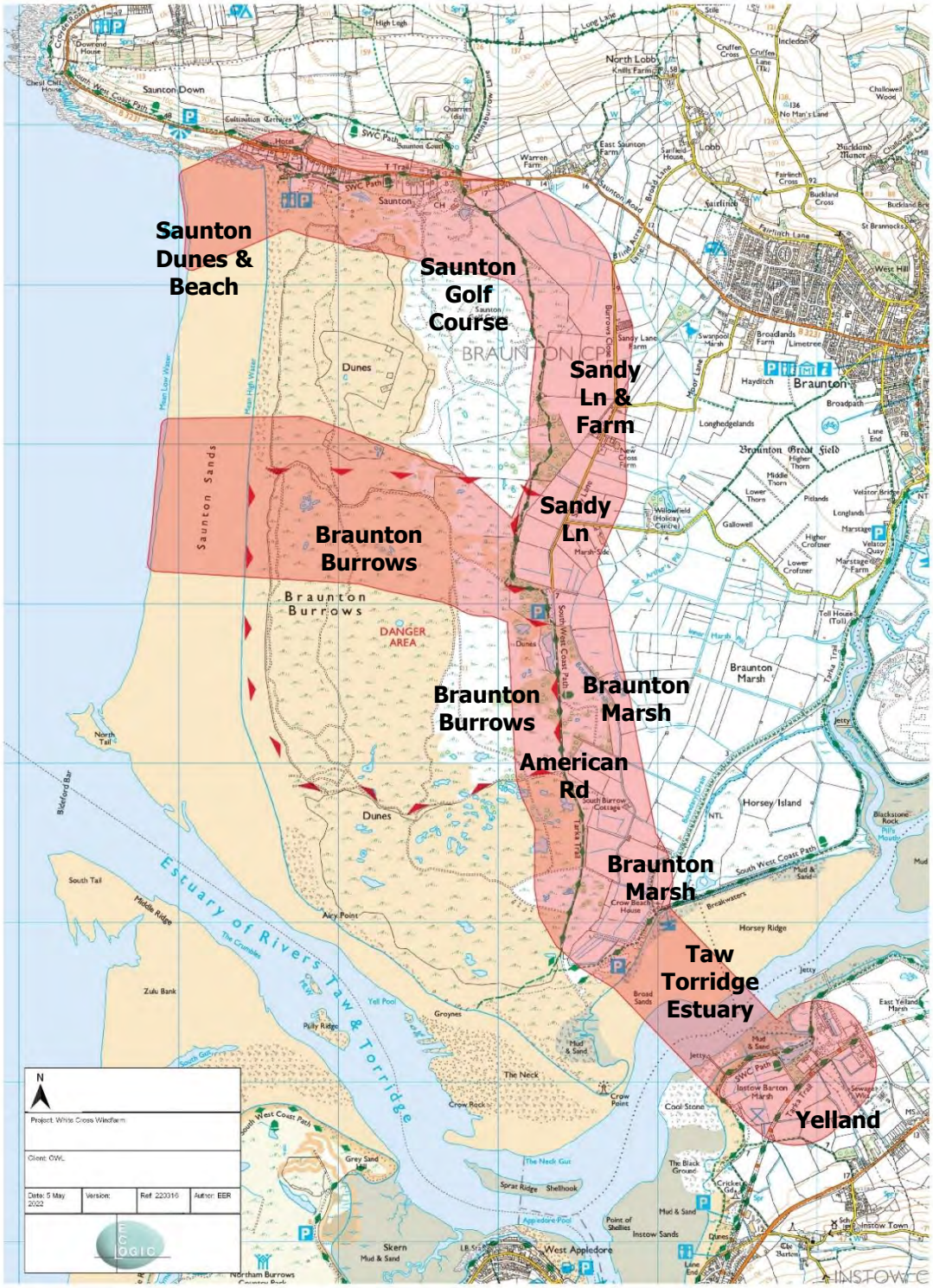


Figure 1-1 The proposed cable corridors with a 50m buffer.

2. Survey Methods

2.1 Initial Identification of Trees with Bat Roosting Potential

The trees within the site were assessed for the presence of features that could support roosting bats, consisting of natural holes, woodpecker holes, cracks/ splits, broken limbs, loose bark, hollows/cavities, and dense epicormic growth. The trees were assessed from the ground with the aid of close-focusing binoculars and a digital camera during April and May 2022 by Andrew Charles and John Polley.

All trees that supported features suitable for roosting bats were subject to an inspection for bat field signs by Aby Sampson and William Corbett on the following dates:

- 12th September 2022;
- 13th September 2022;
- 26th September 2022; and,
- 27th September 2022

2.2 Inspection of Trees

Trees identified with potential bat roost features were classified in accordance with the Bat Conservation Trust's Bat Surveys for Professional Ecologists Good Practice Guidelines 3rd Edition (Collins, 2016) as following:

- Confirmed bat roost: Trees with bat roosting features with the presence or further evidence of roosting bat/s;
- High: A tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions and surrounding habitat;
- Moderate: A tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions and surrounding habitat but unlikely to support a roost of high conservation status;
- Low: A tree of sufficient size and age to contain potential roost features but with none seen from the ground or features are seen with only very limited roosting potential; and,

- Negligible: A tree with negligible habitat features that may be used by roosting bats.

Features were inspected from ground level, accessed via a ladder or accessed by aerial tree climbing. Features were inspected with an endoscope and torch for presence of bats, bat field signs, such as droppings, insect prey remains and/or urine staining.

2.3 Bat Emergence Survey

Three trees were not possible to fully inspect due to the presence of inaccessible features or features that extended past the length of the endoscope. These trees were subject to bat emergence surveys.

Bat emergence surveys were undertaken of the following trees:

- Tree 629 – 21st September 2022 by Aby Sampson (including use of thermal camera);
- Tree 77 – 26th September 2022 by Aby Sampson; and,
- Tree 466 – 26th September 2022 by William Corbett

The bat emergence surveys were undertaken from 15 minutes prior to sunset until 1½ hours after sunset. The surveyors were positioned to cover all aspects of the trees, with particular emphasis placed on the areas which had potential to be utilised by emerging bats. When a bat was detected, it was identified with its position and activity noted on a field base plan. The time and position of each bat was recorded, along with its direction of flight (light permitting) and whether the bat was emerging, foraging or commuting. Cloud cover, wind strength, precipitation, humidity and temperature were all recorded at the start and on completion of the survey.

For the bat emergence surveys, surveyors were each equipped with a bat detector and recording device, comprising of either an Echo Meter Touch 2 or a Peersonic RPA3 bat detector with internal recording capability. To aid species identification, all recordings were analysed using Kaleidoscope Viewer (ver4.5.5), BatSound (ver3.3 and/or ver4.03) and/or Analook (ver3.8) computer software.

A thermal imaging camera (Hikmicro Owl Thermal Telescope), was positioned to cover various aspects of the subject tree as complimentary method where visibility was reduced (e.g. features situated below woodland canopy level with increased shading/reduced light levels).

2.4 Limitations

The majority of trees identified with bat roosting potential were located upon private land, with access for inspection and/or bat emergence survey only provided at the end of August 2022.

This limited the inspection surveys to only being undertaken during September 2022, and where required, bat emergence surveys only included a single evening survey visit per tree during September 2022.

For confirmation of presence or likely absence of bat roosts, bat survey guidelines (Collins, 2016) require that trees identified with moderate or high roosting potential are subjected to two or three dusk emergent and/or dawn re-entry surveys. Accordingly, due to the timing constraints it was not possible to undertake presence or likely absence surveys in accordance with the survey guidance.

3. Survey Results

3.1 Inspection Survey Results

The following number of trees were assessed as having high, moderate, low or negligible suitability for roosting bats during the tree inspections:

- 10 trees were found to have high suitability;
- 19 trees were found to have moderate suitability;
- 23 trees were found to have low suitability; and,
- 21 trees were found to have negligible suitability.

These trees were subject to thorough inspections for bats or evidence of roosting bats in September 2022. The results are shown in Table 3.1 below and the tree locations shown in Appendix 1.

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
622	G1	Willow	NE branch, 2.5m above ground level	Knot hole with cavity, extends 30cm upwards	Ladder	Moderate	No bat signs	No bat signs	Check before felling	
			NE branch, 2m above ground level	Knot hole with cavity, extends 20 cm upward and 10 cm downward	Ladder	Moderate	No bat signs	No bat signs	Check before felling	
61	G1	Willow	Central trunk, 1.5m above ground level	Crack between two dividing trunks	Ladder	Negligible	No bat signs	N/A	No further inspection required	
623	G1	Willow	NE face of main trunk	Superficial feature in dead limb	Ladder	Negligible	No bat signs	N/A	No further inspection required	
63	G1	Willow	1m above ground level	Horizontal crack, 15cm deep	Ladder	Low	No bat signs	N/A	No further inspection required	
65	G1	Willow	NE branch, 5m above ground level	Cracks and breaks in branch (open & exposed)	Tree climb	Low	No bat signs	No bat signs	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
			SE face of trunk, 3m above ground level	2 x knot holes (superficial)	Tree climb	Negligible	No bat signs	N/A	No further inspection required	
64	G1	Willow	SE face of trunk, 4m above ground level	Crack in trunk (narrow and open)	Ladder	Negligible	No bat signs	N/A	No further inspection required	
66	G1	Willow	S branch, 2m above ground level	Horizontal crack, cavity extends 5cm along branch	Ladder	Moderate	No bat signs	No bat signs	Check before felling	
82	G1	Willow	N face of E branch, 5m above ground level	Crack in branch (narrow)	Not safe to climb – assessed from ground level	Negligible	N/A	N/A	No further inspection required	
69	G1	Willow	1m above ground level	Crack in vertical branch	Ground	Low	No bat signs	N/A	No further inspection required	
68	G1	Willow	1m above ground level	Crack in horizontal branch	Ground	Low	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
626	G1	Willow	SE branch, 2.5m above ground level	Crack in branch, upward cavity extended 75cm	Ladder	Low	No bat signs	N/A	No further inspection required	
67	G1	Willow	Main trunk	Ivy covered	Ladder	Negligible	No bat signs	N/A	No further inspection required	
75	G1	Willow	NE branch, S face	Knot hole with upward cavity, extends 2cm	Ladder	Negligible	No bat signs	N/A	No further inspection required	
76	G1	Willow	Central, 2.5m above ground level	Horizontal crack within main trunk	Ladder	Negligible	No bat signs	N/A	No further inspection required	
78	G1	Willow	NE face, 1m above ground level	Two splits in trunk, 30cm upward cavity	Ground	High	No bat signs	No bat signs	Third inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
77	G1	Willow	W face of W branch	Hollow branch, three knot holes with 30cm upward cavity extending between	Bat Emergence Survey (highest feature not accessible)	High	No bats observed emerging	TBC	Two further bat emergence surveys required	
627	G1	Willow	S branch, 1.5m above ground level	Cracked branch	Ladder	Negligible	No bats signs	N/A	No further inspection required	
80	G1	Willow	NE face, 1m above ground level	5cm upwards cavity	Ground	Low	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
			E face, 0.5m above ground level	10cm upward cavity	Ground	Moderate	No bat signs	No bat signs	Check before felling	
			W face, 3m above ground level	Crack (open and exposed)	Ladder	Negligible	No bat signs	N/A	No further inspection required	
79	G1	Willow	S branch, 1m above ground level	Horizontal crack along branch	Ladder	Low	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
			E branch, 1m above ground level	Horizontal crack leading downwards into cavity	Ground	Low	No bat signs; nesting material (possibly dormouse)	N/A	Check before felling (for small mammals)	
81	G1	Willow	E face, 2m above ground level	10cm cavity along horizontal branch	Ground	Moderate	No bat signs	No bat signs	Check before felling	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
492	G2	Willow	N branch, 1.5m above ground level	10cm cavity in horizontal branch	Ground	Low	No bat signs	N/A	No further inspection required	
			N branch, 1.5m above ground level	Knot hole (superficial)	Ground	Negligible	No bat signs	N/A	No further inspection required	
			Central, W face, 1 m above ground level	5cm upward cavity	Ground	Moderate	No bat signs	No bat signs	Check before felling	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
493	G2	Willow	E branch, 1.25m above ground level	Cavity 1m in total length	Ground	Moderate	No bat signs; former tit species nest	No bat signs	Check before felling	
494	G2	Willow	W face, 3m above ground level	Split branch (superficial)	Ladder	Negligible	No bat signs	N/A	No further inspection required	
			N branch, 2.5m from ground level	30cm upward cavity	Ladder	Moderate	No bat signs; signs of roosting birds	No bat signs	Check before felling	
495	G2	Willow	E branch, 2m above ground level	Crack in branch	Ground	Low	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
496	G2	Willow	Central trunk	Hollow in trunk	Ground	Negligible	No bat signs	N/A	No further inspection required	
628	G2	Willow	W face of branch, 3m above ground level	Downwards feature with slight upward section	Ladder	Moderate	No bat signs	No bat signs	Check before felling	
629	G3	Ash	W face, 5m above ground level	50cm downward cavity into branch	Tree climb	High	No bats observed emerging	TBC	Two further bat emergence surveys required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
			S branch	Hollow, multiple gaps and woodpecker holes	Not safe to climb	High				
462	G3	Willow	Main trunk	Crack in main trunk, 0.75 cm in length (open & exposed)	Ground	Negligible	No bat signs	N/A	No further inspection required	
463	G3	Alder	S facing branch, 1.5m above ground level	Knot hole, cavity 15cm deep	Ladder	Low	No bat signs	N/A	No further inspection required	
			E facing branch, 2m above ground	Outer feature 50 cm long (very narrow)	Ladder	Low	No bat signs	N/A	No further inspection required	
			E facing branch, 2m above ground	Inner knot hole, superficial	Ladder	Negligible	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
			Main trunk	Hollow branch	Ladder	Negligible	No bat signs	N/A	No further inspection required	
			Main trunk, W facing	Cavity, extends 20 cm upwards	Ground	Moderate	No bat signs	No bat signs	Check before felling	
464	G3	Alder	E branches	Knot hole x 2 (superficial)	Tree climb	Negligible	No bat signs	N/A	No further inspection required	
				Knot hole, cavity extends 30 cm back along branch		Moderate	No bat signs	TBC	Second inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
465	G3	Alder	E trunk	Hollow, 50 cm in length	Ladder	High	No bat signs	TBC	Second & third inspections required	
			E facing on E trunk, 2.5m above ground	Knot hole, extends 50cm	Ladder	High	No bat signs	TBC	Second & third inspections required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
466	G3	Alder	Main trunk, S face	Large hollow, extends 1m up and also out along E trunk	Ground	High	No bats emerged	TBC	Two further bat emergence surveys required	
467	G3	Willow	E face	Knot hole with cavity, extends <10cm	Ground/ladder	Low	No bat signs	N/A	No further inspection required	
467A	G3	Alder	W face	Cavity, extends 10cm	Ground/ladder	Low	No bat signs	N/A	No further inspection required	
468	G3	Alder	E branch	Broken branch, cavity extends 30cm	Ground/ladder	Moderate	No bat signs	TBC	Second & third inspections required	
			E branch	Cavity extends downward (open & exposed)	Ground/ladder	Negligible	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
469	G3	Elder	NE facing on E branch	Cavity, extends 10cm downward (enclosed)	Ground/ladder	Moderate	No bat signs	TBC	Second & third inspections required	
			Open split in branch, 1m above ground level	Open split in branch, superficial	Ground/ladder	Negligible	No bat signs	N/A	No further inspection required	
470	G3	Alder	Main trunk	Ivy cover	Ground	Low	No bat signs	N/A	No further inspection required	
471	G3	Ash	Eastern face, 2m above ground level	Knot hole extends 10cm	Ground	Low	No bat signs	N/A	No further inspection required	
472	G3	Alder	Eastern face, 3m above ground level	Knot hole, with cavity extends 15cm	Ground	Low	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
474	G3	Alder	Base of E trunk	Large, hollow horizontal cavity	Ground	Negligible	No bat signs	N/A	No further inspection required	
475	G3	Alder	S facing, E branch	Knot hole (superficial)	Ground	Negligible	No bat signs	N/A	No further inspection required	
477	G3	Alder	Main trunk	Thick, dense ivy	Ground	Low	No bat signs	N/A	No further inspection required	
			E branch	Hollow, with cavity, extends downward 40cm and upwards 10cm	Ground	Low	No bat signs	N/A	No further inspection required	
478	G3	Hawthorn	W trunk, 1m above ground level	Cavity, extends upwards 20cm	Ground	High	No bat signs	TBC	Second & third inspections required	
			E trunk	Hollow, extends 1m in both directions, feature enclosed	Ground	High	No bat signs	TBC	Second & third inspections required	
479	G3	Alder	Main trunk	Ivy	Ground	Low	No bat signs	N/A	No further inspection required	
480	G3	Alder	2m above ground level	2 x knot holes (superficial)	Ladder	Negligible	No bat signs	N/A	No further inspection required	
481	G3	Alder	Main trunk, N face	Cavity, extends 30cm	Ground	Moderate	No bat signs	TBC	Second & third inspections required	
482	G3	Alder	S face, 1.5 m above ground level	Lifted bark, 10cm upwards crevice behind	Ladder	Low	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
483	G3	Ash	Main trunk	Ivy cover	Ladder	Low	No bat signs	N/A	No further inspection required	
484	G3	Alder	Main trunk	Base cavity	Ground	Negligible	No bat signs; otter holt	N/A	No further inspection required	
486	G3	Alder	E facing, 2m above ground level	Knot hole, with cavity extends 75cm along branch towards trunk	Ladder	High	No bat signs	TBC	Second & third inspections required	
487	G3	Dead tree	Main trunk (rotten and fallen)	Cavity extends upwards 50cm along trunk	Ground	Moderate	No bat signs	TBC	Second inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
489	G3	Hawthorn	SE branch	Cavity in branch, extends 10cm (narrow)	Ladder	Low	No bat signs	N/A	No further inspection required	
490	G3	Alder	E trunk, ground level – 2m above ground level	Lower branch, cavity extends 60 cm	Ladder	High	No bat signs	TBC	Second inspection required	
				Knot holes on northern and western face of trunk lead into same large cavity	Ladder	High	No bat signs	TBC	Second inspection required	
			E branch	Knot hole cavity, extends 50cm	Ladder	High	No bat signs; evidence of nesting birds	TBC	Second & third inspections required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
			E branch	Knot hole with cavity, extends 20cm	Ladder	High	No bat signs	TBC	Second & third inspections required	
			E branch	Knot hole with cavity, extends 40cm	Ladder	High	No bat signs	TBC	Second & third inspections required	
491	G3	Alder	Main trunk	Large cavity, extends downward 1m	Ground	Moderate	No bat signs	TBC	Second inspection required	
445	G3	Alder	E branch	Cavity, horizontal extends 20-40cm each way	Ground	Moderate	No bat signs	TBC	Second inspection required	
446	G3	Willow	E branch, 2m above ground level	Crack (open & exposed)	Ground	Negligible	No bat signs	N/A	No further inspection required	
			NE branch, 1m above ground level	Cavity extends 10cm downwards	Ground	Negligible	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
448	G3	Willow	W face, 2m above ground level	Cavity extends upwards 10cm	Ladder	Low	No bat signs	N/A	No further inspection required	
450	G3	Willow	E trunk	Split (open & exposed)	Ground	Negligible	No bat signs	N/A	No further inspection required	
447	G3	Willow	Branches	Cracks in branches	Ground	Negligible	No bat signs	N/A	No further inspection required	
451	G3	Willow	SE face, ground level	Cavity in lower horizontal branch, extends 20cm	Ground	Moderate	No bat signs	TBC	Second inspection required	
452	G3	Alder	E branch	Cavity, extends 10cm	Ground	Low	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
453	G3	Willow	Main trunk	Cavity, extends 90 cm downward 1 m upwards	Ground	Moderate	No bat signs	TBC	Second inspection required	
			Eastern branch, 3m from ground level	Cavity, extends upward 10 cm and downward 20 cm	Ladder (tall person & precarious ladder)	Moderate	No bat signs	TBC	Second inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
455	G3	Alder	S facing, 1.5m above ground level	Knot hole with cavity, extends 50cm downward	Ladder	Moderate	No bat signs; bird nesting material	TBC	Second inspection required	
456	G3	Alder	E branch, 1.5 m above ground level	Split (open & exposed)	Ladder	Negligible	No bat signs	N/A	No further inspection required	
			S small branch	Hollow	Ground	Low	No bat signs	N/A	No further inspection required	
458	G3	Willow	NE branch	Knot holes (superficial)	Ground	Negligible	No bat signs	N/A	No further inspection required	
459	G3	Willow	Main trunk, ground level	Large cavity, extends downward 75cm	Ground	Moderate	No bat signs	TBC	Second inspection required	
460	G3	Alder	E trunk	Hollow along branch	Ground	Negligible	No bat signs	N/A	No further inspection required	

Table 3.1. Results of the tree inspections undertaken in September 2022

No.	Group	Species	Feature Location	Feature	Access	Potential Suitability to support roosting bats	Survey 1	Survey 2	Recommendation	Photo
461	G3	Willow	W branch, ground level	Cavity, extends 10cm	Ground	Low	No bat signs	N/A	No further inspection required	
442	G4	Hawthorn	Central	Hollow in trunk	Ground	Low	No bat signs	N/A	No further inspection required	
			E branch	Hollow branch, cavity extending downward 70cm on both directions	Ground	High	No bat signs	TBC	Second inspection required	
443	G4	Alder	E face	Hollow branch section parallel to trunk covered in ivy	Tree climb	Low	No bat signs	N/A	No further inspection required	
444	G4	Dead hawthorn with ivy covered crown	Central	Trunk twisted with crevices	Ground	Negligible	No bat signs	N/A	No further inspection required	
58	G5	Sycamore	E branch	Large cavity leading through two horizontal branches (S side 1m deep)	Ground	High	No bat signs	TBC	Second inspection required	

3.2 Bat Emergence Survey Results

It was not possible to undertake thorough inspections of Trees 77, 466 and 629, therefore bat emergence surveys were undertaken for these trees. The results of which are detailed within Table 3.2 & 3.3 below.

Table 3.2. Timings and environmental conditions relating to the bat emergence surveys

		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation %	Humidity %
21st Sept 2022 Sunrise: 19:16 Start Time: 19:00 End Time: 20:40	Start of Survey	13.8	1	60	0	46
	End of Survey	11.3	0	25	0	73
26th Sept 2022 Sunrise: 19:07 Start Time: 18:54 End Time: 20:11	Start of Survey	14	5	100	0	74
	End of Survey	13	5	100	0	87

Table 3.3. Results of the bat emergence surveys

Date	Tree	Bat Emergences	Location/Feature
21st Sept 2022	629	0	N/A
26th Sept 2022	466	0	N/A
26th Sept 2022	77	0	N/A

3.3 Results Summary

All trees were subject to at least one inspection, however due to access constraints and subsequent time limitations further tree inspections and/or bat emergence surveys will be required to confirm the presence or likely absence of bat roosts.

To date, the inspection and bat emergence surveys have not identified a confirmed roost within the surveyed trees.

4. Discussion

Where possible the proposed works should avoid the felling or disturbing of any trees which support features assessed as being suitable for supporting roosting bats.

Further inspection and/or a bat emergence survey to meet the survey effort specified within the Bat Survey Guidelines (Collins, 2016), would be required prior to any works affecting trees identified as having high or moderate suitability for roosting bats (29 trees in total).

If individual trees were to remain unaffected by the works, including consideration of root protection zones, then further survey would to confirm the presence or likely absence of a bat roost relating to the tree in question.

References

Bat Tree Habitat Key (2018) Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals

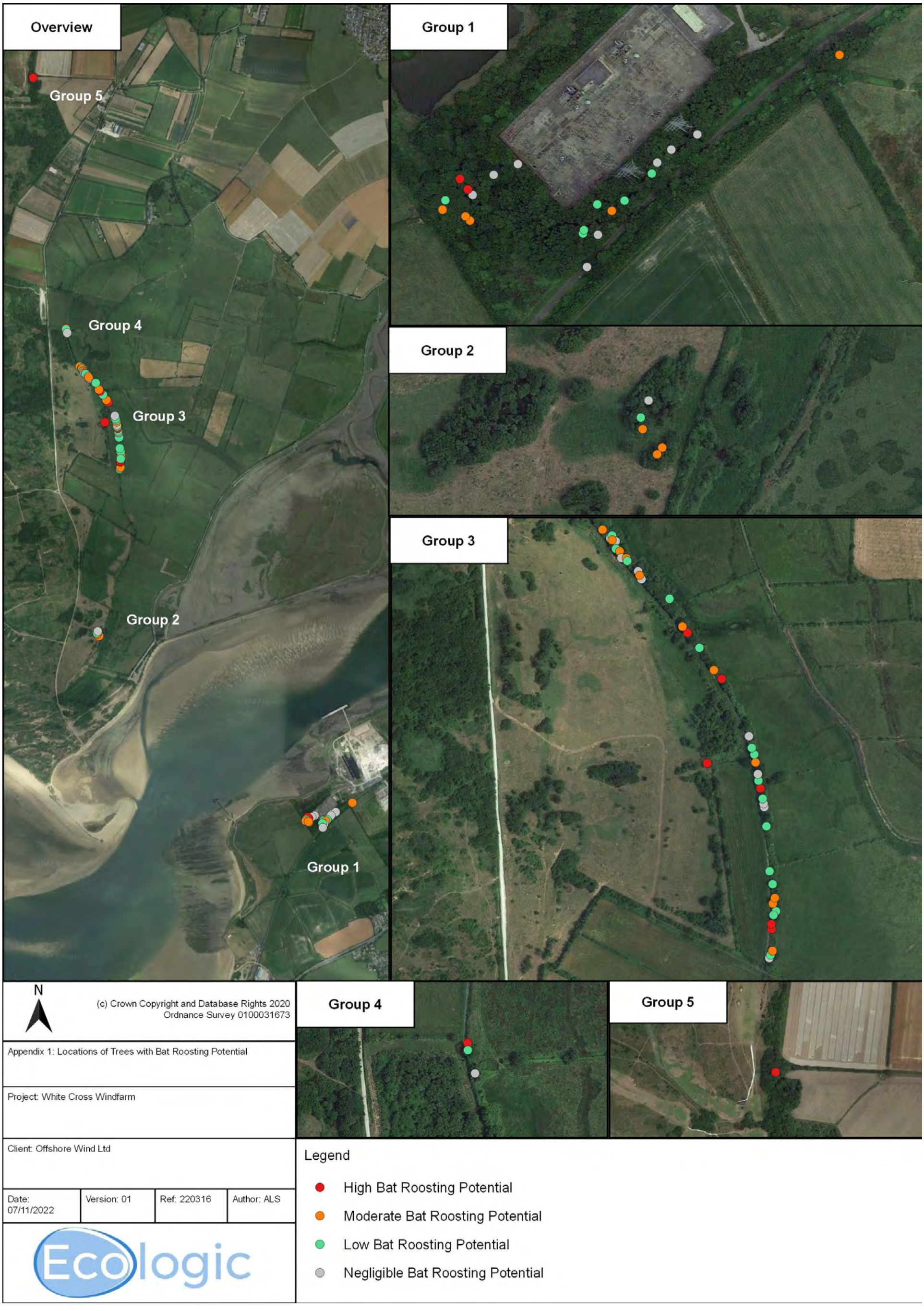
Collins, J. (2016). *Bat Surveys for Professional Ecologist: Good Practice Guidelines* (3rd ed.) The Bat Conservation Trust, London.

Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019

Wildlife & Countryside Act 1981, as amended. HMSO

Appendices

Appendix 1: Locations of Trees Identified with Bat Roosting Potential



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Appendix 1: Locations of Trees with Bat Roosting Potential

Project: White Cross Windfarm

Client: Offshore Wind Ltd

Date:	Version:	Ref:	Author:
07/11/2022	01	220316	ALS

Ecologic

Legend

- High Bat Roosting Potential
- Moderate Bat Roosting Potential
- Low Bat Roosting Potential
- Negligible Bat Roosting Potential

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.H Otter & Water Vole Survey Report

Appendix 16.H Otter & Water Vole Survey Report 2022

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland Devon

Report Reference:	220316 OWV rev02
Client:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal HaskoningDHV
Survey Date/s:	Aune – September 2022
Report Date:	November 2022
Report Author:	Willow West BSc, MScR
Approved By:	Andrew Charles BSc (Hons), MSc, MCIEEM
Surveyor/s	Willow West BSc, MScR Andrew Charles BSc (Hons), MSc, MCIEEM Paul Lott BSc William Corbett BSc, MSc Aby Sampson BSc (Hons) Katrina Williams

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Disclaimer

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake an Otter *Lutra lutra* and Water Vole *Arvicola amphibius* Survey along the proposed onshore export cable corridor routes for the White Cross Windfarm ("the Project").

The proposed onshore export cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1-1). There are two onshore export cable corridor routes. The first onshore export cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a second route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final preferred route is to be determined; see Figure 1-1).

The survey area consisted of the proposed onshore export cable corridor routes (see Figure 1-1), plus an additional 100 m buffer for water vole and 250 m buffer for otter.

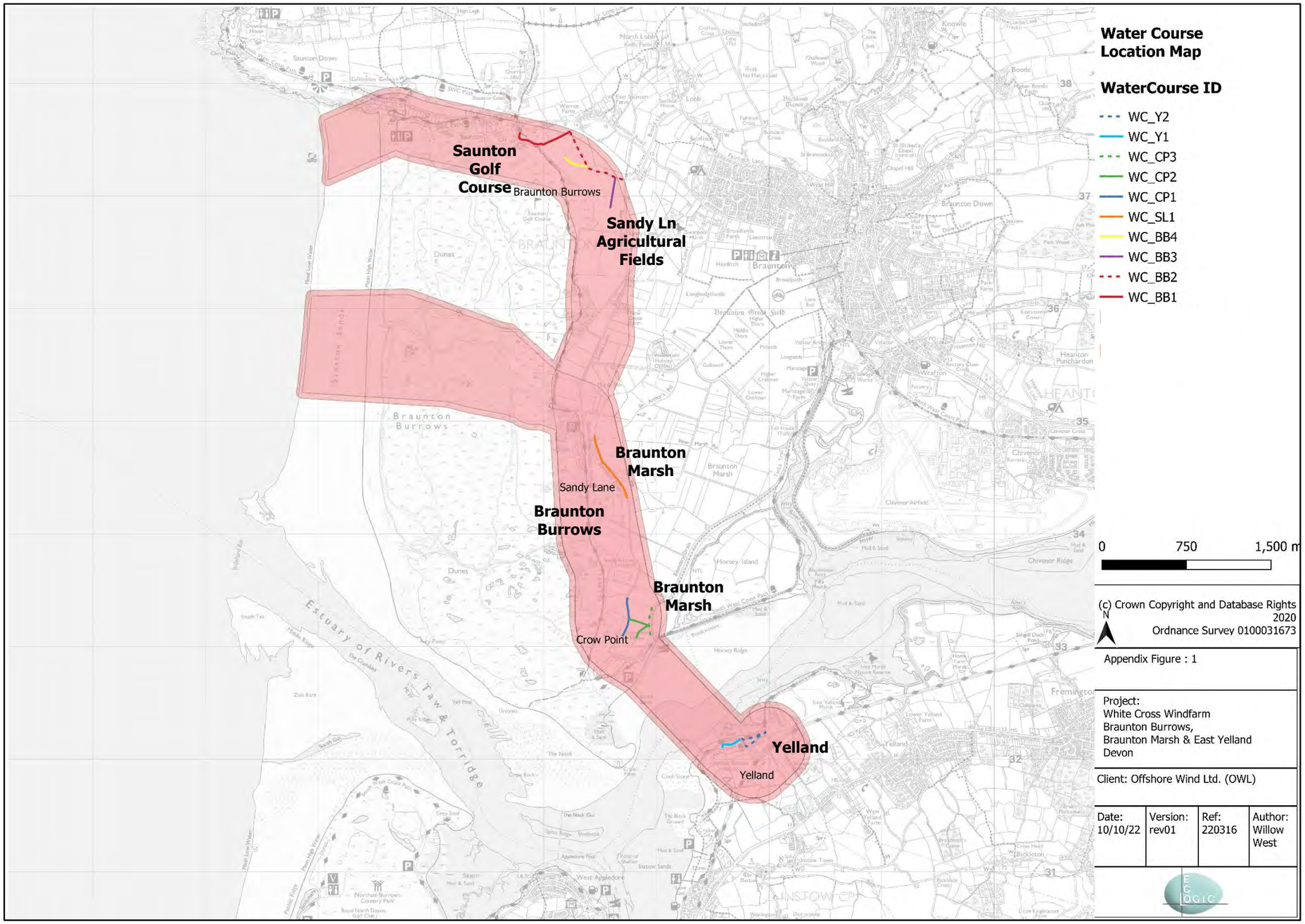

Figure 1-1. Full site map with water course locations

2. Survey Methods

2.1 Desk Study

Information provided by Devon Biodiversity Records Centre including no records for water vole within 1 km of the proposed onshore export cable corridor routes. Although water voles were historically abundant in Braunton Marshes, they are reported to now be absent (Gow, North Devon Biosphere, March 2022).

There were seven records for otter within 1 km of the site associated with the Caen River, east of Braunton Burrows.

The ditches, streams and lake within Braunton Marshes, Sandy Lane agricultural fields and Yelland agricultural fields and coastal strip are suitable to support habitat for water vole and otter.

2.2 Field Survey

The water vole and otter surveys were undertaken in accordance with the methodology set out in the Water Vole Conservation Handbook (3rd Ed.) (*Strachan, Moorhouse and Gelling, 2011*) and as modified by The Water Vole Mitigation Handbook (*Dean et al., 2016*) and Water Vole Field Signs and Habitat Assessment (*Dean, 2016*).

Surveys were conducted along one bank for the full length of each watercourse/rhyne/ditch/lake within the onshore export cable corridor routes plus an additional 100m buffer for water vole and 250m buffer for otter.

In accordance with the guidance, each water course/feature was surveyed twice, once during mid-April to the end of June, and once during July to September 2022.

At each survey visit, all field signs of water vole and otter were recorded. These included sightings, burrows, latrines, feeding stations, lawns, nests, footprints and runways for water vole, and sightings, holts, dens, laying up sites, spraints and footprints for otter. Each field sign type and its location was recorded, and a photograph taken where applicable.

2.3 Notes & Limitations

A decision to not survey drainage ditches that were dry during the period of the survey was made, due the low probability of water vole or otter using them on a regular basis.

Isolated ponds present within Braunton Burrows dunes were not surveyed due to the unlikely presence of water vole or otter within these small areas of isolated habitat.

Presence of cattle during all visits to WC_Y1 prevented direct access to the bank side. Surveys were conducted 3 to 4m from the bank with the aid of handheld binoculars (Bushnell 10x42).

Access to the south bank of WC_Y2 was not possible on foot due to deep, uneven aquatic vegetation and the water was too deep to access with waders. Surveys for the south bank were conducted with the aid of handheld binoculars (Bushnell 10x42).

3. Results

3.1 Survey Dates & Weather Conditions

See Table 3.1 and 3.2 for survey dates and weather conditions relating to the water vole and otter surveys.

Table 3.1: Braunton Marsh, Sandy Lane Farm Agricultural Fields & Saunton Golf Course – Timings, environmental conditions and surveyor relating to the water vole and otter surveys

Braunton Marsh, Sandy Ln Fields & Saunton Golf Course		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %	Surveyors
8th June 2022	Start	23	0	0	None	55	Willow West & Teresa Sullivan
	End	25	0	0	None	53	
14th Sept 2022	Start	20	2	80	None	87	Willow West, Teresa Sullivan & Katrina Williams
	End	22	2	65	None	68	
20th Sept 2022	End	18	1	10	None	84	
	End	18	1-2	20	None	69	
26th Sept 2022	Start	15	3	90	None	85	William Corbett & Aby Sampson
	End	14	3	90	None	90	

Table 3.2: East Yelland – Timings, environmental conditions and surveyor relating to the water vole and otter surveys

East Yelland		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %	Surveyors
7th June 2022	Start	19	2	0	None	58	Willow West & Teresa Sullivan
	End	21	2	0	None	58	
14th Sept 2022	Start	20	2	80	None	87	Willow West & Teresa Sullivan
	End	22	2	65	None	68	

3.2 Otter Field Survey

Evidence of otter, observed during the field surveys, are summarized in the Table 3.3 below. Photos of the evidence found during the field surveys, are shown in Appendix 3. Maps detailing the precise locations where each piece of evidence was observed, are shown in Appendix 4.

Table 3. 3: Summary of field signs relating to otter.

Watercourse ID	Date recorded	Description of evidence
WC_Y2	14/09/22	Two spraints found close to each other
WC_CP2	08/07/22	Spraint on raised walkway between ditches. Footprint close by spraint location (Appendix 3). Potential feeding remains and run.
WC_CP3	20/09/22	Spraint
WC_SL1	26/09/22	Holt
WC_SL1	26/09/22	Spraint and holt

3.3 Water Vole Field Survey

The field surveys observed no evidence of water vole presence.

Photos of that habitat seen at each survey location are shown in Appendix 2.

Assessment of the habitat suitability for water voles, at specific survey locations is summarised below (Table 3.4). Maps showing the suitability of habitat at each survey location is shown in the Appendix 1.

The only "Optimal" habitat was recorded at the Yelland site (southern extent of survey area), WC_Y2. This was a pond surrounded with deep reed beds, in an area not grazed by livestock (Appendix 1). Theoretically this habitat would be suitable for burrows and above ground nesting. However, there were no signs of feeding, burrows or latrines.

Watercourse WC_Y1 (west of WC_Y2) was classified as "Negligible value" due to heavy grazing, low vegetation and trampled banksides (Appendix 1.).

The watercourses within the southern extent of Braunton Marsh (WC_CP1 to CP3), were classified as "Suitable but poor" due to the vegetation, bank profile and water

depth being suitable (Appendix 1). Heavy trampling of the banks by cattle and the bank substrate composing largely of sand, it is unlikely to be able to support water voles at this time. With exclusion of cattle close to the bankside, the habitat may become "Optimal" with continued management. There were no signs of water voles observed.

The watercourse within the northern extent of Braunton Marsh, and adjacent to Braunton Burrows (WC_SL1) was classified as "Good". The western bank was more suitable, due to limited access by cattle. The riparian vegetation was a mix of tall grasses, making up >60% coverage of the bank (Appendix 1). There were no signs of water vole observed.

The watercourses within the agricultural fields adjacent to Sandy Lane and within Saunton Golf Course (WC_BB1 to BB4) were classified as "Negligible value". These ditches were heavily vegetated, with riparian trees and brambles, with little to no tall grasses (Appendix 1). The ditches were largely dry and overgrown at the time of the survey. There were no signs of water vole observed.

Table 3.4: Summary of the habitat suitability for water vole at each water course

Water Course ID	Habitat Suitability	Comments	Water vole signs
WC_Y1	Negligible value	Bankside vegetation heavily grazed by cattle. Bank heavily trampled.	None
WC_Y2	Optimal	Pond surrounded by adequate vegetation, tall reeds for above ground nesting.	None
WC_CP1	Suitable but poor	Patches of suitable riparian vegetation. Bank heavily trampled by cattle.	None
WC_CP2	Suitable but poor	Patches of suitable riparian vegetation. Bank heavily trampled by cattle.	None
WC_CP3	Suitable but poor	Patches of suitable riparian vegetation. Bank heavily trampled by cattle.	None
WC_SL1	Good	>60% suitable riparian vegetation. Some bank trampling by cattle but generally limited to eastern bankside.	None
WC_BB1	Negligible value	Bankside vegetation dense and wooded. Ditches largely dried out.	None
WC_BB1	Negligible value	No suitable bankside vegetation. Ditches dry.	None
WC_BB3	Negligible value	No suitable bankside vegetation. Ditches dry.	None
WC_BB4	Negligible value	No suitable bankside vegetation. Ditches dry.	None

3.4 Results Summary

The presence of otter was recorded at East Yelland (WC_Y2), Braunton Marsh (WC_CP2 & WC_CP3) and within the watercourse dividing Braunton Marsh from Braunton Burrows (WC_SL1).

No field signs were recorded for water vole within any of the surveyed watercourses.

Table 3.5: Summary of results for evidence of the presence of target species, otter and water vole.

Species	Watercourse
Otter	WC_Y2, WC_CP2, WC_CP3, WC_SL1
Water vole	No evidence

References

Chanin, P. (1993), Otters, Volume 2, Whittet Books.

Dean, M. (2021), Water vole field signs and habitat assessment, A practical guide to water vole surveys, Pelagic Publishing.

Dean, M., Strachan, R., Gow, D. & Andrews, R., (2016), The Water Vole Mitigation Handbook, London: The Mammal Society.

Lawton, J. & Woodroffe, G., (1991), Habitat and the distribution od water voles: why are there gaps in the species range?, Journal of Animal Ecology, vol 60, pages 79-91.

Liles, G., (2003), Otter Breeding Sites: Conservation and Management. Conserving Natura 2000 Rivers Conservation Techniques Series No. 5, Peterborough: English Nature.

Moorhouse, T., Strachan, R., Gelling, M. (2011). Water Vole Conservation Handbook. United Kingdom: Wildlife Conservation Research Unit, Department of Zoology, University of Oxford

Williams, J. (2010), The Otter, Merlin Unwin Books.

Appendices

Appendix 1: Maps of Habitat Suitability for Water Vole

Appendix 2: Images of Water Course Habitats Across the Survey Site

Appendix 3: Evidence of Otter Presence

Appendix 4: Maps Showing Location & Type of Evidence for Otter Presence

Appendix 1: Maps of Habitat Suitability for Water Vole

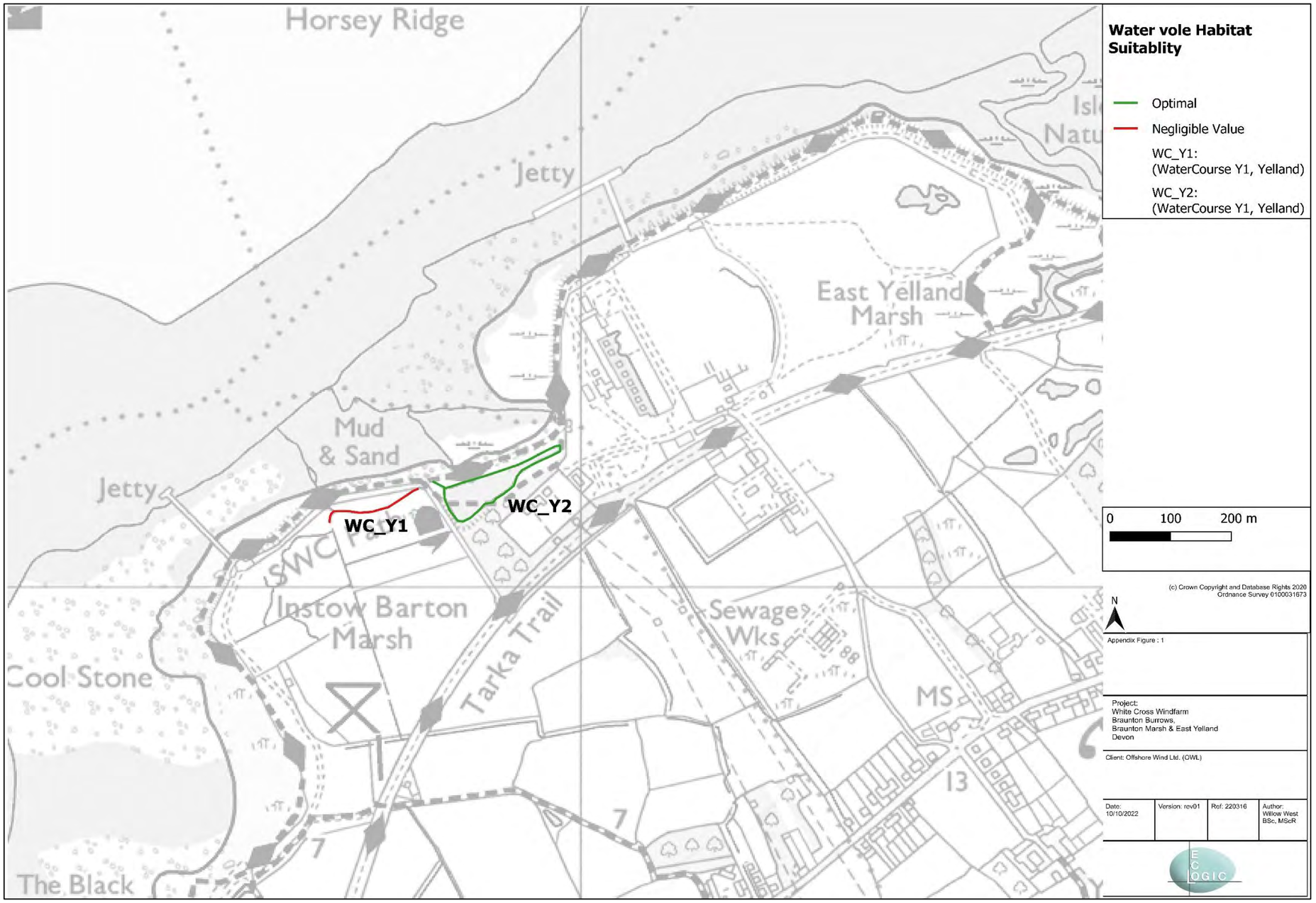

Figure A1-1: A map depicting the habitat suitability assessment for use by water voles at East Yelland – water courses: WC_Y1 & WC_Y2.

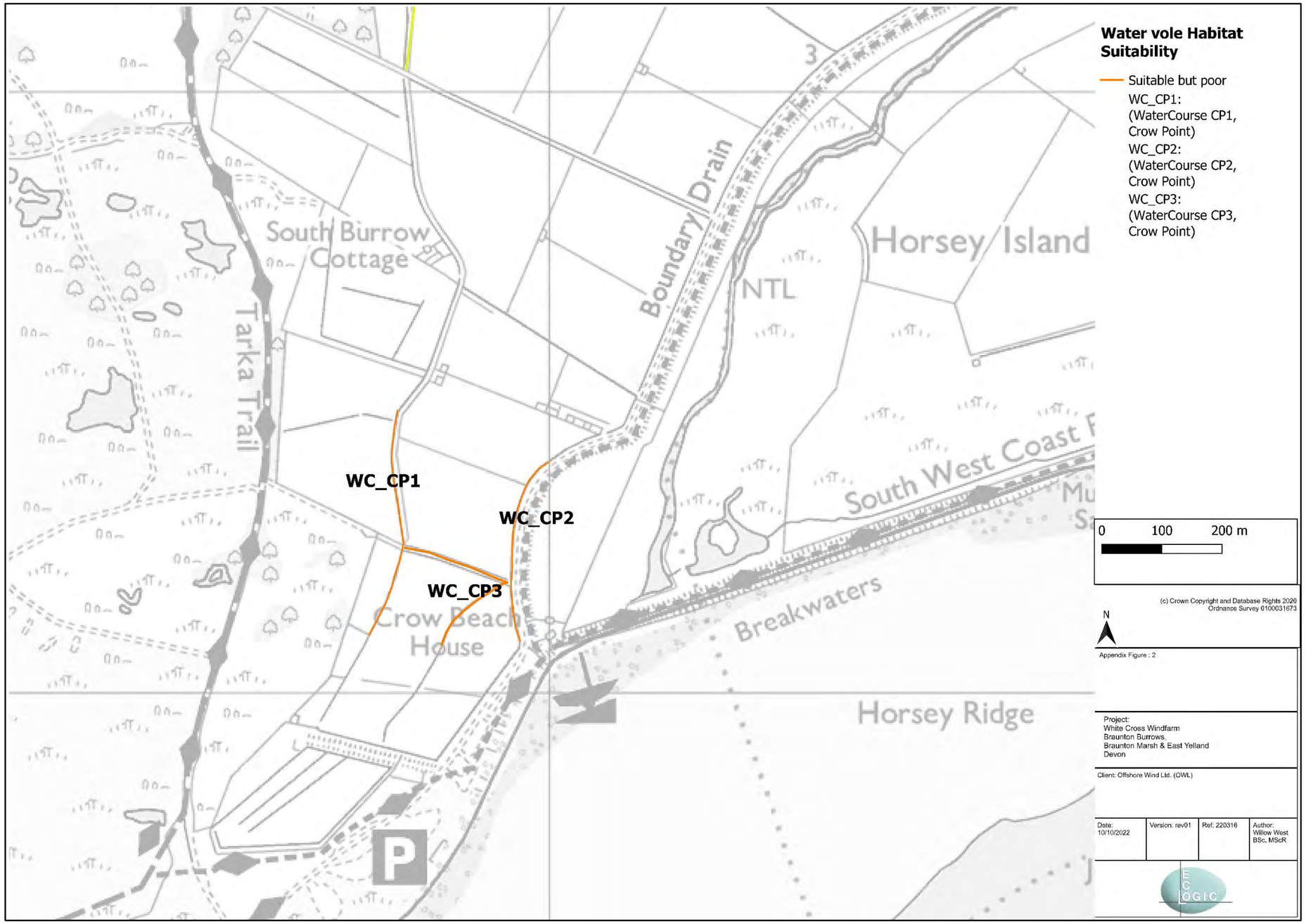

Figure A1-2: A map depicting the habitat suitability assessment for use by water voles at Braunton Marsh – water courses: WC_CP1, WC_CP2 & WC_CP3.

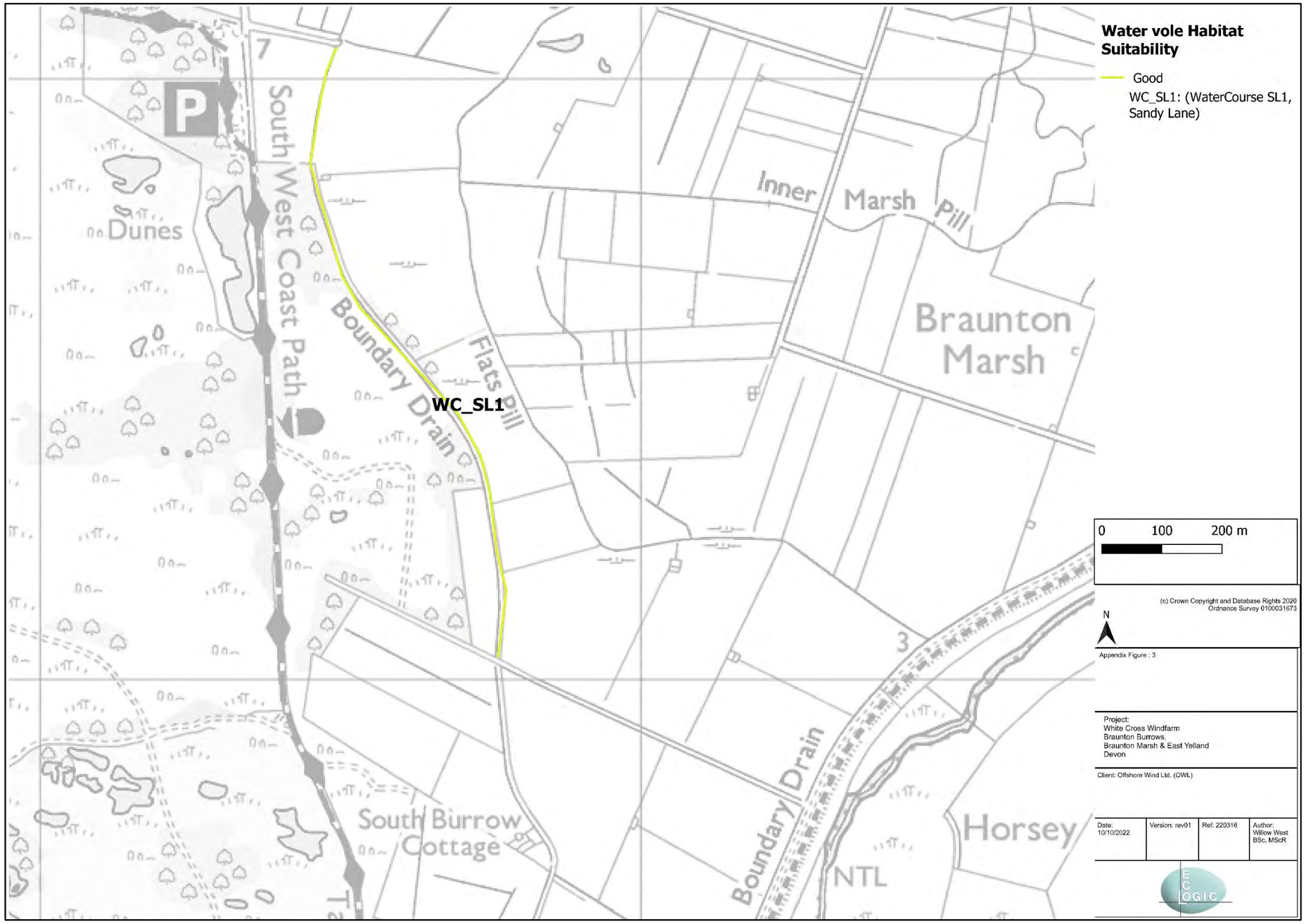

Figure A1-3: A map depicting the habitat suitability assessment for use by water voles at Braunton Burrows and Braunton Marsh – water course: WC_SL1.

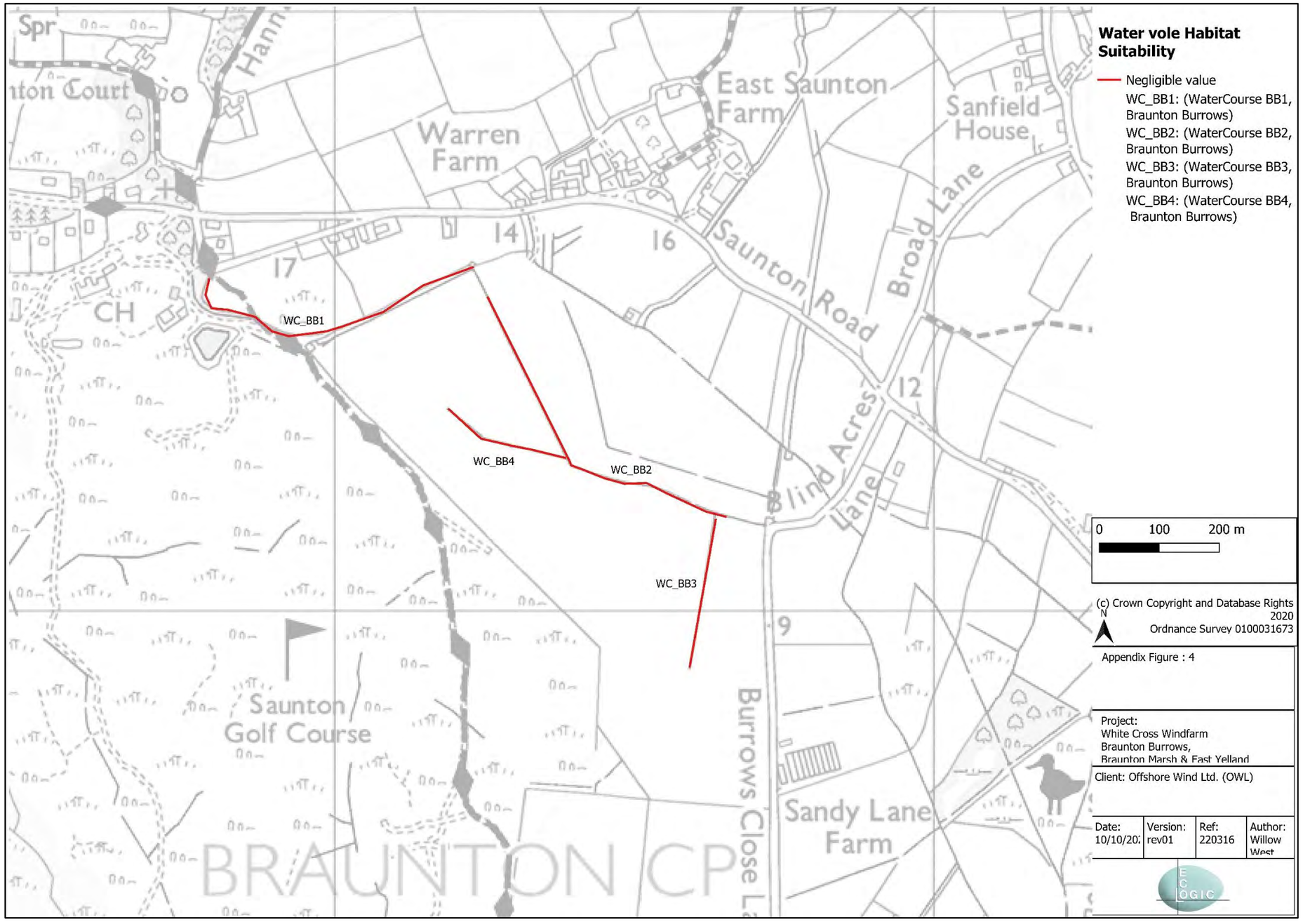

Figure A1-4: A map depicting the habitat suitability assessment for use by water voles within Sandy Lane Agricultural Fields and Saunton Golf Course – water courses: WC_BB1, WC-BB2, WC_BB3 & WC_BB4.

Appendix 2: Images of Water Course Habitats Across the Survey Site

Figure A2-1: Location: WC_Y2. Heavily poached vegetation and trampled bankside, caused by cattle.

Figure A2-2: Location: WC_Y2. Heavily poached vegetation and trampled bankside, caused by cattle.

Figure A2-3: Location: WC_BB4. Overgrown, dried out.

Figure A2-4: Location: WC_BB1. Tall, dense riparian vegetation, overgrown into channel.

Figure A2-5: Location: WC_BB3. Overgrown, dried out.

Figure A2-6: Location: WC_CP2. Bankside vegetation partially suitable for water vole.

Figure A2-7: Location: WC_CP1. Heavily poached vegetation and trampled bankside, caused by cattle.

Figure A2-8: Location: WC_Y1. Drainage channel into pond, surrounded by tall reeds.

Figure A2-9: Location: WC_SL1. Riparian vegetation partailly suitable, some damage to bankside trampling from cattle.

Appendix 3: Evidence of Otter Presence

Figure A3-1: Evidence: Otter spraint. Date found: 08/07/22 Location: WC_CP3

Figure A3-2: Evidence: Otter spraint. Date found: 14/09/22. Location: WC_Y2

Figure A3-3: Evidence: Otter spraint. Date found: 14/09/22. Location: WC_Y2

Figure A3-4: Evidence: Otter spraint. Date found: 20/09/22. Location: WC_CP3

Figure A3-5: Evidence: Otter holt. Date: 08/06/22. Location: WC_CP1.

Figure A3-6: Evidence: Otter holt. Date: 26/09/2022. Location: WC_SL1.

Figure A3-7: Evidence: Otter track. Date: 08/06/22. Location: WC_CP3

Appendix 4: Maps Showing Location & Type of Evidence for Otter Presence

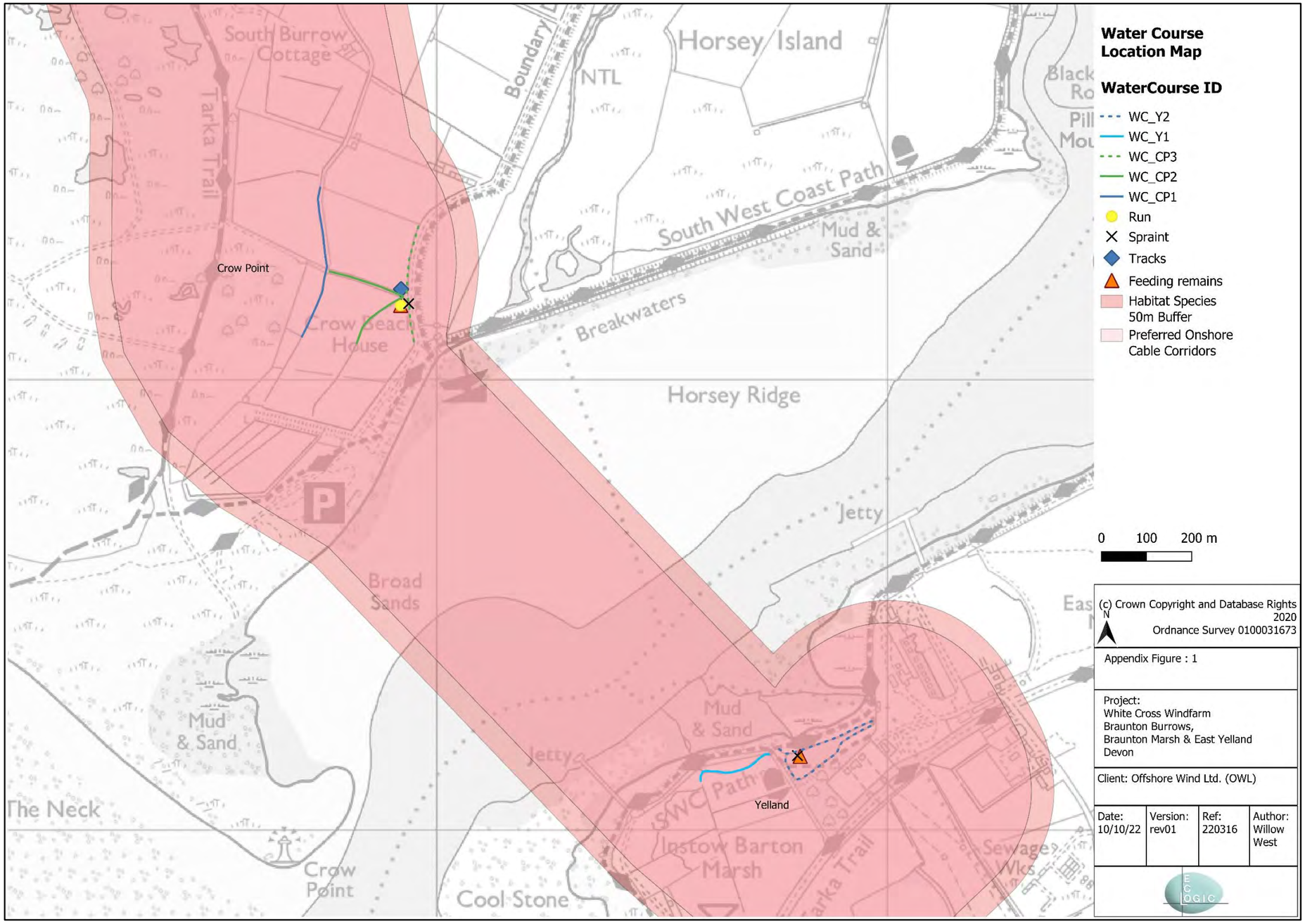

Figure A4-1. Map showing the type of evidence and location when evidence was found, relating to otter, within survey sites – Yelland and Braunton Marsh.

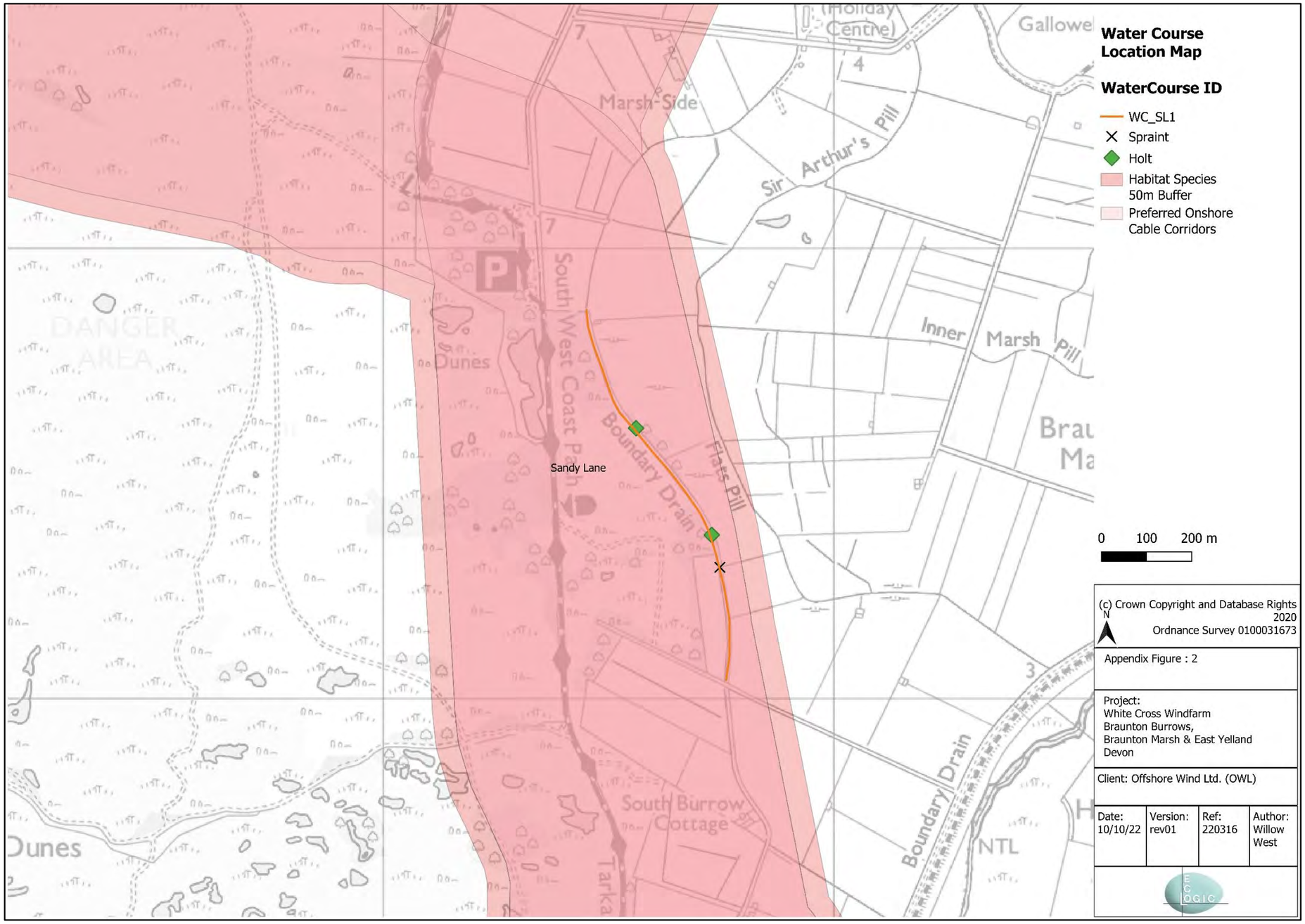

Figure A4-2**:** Map showing the type of evidence and location when evidence was found, relating to otter, within survey sites – Braunton Marsh & Braunton Burrows.

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White Cross Offshore Windfarm Environmental Statement

Appendix 16.I Dormice Survey Report

Appendix 16.I Dormouse Survey Report 2022

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 D rev02	
Client:	Offshore Wind Ltd. (OWL)	
Architect/Agent:	Royal HaskoningDHV	
Survey Date/s:	April – October 2022	
Report Date:	November 2022	
Report Author:	Erin Reardon BSc, PhD, MCIEEM	
Approved By:	Andrew Charles BSc (Hons), MSc, MCIEEM	
Lead Surveyor/s & License N°:	Andrew Charles	Dormouse: 2016-21680-CLS-CLS
	Erin Reardon	Dormouse: 2022-10586-CL10A-DOR
Additional Surveyor/s:	William Corbett, Paul Lott, Teresa Sullivan, Willow West, Martin Clements & Megan Hobbs	

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Disclaimer

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake a Dormouse *Muscardinus avellanarius* Survey along the proposed Onshore Export Cable Corridor routes for the White Cross Windfarm ("the Project").

The proposed onshore cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1.1). There are two onshore cable corridor routes. The first onshore cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a second route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final preferred route is to be determined; see Figure 1.1).

The survey areas consisted of hedgerow, scrub and woodland habitat within the proposed Onshore Export Cable Corridor routes (see Figure 1.1).

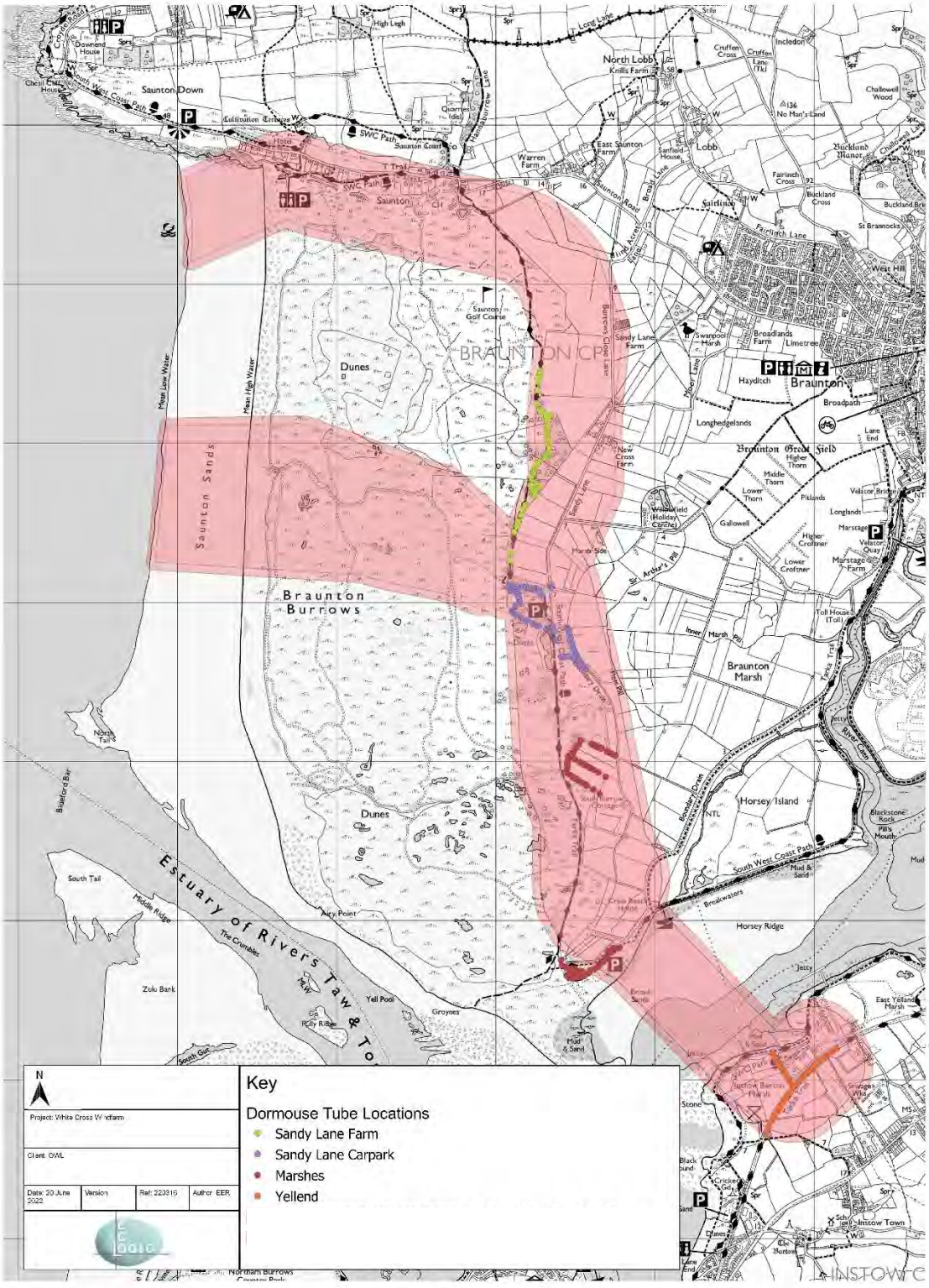

Figure 1.1. The dormouse tube survey locations within the proposed Onshore Cable Corridor routes for The Project.

2. Survey Methods

The dormouse tube survey was undertaken in accordance with The Dormouse Conservation Handbook (Bright et al., 2006). 235 tubes were deployed in April and early May 2022 at approximately 20 m intervals within habitat suitable for supporting dormice located within the within the proposed Onshore Cable Corridor routes (see Figure 1.1). The tubes were checked monthly from May to October.

The survey was sub-divided into four dormouse survey areas:

- Yelland – edge of the woodland surrounding the substation and hedgebank boundaries to the agricultural fields: 50 tubes, installed on the 12th May 2022;
- Braunton Marshes – scrub and hedgebank field boundaries. 76 tubes, installed on the 30th April & 6th May 2022;
- Braunton Burrows – woodlands and scrub surrounding American Road and near Sandy Lane carpark. 59 tubes installed on the 6th May 2022; and,
- Sandy Lane Farm – hedgebank field boundaries. 50 tubes installed on the 11th May 2022.

Each area included at least 50 dormouse tubes. Each area had a probability score of at least 22 evidencing sufficient survey effort to determine presence/likely absence of the species on a given site (Bright et al., 2006).

A limitation to the survey consisted of a number of the tubes being disturbed at Yelland, the southern extent of Braunton Marsh, Braunton Burrows and Sandy Lane Farm. These areas all included public footpaths and/or open access, and it is assumed a number of the tubes were disturbed by members of the public.

3. Results

3.1 Desk Study

Information provided by Devon Biodiversity Records Centre (DBRC) included no records for dormouse within 1 km of the proposed Onshore Cable Corridor routes. The Government's mapping website MAGIC revealed the closest EPSL for dormouse located 5 km to the north of the proposed Onshore Cable Corridor routes.

3.2 Dormouse Survey Results

No confirmed field signs of dormice were recorded within any of the survey areas (Tables 3.1 and 3.2).

A loose pile of green leaves was found within a dormouse nesting tube within the woodland edge at Yelland on the 17th September 2022. It is possible that this was the initial stages of a nest, potentially by a juvenile dormouse. However, this alone was not sufficient to confirm presence of dormice.

Table 3.1: Dormouse nesting tube survey results for Braunton Marshes, Braunton Burrows, and Sandy Lane Farm

Dormouse nesting tube locations	**Field Signs of Dormouse Use**					
	31st May 2022	**15th June 2022**	**27th July 2022**	**17th Aug 2022**	**24th Sept 2022**	**26th Oct 2022**
Braunton Marshes	None	None	None	None	None	None
Braunton Burrows	None	None	None	None	None	None
Sandy Lane Farm	None	None	None	None	None	None

Table 3.2: Dormouse nesting tube survey results for East Yelland

Dormouse nesting tube locations	Field Signs of Dormouse Use					
	31th May 2022	1st June 2022	20th July 2022	16th Aug 2022	17th Sept 2022	19th Oct 2022
East Yelland	None	None	None	None	None	None

3.3 Conclusion

Despite the presence of suitable habitat within the proposed Onshore Cable Corridor routes, the dormouse survey recorded no confirmed presence, or field of presence, for dormouse.

The surveys undertaken achieved a valid points score with regard to survey effort (Bright et al., 2006), and therefore the presence of dormouse within the Onshore Cable Corridor routes is considered unlikely.

References

Bright, P. Morris, P. & Mitchell-Jones, A. 2006. *The Dormouse Conservation Handbook 2nd Edition.* English Nature.

Conservation of Habitats & Species Regulations. 2010. HMSO

Countryside and Rights of Way Act 2000. HMSO

English Nature. 2003. *Surveying using nest tubes: Results and experiences from the South West Dormouse Project*. English Nature.

Morris, P.A. Bright, P.W. & Woods, D. 1990. Use of nest boxes by the dormouse *Muscardinus avellanarius*. *Biological Conservation*. 51: 1-13

UK Biodiversity Action Plan. www.ukbap.org/uk

Wildlife & Countryside Act 1981, as amended. HMSO

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White Cross Offshore Windfarm Environmental Statement

Appendix 16.J Yelland Substation Badger Survey Report - Confidential Document

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.K Breeding Bird Survey Report

Appendix 16.K Breeding & Ground Nesting Bird Survey Report 2022

White Cross Windfarm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 BB rev00
Client:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal Haskoning DHV
Survey Date/s:	April – July 2022
Report Date:	September 2022
Report Author:	Andrew Charles BSc (Hons), MSc, MCIEEM
Approved By:	Erin Reardon BSc PhD
Surveyor/s	Andrew Charles BSc (Hons), MSc, MCIEEM Willow West BSc, MSc Paul Lott BSc

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Disclaimer

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake a Breeding and Ground Nesting Bird Survey along the proposed onshore cable corridor routes for the White Cross Windfarm ("the Project").

The proposed onshore cable corridor routes extends from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1). The preferred onshore cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a secondary/alternative route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final route to be determined; see Figure 1-1).

The survey area consisted of the proposed Onshore Export Cable Corridors and an extended 50m buffer (see Figure 1-1).

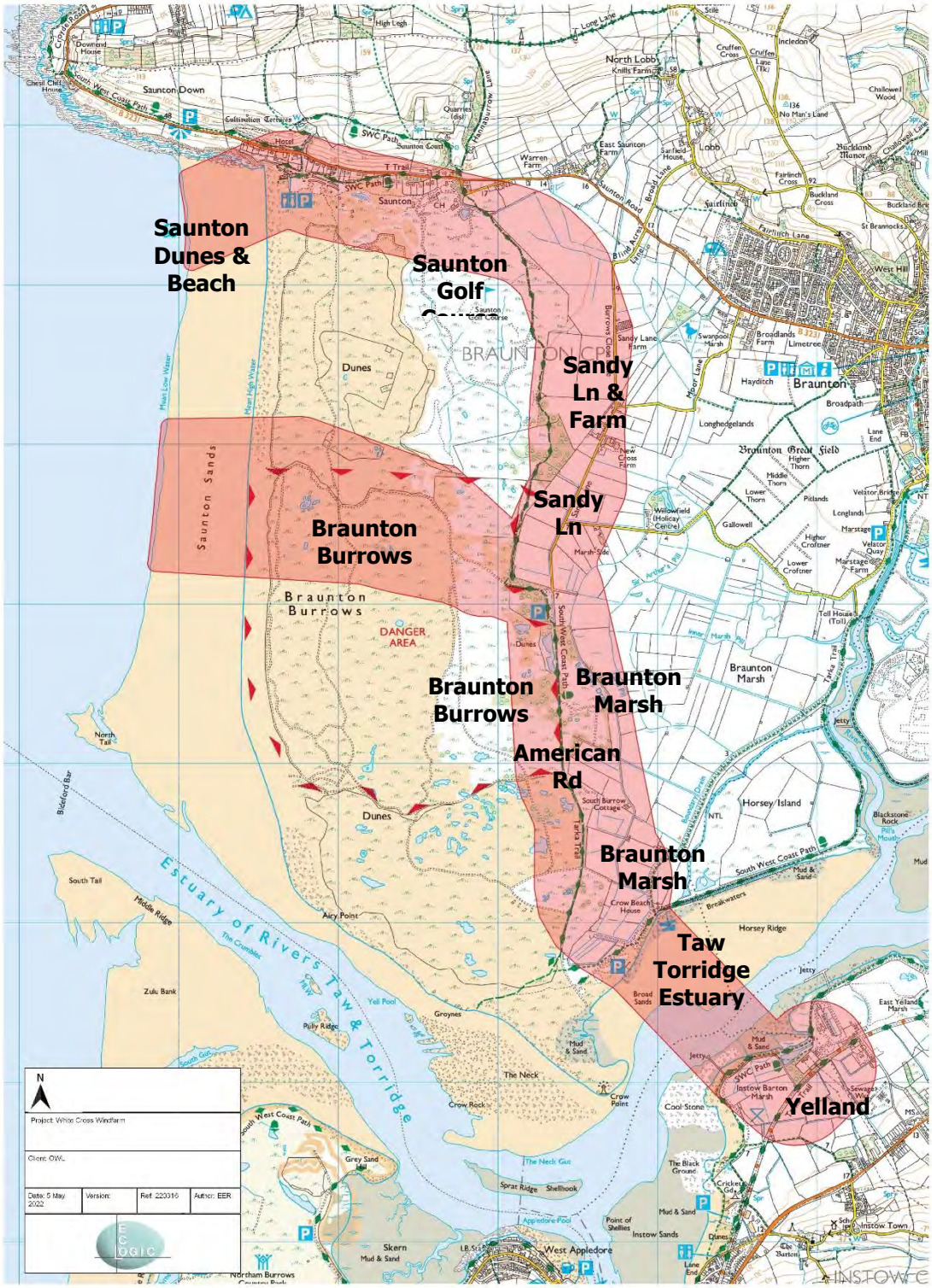


Figure 1-1 The proposed cable corridors and the breeding and ground nesting bird survey area

2. Survey Method

The survey comprised of twice monthly transects; April to July 2022 inclusive, incorporating regularly spaced vantage points, to record bird numbers, species, distribution and activity within the survey area.

The survey area was sub-divided into four transect routes:

- East Yelland – woodland, agricultural fields and coast;
- Braunton Marsh & American Road;
- Braunton Burrows Dunes & Northern Boundary Track (habitats west of Sandy Lane carpark); &,
- Sandy Lane, Sandy Lane Farm/agricultural fields, Saunton Golf Course & Saunton Sands Dunes/Beach.

The survey visits were undertaken during suitable clear weather conditions, commencing approximately 1 hour after sunrise and before 11:00, when birds are most active. The reconnaissance and survey visits were carried out in the early morning with a start time approximately one hour after sunrise; this period was chosen to avoid the period before and after sunrise (i.e. dawn chorus) as recommended by Gilbert *et. al.* (1998).

The survey transect routes were identified during reconnaissance visits and subsequently repeated during the early and late breeding/nesting season survey visits, with the route directionally alternated, and at varying levels of tide (for coastal areas) for each survey visit, to reduce temporal bias in recording. The transect surveys used a mapping approach as a means to record the locations and activities of individual birds on a site, and territories were identified and mapped accordingly.

Weather conditions, including temperature, wind speed, humidity, precipitation and timing of high and low tides will be recorded at the start and end of each survey visit.

The survey aims to determine possible, probable and confirmed breeding status of all species heard or observed and to determine which birds were using the areas for breeding or for other activities such as foraging. Habitats on site were assessed for their suitability for breeding birds and nests were recorded if they were encountered.

Observational records were made of birds singing or calling, repeated territorial calls, territorial aggression, displaying, adults carrying food or nesting material, juvenile birds and family groups.

The survey was extended to recorded species heard or seen within approximately 50 m of the survey boundary. This 'buffer zone' allowed for species that may occasionally use the site itself to be recorded even though they might not have been on the site at the particular time that the surveys were carried out. This approach (which is suggested by Marchant, 1983) meant that the whole range of bird species that occurs in the immediate area could be recorded, and not just those within the site boundary.

3. Survey Results

A high diversity and high abundance of bird species, including 73 bird species, were recorded during the breeding and ground nesting bird survey transects. Of the species recorded, 65 species are considered to breed within the survey area.

Survey timings and weather conditions are presented in Tables 3.1 to 3.4.

See Table 3.5 for a list of species recorded and see Breeding & Ground Nesting Bird Survey Maps in Appendix 2 for the locations of recorded bird activity during the survey visits.

Of the breeding and ground nesting bird species recorded during the survey, eleven bird species are considered to be of high (red-listed) conservation status:

- Grasshopper warbler;
- Greenfinch;
- Herring gull;
- House martin;
- House sparrow;
- Linnet;
- Skylark;
- Mistle thrush;
- Starling;
- Willow tit; and,
- Yellowhammer.

Of the non-breeding and ground nesting bird species recorded during the survey, three bird species are considered to be of high (red-listed) conservation status:

- Black-tailed godwit;
- Curlew; and,
- Swift.

Of the breeding and ground nesting bird species recorded during the survey, fifteen bird species are considered to be of medium (amber-listed) conservation status:

- Bullfinch;
- Dunnock;
- Great black-backed gull;
- Mallard;
- Meadow pipit;
- Moorhen;
- Oystercatcher;
- Redshank;
- Sedge warbler;
- Shelduck;
- Song thrush;
- Wheatear;
- Whitethroat;
- Willow warbler; and,
- Wood pigeon.

Of the non-breeding and ground nesting bird species recorded during the survey, three bird species are considered to be of medium (amber-listed) conservation status:

- Kestrel;
- Snipe; and,
- Sparrowhawk.

Bird species were recorded breeding and/or ground nesting within all habitat types within the survey area, including:

- Woodland;
- Scrub;
- Hedgebank/hedgerow;
- Stonewall;
- Standing tree;
- Agricultural grasslands;
- Arable fields;
- Coastal lagoon/lake;

- Pond;
- Reedbed;
- Saltmarsh;
- Estuarine mudflats;
- Short perennial vegetation;
- Grazing marsh/lowland fen;
- Rhyne/ditch;
- Marshy grassland;
- Dune grasslands;
- Dune slack; and,
- Buildings/structures.

Breeding species recorded during the survey afforded protection under Schedule 1 of the Wildlife & Countryside Act 1981 recorded during the survey included:

- Barn owl;
- Cetti's warbler; and,
- Kingfisher.

Table 3.1. East Yelland – Timings and environmental conditions relating to the bird transect surveys

East Yelland	Tide		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %
15th April 2022 Sunrise: 06:20 Start Time: 07:15 End Time: 11:00	High 06:00	Start of Survey	14	3	100	None	92
	Low 13:07	End of Survey	14	3	100	None	82
28th April 2022 Sunrise: 05:54 Start Time: 07:00 End Time: 11:00	High 05:14	Start of Survey	9	3	10	None	74
	Low 12:14	End of Survey	11	32	<5	None	56
2nd May 2022 Sunrise: 05:46 Start Time: 06:40 End Time: 11:00	High 07:50	Start of Survey	9	1	90	None	94
	Low 14:50	End of Survey	11	1	90	None	68
30th May 2022 Sunrise: 05:08 Start Time: 06:00 End Time: 10:30	High 06:49	Start of Survey	9	1	75	None	83
	Low 13:47	End of Survey	10	2	80	None	61
15th June 2022 Sunrise: 05:01 Start Time: 06:00 End Time: 10:30	High 07:17	Start of Survey	14	1	10	None	79
	Low 14:47	End of Survey	17	2	20	None	60
22nd June 2022 Sunrise: 05:01 Start Time: 06:00 End Time: 10:45	Low 07:48	Start of Survey	15	2	<5	None	73
	High 13:47	End of Survey	19	2	<5	None	42
8th July 2022 Sunrise: 05:12 Start Time: 06:15 End Time: 10:15	Low 07:28	Start of Survey	16	1	<10	None	88
	High 13:26	End of Survey	19	1	<10	None	82
15th July 2022 Sunrise: 05:19 Start Time: 06:15 End Time: 10:00	Low 03:00	Start of Survey	15	1	<10	None	90
	High 07:52	End of Survey	29	1	<5	None	55

Table 3.2. Braunton Marsh & American Rd – Timings and environmental conditions relating to the bird transect surveys

Braunton Marsh & American Rd	Tide		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %
15th April 2022 Sunrise: 06:23 Start Time: 07:30 End Time: 11:00	High 06:00	Start of Survey	14	3	100	None	92
	Low 13:07	End of Survey	14	3	100	None	82
28th April 2022 Sunrise: 05:56 Start Time: 07:00 End Time: 11:00	High 05:14	Start of Survey	9	3	10	None	74
	Low 12:14	End of Survey	11	32	<5	None	56
13th May 2022 Sunrise: 05:30 Start Time: 06:30 End Time: 11:00	High 04:40	Start of Survey	11	3	30	None	83
	Low 11:25	End of Survey	13	3	50	None	70
29th May 2022 Sunrise: 05:11 Start Time: 06:15 End Time: 10:30	High 06:11	Start of Survey	11	1	<5	None	92
	Low 13:08	End of Survey	14	1	<5	None	64
2nd June 2022 Sunrise: 05:07 Start Time: 06:00 End Time: 10:00	Low 03:13	Start of Survey	12	2	30	None	91
	High 08:32	End of Survey	16	2	80	None	65
29th June 2022 Sunrise: 05:05 Start Time: 06:15 End Time: 10:30	High 07:03	Start of Survey	14	1	50	None	93
	Low 13:59	End of Survey	16	2	60	None	70
8th July 2022 Sunrise: 05:12 Start Time: 06:15 End Time: 10:30	Low 07:28	Start of Survey	16	1	<10	None	88
	High 13:26	End of Survey	19	1	<10	None	82
19th July 2022 Sunrise: 05:24 Start Time: 06:30 End Time: 10:00	Low 05:45	Start of Survey	22	1	<5	None	72
	High 11:04	End of Survey	23	1	<5	None	66

Table 3.3. Braunton Burrows Dunes & Northern Boundary Track – Timings and environmental conditions relating to the bird transect surveys

Braunton Burrows Dunes & Northern Boundary Track	Tide		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %
15th April 2022 Sunrise: 06:23 Start Time: 07:30 End Time: 11:00	High 05:57	Start of Survey	14	3	100	None	92
	Low 12:03	End of Survey	14	3	100	None	82
28th April 2022 Sunrise: 05:56 Start Time: 07:00 End Time: 11:00	High 05:18	Start of Survey	9	3	10	None	74
	Low 11:25	End of Survey	11	32	<5	None	56
2nd May 2022 Sunrise: 05:49 Start Time: 06:45 End Time: 11:00	High 07:47	Start of Survey	9	1	90	None	94
	Low 13:40	End of Survey	11	1	90	None	68
28th May 2022 Sunrise: 05:12 Start Time: 06:15 End Time: 11:00	High 05:29	Start of Survey	11	1	<5	None	91
	Low 11:29	End of Survey	14	1	<5	None	54
15th June 2022 Sunrise: 05:02 Start Time: 06:00 End Time: 11:00	High 07:14	Start of Survey	14	1	10	None	79
	Low 13:18	End of Survey	17	2	20	None	60
30th June 2022 Sunrise: 05:06 Start Time: 06:00 End Time: 11:00	High 07:38	Start of Survey	13	3	80	None	83
	Low 13:29	End of Survey	14	2	80	None	65
8th July 2022 Sunrise: 05:12 Start Time: 06:15 End Time: 10:45	Low 06:47	Start of Survey	16	1	<10	None	88
	High 13:18	End of Survey	19	1	<10	None	82
19th July 2022 Sunrise: 05:24 Start Time: 06:30 End Time: 11:00	Low 04:44	Start of Survey	22	1	<5	None	72
	High 11:01	End of Survey	23	1	<5	None	66

Table 3.4. Sandy Lane, Saunton Golf course & Saunton Sands Dunes & Beach – Timings and environmental conditions relating to the bird transect surveys

Sandy Lane Farm, Saunton Golf Course & Saunton Sands Dunes/Beach	Tide		Temp (ºC)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %
15th April 2022 Sunrise: 06:23 Start Time: 07:15 End Time: 11:00	High 05:57	Start of Survey	14	3	100	None	92
	Low 12:03	End of Survey	14	3	100	None	82
30th April 2022 Sunrise: 05:53 Start Time: 07:00 End Time: 11:00	High 06:38	Start of Survey	7	2	10	None	82
	Low 12:38	End of Survey	10	1	10	None	55
13th May 2022 Sunrise: 05:30 Start Time: 06:40 End Time: 11:00	High 04:30	Start of Survey	11	3	30	None	83
	Low 10:39	End of Survey	13	3	50	None	70
28th May 2022 Sunrise: 05:12 Start Time: 06:15 End Time: 11:00	High 05:29	Start of Survey	11	1	<5	None	91
	Low 11:29	End of Survey	14	1	<5	None	54
14th June 2022 Sunrise: 05:02 Start Time: 06:00 End Time: 11:00	High 06:23	Start of Survey	10	1	<5	None	84
	Low 12:28	End of Survey	17	1	<5	None	56
23th June 2022 Sunrise: 05:03 Start Time: 06:00 End Time: 11:00	High 02:03	Start of Survey	15	1	50	None	85
	Low 08:14	End of Survey	17	1	75	None	70
3th July 2022 Sunrise: 05:08 Start Time: 06:00 End Time: 11:00	Low 03:00	Start of Survey	13	3	80	None	92
	High 09:23	End of Survey	16	3	50	None	68
28th July 2022 Sunrise: 05:36 Start Time: 06:30 End Time: 11:00	High 06:47	Start of Survey	15	2	80	None	91
	Low 12:39	End of Survey	20	2	50	None	58

Table 3.5 Bird species recorded during the April, May, June & July 2022 survey visits – see Appendix 1 for definitions of conservation status.
N.B. Green conservation status (of least conservation concern) is omitted from the table

Species		Yelland Agricultural Fields & Woodland		Coastal Lagoon, Grassland & Scrub		Taw-Torridge Estuary		Braunton Marsh		American Road/Braunton Burrows		Braunton Burrows/Northern Boundary Track		Sandy Ln & Agricultural Fields		Saunton Golf Course, Saunton Sands Dunes/Beach		Status
Common name	Latin name	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	
Barn owl	*Tyto alba*							✓	✓	✓		✓		✓				Sch 1 WCA
Blackbird	*Turdus merula*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Blackcap	*Sylvia atricapilla*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Black-tailed godwit	*Limosa limosa*					✓												Red
Blue tit	*Cyanistes caeruleus*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Bullfinch	*Pyrrhula pyrrhula*									✓	✓			✓	✓			Amber
Buzzard	*Buteo buteo*	✓		✓		✓		✓		✓		✓		✓		✓		
Canada goose	*Branta canadensis*					✓	✓											
Carrion crow	*Corvus corone*	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Cetti's warbler	*Cettia cetti*							✓	✓	✓	✓							Sch 1 WCA
Chaffinch	*Fringilla coelebs*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Chiffchaff	*Phylloscopus collybita*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Collared dove	*Streptopelia decaocto*	✓	✓											✓	✓			
Coot	*Fulica atra*							✓	✓									
Cormorant	*Phalacrocora cidae*					✓	✓											
Curlew	*Numenius arquata*					✓		✓										Red
Dunnock	*Prunella modularis*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Amber
Garden warbler	*Sylvia borin*													✓	✓	✓	✓	
Goldfinch	*Carduelis carduelis*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Grasshopper warbler	*Locustella naevia*							✓	✓									Red
Great black-backed gull	*Larus marinus*					✓	✓	✓										Amber
Great spotted woodpecker	*Dendrocopos major*	✓	✓					✓	✓	✓				✓	✓	✓	✓	
Great tit	*Parus major*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Green woodpecker	*Picus viridis*	✓	✓	✓				✓	✓	✓								
Greenfinch	*Carduelis chloris*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Red
Grey heron	*Ardea cinerea*	✓		✓		✓	✓	✓						✓				
Herring gull	*Larus argentatus*	✓		✓		✓	✓	✓		✓		✓		✓		✓	✓	Red
House martin	*Delichon urbica*	✓	✓	✓										✓		✓	✓	Red
House sparrow	*Passer domesticus*	✓	✓					✓	✓			✓	✓	✓	✓	✓	✓	Red

Table 3.5 Bird species recorded during the April, May, June & July 2022 survey visits – see Appendix 1 for definitions of conservation status.
N.B. Green conservation status (of least conservation concern) is omitted from the table

Species		Yelland Agricultural Fields & Woodland		Coastal Lagoon, Grassland & Scrub		Taw-Torridge Estuary		Braunton Marsh		American Road/Braunton Burrows		Braunton Burrows/Northern Boundary Track		Sandy Ln & Agricultural Fields		Saunton Golf Course, Saunton Sands Dunes/Beach		Status
Common name	Latin name	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	
Jack snipe	*Lymnocryptes minimus*							✓										
Jackdaw	*Corvus monedula*	✓	✓	✓		✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	
Jay	*Garrulus glandarius*							✓	✓	✓				✓	✓	✓	✓	
Kestrel	*Falco tinnunculus*							✓										Amber
Kingfisher	*Alcedo atthis*					✓	✓	✓	✓					✓				Sch 1 WCA
Lesser whitethroat	*Sylvia curruca*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Linnet	*Carduelis cannabina*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Red
Little egret	*Egretta garzetta*			✓		✓	✓	✓										
Little grebe	*Tachybaptus ruficollis*											✓	✓					
Long-tailed tit	*Aegithalos caudatus*							✓	✓	✓	✓			✓	✓	✓	✓	
Magpie	*Pica pica*	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Mallard	*Anas platyrhynchos*			✓	✓	✓	✓	✓	✓			✓	✓					Amber
Meadow pipit	*Anthus pratensis*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Amber
Mistle thrush	*Turdus viscivorus*	✓	✓					✓	✓									Red
Moorhen	*Gallinula chloropus*			✓	✓			✓	✓			✓	✓					Amber
Nuthatch	*Sitta europaea*	✓	✓							✓	✓	✓	✓	✓	✓	✓	✓	
Oystercatcher	*Haematopus ostralegus*					✓	✓											Amber
Pheasant	*Phasianus colchicus*	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Pied wagtail	*Motacilla alba*	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Raven	*Corvus corax*	✓	✓	✓		✓		✓		✓	✓	✓	✓	✓	✓	✓		
Redshank	*Tringa totanus*			✓		✓	✓	✓										Amber
Reed warbler	*Acrocephalus scirpaceus*			✓	✓			✓	✓			✓	✓					
Robin	*Erithacus rubecula*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Rock pipit	*Anthus petrosus*			✓	✓	✓												
Rook	*Corvus frugilegus*	✓	✓	✓		✓								✓	✓	✓	✓	
Sand martin	*Riparia riparia*			✓		✓												

Table 3.5 Bird species recorded during the April, May, June & July 2022 survey visits – see Appendix 1 for definitions of conservation status.
N.B. Green conservation status (of least conservation concern) is omitted from the table

Species		Yelland Agricultural Fields & Woodland		Coastal Lagoon, Grassland & Scrub		Taw-Torridge Estuary		Braunton Marsh		American Road/Braunton Burrows		Braunton Burrows/Northern Boundary Track		Sandy Ln & Agricultural Fields		Saunton Golf Course, Saunton Sands Dunes/Beach		Status
Common name	Latin name	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	Present	Breeding	
Sedge warbler	*Acrocephalus schoenobaenus*	✓	✓	✓	✓			✓	✓					✓	✓	✓	✓	Amber
Shelduck	*Tadorna tadorna*					✓	✓											Amber
Skylark	*Alauda arvensis*	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓		Red
Snipe	*Scolopacidae*							✓										Amber
Song thrush	*Turdus philomelos*	✓	✓	✓				✓	✓	✓	✓	✓		✓	✓	✓	✓	Amber
Sparrowhawk	*Accipiter nisus*	✓						✓		✓		✓						Amber
Starling	*Sturnus vulgaris*	✓	✓					✓	✓									Red
Stonechat	*Saxicola torquata*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓			✓	✓	
Swallow	*Hirundo rustica*	✓	✓	✓		✓		✓	✓	✓		✓		✓	✓	✓	✓	
Swift	*Apus apus*											✓						Red
Treecreeper	*Certhia familiaris*							✓	✓	✓	✓					✓	✓	
Wheatear	*Oenanthe oenanthe*							✓	✓	✓	✓	✓	✓			✓	✓	Amber
Whitethroat	*Sylvia communis*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Amber
Willow tit	*Poecile montanus*							✓	✓									Red
Willow warbler	*Phylloscopus trochilus*	✓	✓					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Amber
Wood pigeon	*Columba palumbus*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	Amber
Wren	*Troglodytes troglodytes*	✓	✓	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Yellowhammer	*Emberiza citrinella*	✓	✓	✓														Red
Total number of species recorded as present & breeding		**42**	**38**	**39**	**25**	**23**	**11**	**57**	**45**	**40**	**31**	**39**	**32**	**42**	**36**	**40**	**37**	

4. Discussion

4.1 Site Status

A high diversity and high abundance of bird species, including 73 bird species, were recorded during the breeding and ground nesting bird survey transects. Of the species recorded, 65 species are considered to breed within the survey area.

It is considered that this assemblage of breeding and ground nesting bird species surrounded within the survey area are of at least regional importance.

It is additionally noted that extents of the survey area are further recognised as Important Bird Areas (IBA), considered as of international importance for bird species, comprising of:

- The Taw and Torridge Estuary IBA. This area includes the estuary and Braunton Marsh, being predominantly designated for migratory and wintering wildfowl and waders; and,
- Saunton Sands beach and coast, which forms part of the Exmoor Coast and Heaths IBA. This area is designated for supporting breeding and resident bird species.

4.2 Legislation & Policy

All birds, their nests and eggs are protected under the Wildlife and Countryside Act 1981 (as amended). Nesting is determined as being from when birds first initiate nest building up until the point when fledglings stop returning to the nest.

Bird species listed upon Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) are afforded further protection from intentional or reckless:

- Disturbance of a bird/s when building a nest, and while it is in or near a nest containing dependant young; and
- Disturbance of dependant young birds.

The National Planning Policy Framework outlines the Government's commitment to minimise impacts on biodiversity and provide net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in

biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures. Therefore, planning applications are required to include mitigation, compensation and/or enhancement, as required, in order to achieve a positive biodiversity impact.

4.3 Potential Impacts of the Project

The proposed cable route and working methods are yet to be determined. However, it is understood that the proposed works will represent temporary removal of habitat, which could cause removal of nesting sites and temporary disturbance to adjacent habitats.

4.3.1Active Bird Nests

Nesting sites within the proposed working area/corridor included wooded vegetation (standings trees, scrub, hedgebank/hedgerow etc.), aquatic vegetation, ground vegetation (grasslands, dune vegetation, arable crops, saltmarsh etc.) and built structures (stonewalls, buildings etc.).

To eliminate the possibility of disturbing or damaging any activity nest sites, removal and clearance of wooded vegetation, ground vegetation and/or built structures should either be avoided or ideally be undertaken outside of the bird nesting season.

The bird-nesting season is considered to extent from March to August inclusively. Although, depending upon the species, geographical area and the weather conditions, nesting can extend outside this period.

However, it is noted that works undertaken outside of the bird nesting season (i.e. during spring, autumn and/or winter) will need to avoid disturbance of migratory and wintering bird species for which are of conservation concern and/or for which the Taw and Torridge Estuary IBA is designated.

Alternatively, if removal and clearance of wooded vegetation, ground vegetation and/or built structures are to be commenced during the bird nesting season, a nesting bird check must be prior undertaken by a suitably qualified ecologist to confirm the presence or absence of active bird nests within or in proximity to the

works, with any active nests protected and buffered according to the species and location. However, it is emphasised that nesting bird checks should not be relied upon for extensive clearance of dense or layered habitat types such as woodland, scrub, hedgebank/hedgerow etc. due to the difficulty of identifying active nests without causing disturbance.

It works are to be undertaken over an extended period of time, it is considered that any areas cleared of vegetation may require repeat maintenance cuts until installation works within the corresponding area/s are complete.

4.3.2Temporary Removal of Habitat

It is understood that the installation of the cable will require an extent of wooded vegetation and/or ground vegetation removal.

The proposed route and working methods should minimise the removal and/or disturbance of habitat/s, ideally including:

- Retention and protection of standing trees, woodland and/or established scrub;
- Protection and/or reinstatement of ground vegetation, including soil profile/s, hydrology and/or vegetive species cover; and/or,
- A habitat management and enhancement plan.

4.3.3Disturbance During Construction

Any wooded vegetation, ground vegetation and/or built structures removal or clearance, and cable installation works, must be designed to avoid disturbance of bird nesting sites within adjacent retained habitats.

This is to minimize impacts upon bird species, whilst being a legal requirement for the works to avoid disturbance of bird species listed upon Schedule 1 of the Wildlife & Countryside Act 1981. Species listed upon the schedule, which were recorded during the survey included:

- Barn owl – nesting within Braunton Marsh;
- Cetti's warbler – nesting within Braunton Marsh & Braunton Burrows; and,
- Kingfisher – nesting within Braunton Marsh & Taw-Torridge Estuary.

References

Countryside and Rights of Way Act 2000. HMSO

BTO 2015. *Breeding Bird Survey Instructions*. BTO, JNCC, RSPB.

Eaton, M.A., Brown, A.F., Noble, D.G., Hearn, R., Aebischer, N.J., Gibbons, D. W., Evans, A. & Gregory, R.D. 2009. *Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man.* British Birds, 102, 296-341.

Gilbert, G., Gibbons, D.W. & Evans, J. 1998. *Bird Monitoring Methods.* RSPB, Sandy.

Marchant, J.H. 1983. *BTO Common Birds Census Instructions.* BTO, Thetford.

Wildlife & Countryside Act 1981, as amended. HMSO

Appendices

Appendix 1: Birds of Conservation Concern Definitions

Appendix 2: Breeding Bird Survey Maps

Appendix 1: Birds of Conservation Concern Definitions

The Red List Criteria
Species that meet any of the following criteria are red listed:

IUCN Global Conservation Status. Species listed by BirdLife International as being Globally Threatened using IUCN criteria.

HD Historical Decline. A severe decline in the UK between 1800 and 1995, without substantial recent recovery.

BDp Breeding Population Decline. Severe decline in the UK breeding population size, of more than 50%, over 25 years (BDp1) or the entire period used for assessments since the first BoCC review, starting in 1969 ("longer-term") (BDp2).

WDp Non-breeding Population Decline. Severe decline in the UK non-breeding population size, of more than 50%, over 25 years (WDp1) or the longer-term (WDp2).

BDr Breeding Range Decline. Severe decline in the UK range, of more than 50%, as measured by number of 10 km squares occupied by breeding birds, over 25 years (BDr1) or the longer-term (BDr2).

The Amber List Criteria
Species that meet any of the following criteria, but none of the red list criteria, are amber listed:

SPEC European Conservation status. Categorised as a Species of European Conservation Concern (SPEC 1, 2 or 3).

SPEC 1 species are those which are of global conservation concern.

SPEC 2 species are those which have an unfavourable conservation status in Europe (if the population is threatened, declining, depleted from historical levels or is found only in a few locations) and is concentrated in Europe (i.e. more than 50% of the global population occurs in Europe).

SPEC 3 species are which have an unfavourable conservation status in Europe (see above), but which are not concentrated in Europe.

HDrec Historical Decline – Recovery. Red listed for Historical Decline in a previous review but with substantial recent recovery (more than doubled in the last 25 years).

BDMp Breeding Population Decline. As for red list criteria BDp1 and BDp2, but with moderate decline (by more than 25% but less than 50%).

WDMp Non-breeding Population Decline. As for red list criteria WDp1and WDp2, but with moderate decline (by more than 25% but less than 50%).

BDMr Breeding Range Decline. As for red list criteria BDr1 and BDr2, but with moderate decline (by more than 25% but less than 50%).

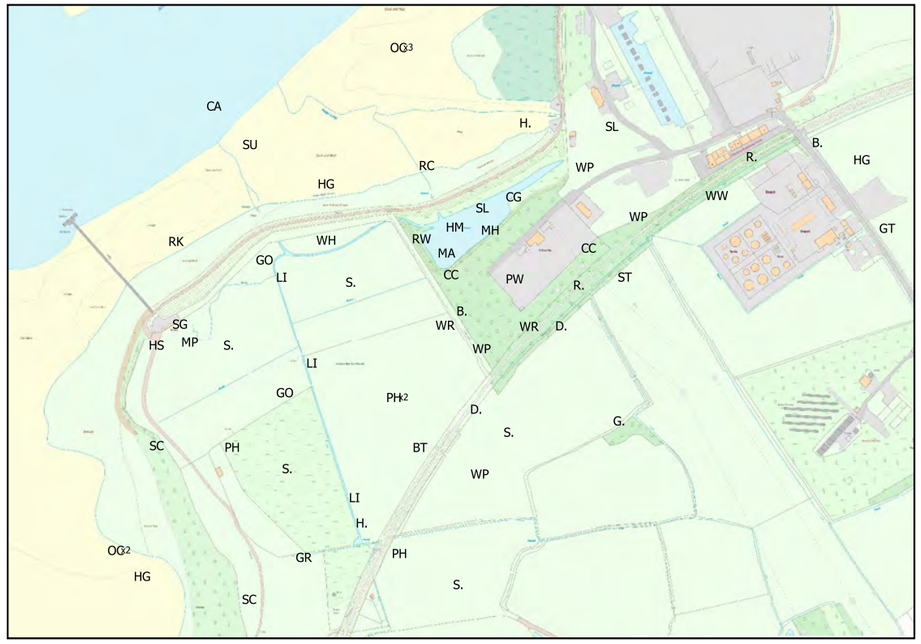
BR and **WR** Rarity. UK breeding population of less than 300 pairs (BR), or non-breeding population of less than900 individuals (WR).

BL and **WL** Localisation. At least 50% of the UK breeding (BL) or non-breeding (WL) population found in 10 or fewer sites.

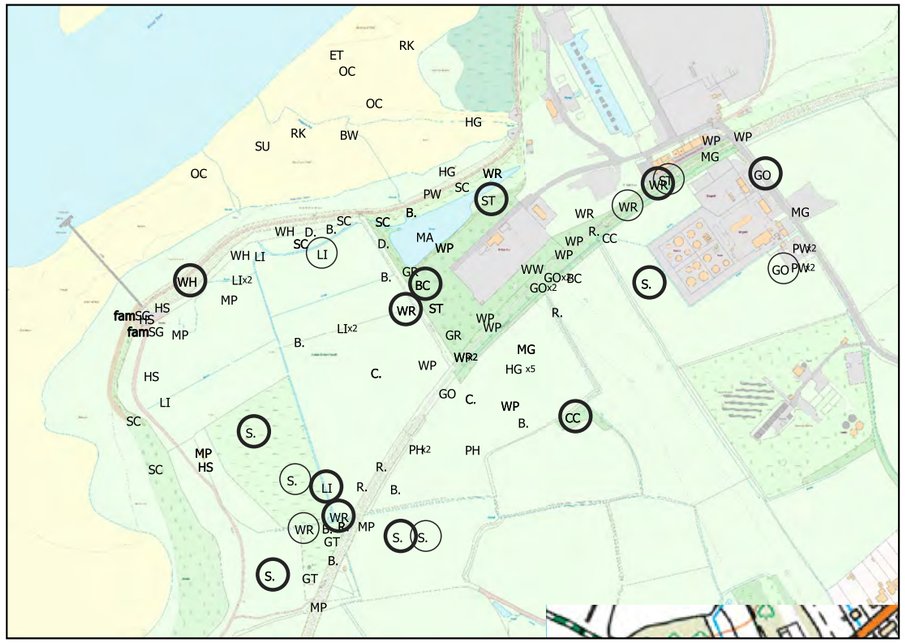
BI and **WI** International Importance. At least 20% of the European breeding (BI) or non-breeding (WI) population found in the UK.

Appendix 2: Breeding Bird Survey Maps

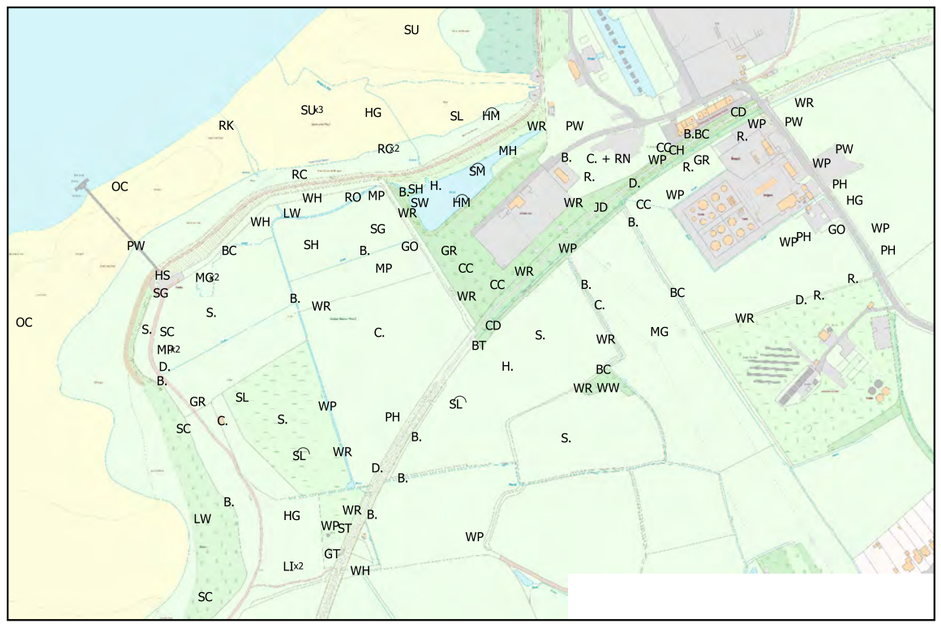
Yelland - 15 April 2022



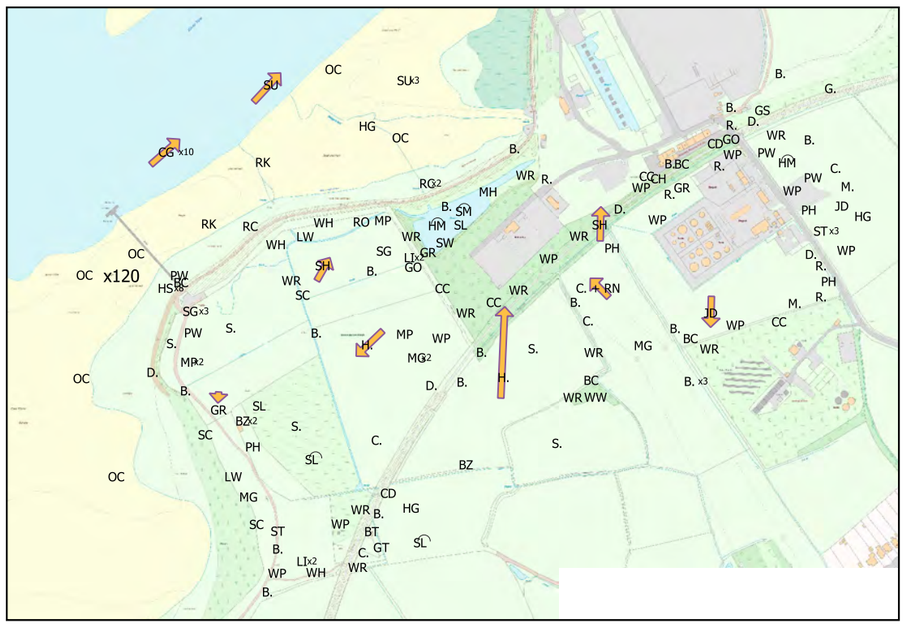
Yelland - 28 April 2022



Yelland - 2 May 2022



Yelland - 30 May 2022



Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

East Yelland BTO Bird Codes

B.	Blackbird
BC	Blackcap
BW	Black-tailed godwit
BT	Blue tit
BZ	Buzzard
CG	Canada goose
C.	Carrion crow
CH	Chaffinch
CF	Chiffchaff
CD	Collared dove
CA	Cormorant
D.	Dunnock
GO	Goldfinch
GS	Great spotted woodpecker
GT	Great tit
G.	Green woodpecker
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HM	House martin
HS	House sparrow
JD	Jackdaw
LW	Lesser whitethroat
LI	Linnet
EI	Little egret
MG	Magpie
MA	Mallard
M.	Meadow pipit
M.	Mistle thrush
MH	Moorhen
NH	Nuthatch
OC	Oystercatcher
PH	Pheasant
PW	Pied wagtail
RN	Raven
RK	Redshank
RW	Reed warbler
R.	Robin
RC	Rock pipit
RO	Rook
SM	Sand martin
SW	Sedge warbler
SU	Shelduck
S.	Skylark
ST	Song thrush
SH	Sparrowhawk
SG	Starling
SC	Stonechat
SL	Swallow
WH	Whitethroat
WW	Willow warbler
WP	Wood pigeon
WR	Wren
Y.	Yellowhammer

N

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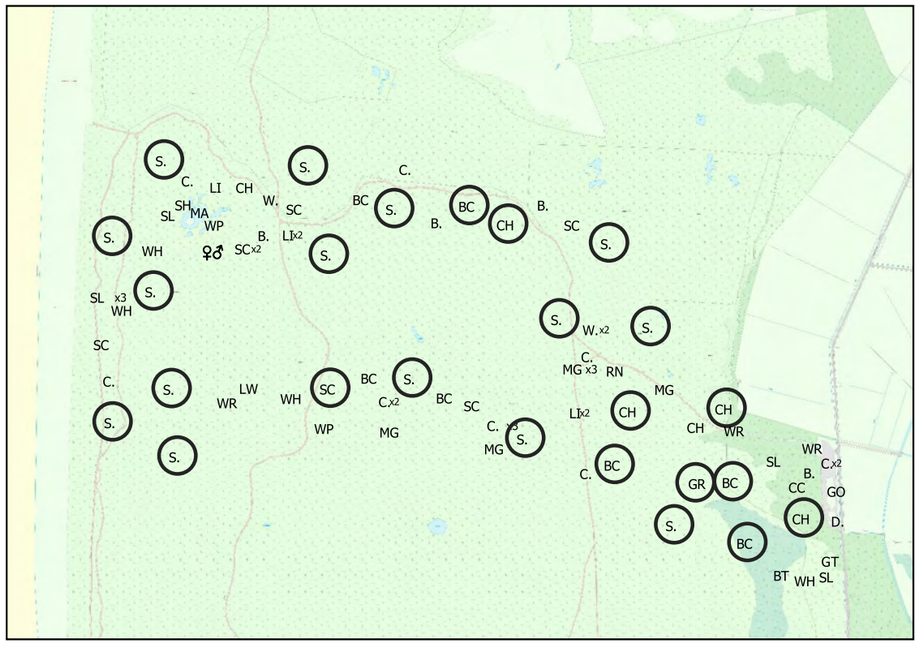
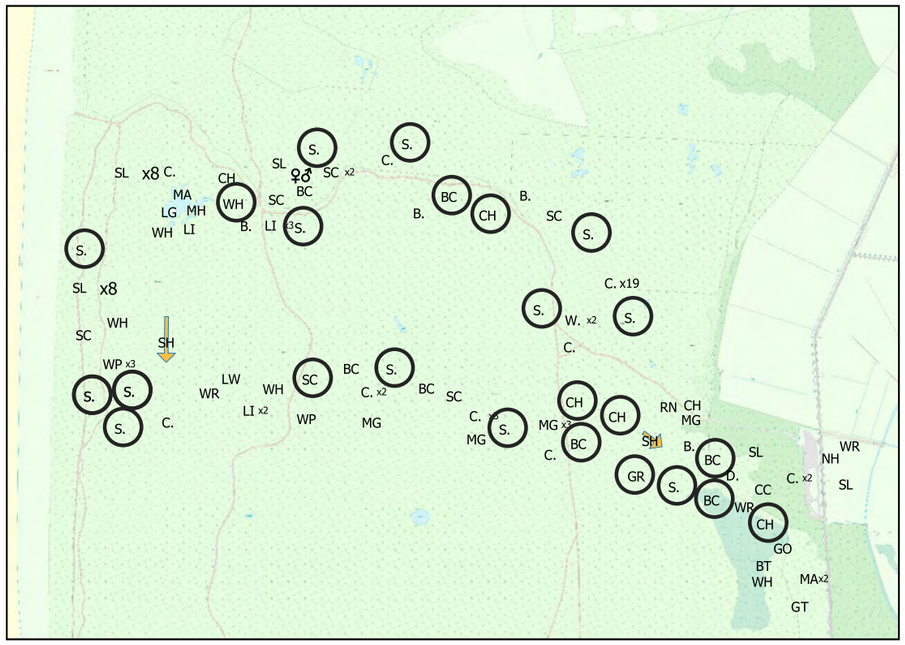
Appendix 1: The East Yelland bird transect maps.			
Project: White Cross Offshore Windfarm			
Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

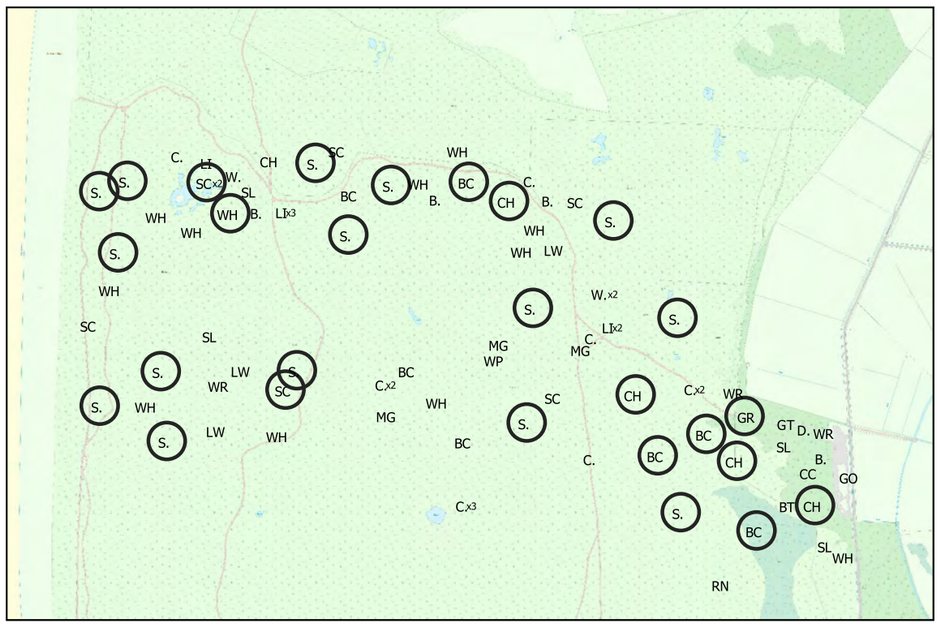
Partridge Slack - 15 April 2022



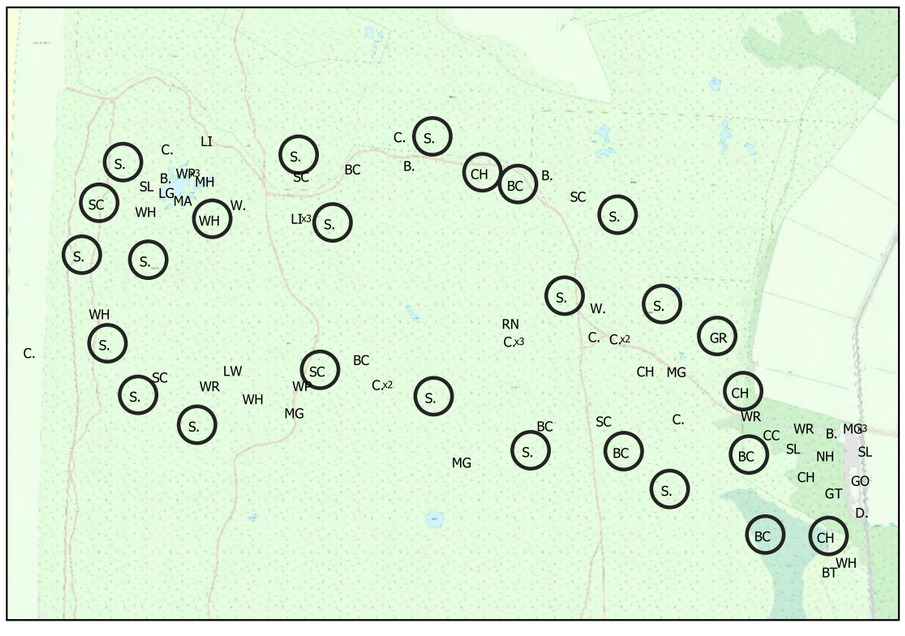
Partridge Slack - 28 April 2022



Partridge Slack - 2 May 2022



Partridge Slack - 30 May 2022



Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

Partridge Slack BTO Bird Codes

B.	Blackbird
BC	Blackcap
BT	Blue tit
BZ	Buzzard
C.	Carrion crow
CH	Chaffinch
CF	Chiffchaff
CU	Curlew
D.	Dunnock
GO	Goldfinch
GT	Great tit
GR	Greenfinch
HS	House sparrow
LW	Lesser whitethroat
LI	Linnet
LG	Little grebe
MG	Magpie
MA	Mallard
M.	Meadow pipit
MH	Moorhen
NH	Nuthatch
OC	Oystercatcher
PW	Pied wagtail
RN	Raven
RW	Reed warbler
R.	Robin
S.	Skylark
ST	Song thrush
SH	Sparrowhawk
SC	Stonechat
SL	Swallow
SI	Swift
W.	Wheatear
WH	Whitethroat
WW	Willow warbler
WP	Wood pigeon
WR	Wren

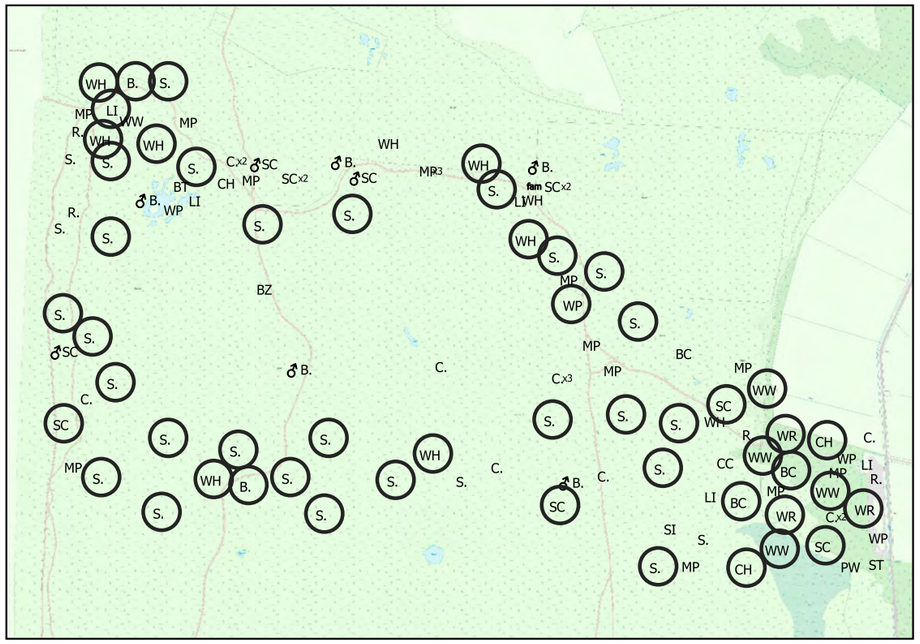
N

Appendix 1: The Partridge Slack bird transect maps.

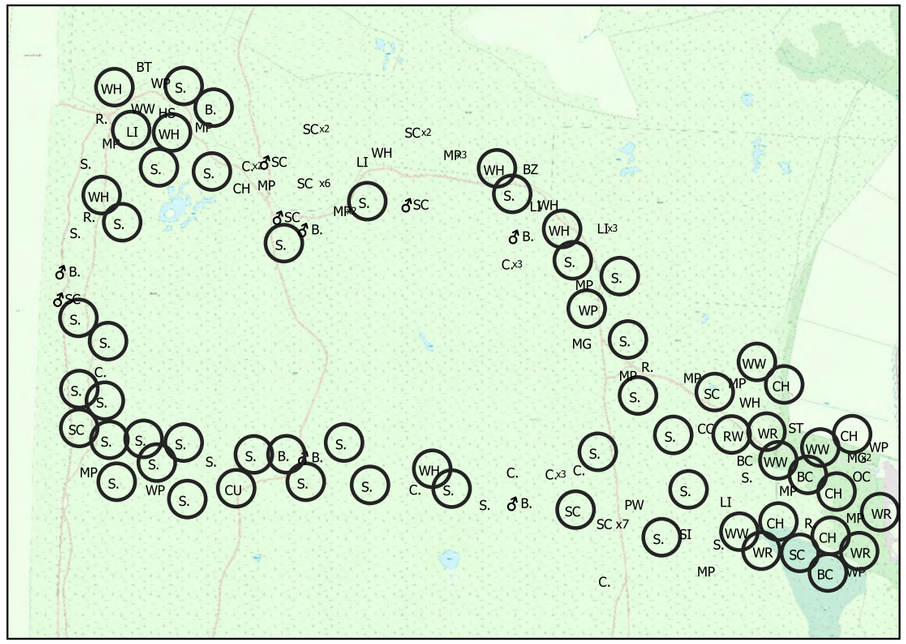
Project: White Cross Offshore Windfarm

Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

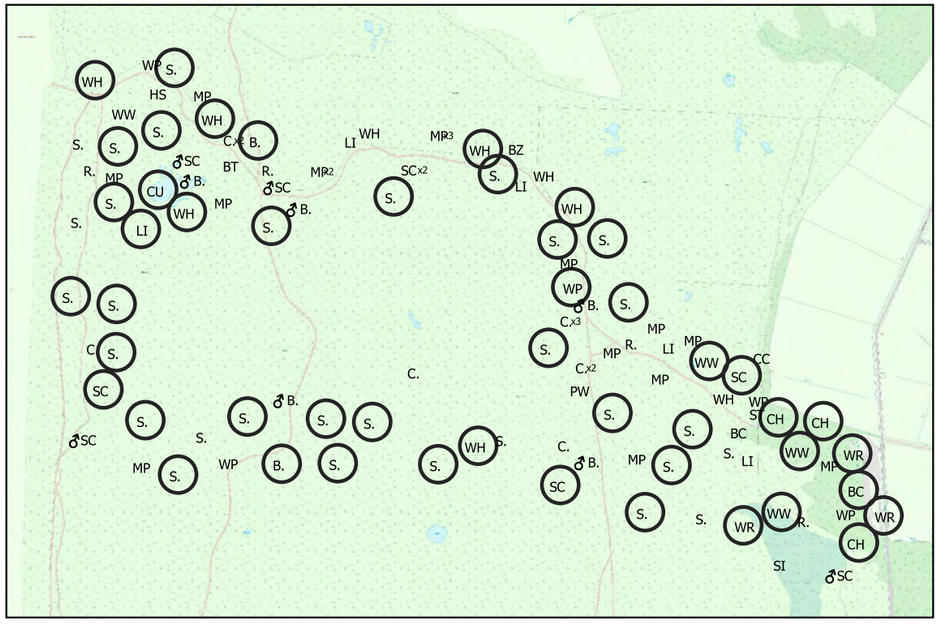
Partridge Slack - 15 June 2022



Partridge Slack - 30 June 2022



Partridge Slack - 8 July 2022



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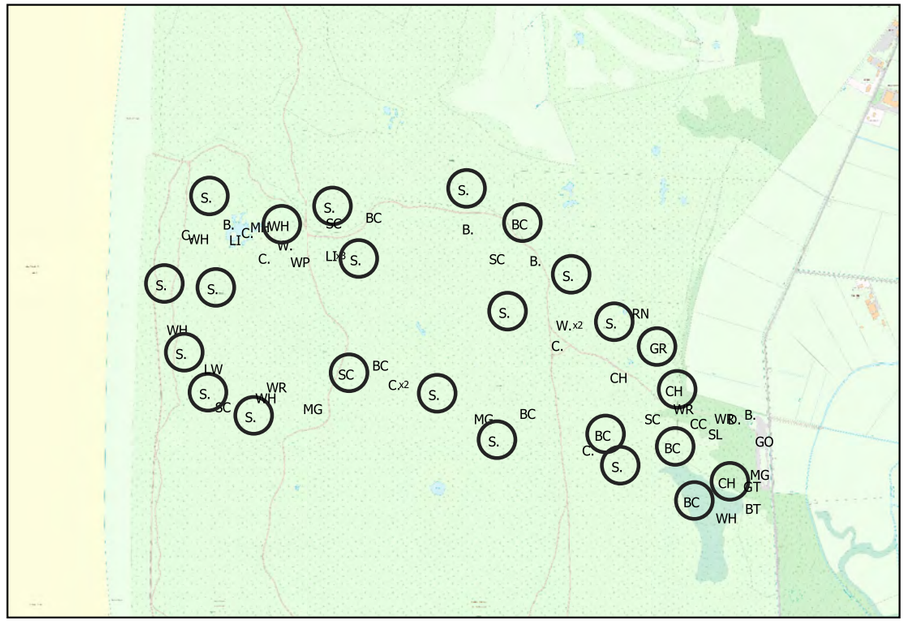

Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

Partridge Slack BTO Bird Codes

B.	Blackbird
BC	Blackcap
BT	Blue tit
BZ	Buzzard
C.	Carrion crow
CH	Chaffinch
CF	Chiffchaff
CU	Curlew
D.	Dunnock
GO	Goldfinch
GT	Great tit
GR	Greenfinch
HS	House sparrow
LW	Lesser whitethroat
LI	Linnet
LG	Little grebe
MG	Magpie
MA	Mallard
M.	Meadow pipit
MH	Moorhen
NH	Nuthatch
OC	Oystercatcher
PW	Pied wagtail
RN	Raven
RW	Reed warbler
R.	Robin
S.	Skylark
ST	Song thrush
SH	Sparrowhawk
SC	Stonechat
SL	Swallow
SI	Swift
W.	Wheatear
WH	Whitethroat
WW	Willow warbler
WP	Wood pigeon
WR	Wren

N

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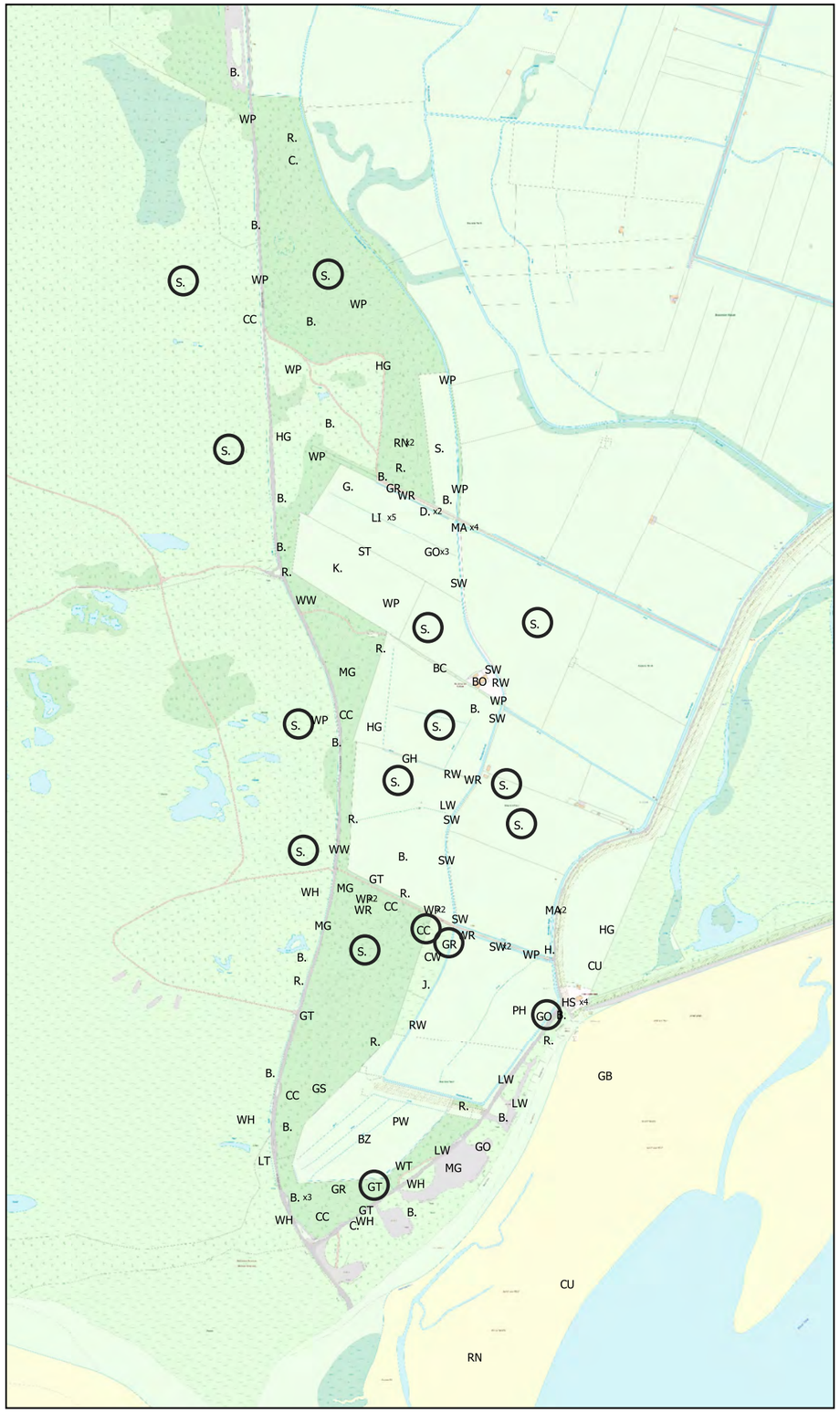
Appendix 1: The Partridge Slack bird transect maps.

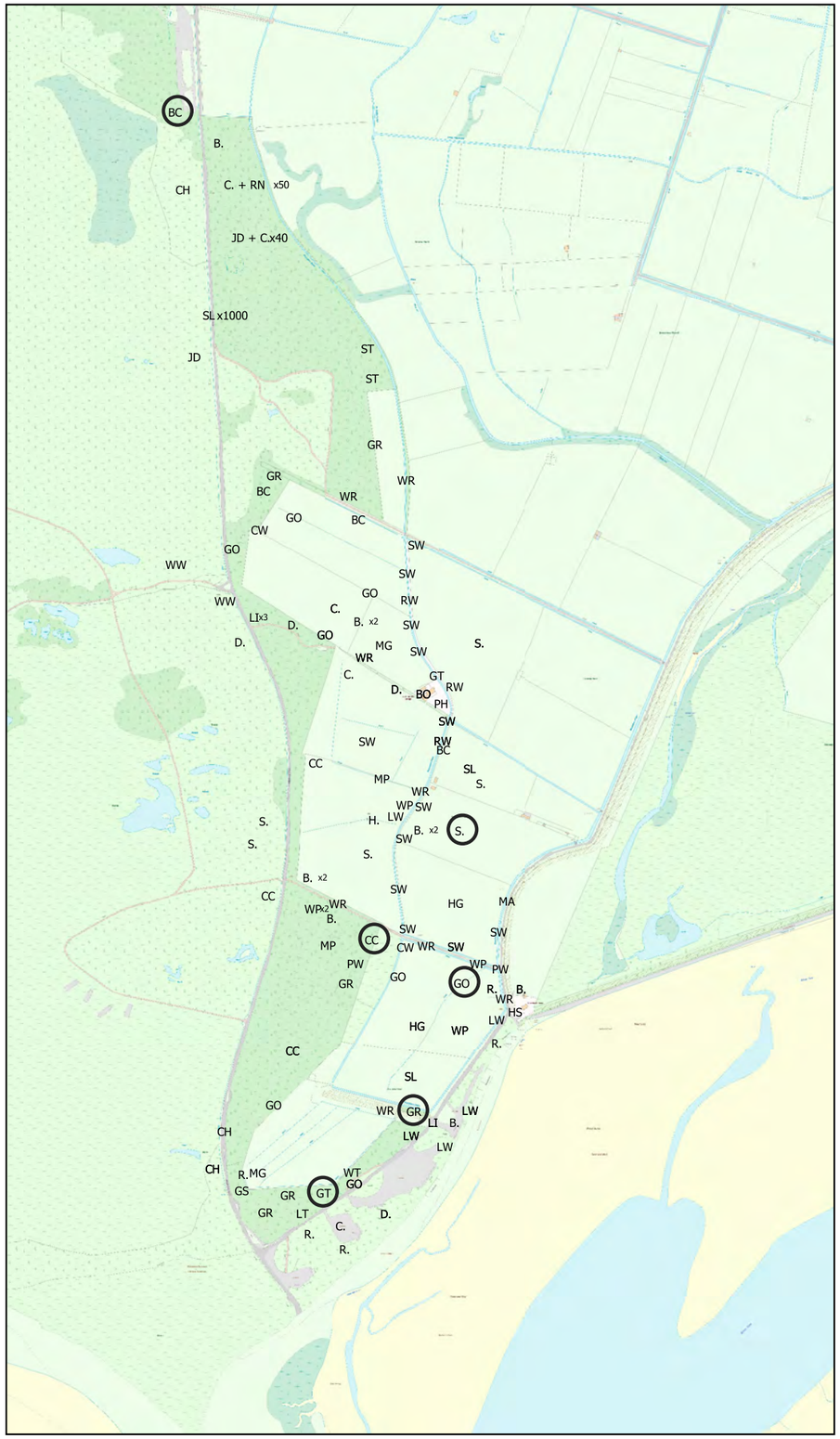
Project: White Cross Offshore Windfarm

Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Braunton Marshes - 15 April 2022



Braunton Marshes - 28 April 2022



Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

Braunton Marshes BTO Bird Codes

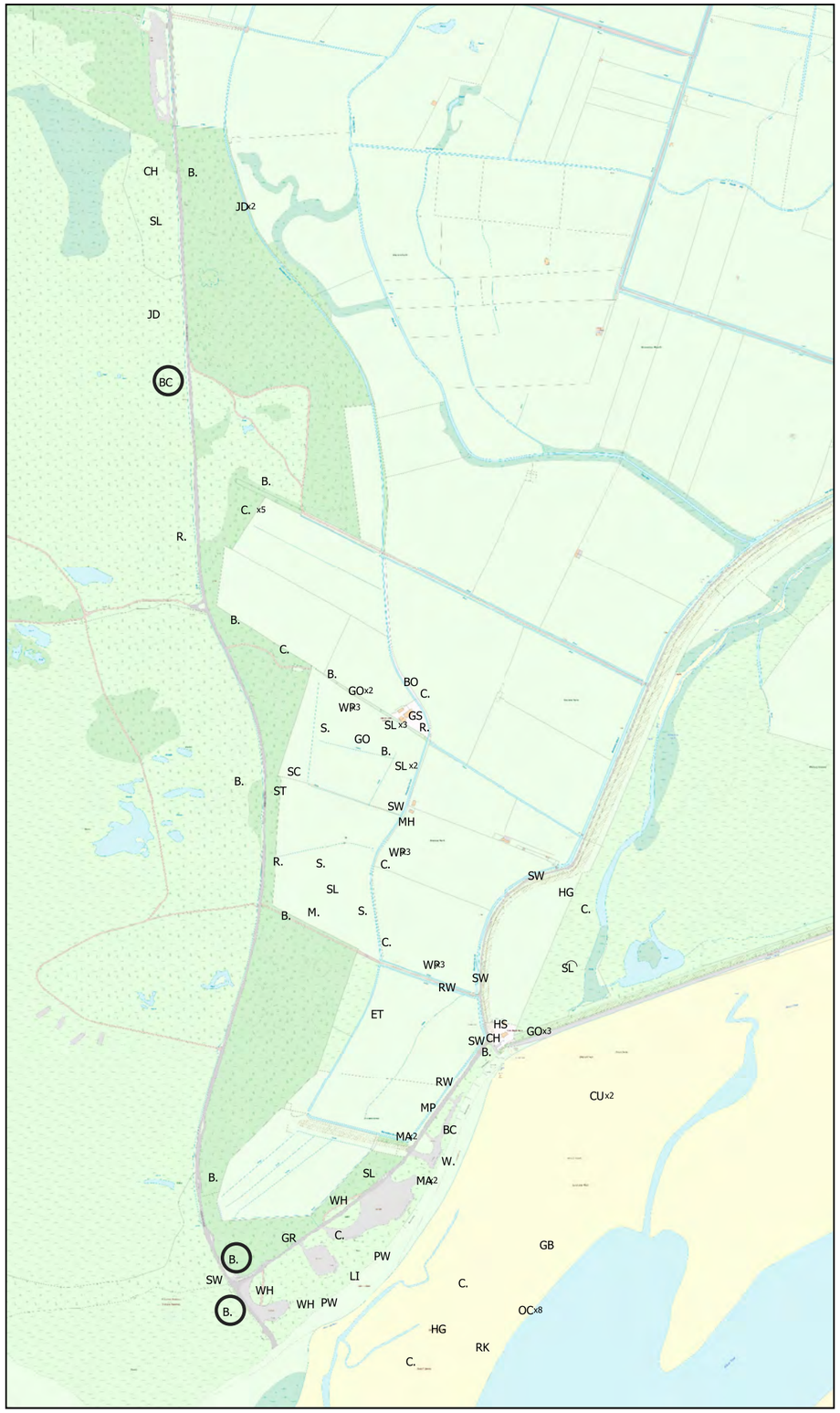
BO	Barn owl
B.	Blackbird
BC	Blackcap
BT	Blue tit
BZ	Buzzard
C.	Carrion crow
C.	Cettis warbler
CH	Chaffinch
CF	Chiffchaff
CO	Coot
CU	Curlew
D.	Dunnock
GO	Goldfinch
GH	Grasshopper warbler
GB	Great black-backed gull
GS	Great spotted woodpecker
GT	Great tit
G.	Green woodpecker
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HS	House sparrow
JS	Jack snipe
JD	Jackdaw
J.	Jay
K.	Kestrel
KF	Kingfisher
LW	Lesser whitethroat
LI	Linnet
EI	Little egret
LT	Long-tailed tit
MG	Magpie
MA	Mallard
M.	Meadow pipit
M.	Mistle thrush
MH	Moorhen
OC	Oystercatcher
PH	Pheasant
PW	Pied wagtail
RN	Raven
RK	Redshank
RW	Reed warbler
R.	Robin
SW	Sedge warbler
S.	Skylark
SN	Snipe
ST	Song thrush
SH	Sparrowhawk
SG	Starling
SC	Stonechat
SL	Swallow
TC	Treecreeper
W.	Wheatear
WH	Whitethroat
WT	Willow tit
WW	Willow warbler
WP	Wood pigeon
WR	Wren

N

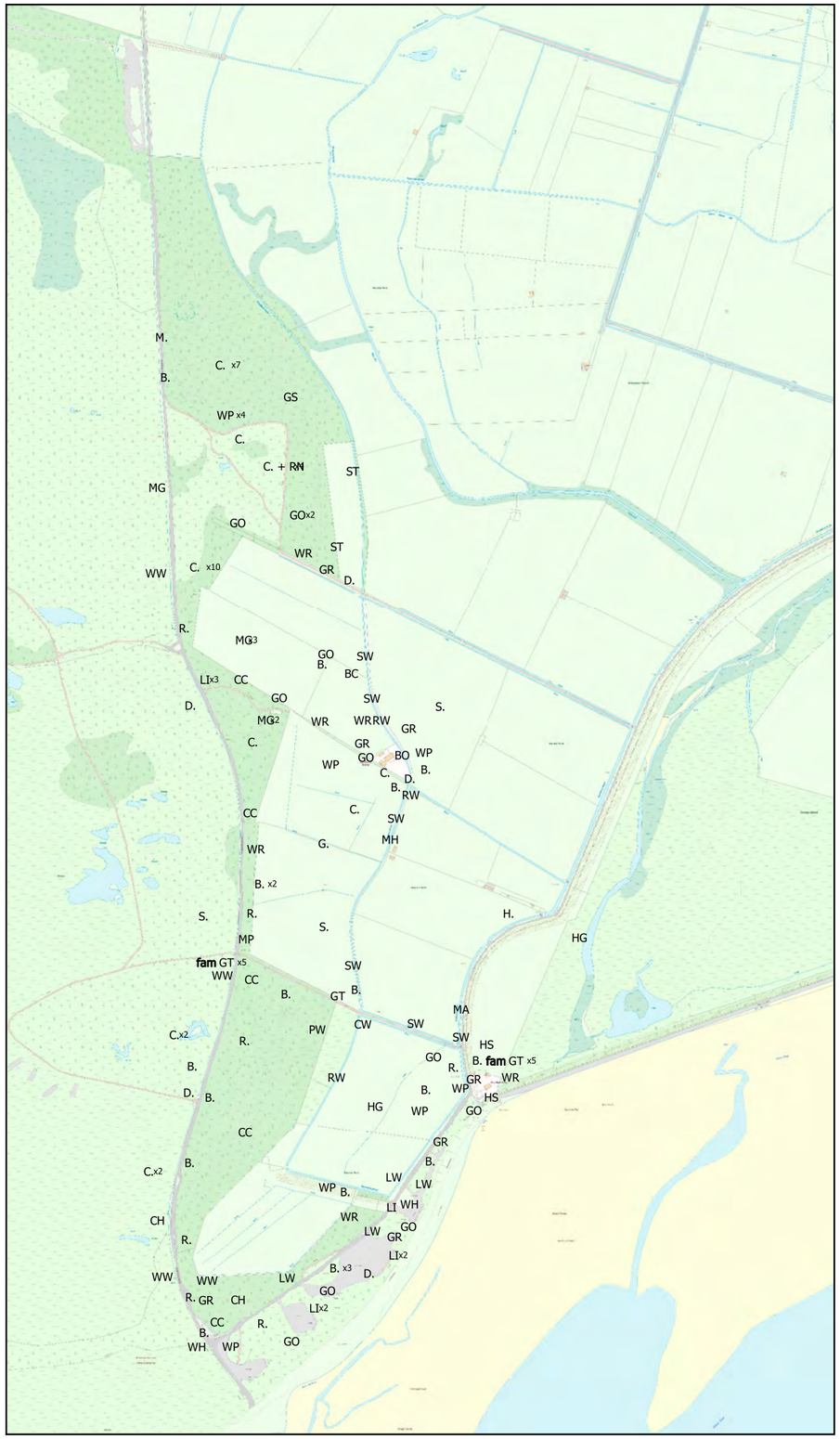
ECOGIC

Appendix 1: The Braunton Marshes bird transect resuts maps.			
Project: White Cross Offshore Windfarm			
Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Braunton Marshes - 13 May 2022



Braunton Marshes - 29 May 2022



Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

Braunton Marshes BTO Bird Codes

BO	Barn owl
B.	Blackbird
BC	Blackcap
BT	Blue tit
BZ	Buzzard
C.	Carrion crow
C.	Cettis warbler
CH	Chaffinch
CF	Chiffchaff
CO	Coot
CU	Curlew
D.	Dunnock
GO	Goldfinch
GH	Grasshopper warbler
GB	Great black-backed gull
GS	Great spotted woodpecker
GT	Great tit
G.	Green woodpecker
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HS	House sparrow
JS	Jack snipe
JD	Jackdaw
J.	Jay
K.	Kestrel
KF	Kingfisher
LW	Lesser whitethroat
LI	Linnet
EI	Little egret
LT	Long-tailed tit
MG	Magpie
MA	Mallard
M.	Meadow pipit
M.	Mistle thrush
MH	Moorhen
OC	Oystercatcher
PH	Pheasant
PW	Pied wagtail
RN	Raven
RK	Redshank
RW	Reed warbler
R.	Robin
SW	Sedge warbler
S.	Skylark
SN	Snipe
ST	Song thrush
SH	Sparrowhawk
SG	Starling
SC	Stonechat
SL	Swallow
TC	Treecreeper
W.	Wheatear
WH	Whitethroat
WT	Willow tit
WW	Willow warbler
WP	Wood pigeon
WR	Wren

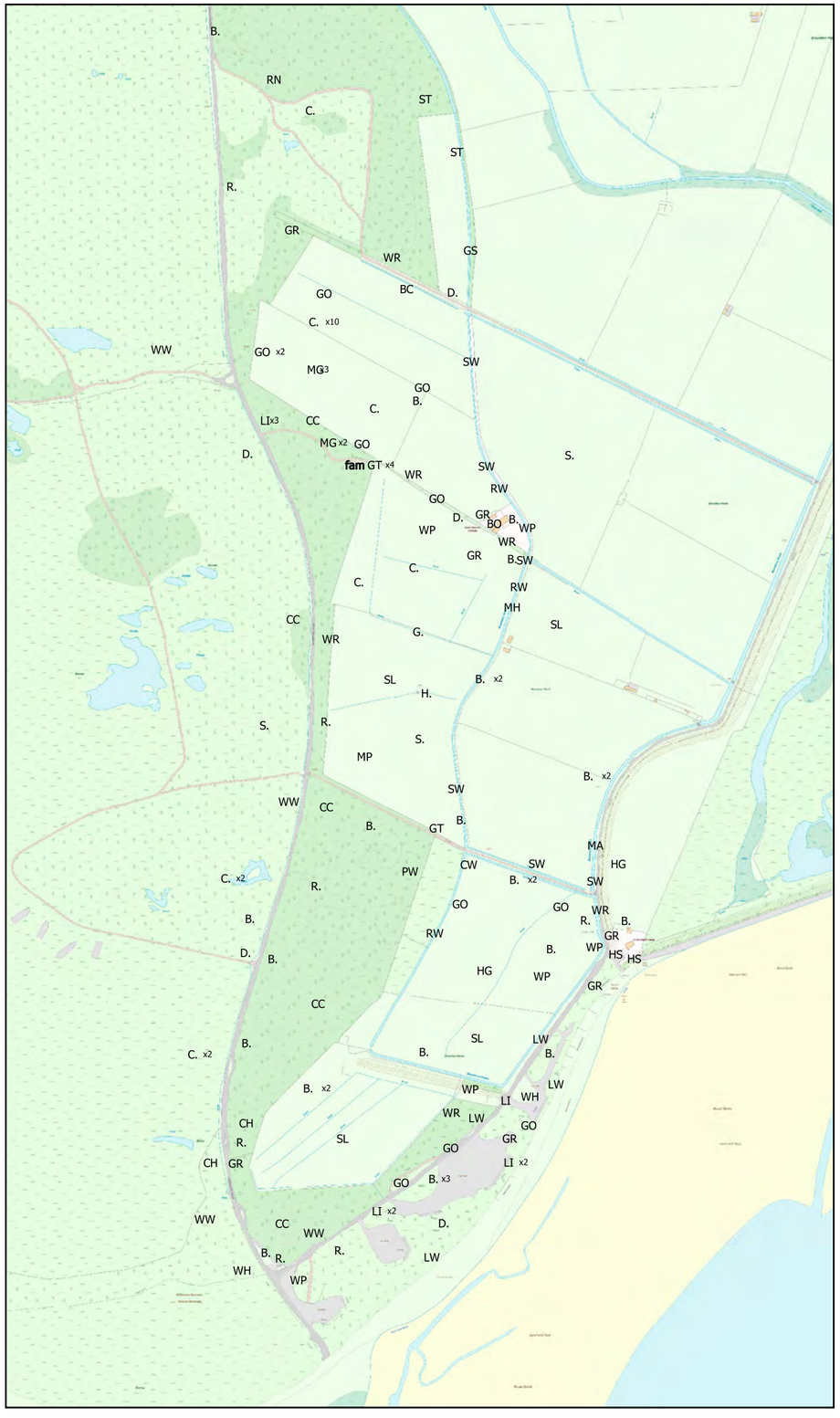
N

Appendix 1: The Braunton Marshes bird transect resuts maps.

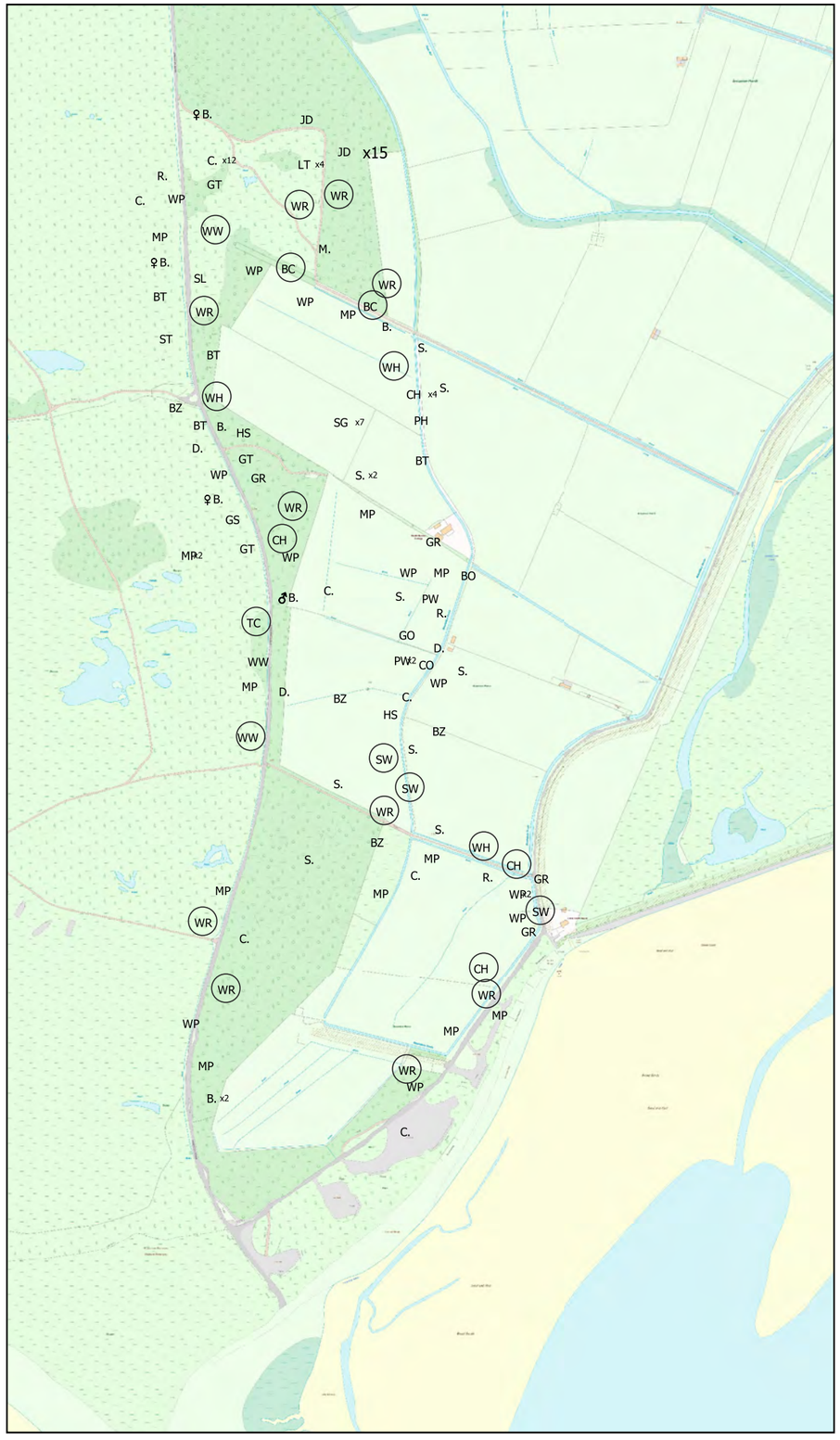
Project: White Cross Offshore Windfarm

Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Braunton Marshes - 2 June 2022



Braunton Marshes - 29 June 2022



Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

Braunton Marshes BTO Bird Codes

BO	Barn owl
B.	Blackbird
BC	Blackcap
BT	Blue tit
BZ	Buzzard
C.	Carrion crow
C.	Cettis warbler
CH	Chaffinch
CF	Chiffchaff
CO	Coot
CU	Curlew
D.	Dunnock
GO	Goldfinch
GH	Grasshopper warbler
GB	Great black-backed gull
GS	Great spotted woodpecker
GT	Great tit
G.	Green woodpecker
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HS	House sparrow
JS	Jack snipe
JD	Jackdaw
J.	Jay
K.	Kestrel
KF	Kingfisher
LW	Lesser whitethroat
LI	Linnet
EI	Little egret
LT	Long-tailed tit
MG	Magpie
MA	Mallard
M.	Meadow pipit
M.	Mistle thrush
MH	Moorhen
OC	Oystercatcher
PH	Pheasant
PW	Pied wagtail
RN	Raven
RK	Redshank
RW	Reed warbler
R.	Robin
SW	Sedge warbler
S.	Skylark
SN	Snipe
ST	Song thrush
SH	Sparrowhawk
SG	Starling
SC	Stonechat
SL	Swallow
TC	Treecreeper
W.	Wheatear
WH	Whitethroat
WT	Willow tit
WW	Willow warbler
WP	Wood pigeon
WR	Wren

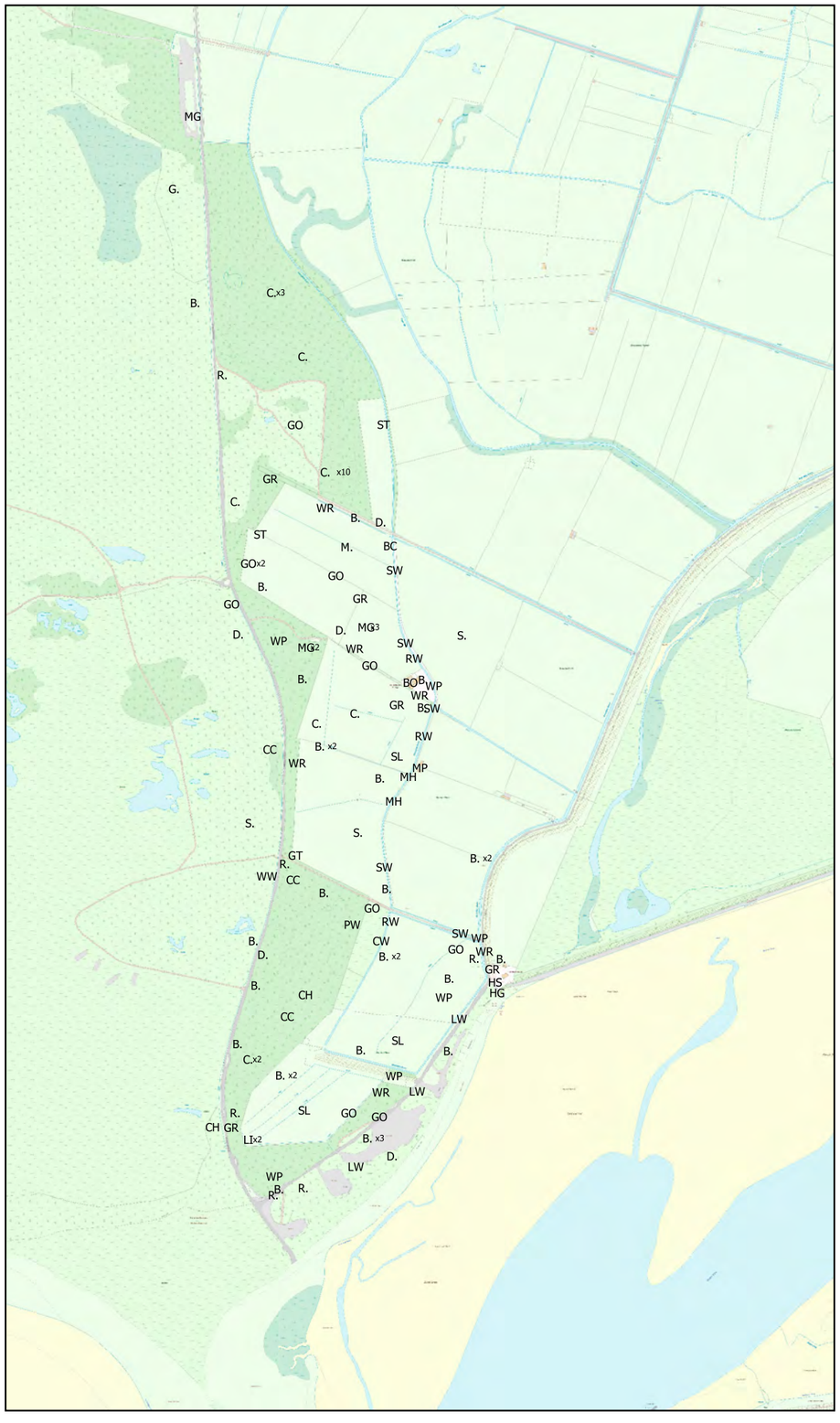
N

Appendix 1: The Braunton Marshes bird transect resuts maps.

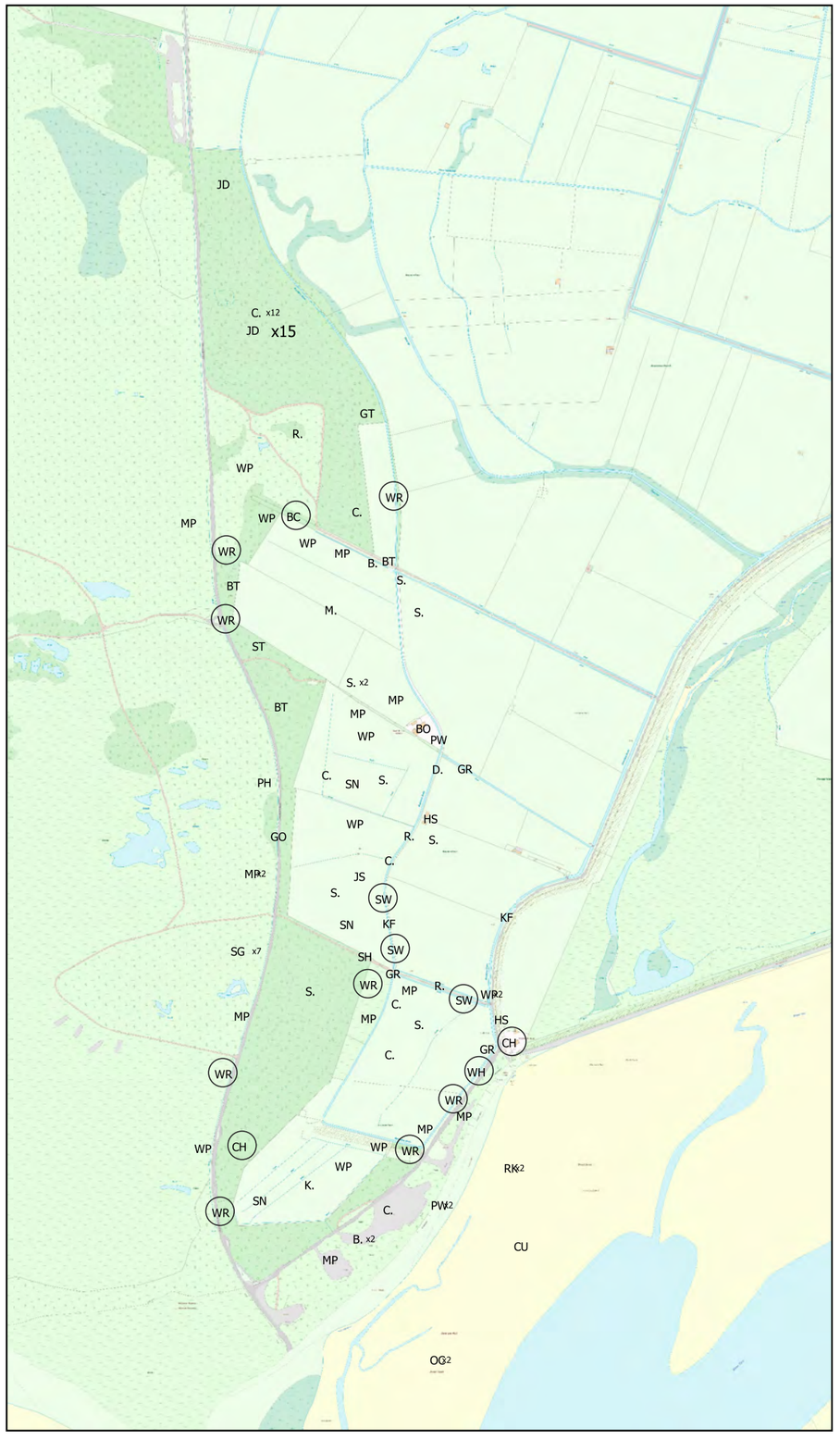
Project: White Cross Offshore Windfarm

Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Braunton Marshes - 8 July 2022



Braunton Marshes - 19 July 2022



Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

Braunton Marshes BTO Bird Codes

BO	Barn owl
B.	Blackbird
BC	Blackcap
BT	Blue tit
BZ	Buzzard
C.	Carrion crow
C.	Cettis warbler
CH	Chaffinch
CF	Chiffchaff
CO	Coot
CU	Curlew
D.	Dunnock
GO	Goldfinch
GH	Grasshopper warbler
GB	Great black-backed gull
GS	Great spotted woodpecker
GT	Great tit
G.	Green woodpecker
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HS	House sparrow
JS	Jack snipe
JD	Jackdaw
J.	Jay
K.	Kestrel
KF	Kingfisher
LW	Lesser whitethroat
LI	Linnet
EI	Little egret
LT	Long-tailed tit
MG	Magpie
MA	Mallard
M.	Meadow pipit
M.	Mistle thrush
MH	Moorhen
OC	Oystercatcher
PH	Pheasant
PW	Pied wagtail
RN	Raven
RK	Redshank
RW	Reed warbler
R.	Robin
SW	Sedge warbler
S.	Skylark
SN	Snipe
ST	Song thrush
SH	Sparrowhawk
SG	Starling
SC	Stonechat
SL	Swallow
TC	Treecreeper
W.	Wheatear
WH	Whitethroat
WT	Willow tit
WW	Willow warbler
WP	Wood pigeon
WR	Wren

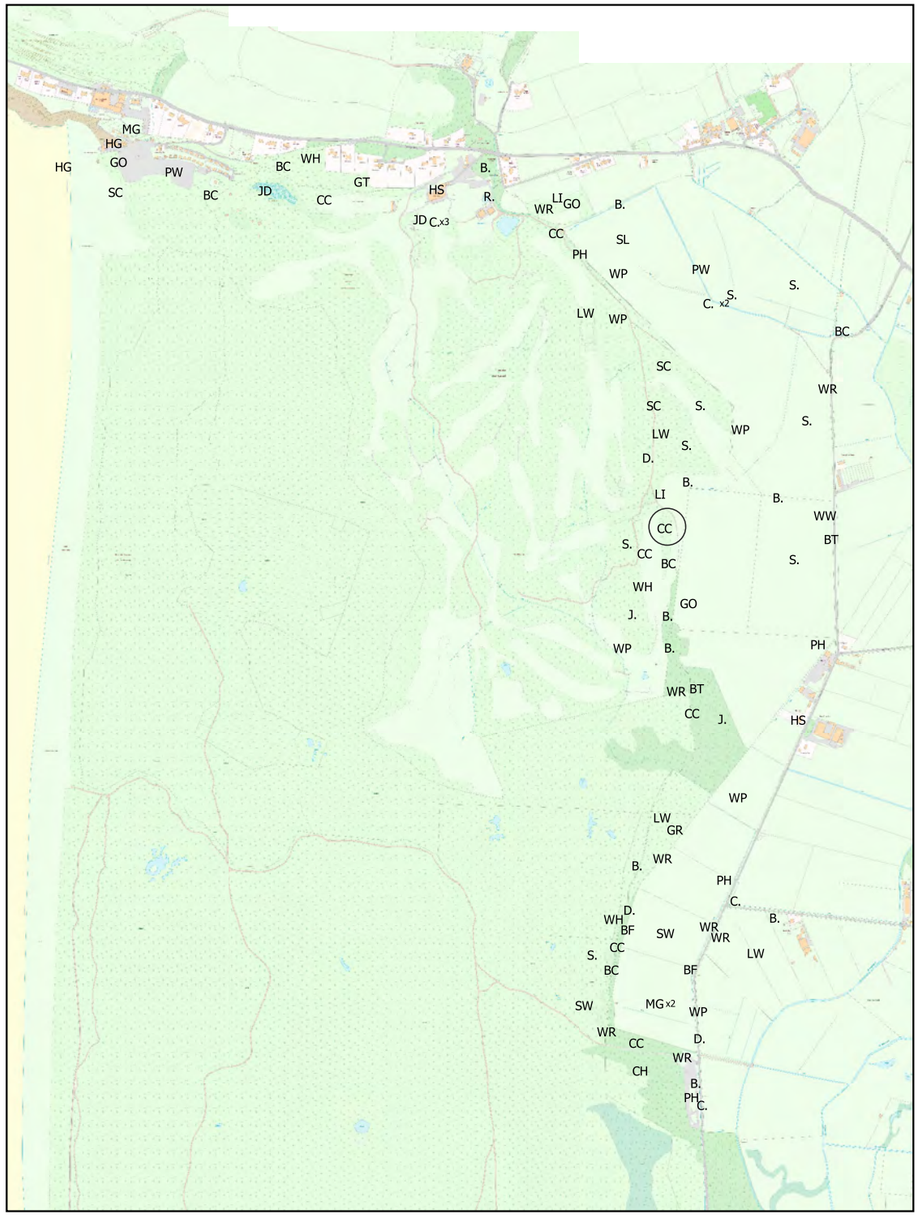
N

Appendix 1: The Braunton Marshes bird transect resuts maps.

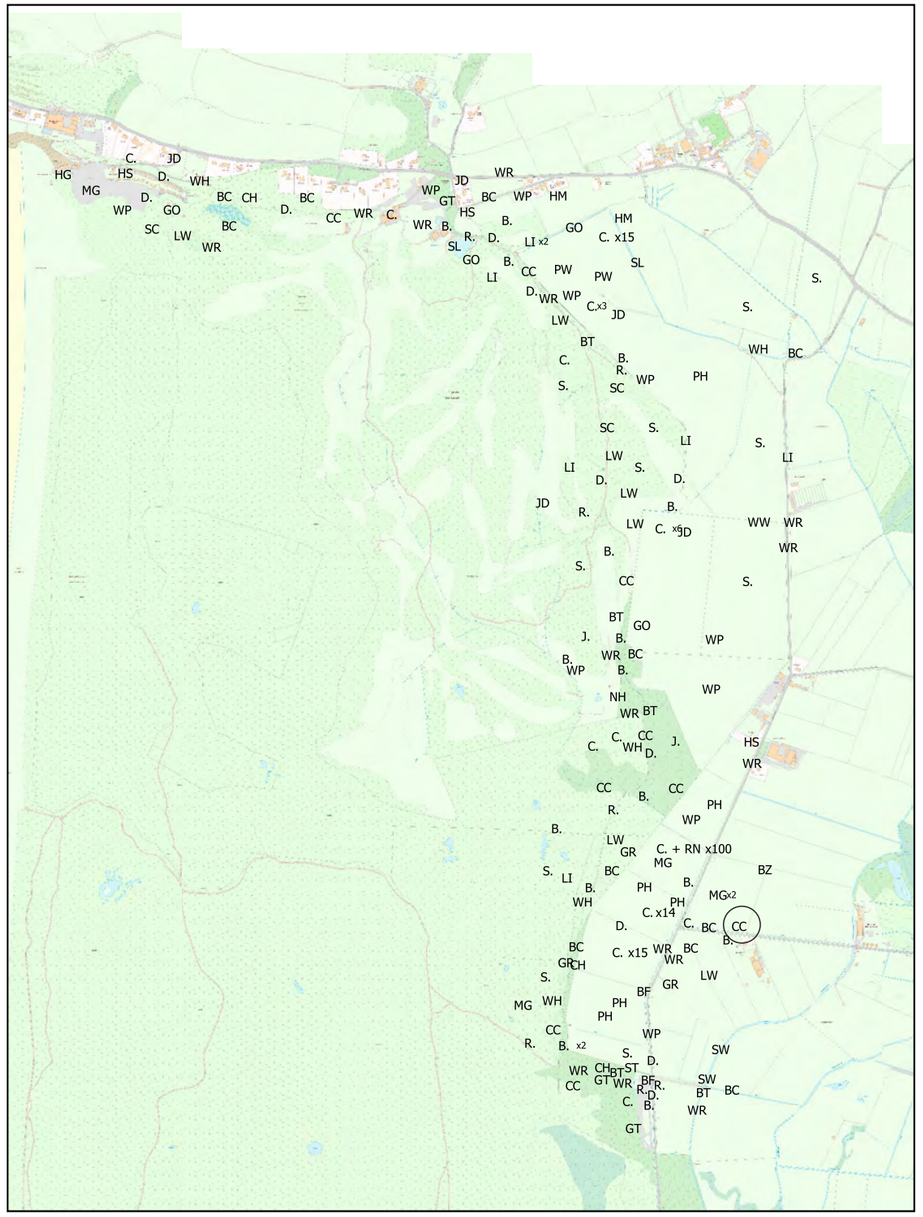
Project: White Cross Offshore Windfarm

Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Saunton - 23 April 2022



Saunton - 30 April 2022



Saunton BTO Bird Codes

B.	Blackbird
BC	Blackcap
BT	Blue tit
BF	Bullfinch
BZ	Buzzard
C.	Carrion crow
C.	Cettis warbler
CH	Chaffinch
CF	Chiffchaff
CD	Collared dove
D.	Dunnock
GW	Garden warbler
GO	Goldfinch
GS	Great spotted woodpecker
GT	Great tit
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HM	House martin
HS	House sparrow
JD	Jackdaw
J.	Jay
KF	Kingfisher
LW	Lesser whitethroat
LI	Linnet
LT	Long-tailed tit
MG	Magpie
M.	Meadow pipit
NH	Nuthatch
PH	Pheasant
PW	Pied wagtail
RN	Raven
R.	Robin
RO	Rook
SW	Sedge warbler
S.	Skylark
ST	Song thrush
SC	Stonechat
SL	Swallow
TC	Treecreeper
WH	Whitethroat
WW	Willow warbler
WP	Wood pigeon
WR	Wren

Legend

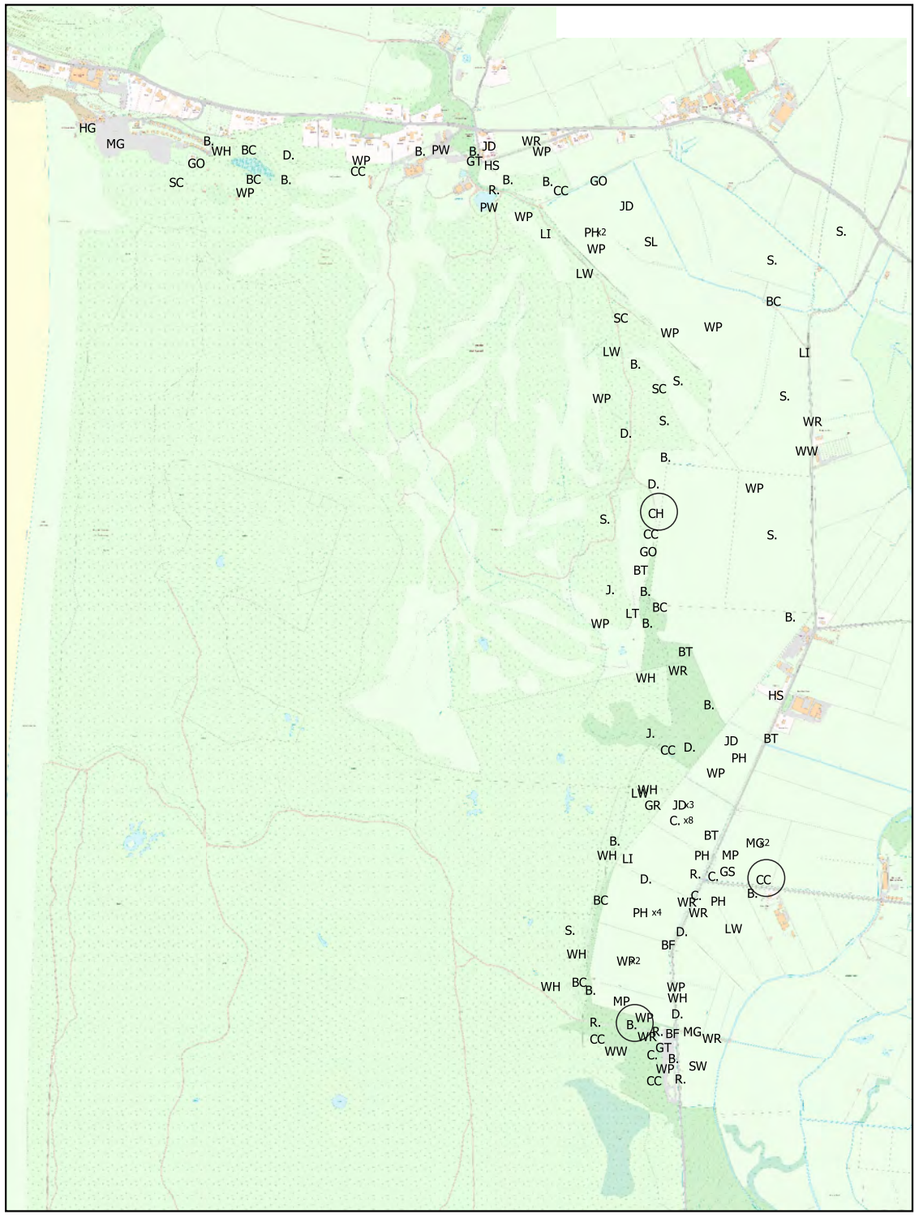
- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

N

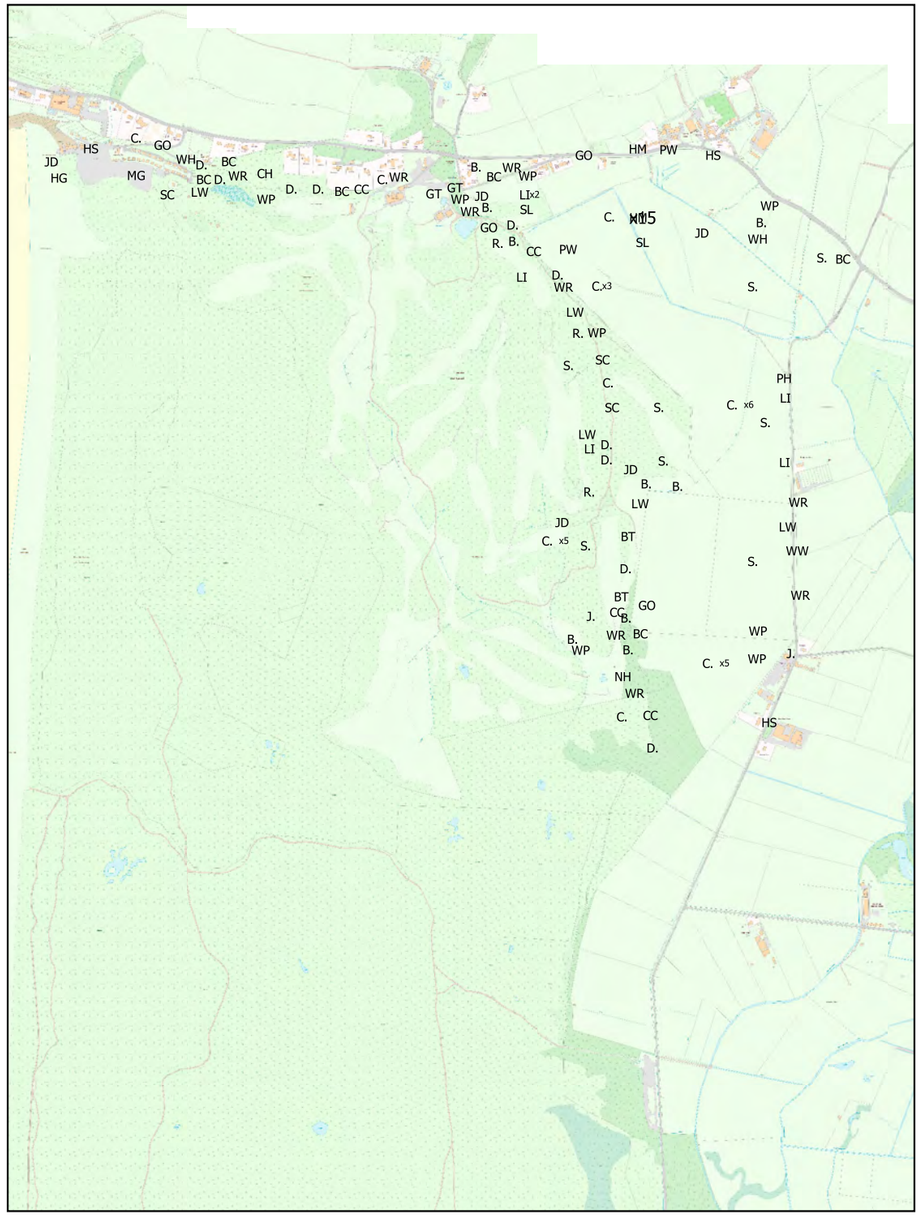
ECOLOGIC

Appendix 1: The Saunton bird transect maps.			
Project: White Cross Offshore Windfarm			
Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Saunton - 13 May 2022



Saunton - 28 May 2022



Saunton BTO Bird Codes

B.	Blackbird
BC	Blackcap
BT	Blue tit
BF	Bullfinch
BZ	Buzzard
C.	Carrion crow
C.	Cettis warbler
CH	Chaffinch
CF	Chiffchaff
CD	Collared dove
D.	Dunnock
GW	Garden warbler
GO	Goldfinch
GS	Great spotted woodpecker
GT	Great tit
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HM	House martin
HS	House sparrow
JD	Jackdaw
J.	Jay
KF	Kingfisher
LW	Lesser whitethroat
LI	Linnet
LT	Long-tailed tit
MG	Magpie
M.	Meadow pipit
NH	Nuthatch
PH	Pheasant
PW	Pied wagtail
RN	Raven
R.	Robin
RO	Rook
SW	Sedge warbler
S.	Skylark
ST	Song thrush
SC	Stonechat
SL	Swallow
TC	Treecreeper
WH	Whitethroat
WW	Willow warbler
WP	Wood pigeon
WR	Wren

Legend

➪	flight direction
○	singing
◠	circling
♂	Male
♀	Female
♀♂	Female & male
fam	Family
juv	Juvenile
x	# of birds

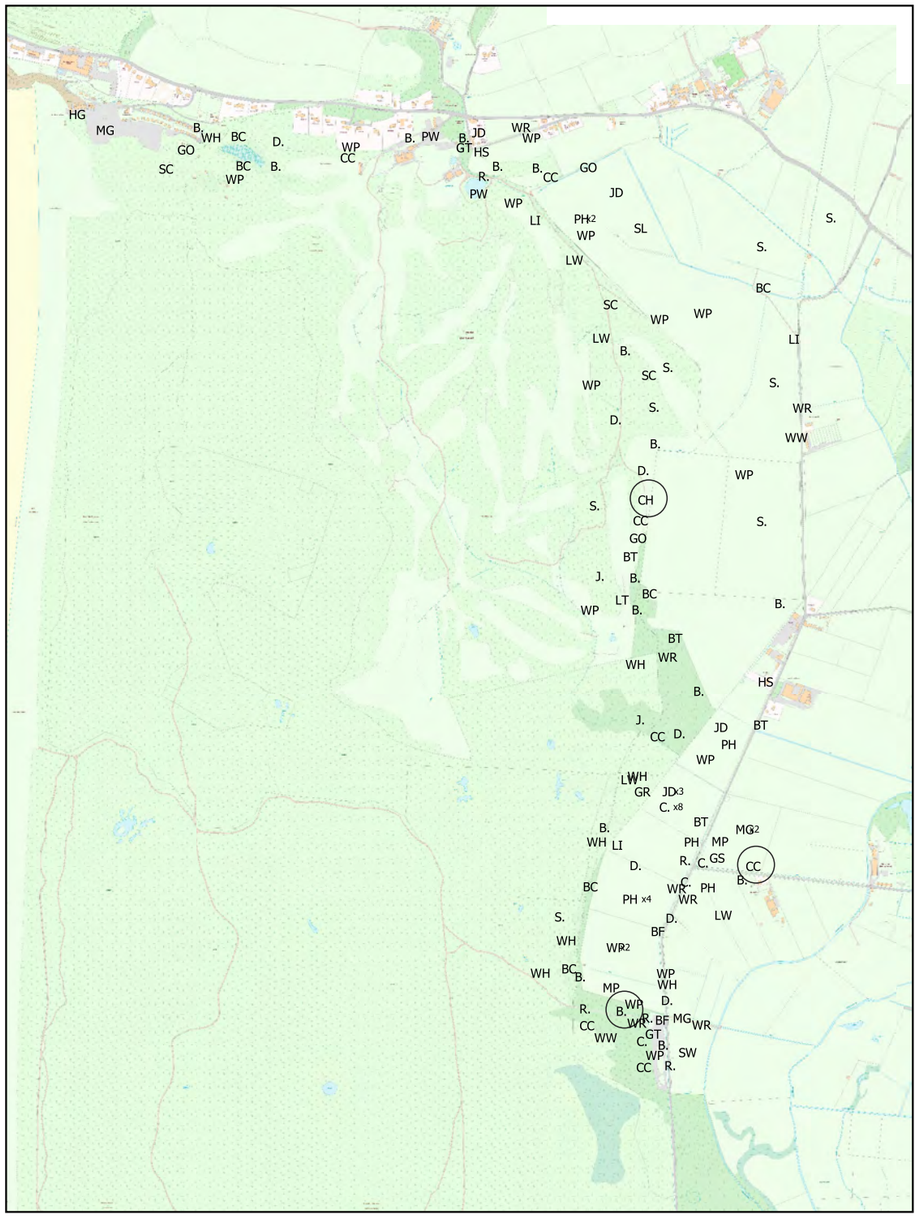
N

Appendix 1: The Saunton bird transect maps.

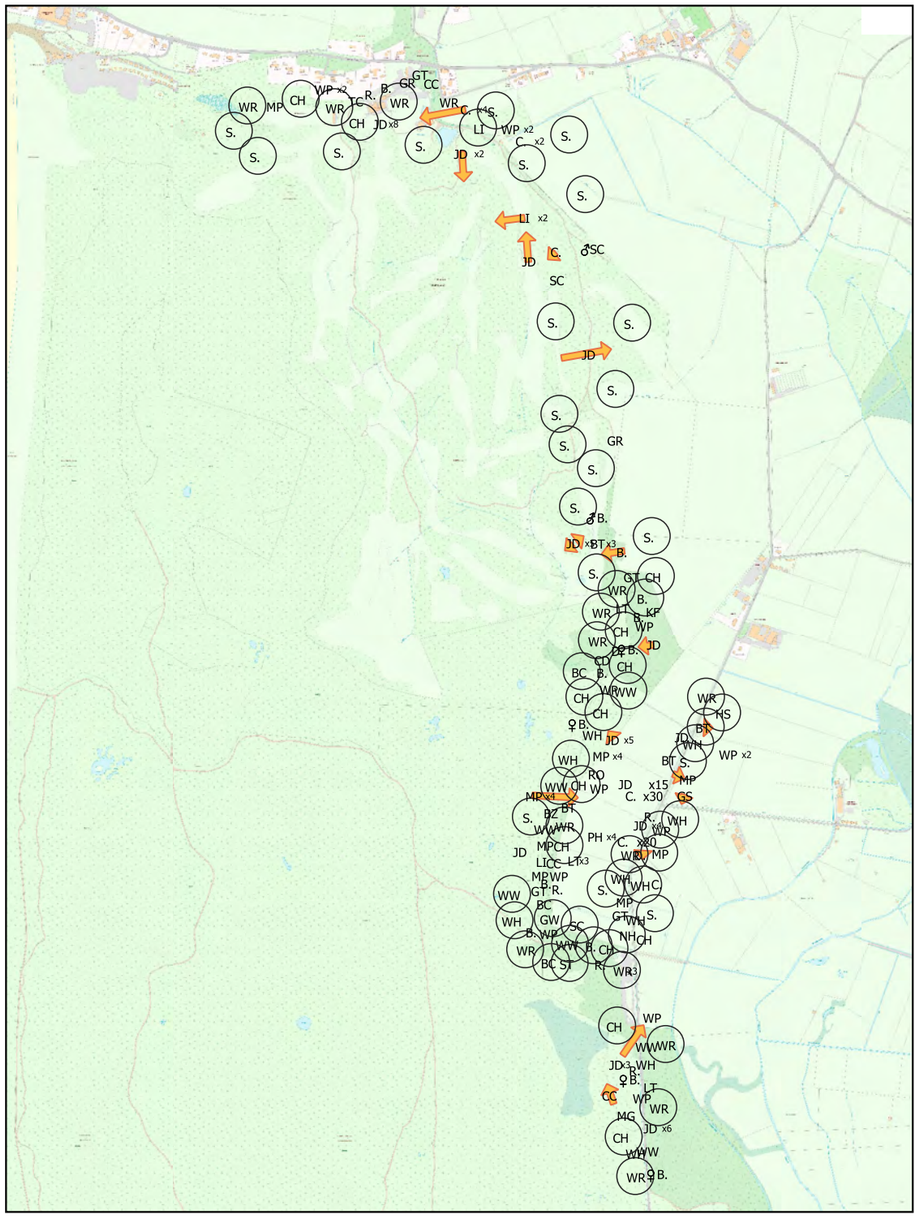
Project: White Cross Offshore Windfarm

Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Saunton - 14 June 2022



Saunton - 23 June 2022



Saunton BTO Bird Codes

B.	Blackbird
BC	Blackcap
BT	Blue tit
BF	Bullfinch
BZ	Buzzard
C.	Carrion crow
C.	Cettis warbler
CH	Chaffinch
CF	Chiffchaff
CD	Collared dove
D.	Dunnock
GW	Garden warbler
GO	Goldfinch
GS	Great spotted woodpecker
GT	Great tit
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HM	House martin
HS	House sparrow
JD	Jackdaw
J.	Jay
KF	Kingfisher
LW	Lesser whitethroat
LI	Linnet
LT	Long-tailed tit
MG	Magpie
M.	Meadow pipit
NH	Nuthatch
PH	Pheasant
PW	Pied wagtail
RN	Raven
R.	Robin
RO	Rook
SW	Sedge warbler
S.	Skylark
ST	Song thrush
SC	Stonechat
SL	Swallow
TC	Treecreeper
WH	Whitethroat
WW	Willow warbler
WP	Wood pigeon
WR	Wren

Legend

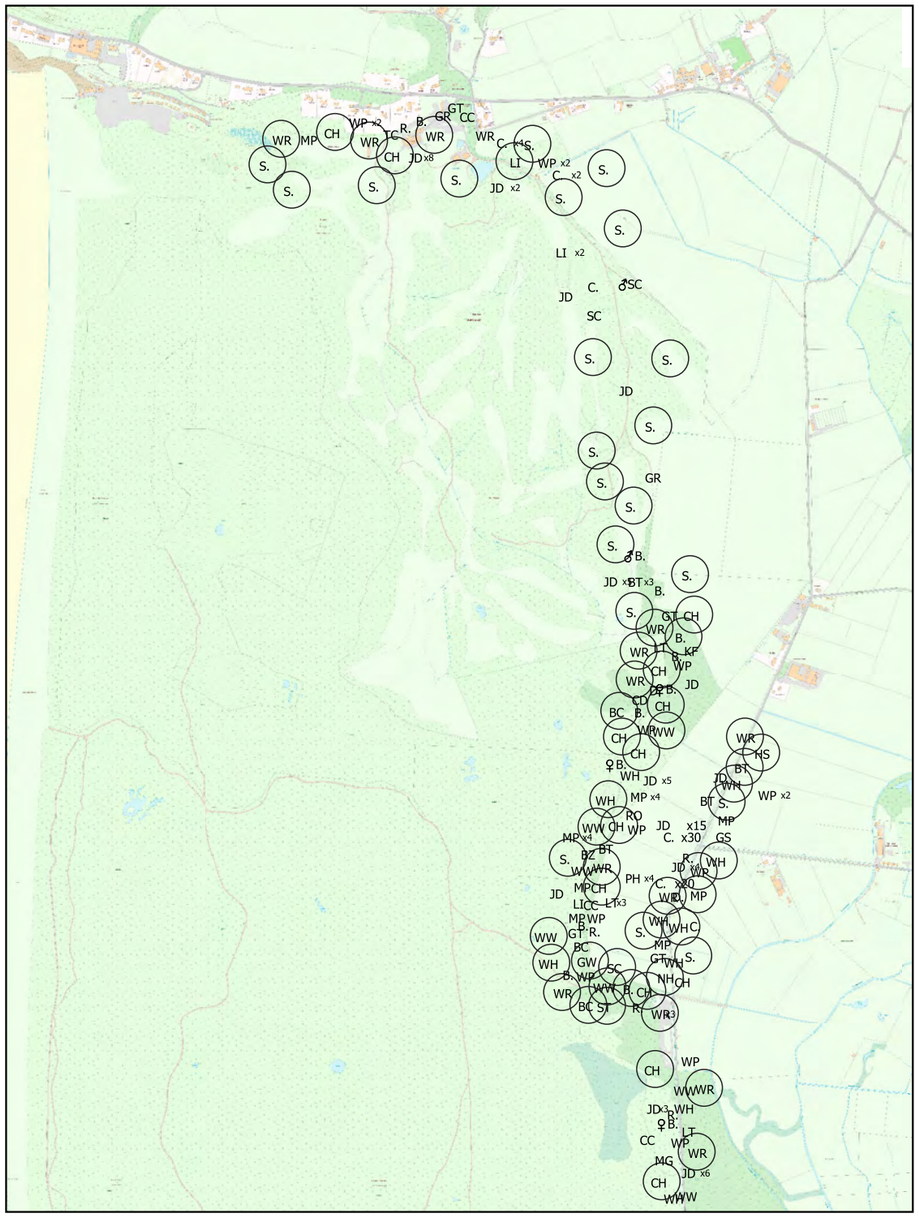
- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

N

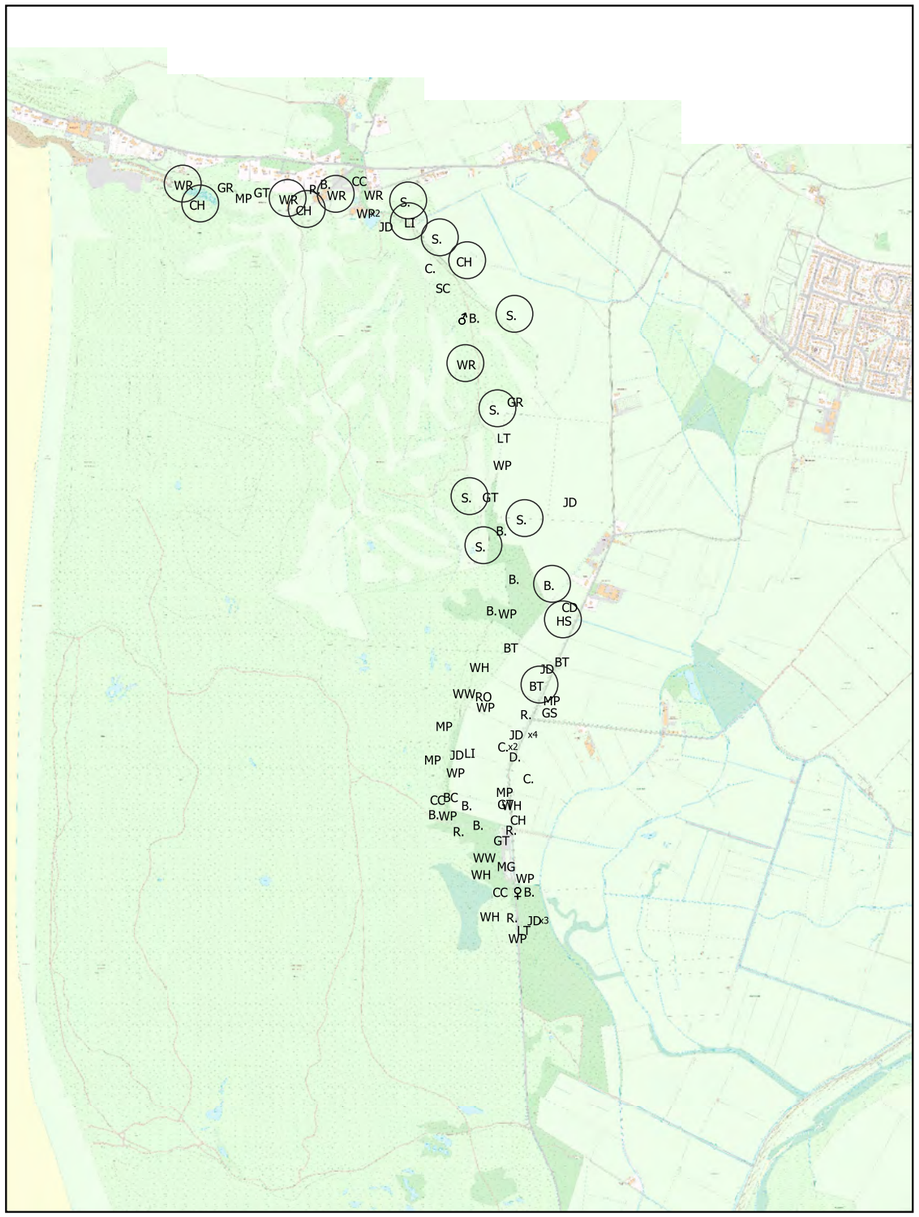
ECOLOGIC

Appendix 1: The Saunton bird transect maps.			
Project: White Cross Offshore Windfarm			
Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Braunton Marshes - 8 July 2022



Braunton Marshes - 19 July 2022



Saunton BTO Bird Codes

B.	Blackbird
BC	Blackcap
BT	Blue tit
BF	Bullfinch
BZ	Buzzard
C.	Carrion crow
C.	Cettis warbler
CH	Chaffinch
CF	Chiffchaff
CD	Collared dove
D.	Dunnock
GW	Garden warbler
GO	Goldfinch
GS	Great spotted woodpecker
GT	Great tit
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HM	House martin
HS	House sparrow
JD	Jackdaw
J.	Jay
KF	Kingfisher
LW	Lesser whitethroat
LI	Linnet
LT	Long-tailed tit
MG	Magpie
M.	Meadow pipit
NH	Nuthatch
PH	Pheasant
PW	Pied wagtail
RN	Raven
R.	Robin
RO	Rook
SW	Sedge warbler
S.	Skylark
ST	Song thrush
SC	Stonechat
SL	Swallow
TC	Treecreeper
WH	Whitethroat
WW	Willow warbler
WP	Wood pigeon
WR	Wren

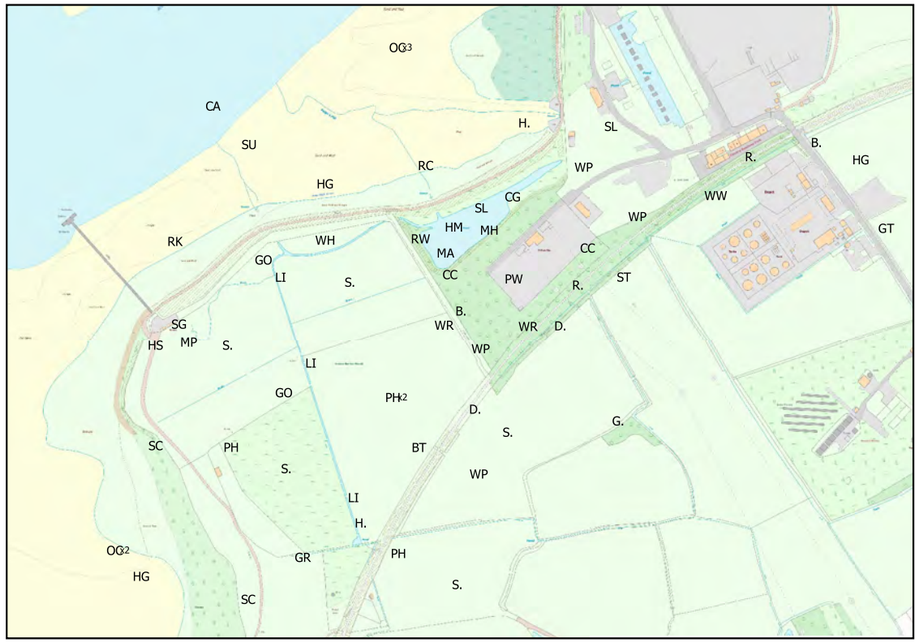
Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

N

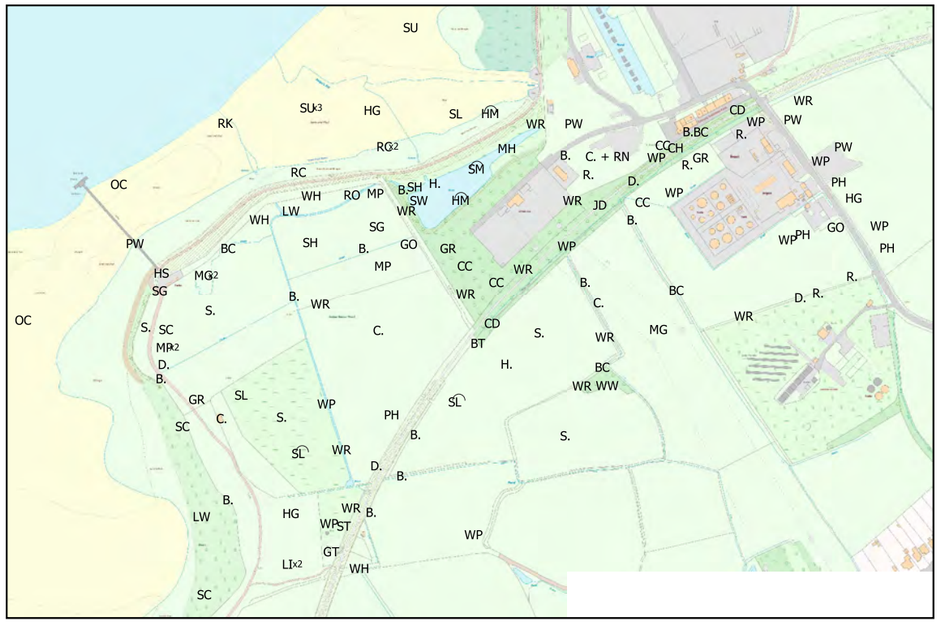
Appendix 1: The Saunton bird transect maps.			
Project: White Cross Offshore Windfarm			
Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Yelland - 15 April 2022

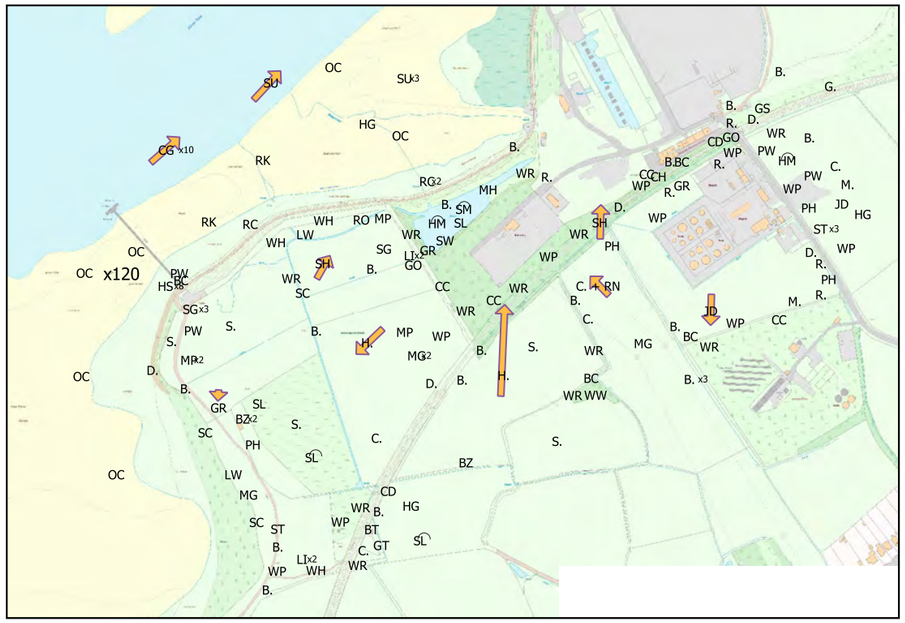


Yelland - 28 April 2022

Yelland - 2 May 2022



Yelland - 30 May 2022



Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ⚥ Female & male
- fam Family
- juv Juvenile
- x # of birds

East Yelland BTO Bird Codes

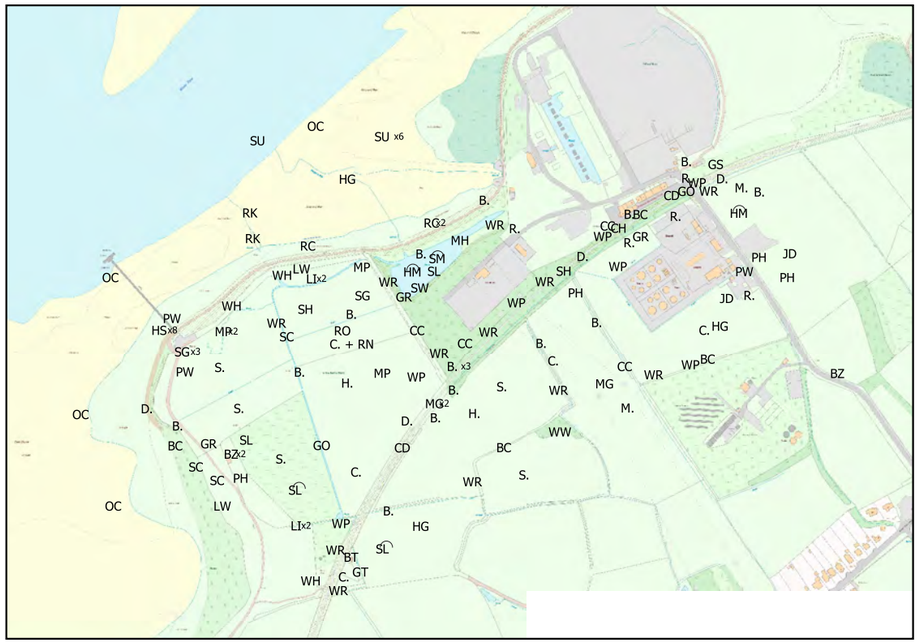
B.	Blackbird
BC	Blackcap
BW	Black-tailed godwit
BT	Blue tit
BZ	Buzzard
CG	Canada goose
C.	Carrion crow
CH	Chaffinch
CF	Chiffchaff
CD	Collared dove
CA	Cormorant
D.	Dunnock
GO	Goldfinch
GS	Great spotted woodpecker
GT	Great tit
G.	Green woodpecker
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HM	House martin
HS	House sparrow
JD	Jackdaw
LW	Lesser whitethroat
LI	Linnet
EI	Little egret
MG	Magpie
MA	Mallard
M.	Meadow pipit
M.	Mistle thrush
MH	Moorhen
NH	Nuthatch
OC	Oystercatcher
PH	Pheasant
PW	Pied wagtail
RN	Raven
RK	Redshank
RW	Reed warbler
R.	Robin
RC	Rock pipit
RO	Rook
SM	Sand martin
SW	Sedge warbler
SU	Shelduck
S.	Skylark
ST	Song thrush
SH	Sparrowhawk
SG	Starling
SC	Stonechat
SL	Swallow
WH	Whitethroat
WW	Willow warbler
WP	Wood pigeon
WR	Wren
Y.	Yellowhammer

N

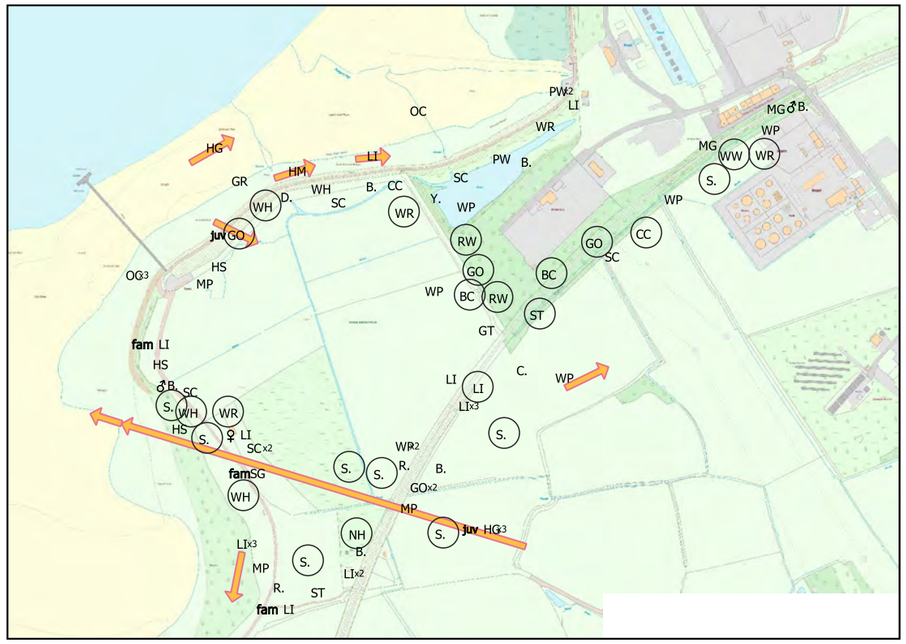
ECOLOGIC

Appendix 1: The East Yelland bird transect maps.			
Project: White Cross Offshore Windfarm			
Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

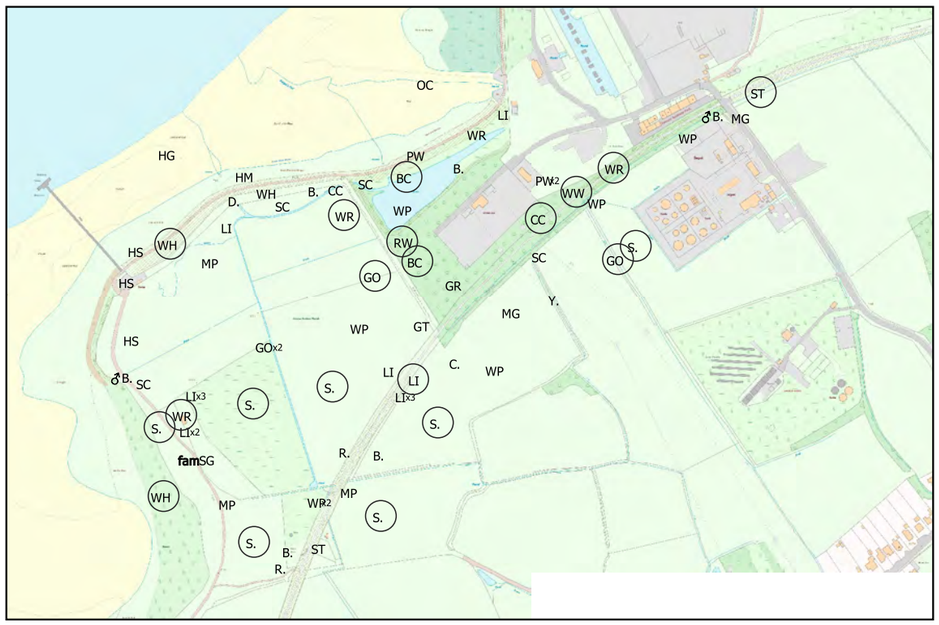
Yelland - 15 June 2022



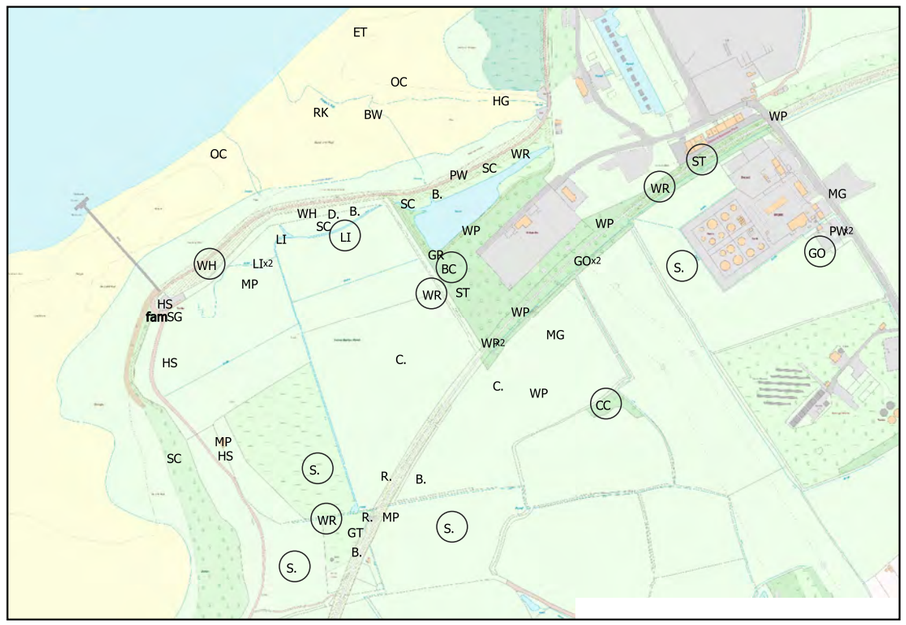
Yelland - 22 June 2022



Yelland - 8 July 2022



Yelland - 15 July 2022



Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

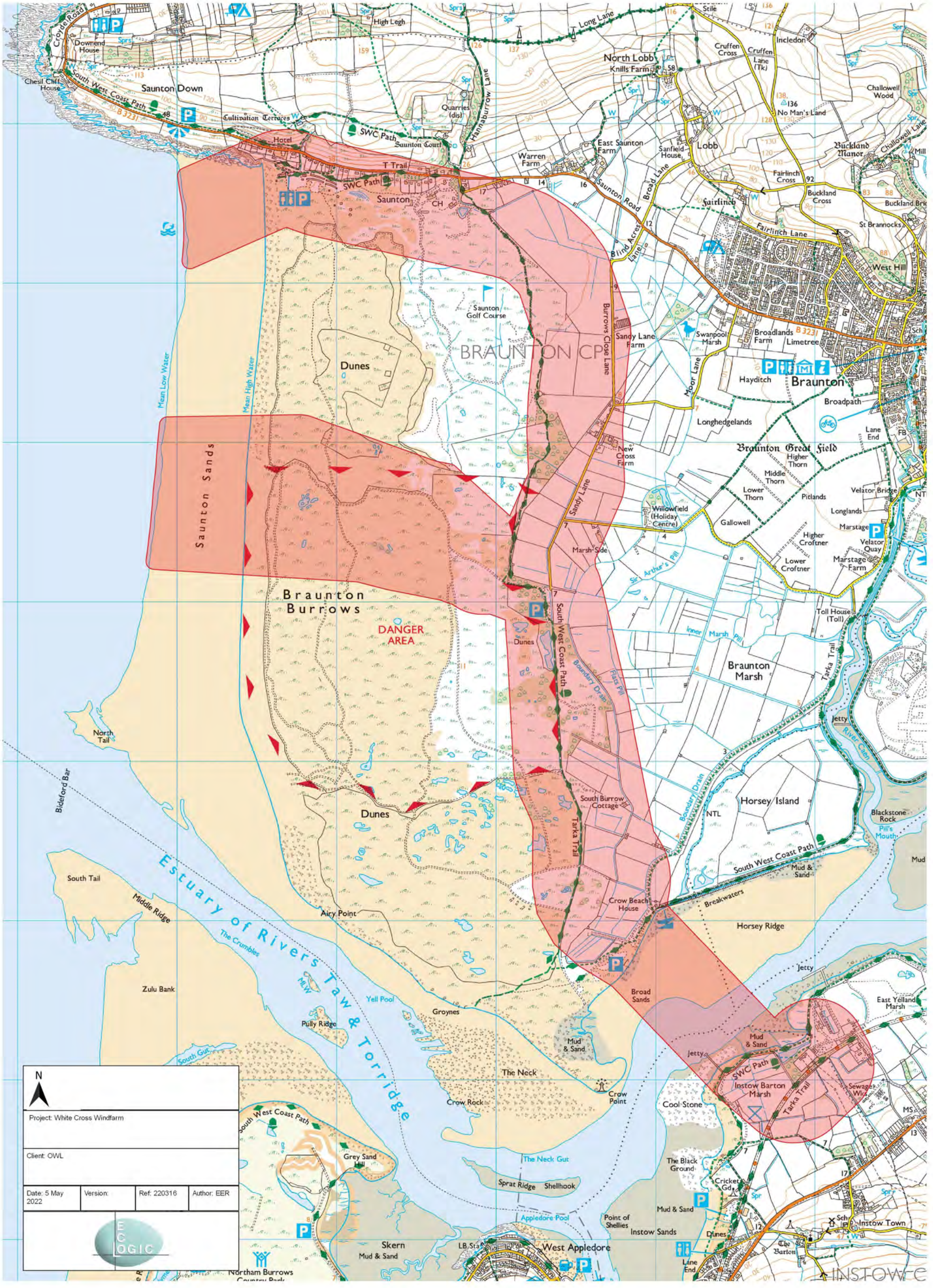
East Yelland BTO Bird Codes

B.	Blackbird
BC	Blackcap
BW	Black-tailed godwit
BT	Blue tit
BZ	Buzzard
CG	Canada goose
C.	Carrion crow
CH	Chaffinch
CF	Chiffchaff
CD	Collared dove
CA	Cormorant
D.	Dunnock
GO	Goldfinch
GS	Great spotted woodpecker
GT	Great tit
G.	Green woodpecker
GR	Greenfinch
H.	Grey heron
HG	Herring gull
HM	House martin
HS	House sparrow
JD	Jackdaw
LW	Lesser whitethroat
LI	Linnet
EI	Little egret
MG	Magpie
MA	Mallard
M.	Meadow pipit
M.	Mistle thrush
MH	Moorhen
NH	Nuthatch
OC	Oystercatcher
PH	Pheasant
PW	Pied wagtail
RN	Raven
RK	Redshank
RW	Reed warbler
R.	Robin
RC	Rock pipit
RO	Rook
SM	Sand martin
SW	Sedge warbler
SU	Shelduck
S.	Skylark
ST	Song thrush
SH	Sparrowhawk
SG	Starling
SC	Stonechat
SL	Swallow
WH	Whitethroat
WW	Willow warbler
WP	Wood pigeon
WR	Wren
Y.	Yellowhammer

N

ECOGIC

Appendix 1: The East Yelland bird transect maps.			
Project: White Cross Offshore Windfarm			
Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER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Downend House
Chesil Cliff House
South West Coast Path
B 3231
Saunton Down
Cultivation Terraces
Hotel
SWC Path
Saunton Court
High Legh
Quarries (dis)
Hannaburrow Lane
Long Lane
Stile
Cruffen Cross
Cruffen Lane (Tk)
Incledon
North Lobb
Knills Farm
Challowell Wood
No Man's Land
Challowell Lane
Buckland Manor
Mill
Warren Farm
East Saunton Farm
Sanfield House
Lobb
Fairlinch Cross
Buckland Cross
Buckland Brick
Saunton Road
Broad Lane
Fairlinch
Fairlinch Lane
St Brannocks
T Trail
Saunton
CH
Blind Acres Lane
West Hill
Saunton Golf Course
BRAUNTON CP
Burrows Close Lane
Sandy Lane Farm
Swanpool Marsh
Broadlands Farm
Limetree
Sch
Moor Lane
Hayditch
Braunton
Broadpath
Longhedgelands
Braunton Great Field
Higher Thorn
Middle Thorn
Lower Thorn
Pitlands
Velator Bridge
NT
Longlands
Marstage
Velator Quay
Gallowell
Higher Croftner
Lower Croftner
Marstage Farm
Lane End
FB
New Cross Farm
Willowfield (Holiday Centre)
Marsh Side
Sir Arthur's Pill
Saunton Sands
Dunes
Mean Low Water
Mean High Water
Braunton Burrows
DANGER AREA
South West Coast Path
Boundary Drain
Flass Pill
Inner Marsh Pill
Toll House (Toll)
Braunton Marsh
Tarka Trail
Jetty
River Caen
North Tail
Bideford Bar
Horsey Island
NTL
Blackstone Rock
Pill's Mouth
Mud
South Burrow Cottage
Tarka Trail
South Tail
Middle Ridge
Estuary of Rivers Taw & Torridge
The Crumbles
Airy Point
Crow Beach House
Breakwaters
Horsey Ridge
Mud & Sand
Zulu Bank
MLW
Yell Pool
Groynes
Pully Ridge
Broad Sands
East Yelland Marsh
Jetty
Mud & Sand
South Gut
The Neck
Crow Rock
Crow Point
Cool Stone
SWC Path
Instow Barton Marsh
Tarka Trail
Sewage Wks
MS
The Neck Gut
Grey Sand Hill
Sprat Ridge
Shelhook
The Black Ground
Cricket Gd
Mud & Sand
Appledore Pool
Point of Shellies
Instow Sands
Dunes
Skern
Mud & Sand
LB Sta
West Appledore
Lane End
The Barton
Instow Town
Sch
Northam Burrows Country Park
INSTOW CP
N
Project: White Cross Windfarm
Client: OWL
Date: 5 May 2022
Version:
Ref: 220316
Author: EER
ECOLOGIC

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.L Great Crested Newt Survey Report

Appendix 16.L Great Crested Newt Survey 2022 Habitat Suitability Index, eDNA & Population Class Assessment

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220313 GCN rev02		
Client:	Offshore Wind Ltd. (OWL)		
Architect/Agent:	Royal HaskoningDHV		
Survey Date/s:	HSI: 8th & 18th April 2022, eDNA: 28th & 29th April 2022 Population size class: May & June 2022		
Report Date:	November 2022	**OS Grid Ref:**	SS 47933 32109 SS 46854 33424 SS 45734 34813 SS 45544 37296
Report Author:	Erin Reardon BSc, PhD		
Approved By:	Andrew Charles BSc (Hons), MSc, MCIEEM		
Surveyor/s & License N°:	Andrew Charles	Great Crested Newt: 2016-20368-CLS-CLS	
	John Polley	Great Crested Newt: 2015-18161-CLS-CLS	
	Erin Reardon	Great Crested Newt: 2022-10583-CL08-GCN	
Additional Surveyors	Will Corbett, Paul Lott, Dominic Sheldon & Martin Clements		

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Disclaimer

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake a Great Crested Newt (*Triturus cristatus*) Survey along the proposed onshore export cable corridor routes for the White Cross Windfarm ("the Project").

The proposed onshore export cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1-1). There are two onshore export cable corridor routes. The first onshore export cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a second onshore export cable corridor route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final preferred route is to be determined; see Figure 1.1).

The total survey area includes the proposed onshore export cable corridor routes, and an additional 250m buffer, approximately 400ha, which has been sub-divided into five areas:

- Yelland – woodland, agricultural fields and coast;
- Braunton Marsh;
- America Road & Sandy Lane;
- Dunes & Northern Boundary Track (habitats west of Sandy Lane carpark); and,
- Sandy Lane Farm/agricultural fields & Saunton Sands dunes.

Across all survey areas, approximately 61 ponds, ditches, and rhynes were previously identified with suitability to provide aquatic breeding habitat for great crested newt (Richard Green Ecology 2021; Ecologic 2022). The areas of grassland, scrub, and woodland may provide terrestrial habitat for amphibians, including for cover, foraging, dispersal, and hibernation.

Accordingly, a habitat suitability index (HSI) assessment and environmental DNA (eDNA) analysis was undertaken to identify whether the ponds support great crested newts. Each pond that tested positive for great crested newt eDNA was subject to a further survey consisting of a population class assessment in accordance with the Great Crested Newt Mitigation Guidelines (English Nature 2001).

The survey specifically aimed to:

- Identify the presence/absence of great crest newt within individual ponds; and,
- Calculate a population class assessment of great crested newts.

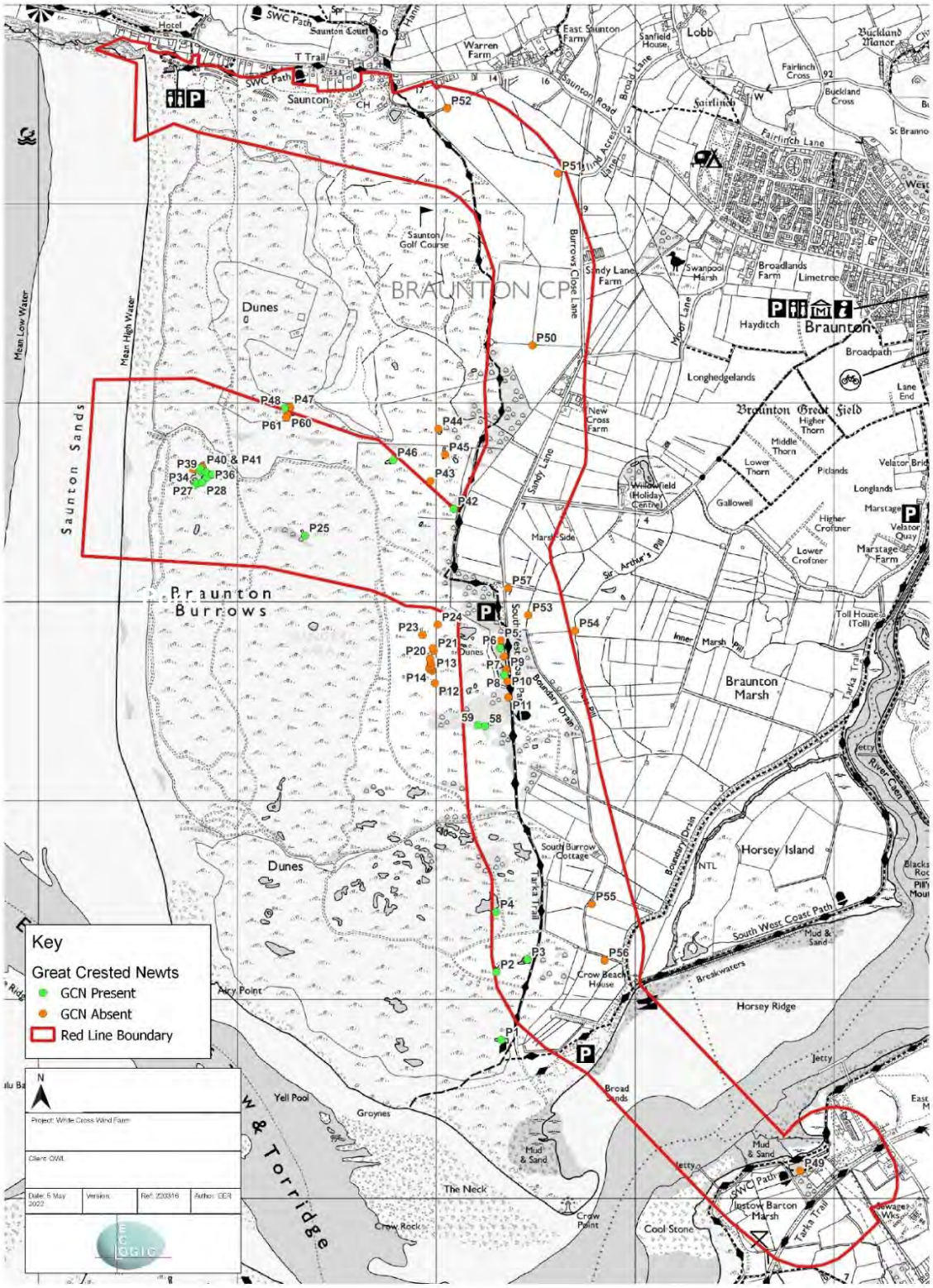

Figure 1-1. The survey area indicated with a red outline with numbered pond locations (orange circles = GCN absent; green circles = GCN present)

2. Survey Methods

2.1 Great Crested Newt Habitat Suitability Index

All ponds, ditches and rhynes within the proposed cable routes plus a 250m buffer area were classified using the great crested newt habitat suitability index (HSI) (Oldham *et al*, 2000) by Andrew Charles and John Polley (licensed great crested newt surveyors) on the 8th and 18th April 2022.

The HSI is a numerical index between 0 and 1, wherein a score of 1 represents optimal habitat for great crested newts. The HSI score is used to define the suitability of the pond on a categorical scale (Table 2.1).

Table 2.1. Scoring system for great crested newt breeding suitability using HSI

HSI	<0.5	0.5-0.59	0.6-0.69	0.7-0.79	>0.8
Suitability for breeding GCN	Poor	Below average	Average	Good	Excellent

It should be noted, however, that the system is only indicative for the likelihood of great crested newts being present or absent.

2.2 Great Crested Newt eDNA

Ponds and ditches holding standing water within the survey area were sampled for great crested newt eDNA. This method involved taking water samples from the water body within Natural England's accepted sampling period of 15th April to 30th June following the methodology described in the Defra Report WC1067 (Biggs *et al*. 2014a) and the subsequent Technical Advice Note (Biggs *et al*. 2014b).

Twenty 30ml water samples were taken from each pond and ditch/rhyne system on the 28th & 29th April 2022 by Andrew Charles, Paul Lott and William Corbett, using sterile field equipment supplied by SureScreen Scientific. Sample locations were selected based on accessibility and suitable great crested newt egg laying and displaying areas, with as much of the margin being sampled as possible. The surveyor wore sterile gloves whilst taking the sample and did not enter the water. The water column was mixed gently before taking the sample, with care taken not to disturb the sediment at the bottom of the pond. The samples from each pond were mixed and 15 ml added to six sterile tubes containing 35ml ethanol. Water samples

from ponds within the same vicinity were pooled for eDNA analysis (see Appendix 1, Table 1).

Samples were stored overnight in a refrigerator and then sent to SureScreen Scientific for analysis. The methodology for laboratory analysis can be provided by SureScreen Scientific on request.

2.3 Great Crested Newt Population Size Class Assessment

All water bodies within the survey area with a positive great crested newt eDNA test and/or previously confirmed great crested newt presence (Richard Green Ecology 2021) were surveyed to provide a 'population class estimate'. In accordance with the guidance, six separate survey visits were undertaken per pond with at least two of the six visits being timed between mid-April and mid-May (English Nature 2001).

The peak population count for a single night is used to inform the calculation of population size class. Where ponds are within 250m of each other the peak is summed across the ponds for the same survey visit, with a 'population size class' assigned using the following criteria:

- Small population – where peak count is up to 10;
- Medium population – where peak count is 11 to 100; and,
- Large population – where peak count exceeds 100.

The population size class assessment is then used to determine the level of mitigation required, should great crested newts be present, e.g. number of trapping days..

A combination of three survey methodologies are required for each survey visit. The standard survey methodologies include:

- Torchlight survey;
- Bottle trapping;
- Sweep netting; and,
- Egg searching.

The torchlight survey is a standard amphibian recording technique employing a high-power torch to penetrate the water and illuminate the ponds during the hours of

darkness. This allows the surveyor to record any great crested newts, which will subsequently include displaying and courting newts which may have moved into areas of open water.

Bottle traps were laid before darkness during the evening using the method described by Gent and Gibson (1998). The traps were then checked for newts before 10am the following morning. Any newts found were recorded and then released directly back into the respective pond.

The egg search involved a direct assessment of emergent and submerged vegetation for great crested newt eggs. Egg surveys can only be undertaken during late spring and early summer (April to June).

The sweep netting technique was used as the third survey method on ponds too shallow for bottle traps.

3. Survey Results

3.1 Great Crested Newt Habitat Suitability Index

A habitat suitability index was undertaken for 59 ponds and ditch/rhyne systems within the survey area.

Ponds 60 and 61 were identified in the 2021 survey, but were dry during the 2022 HSI assessment, and therefore omitted from further survey during 2022.

HSI scores ranges from 0.22 to 0.58. Ponds scored below 0.5 are categorized as 'poor' suitability as breeding habitat, whereas scores of 0.50 – 0.59 are categorized as 'below average' as breeding habitat for great crested newt. Individual pond HSI scores and photos are presented in Appendix 1.

However, it is noted that the HSI scores reduced by the mandatory geographic SI_1 location score of C (least suitable) assigned to the southwest of England. If the geographic location is scored as A (optimal), these sites would be categorized as 'good' to 'average' suitability as breeding habitat for great crested newt.

3.2 Great Crested Newt eDNA

The water samples from 50 ponds/pond groups within Braunton Burrows returned a positive result for great crested newt DNA (Ponds 1 - 48, 58 & 59, Appendix 1, Table 1).

The water samples from each of the ditch/rhyne systems (Ponds 50-57, Appendix 1), and the pond in East Yelland (Pond 49, Appendix 1, Table 1) returned a negative result for great crested newt DNA.

Ponds 60 and 61 were identified in the 2021 survey, but were dry during the 2022 HSI assessment, and therefore omitted from further survey during 2022.

3.3 Population Size Class Assessment

The population size class assessment set out to survey the 50 ponds which tested positive for great crested newt eDNA identified in Section 4.2. This comprised of six visits, in compliance with the combined survey methods to determine presence/absence of great crested newts, and to determine a population size class assessment.

However, at the first visit, 24 of the ponds were found to be dry (ponds: 5, 7, 9, 10 – 24, 31, 34 – 36 & 40 – 41), thus no further survey was undertaken of these ponds. Furthermore, pond 6 dried out after the second site visit and thus no further survey was undertaken.

Similarly ponds 32, 39 and 47 dried after the third site visit, thus no further survey was undertaken and great crested newt was considered to be absent (Appendix 1).

The full six visit population size class assessment was undertaken for 21 ponds (Appendix 1).

Great crested newts were recorded in 17 of the survey ponds within Braunton Burrows throughout the survey visits (Ponds: 1 – 4, 8, 25 – 30, 33, 42,46, 48, 58 & 59; Figure 1; Appendix 1). Great crested newt eggs were recorded in ponds 4, 26, 28, 29, 46, 38, & 58. Similarly, great crested newt larvae were observed in ponds 3, 25, 28, 29, 33, 46, 58, with more than 20 larvae observed in one visit in pond 4 and more than 50 larvae observed in one visit in pond 25 (Appendix 1). Thus, all 17 ponds were considered to be breeding ponds.

The ponds included an abundance of breeding palmate and smooth newts, with additional presence of common toad and common frog (Appendix 1).

See Appendix 1 for the full survey results and see Figure 1 for locations of the surveyed ponds. See Appendix 1 for weather conditions during the survey visits.

Table 3.1. Total number of great crested newts identified for all survey methods, for each survey visit. Note that great crested newt was considered present in pond 33 due to the presence of great crested newt larvae on the last two site visits.

Ponds within 250 m of each other	Pond	Presence or Absence	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Pop Size Estimate
	1	P	9	7	0	0	0	0	small
A	2	P	4	2	0	0	0	0	small
A	3	P	0	0	0	1	0	0	small
	4	P	12	14	2	0	0	0	medium
B	6	A	0	0	-	-	-	-	small
B	8	P	0	0	0	1	0	0	small
C	58	P	1	0	0	1	2	0	small
C	59	P	1	1	0	0	0	0	small
D	42	P	1	0	0	1	0	0	small
D	43	A	0	0	0	0	0	0	small
D	44	A	0	0	0	0	0	0	small
D	45	A	0	0	0	0	0	0	small
D	46	P	15	12	10	17	19	13	medium
	25	P	0	0	0	0	0	0	small
E	26	P	6	3	4	9	1	1	small
E	27	P	0	0	2	0	7	4	small
E	28	P	3	5	2	0	0	0	small
E	29	P	4	1	1	1	0	0	small
E	30	P	4	0	0	5	2	2	small
E	32	A	0	0	0	-	-	-	small
E	33	P	0	0	0	0	0	0	small
E	37	A	0	0	0	0	0	0	small
E	38	A	0	0	0	0	0	0	small
E	39	A	0	0	0	-	-	-	small
F	47	A	0	0	0	-	-	-	small
F	48	P	0	0	0	2	7	4	small

Table 3.2. Total number of great crested newts identified for all survey methods, for each survey visit for each group of ponds within 250 m of each other.

Pond Group	P or A	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Population Size Estimate
A	P	4	2	0	1	0	0	small
B	P	0	0	0	1	0	0	small
C	P	2	1	0	1	2	0	small
D	P	16	12	10	18	19	13	medium
E	P	17	9	9	15	10	7	medium
F	P	0	0	0	2	7	4	small
All Pond Total Per Visit		60	45	21	38	38	24	medium

4. DISCUSSION

4.1 Great Crested Newt

The combined HSI, eDNA, population class surveys confirms that the ponds in Braunton Burrows and surrounding terrestrial habitat support a 'medium' great crested newt population.

Stickleback fish were abundant in ponds 43, 44, and 45, which likely accounts for the absence of great crested newt in these ponds.

The pond at East Yelland (pond 49) is not considered to support great crested newt due to low HSI and negative eDNA score. This pond is likely brackish due to estuarine water influx at high tides.

The ditches and rhynes associated with Braunton Marshes and agricultural fields were also not considered to support great crested newt due to low HSI scores and negative eDNA. Also, the rhynes include predators present (waterfowl, fish, etc) that may preclude the presence of great crested newt.

Great crested newt eggs larvae were observed in many of the ponds. The earliest great crested newt larvae observed in mid-May was suggestive of egg laying in mid-March.

Although no great crested newts were recorded in Pond 6 or 38, it is considered likely that great crested newts are present within these ponds at low levels. This is due to the close proximity and similarity of the surrounding ponds where great crested newts were recorded.

It is considered that the proposed cable route may avoid great crested newt ponds, but will damage, temporarily remove an extent of great crested newt terrestrial habitats and may have the potential to harm individual newts.

Great crested newts are protected under Schedule 5 of the Wildlife and Countryside Act 1981, the CRoW Act 2000, and the Conservation (Natural Habitats, &c) (Amendments) (EU Exit) Regulations 2019. Under this legislation, it is illegal to:

- Intentionally kill, injure, take, possess, sell or disturb great crested newts; and,
- Intentionally or recklessly damage, destroy or obstruct their place of shelter or protection (including aquatic and terrestrial habitat).

Where works are proposed that would result in offences being committed, a European Protected Species License (EPSL) is required under the Habitats Regulations. An EPSL must be applied for from Natural England, permitting activities that would otherwise be deemed illegal.

Thus, it will be necessary to apply and obtain an EPSL from Natural England under the conservation (Natural Habitats, &c) (Amendments) 2010 Regulations, to legally allow the destruction of great crested newt aquatic and terrestrial habitat. In order to apply for the license it will be required to successfully obtain full planning from the respective authority. Once applied for Natural England may take at least 30 working days to grant such a license.

Mitigation and compensatory measures will need to be detailed within the EPSL application, including appropriate/sensitive timing of the commencement of works, an exclusion programme and ecological supervision for habitat removal, with the incorporation of a supplementary replacement aquatic and terrestrial habitat creation. Providing that such measures are implemented, the destruction followed by recreation and management of great crested newt habitat at the Braunton Burrows portion of the site will mean that the proposal will not necessarily have a detrimental population effect or effect it's long term conservational status.

References

Conservation (Natural Habitats, &c) (Amendments) (EU Exit) Regulations 2019

Countryside and Rights of Way Act 2000. HMSO

EcoLogic. (2022). Preliminary Ecological Appraisal Report.

English Nature. (2001) Great crested newts mitigation guidelines.

Gent, A. and Gibson, S. (1998) *Herptofauna Workers Manual*. Joint Nature Conservation Committee.

Green Ecology (2021). Great crested newt survey: Braunton Burrows.

Herpetofauna Groups of Britain & Ireland. (1998) *Evaluating local mitigation/translocation programmes: Maintaining Best Practice and lawful standards*. Herpetofauna Groups of Britain & Ireland, Bournemouth.

Langton, T., Beckett, C., and Foster, J. (2001) Great Crested Newt Conservation Handbook. Froglife.

Oldham R. S., Keeble, J., Swan, M. J. S. and Jeffcote, M. (2000) 'Evaluating the suitability of habitat for the Great Crested Newt (*Triturus cristatus*)'. Herptetological Journal 10 (4), 143-155.

Wildlife & Countryside Act 1981, as amended. HMSO

Appendix 1 Great Crested Newt Survey Results

Table A1. Great crested newt habitat suitability index (HSI) and eDNA results for water bodies within the survey area

Date HSI assessment undertaken	Pond ref	Grid Ref	Shape	Pond area (m^2)	SI3 - Pond drying	SI4 - Water quality	SI4 – Shade %	SI6 - Fowl	SI7 - Fish	SI8 - Ponds	SI9 - Terr'l habitat	SI10 – Macro. %	HSI	HSI Category	eDNA Result
8-Apr-22	P1	SS 46327 32800	Irregular	106	Sometimes	Moderate	0	Absent	Absent	11	Good	0	0.43	Poor	+
8-Apr-22	P2	SS 46297 33139	Ellipse	27	Frequently	Poor	0	Absent	Absent	6	Good	0	0.32	Poor	+
8-Apr-22	P3	SS 46455 33203	Ellipse	3925	Rarely	Moderate	90	Minor	Absent	8	Good	0	0.45	Poor	+
8-Apr-22	P4	SS 46294 33445	Irregular	1021	Frequently	Moderate	0	Absent	Absent	9	Good	0	0.53	Below Average	+
8-Apr-22	P5	SS 46330 34794	Ellipse	1766	Sometimes	Good	65	Minor	Absent	20	Good	0	0.49	Poor	
8-Apr-22	P6	SS 46310 34776	Ellipse	23550	Sometimes	Good	0	Minor	Absent	20	Good	0	0.49	Poor	
8-Apr-22	P7	SS 46339 34758	Ellipse	118	Sometimes	Good	90	Minor	Absent	20	Good	0	0.38	Poor	
8-Apr-22	P8	SS 46332 34639	Ellipse	11775	Frequently	Good	0	Minor	Absent	20	Good	0	0.53	Below Average	
8-Apr-22	P9	SS 46353 34656	Ellipse	94	Sometimes	Moderate	90	Absent	Absent	20	Good	0	0.35	Poor	+
8-Apr-22	P10	SS 46359 34591	Irregular	120	Sometimes	Moderate	90	Absent	Absent	20	Good	0	0.35	Poor	
8-Apr-22	P11	SS 46358 34545	Ellipse	58	Sometimes	Moderate	90	Absent	Absent	20	Good	0	0.41	Poor	
8-Apr-22	P12	SS 46004 34589	Ellipse	25	Frequently	Poor	0	Absent	Absent	18	Good	0	0.32	Poor	
8-Apr-22	P13	SS 45980 34649	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	
8-Apr-22	P14	SS 45968 34659	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	
8-Apr-22	P15	SS 45972 34664	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	
8-Apr-22	P16	SS 45962 34665	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	
8-Apr-22	P17	SS 45973 34675	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	
8-Apr-22	P18	SS 45969 34683	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	
8-Apr-22	P19	SS 45969 34695	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	+
8-Apr-22	P20	SS 45968 34718	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.44	Poor	
8-Apr-22	P21	SS 45981 34767	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	
8-Apr-22	P22	SS 45985 34755	Ellipse	3	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	
8-Apr-22	P23	SS 45985 34755	Ellipse	19	Frequently	Poor	0	Absent	Absent	18	Good	0	0.32	Poor	
8-Apr-22	P24	SS 46002 34881	Ellipse	1	Sometimes	Good	0	Absent	Absent	18	Good	0	0.41	Poor	
8-Apr-22	P25	SS 45331 35339	Irregular	553	Frequently	Good	0	Absent	Absent	16	Good	50	0.58	Below Average	+
18-Apr-22	P26	SS 45331 35339	Ellipse	72	Rarely	Good	0	Minor	Possible	16	Moderate	75	0.45	Poor	
18-Apr-22	P27	SS 44803 35626	Irregular	1800	Rarely	Good	0	Minor	Possible	16	Moderate	75	0.55	Below Average	
18-Apr-22	P28	SS 44825 35597	Ellipse	377	Rarely	Good	0	Minor	Possible	16	Moderate	75	0.54	Below Average	
18-Apr-22	P29	SS 44848 35633	Ellipse	130	Rarely	Good	0	Minor	Possible	16	Moderate	60	0.48	Poor	
18-Apr-22	P30	SS 44837 35659	Ellipse	59	Rarely	Good	0	Minor	Possible	16	Moderate	60	0.45	Poor	
18-Apr-22	P31	SS 44810 35667	Ellipse	0.79	Frequently	Good	0	Minor	Possible	16	Moderate	60	0.27	Poor	
18-Apr-22	P32	SS 44805 35657	Ellipse	0.79	Frequently	Good	0	Minor	Possible	16	Moderate	60	0.27	Poor	
18-Apr-22	P33	SS 44816 35676	Ellipse	15.7	Frequently	Good	0	Minor	Possible	16	Moderate	85	0.36	Poor	+
18-Apr-22	P34	SS 44777 35665	Ellipse	19.6	Frequently	Good	0	Minor	Possible	16	Moderate	85	0.37	Poor	
18-Apr-22	P35	SS 44822 35678	Ellipse	4.7	Frequently	Good	0	Minor	Possible	16	Moderate	91	0.32	Poor	
18-Apr-22	P36	SS 44871 35637	Ellipse	0.79	Frequently	Good	0	Minor	Possible	16	Moderate	85	0.27	Poor	
18-Apr-22	P37	SS 44875 35645	Ellipse	0.79	Frequently	Good	0	Minor	Possible	16	Moderate	85	0.27	Poor	
18-Apr-22	P38	SS 44878 35638	Ellipse	0.79	Frequently	Good	0	Minor	Possible	16	Moderate	85	0.27	Poor	
18-Apr-22	P39	SS 44815 35654	Ellipse	4.71	Frequently	Good	0	Minor	Possible	16	Moderate	85	0.32	Poor	
18-Apr-22	P40	SS 44825 35676	Ellipse	4.71	Frequently	Good	0	Minor	Possible	16	Moderate	85	0.32	Poor	
18-Apr-22	P41	SS 44824 35676	Ellipse	4.71	Frequently	Good	0	Minor	Possible	16	Moderate	81	0.32	Poor	

Date HSI assessment undertaken	Pond ref	Grid Ref	Shape	Pond area (m^2)	SI3 - Pond drying	SI4 - Water quality	SI4 – Shade %	SI6 - Fowl	SI7 - Fish	SI8 - Ponds	SI9 - Terr'l habitat	SI10 – Macro. %	HSI	HSI Category	eDNA Result
18-Apr-22	P42	SS 46081 35469	Ellipse	30	Rarely	Poor	0	Absent	Absent	6	Good	41	0.39	Poor	
18-Apr-22	P43	SS 45965 35610	Ellipse	27	Rarely	Good	0	Absent	Absent	6	Good	90	0.47	Poor	
18-Apr-22	P44	SS 46014 35859	Ellipse	347	Rarely	Good	0	Minor	Possible	6	Good	90	0.56	Below Average	+
18-Apr-22	P45	SS 46035 35738	Irregular	344	Rarely	Good	75	Minor	Possible	6	Good	90	0.56	Below Average	
18-Apr-22	P46	SS 45757 35701	Irregular	400	Rarely	Good	0	Minor	Possible	6	Good	90	0.56	Below Average	
18-Apr-22	P47	SS 45263 35978	Ellipse	12	Frequently	Moderate	0	Absent	Absent	22	Good	56	0.37	Poor	+
18-Apr-22	P48	SS 45237 35973	Irregular	125	Frequently	Moderate	0	Absent	Absent	22	Good	56	0.46	Poor	
8-Apr-22	P49	SS 4782832148	Irregular	2898	Rarely	Moderate	0	Minor	Major	1	Good	71	0.22	Poor	-
18-Apr-22	P50	SS 46480 36286	Ellipse	7.85	Frequently	Moderate	0	Absent	Absent	2	Moderate	41	0.28	Poor	-
18-Apr-22	P51	SS 46611 37155	Irregular	141	Frequently	Moderate	0	Absent	Absent	2	Moderate	41	0.38	Poor	-
18-Apr-22	P52	SS 46056 37485	Rectangle	50	Rarely	Good	0	Absent	Possible	18	Moderate	90	0.45	Poor	-
18-Apr-22	P53	SS 46458 34930	Rectangle	1600	Rarely	Good	0	Minor	Possible	13	Good	41	0.52	Below Average	-
18-Apr-22	P54	SS 46700 34853	Rectangle	1600	Rarely	Good	0	Minor	Possible	8	Good	41	0.52	Below Average	-
18-Apr-22	P55	SS 46776 33482	Rectangle	1600	Rarely	Good	0	Minor	Possible	8	Good	41	0.52	Below Average	-
18-Apr-22	P56	SS 46845 33197	Rectangle	800	Rarely	Good	0	Minor	Possible	8	Good	41	0.53	Below Average	-
18-Apr-22	P57	SS 46360 35070	Irregular	16	Frequently	Good	0	Absent	Absent	18	Good	90	0.56	Below Average	-
12-May-22	P58	SS 46242 34374	Ellipse	7	Sometimes	Moderate	90	Absent	Absent	20	Good	50	0.32	Poor	+
12-May-22	P59	SS 46208 34381	Ellipse	12.56	Sometimes	Moderate	90	Absent	Absent	20	Good	25	0.35	Poor	+
12-May-22	P60	SS 45250 35941	Surveyed as a pond within '5 Ponds' in Green (2021) report; dry in 2022												
12-May-22	P61	SS 45246 35928	Surveyed as pond within '5 Ponds' in Green (2021) report; dry in 2022												

Table A2. Individual pond photos taken during the HSI assessment

Pond 1

Pond 2

Pond 3

Pond 4

Pond 5

Pond 6

Pond 7

Pond 8

Pond 9

Pond 10

Pond 11

Pond 12

Pond 13

Pond 14

Pond 15

Pond 16

Pond 17

Pond 18

Pond 19

Pond 20

Pond

Pond 22

Pond 23

Pond 24

Pond 25

Pond 26

Pond 27

Pond 28

Pond 29

Pond 30

Pond 31

Pond 32

Pond 34

Pond 36

Pond 33

Pond 37

Pond 38

Pond 39

Pond 40

Pond 41

Pond 42

Pond 43

Pond 44

Pond 45

Pond 46

Pond 47

Pond 48

Pond 49

Pond 50

Pond 51

Pond 52

Pond 53 – Boundary Ditch North

Pond 54 – Boundary Ditch South

Pond 55 – Sir Arthur's Pill

Pond 56 – Double Ditch

Pond 57

Pond 58

Pond 59

Table A3. Population size class assessment results for Ponds 1-4,6, 8, 42-46, 58, 59

		POND NUMBER												
	Survey method	**P1**	**P2**	**P3**	**P4**	**P6**	**P8**	**P58**	**P59**	**P42**	**P43**	**P44**	**P45**	**P46**
Survey visit 1	**Bottle traps**	-	-	PN♂ 3 SN♂ 2 SN ♀ 4	GCN ♂ 1 GCN ♀ 3 SN♂ 4 SN ♀ 4 PN ♂ 2	-	-	-	-	PN♂ 5	Stickleback fish	Stickleback fish	Stickleback fish	GCN ♂ 4 GCN ♀ 6 SN♂ 18 SN ♀ 26 PN ♂ 24
	Torch light	GCN ♂ 3 GCN ♀ 6 PN♂ 6 SN♂ 7 sml ♀ 35	GCN ♂ 3 GCN ♀ 1 PN♂ 6 SN♂ 8 sml ♀ 49	GCN lar PN♂ 6 SN♂ 8 sml ♀ 18	GCN ♂ 4 GCN ♀ 4 SN♂ 10 PN ♂ 2 sml ♀ 37	PN♂ 6 SN♂ 8 sml ♀ 9	SN♂ 2 sml ♀ 9	GCN ♀ 1 GCN lar sml ♀ 13	GCN ♂ 1 PN♂ 18 SN♂ 8 sml ♀ 67 sml lar Rt 1	GCN ♂ 1 PN♂ 2 sml ♀ 9	0	PN♂ 2 SN♂ 2 sml ♀ 23 sml effs 2	0	GCN ♂ 2 GCN ♀ 3 PN♂ 17 SN♂ 9 sml ♀ 54
	Sweep net	0	0	-	-	0	0	0	0	-	-	**-**	-	-
	Egg search	sml	-	-	GCN sml	-	0	0	0	0	0	**0**	0	GCN sml
	GCN max count	**9**	**4**	**0**	**12**	**0**	**0**	**1**	**1**	**1**	0	**0**	0	**15**
	Notes	PN mating displays;	Low water; duckweed obscuring view	Low water		Poor visibility, v low water	Low water	Low water	Low water		Stickleback fish	Stickleback fish	Stickleback fish	
Survey visit 2	**Bottle traps**	-	-	PN♂ 3 SN♂ 3 SN ♀ 4	GCN ♂ 3 GCN ♀ 8 SN♂ 4 SN ♀ 8 PN ♂ 9	-	-	-	-	SN♂ 2 SN ♀ 6	Stickleback fish	Stickleback fish	Stickleback fish	GCN ♂ 2 GCN ♀ 2 SN♂ 27 SN ♀ 21 PN ♂ 16
	Torch light	GCN ♂ 4 GCN ♀ 3 PN♂ 14 SN♂ 17 sml ♀ 27	GCN ♂ 1 GCN ♀ 1 PN♂ 5 SN♂ 45 sml ♀ 92	GCN larvae PN♂ 2 SN♂ 2 sml ♀ 11	GCN ♂ 1 GCN ♀ 2 SN♂ 10 sml ♀ 45	sml ♀ 4	SN♂ 2 sml ♀ 9	small ♀ 3	GCN ♂ 1 PN♂ 2 SN♂ 2 sml ♀ 75 sml lar Rt 1	SN♂ 3 sml ♀ 8	0	PN♂ 2 SN♂ 2 sml ♀ 23 small effs 2	0	GCN ♂ 2 GCN ♀ 5 PN♂ 11 SN♂ 16 sml ♀ 93
	Sweep net	0	0	-	-	0	0	0	0	-	-	**-**	-	-
	Egg search	sml		sml	GCN sml	0	0	0	0	0	0	sml	0	GCN sml
	GCN count	**7**	**2**	**0**	**14**	**0**	**0**	**0**	**1**		0	**0**	0	**12**
	Notes	Low water	Low water; duckweed obscuring view	Low water Turbid	Turbid	Poor visibility, v low water	Low water	Low water	Low water	Turbid	Stickleback fish	Stickles; effs (overwintered in ponds, fully formed external gills)	Stickleback fish	
Survey visit 3	**Bottle traps**	-	-	PN♂ 3 SN♂ 1 SN ♀ 1	-	-	-	-	-	PN♂ 1	Stickleback fish	Stickleback fish	Stickleback fish	GCN ♂ 1 GCN ♀ 3 SN♂ 16 SN ♀ 18 PN ♂ 7 PN ♀ 18
	Torch light	PN♂ 7 SN♂ 4 sml ♀ 22	PN♂ 5 SN♂ 12 sml ♀ 43	GCN lar PN♂ 8 SN♂ 3 sml ♀ 18	GCN ♂ 1 GCN ♀ 1 SN♂ 15 sml ♀ 38	-	PN♂ 6 SN♂ 2 sml ♀ 1	GCN lar sml ♀ 18	PN♂ 2 SN♂ 2 sml ♀ 43 sml lar	SN♂ 4 sml ♀ 6	0	**0**	0	GCN ♂ 4 GCN ♀ 2 PN♂ 4 SN♂ 2 sml ♀ 52
	Sweep net	0	0	0	-	-	0	0	0	-	-	**-**	-	-
	Egg search	sml		sml	GCN sml	-	0	GCN	0		0	sml	0	GCN sml
	GCN count	**0**	**0**	**0**	**2**	**-**	**0**	**0**	**0**	**0**	0	**0**	0	**10**
	Notes	Low water PN mating displays	Low water; duckweed obscuring view	Turbid	Low water Turbid	**Dry**	Very Low water	Low water	Low water		Stickleback fish	Stickleback fish	Stickleback fish	
Survey visit 4	**Bottle traps**	-	-	**0**	-	-	-	-	-	PN♂ 1 SN♂ 2 SN ♀ 1	Stickleback fish	Stickleback fish	Stickleback fish	SN♂ 6 SN ♀ 17 PN ♂ 14 PN ♀ 8
	Torch light	small ♀ 5 PN♂ 1	PN♂ 4 sml ♀ 38	GCN ♂ 1 sml ♀ 1	GCN lar PN♂ 4 sml ♀ 14 sml lar	**-**	GCN ♂ 1	GCN ♀ 1 GCN lar sml ♀ 13	sml ♀ >200 sml lar	GCN ♂ 1 PN♂ 2 sml ♀ 9	0	**0**	0	GCN ♂ 6 GCN♀ 11 PN♂ 7 SN♂ 13 sml ♀ 41
	Sweep net	0	**0**	**-**	**0**	**-**	0	0	0	-	-	-	-	-
	Egg search	0	**0**	**0**	GCN sml	**-**	0	0	0		0	**0**	0	GCN
	GCN count	**0**	**0**	**1**	**0**	**-**	**1**	**1**	**0**	**1**	0	**0**	0	**17**
	Notes	**Low water**	Low water; duckweed obscuring view	Low water Turbid	Low water Turbid **+20 GCN lar**	**Dry**	Very low water: **3 small areas of water**	Low water	Low water		Stickleback fish	Stickleback fish	Stickleback fish	

		POND NUMBER												
	Survey method	P1	P2	P3	P4	P6	P8	P58	P59	P42	P43	P44	P45	P46
Survey visit 5	Bottle traps	-	-	-	-	-	-	-	-	PN♂ 4 PN♀ 2	Stickleback fish	Stickleback fish	Stickleback fish	GCN ♂ 2 GCN ♀ 1 SN♂ 21 SN ♀ 3 PN ♂ 18 PN ♀ 21
	Torch light	PN♂ 1 SN♂ 1 small ♀ 4	small ♀ 1	0	GCN lar PN♂ 8 SN♂ 8 sml ♀ 26 sml lar	-	0	GCN ♀ 2 GCN lar sml ♀ 8	sml ♀ >200 sml lar	SN♂ 3 sml ♀ 8	0	**0**	0	GCN ♂ 7 GCN ♀ 9 PN♂ 14 sml ♀ 32
	Sweep net	**0**	**0**	**0**	**0**	-	0	0	0	-	-	-	-	-
	Egg search	**0**	**0**	**0**	GCN sml	-	0	0	0	0	0	**0**	0	GCN
	GCN count	**0**	**0**	**0**	**0**	-	**0**	**2**	**0**	**0**	0	**0**	0	**19**
	Notes	**Mostly dry**	**Mostly dry**	Low water Turbid	Low water Turbid **+20 GCN lar**	**Dry**	Very low water: **3 small areas of water**	Low water	Low water		Stickleback fish	Stickleback fish	Stickleback fish	
Survey visit 6	Bottle traps	-	-	-	-	-		-	-	SN♂ 2 PN♀ 3	Stickleback fish	Stickleback fish	Stickleback fish	GCN ♂ 2 GCN ♀ 5 SN♂ 16 SN ♀ 14 PN ♂ 4 PN ♀ 9
	Torch light	PN♂ 5 SN♂ 1 sml ♀ 12	sml ♀ 9	GCN lar	GCN lar PN♂ 7 SN♂ 5 sml ♀ 18 sml lar	-	SN♂ 2 sml ♀ 9	sml ♀ 3	sml ♀ >200 sml lar	SN♂ 1 sml ♀ 2	0	**0**	0	GCN ♂ 3 GCN ♀ 3 PN♂ 15 SN♂ 6 sml ♀ 23
	Sweep net	**0**	**0**	**0**	**0**	-	0	0	0	-	-	-	-	-
	Egg search	**0**		**0**	GCN sml	-	0	0	0	0	0	**0**	0	0
	GCN count	**0**	**0**	**0**	**0**	-	**0**	**0**	**0**	**0**	0	**0**	0	**13**
	Notes	**Mostly dry**	**Mostly dry**	Low water Turbid	Low water Turbid **+20 GCN lar**	**Dry**	Very low water: **3 small areas of water**	Low water	Low water		Stickleback fish	Stickleback fish	Stickleback fish	

Key:

GCN	Great crested newt	SN	Smooth Newt	PN	Palmate newt	sml	unidentified Smooth/Palmate
Rt	Common Frog	Bb	Common Toad	♂	Male	♀	Female
sa	Sub-adult	jv	Juvenile	lar	Larvae	tad	Tadpole

Table A4. Population size class assessment results for ponds 25-30, 32,33,37-39, 47, 48

		POND NUMBER												
	Survey method	**P25**	**P26**	**P27**	**P28**	**P29**	**P30**	**P32**	**P33**	**P37**	**P38**	**P39**	**P47**	**P48**
Survey visit 1	**Bottle traps**	-	GCN ♂ 2 GCN ♀ 2 SN♂ 27 SN ♀ 12 PN ♂ 5	0	SN♂ 2 SN ♀ 1 PN ♂ 1	0	-	-	-	-	-	-	-	-
	Torch light	PN♂ 5 SN♂ 1 sml ♀ 12	GCN ♀ 1; GCN ♂ 1 PN♂ 4 sml ♀ 9	0	GCN ♀ 3; GCN lar PN♂ 5 SN♂ 9 sml 12	GCN ♂ 2; GCN ♀ 2; sml ♀ 4	GCN ♀ 2; GCN ♂ 2 sml ♀ 4	sml ♀ 5	sml ♀ 12 sml lar	0	sml ♀ 4	PN♂ 5 sml ♀ 18	sml ♀ 5	PN♂ 8 SN♂ 10 sml ♀ 18
	Sweep net	0	-	-	-	-	0	0	0	0	0	0	0	0
	Egg search	0	GCN sml	0	GCN sml	GCN	GCN	0	0	0	0	sml	sml	sml
	GCN count	Low water	**6**	**0**	**3**	**4**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Notes			Low water; submerged plants obscuring view		Low water	Low water	Low water	Low water	Low water	Low water	Low water	Low water	Low water
Survey visit 2	**Bottle traps**	-	SN♂ 15 SN ♀ 8 PN ♂ 3	0	GCN ♂ 3 GCN ♀ 1 SN♂ 2 SN ♀ 1 PN ♂ 1	0	-	-	-	-	-	-	-	-
	Torch light	PN♂ 2 SN♂ 1 sml ♀ 8	GCN ♀ 1; GCN ♂ 2 PN♂ 4 sml ♀ 9	0	GCN ♀ 1; GCN lar PN♂ 2 SN♂ 5	GCN ♂ 1; sml ♀ 2	0	sml ♀ 2	0	0	sml ♀ 1	PN♂ 1 sml ♀ 11	sml ♀ 1	PN♂ 5 SN♂ 11 sml ♀ 24
	Sweep net	0	-	-		0	0	0	0	0	0	0	0	0
	Egg search	0	sml	0	sml	0	0	0	0	0	0	0	0	0
	GCN count	**0**	**3**	**0**	**5**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Notes	Low water		Low water; submerged plants obscuring view	Low water	Low water	Low water	Low water	Low water	Low water	Low water	Low water	Low water	Low water
Survey visit 3	**Bottle traps**	-	0	-	GCN ♀ 1 SN♂ 1 PN ♂ 1	PN ♀ 1 PN ♂ 2	-	-	-	-	-	-	-	-
	Torch light	small ♀ 7	GCN ♀ 2; GCN ♂ 2 PN♂ 3 sml ♀ 12	GCN ♀ 2	GCN ♀ 1; GCN lar PN♂ 4 SN♂ 1 sml 6	GCN ♂ 1; sml ♀ 6	0	sml ♀ 2	0	0	sml ♀ 2	PN♂ 8 sml ♀ 18	sml ♀ 1	PN♂ 2 SN♂ 9 sml ♀ 18
	Sweep net	0	-	0	-	-	0	0		0	0	0	0	0
	Egg search	0	GCN	0	0	GCN	0	0		0	0	sml	0	0
	GCN count	**0**	**4**	**2**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
	Notes	Low water		Low water; submerged plants obscuring view	Low water	Low water	Low water	Low water	Low water	Low water	Low water	Low water	**V low water**	**Low water**
Survey visit 4	**Bottle traps**	**-**	**0**	**-**	SN♂ 1 SN ♀ 3	PN ♀ 1 PN ♂ 1	-	-	-	-	-	-	-	-
	Torch light	GCN lar sml ♀ 5 sml lar	GCN ♀ 3; GCN ♂ 5 GCN SA 1 SN♂ 2 sml ♀ 3	0	**GCN lar;** PN♂ 1 SN♂ 5 sml ♀ 8 sml lar	GCN ♂ 1; PN♂ 1 SN♂ 3 sml ♀ 14	GCN ♀ 3; GCN ♂ 2 SN♂ 8 sml ♀ 4	-	sml ♀ 12 sml lar	PN♂ 1 SN♂ 1	0	-	-	GCN ♀ 1; GCN ♂ 1 SN♂ 6 sml ♀ 19 Bb 2
	Sweep net	**0**	**-**	**0**	**-**	**-**	0	-	0	0	0	-	-	0
	Egg search	**0**	GCN	**0**	**0**	**0**	0	-	sml	0	0	-	-	0
	GCN count	**0**	**9**	**0**	**0**	**1**	**5**	**-**	**0**	**0**	**0**	**-**	**-**	**2**
	Notes	Low water **+50 GCN lar**	Low water	Low water; submerged plants obscuring view	Low water	Low water	Low water	Dry	Low water	Almost dry	Almost dry	Dry	Dry	**V low water**
Survey visit 5S	**Bottle traps**	**-**	**-**	**-**	**-**	**0**	-	-	-	-	-	-	-	-
	Torch light	GCN lar sml lar	GCN ♂ 1 SN♂ 3 sml ♀ 10	GCN♀ 4; GCN♂ 2 GCN SA 1 sml ♀ 2	SN♂ 5 sml ♀ 6	**GCN lar** PN♂ 4 SN♂ 3 sml ♀ 9	GCN ♀ 2; SN♂ 3 sml ♀ 8	-	GCN lar SN♂ 2 sml ♀ 11	0	0	-	-	GCN ♀ 4; GCN ♂ 2 GCN SA 1 PN♂ 2 sml ♀ 26
	Sweep net	**0**	**0**	**0**	**0**	**-**	0	-	0	0	0	-	-	0
	Egg search	**0**	**0**	**0**	**0**	**0**	GCN sml	-	0	0	0	-	-	GCN
	GCN count	**0**	**1**	**7**	**0**	**0**	**2**	**-**	**0**	**0**	**0**	**-**	**-**	**7**
	Notes	Low water	Low water	Low water; submerged plants obscuring view	Low water	Low water	Low water	Dry	Low water	Almost dry	Almost dry	Dry	Dry	**V low water**

		POND NUMBER												
	Survey method	**P25**	**P26**	**P27**	**P28**	**P29**	**P30**	**P32**	**P33**	**P37**	**P38**	**P39**	**P47**	**P48**
Survey visit 6	**Bottle traps**	**-**	**-**	**-**	**-**	**-**	-	-	-	-	-	-	-	-
	Torch light	GCN lar sml lar	GCN♀ 1 SN♂ 1 sml ♀ 15	GCN ♀ 2; GCN ♂ 2 sml ♀ 8	SN♂ 2 sml ♀ 10	**GCN lar** PN♂ 5 SN♂ 1 sml ♀ 6	GCN ♀ 2; SN♂ 5 sml ♀ 14	-	GCN lar SN♂ 2 sml ♀ 9	0	0	-	-	GCN ♀ 2; GCN ♂ 2 PN♂ 8 sml ♀ 24
	Sweep net	**0**	**0**	**0**	**0**	**0**	0	-	0	0	0	-	-	0
	Egg search	**0**	**0**	**0**	**0**	**0**	0	-	0	0	0	-	-	0
	GCN count	**0**	**1**	**4**	**0**	**0**	**2**	**-**	**0**	**0**	**0**	**-**	**-**	**4**
	Notes	Low water	Low water	Low water; submerged plants obscuring view	Low water	Low water	Low water	Dry	Low water	Almost dry	Almost dry	Dry	Dry	**V low water**

Key:

GCN	Great crested newt	SN	Smooth Newt	PN	Palmate newt	sml	unidentified Smooth/Palmate
Rt	Common Frog	Bb	Common Toad	♂	Male	♀	Female
sa	Sub-adult	jv	Juvenile	lar	Larvae	tad	Tadpole

Table A5. Population class size survey dates and weather conditions in spring 2022

Visit	Ponds Surveyed	Date	Time	Temp	Wind	Cloud	Precip	Humidity
1	1,2,3,4,6,8,58,59, 42,43,44,45,46	11 May	pm	13	2-3	0	0	86
		12 May	am	15	1	50	0	79
1	25,26, 27, 28, 29, 30, 32, 33, 37, 38,39,47,48	12 May	pm	13	2-3	40	0	78
		13 May	am	13	2	80	0	79
2	1,2,3,4,6,8,58, 59 42,43,44,45,46	13 May	pm	12	2	0	0	81
		14 May	am	13	1	80	0	88
2	25,26, 27,28,29, 30,32,33,37,38,39	14 May	pm	14	1	75	light shower close to midnight	71
		15 May	am	15	2	62	0	75
3	1,2,3,4,6,8,58, 59 42,43,44,45,46	23 May	pm	13	2	100	0	82
		24 May	am	12	2	100	0	81
3	25,26, 27,28,29, 30, 32, 33,37,38,39, 47,48	24 May	pm	13	2	80	0	80
		25 May	am	14	2-3	100	brief shower	94
4	1,2,3,4,6,8,58, 59	28 May	pm	12	2	10	0	78
		29 May	am	15	1	0	0	80
4	42,43,44,45,46	29 May	pm	14	1	50	0	78
		30 May	am	12	1	40	0	83
4	25,26, 27,28,29, 30, 32, 33,37,38,39,47,48	30 May	pm	10	2	80	0	75
		31 May	am	12	1	20	0	78
5	1,2,3,4,8,58, 59 42,43,44,45,46	1 June	pm	10	1	0	0	85
		2 June	am	15	2-3	90	0	
5	25,26, 27,28,29, 30, 33,37,38,47,48	2 June	pm	13	1	0	0	68
		3 June	am	15	1	10	0	78
6	1,2,3,4,8,58, 59 42,43,44,45,46	5 June	pm	13	1	100	Several intermittent showers	94
		6 June	am	13	1	80	0	95
6	25,26, 27,28,29, 30, 33,37,38, 47,48	6 June	pm	14	1	60	0	66
		7 June	am	15	1	90	0	85

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.M Reptile Survey Report

Appendix 16.M Reptile Survey Report 2022

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 R rev 02
Client/s:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal HaskoningDHV
Survey Dates:	May – September 2022
Report Date:	November 2022
Report Author:	Andrew Charles BSc (Hons), MSc, MCIEEM
Approved By:	Erin Reardon, BSc, PhD, MCIEEM
Surveyor/s	Andrew Charles BSc (Hons), MSc, MCIEEM Willow West BSc, MSc Paul Lott BSc Erin Reardon, BSc, PhD, MCIEEM William Corbett BSc, MSc Martin Clements

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Disclaimer

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake a Reptile Survey along the proposed onshore export cable corridor routes for the White Cross Windfarm ("the Project").

The proposed onshore export cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1-1). There are two onshore export cable corridor routes. The first onshore export cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a second route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final preferred route is to be determined; see Figure 1.1).

The survey area consisted of the proposed onshore export cable corridor routes (see Figure 1.1).

Native terrestrial reptiles include:

- Slow worm (*Anguis fragilis*);
- Common lizard (*Zootoca vivipara*);
- Sand lizard (*Lacerta agilis*);
- Grass snake (*Natrix natrix*);
- Adder (*Vipera berus*); and,
- Smooth snake (*Coronella austriaca*).

All reptiles are protected against intentional killing and injury under the Wildlife and Countryside Act 1981 (as amended). Natural England states that activities such as site investigations and movements of machinery may breach this legislation by causing death or injury to reptiles (English Nature 2004).

Sand lizard and smooth snake are afforded further protection under the Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. This affords them additional protection, making it illegal to:

- Deliberately capture smooth snakes or sand lizards;
- Deliberately disturb smooth snakes or sand lizards, including in particular any disturbance which is likely to:

    - Impair their ability to survive, reproduce or to rear or nurture their young;
    - Impair their ability to hibernate or migrate; or
    - Significantly affect their local distribution or abundance.
- Damage or destroy a breeding site or resting place of smooth snakes and sand lizards; and,
- Possess or control any live or dead specimen or anything derived from a smooth snake or sand lizard.

It should also be noted that reptiles are species of principal importance listed in Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

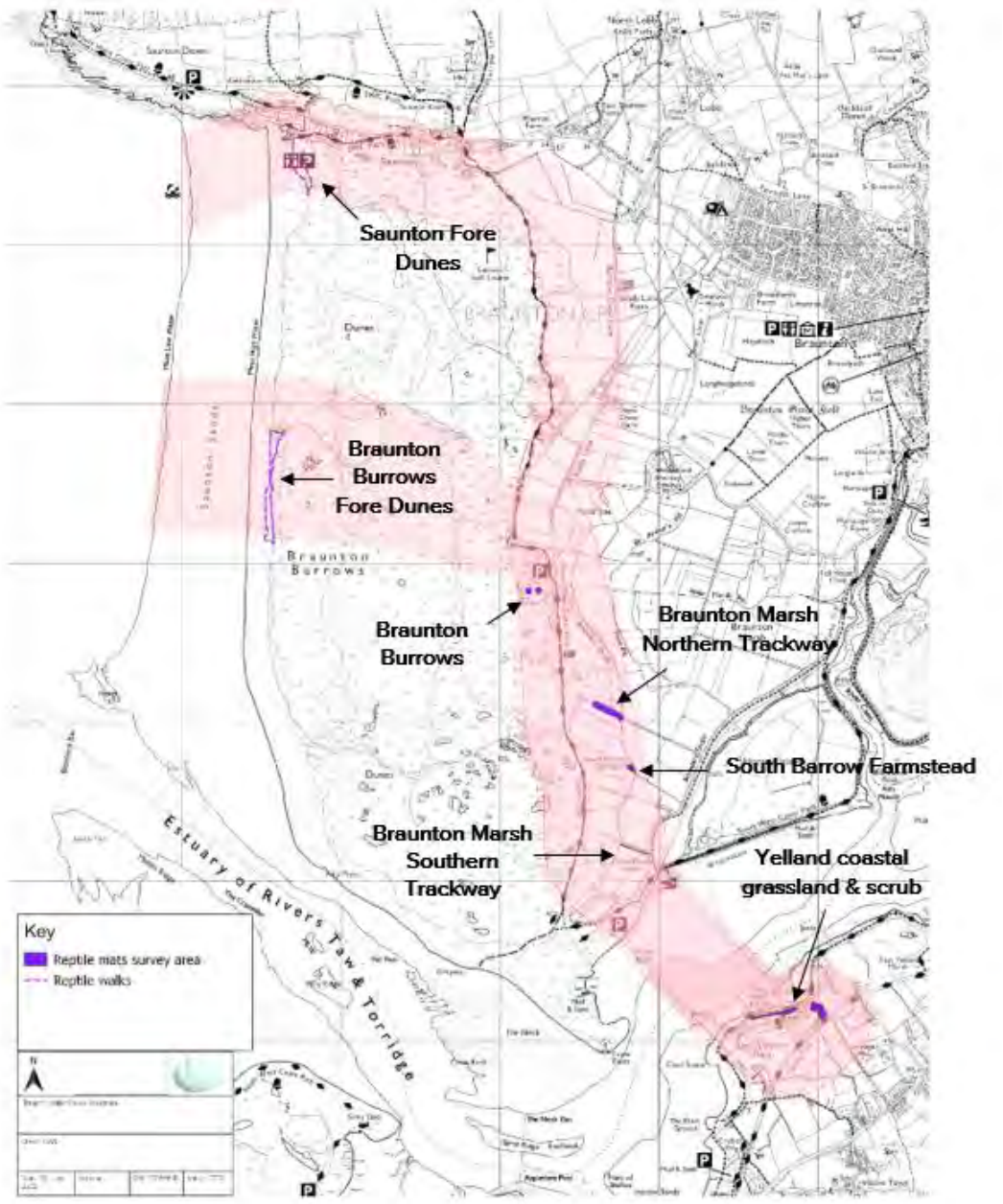

Figure 1-1. The proposed Onshore Export Cable Corridor routes indicated in red with reptile survey locations in purple

2. Survey Methods

2.1 Desk study – Reptiles

The information provided by Devon Biodiversity Records Centre (DBRC) included fifteen records for reptiles within 1 km of the Braunton portion of the proposed cable route, including:

- Adder (4 records);
- Common lizard (5 records);
- Grass snake (2 records); and,
- Sand lizard (3 records).

Grass snake and adder were observed within Braunton Burrows during the walk over survey – April 2022. Additionally, in 2021, a sand lizard survey of in Braunton Burrows observed a breeding population of sand lizard along the foredune ridge in open marram grass dominated dunes (Breeds, 2021). Other reptile species observed during the 2021 study included common lizard and adder.

2.2 Artificial & Natural Refugia Survey

The artificial and natural refugia survey, to ascertain the presence or likely absence of reptiles, was undertaken following current good practice methodologies (Froglife 1999; Gent & Gibson 1998). The survey was undertaken where artificial refugia were distributed within the East Yelland areas (south of the Taw-Torridge Estuary) on 20 April 2022 and with the Braunton Burrows and Braunton Marsh areas (north of the Taw-Torridge Estuary) on 14 May 2022. The artificial refugia comprised of corrugated and non-corrugated bitumen sheets approximately 0.5m x 0.5m in size, and sheets of corrugated metal, approximately 2m x 1m. Natural refugia consisted of logs, stone/rock, litter/debris etc. which were already present within the survey areas.

Artificial refugia were laid in locations which were deemed to have high potential for basking reptiles, such as natural and semi-natural habitats including mosaic open/exposed areas and areas of cover/dense vegetation and/or natural refugia. The artificial refugia were laid at a density of at least 10 per ha. Areas where disturbance of the refugia was likely were avoided, including areas grazed by cattle, agricultural fields and areas including heavy public use.

The survey areas comprised of the following (see Figure 1-1):

- Yelland coastal grassland and scrub;
- Braunton Marsh – southern trackway;
- Braunton Marsh – South Barrow Farmstead;
- Braunton Marsh – northern trackway; and,
- Braunton Burrows – dunes.

Once laid, the refugia were allowed to 'bed in' for a period of at least fourteen days, thus allowing any reptiles within the site to become accustomed to using them.

Due to the exceptionally dry and hot weather conditions experienced during spring and summer 2022, extended period of survey visits were undertaken during May, June, July, August and September 2022. At least seven survey visits were undertaken during suitable weather conditions as detailed by Gent & Gibson (1998). The ideal weather conditions are summarised in Table 2.1.

2.3 Reptile Transect Survey

Due to the confirmed presence of sand lizard *Lacerta agilis* within Braunton Burrows (Breeds, 2021), reptile transect surveys were undertaken of the foredunes within the proposed onshore export cable corridors at Braunton Burrows (mid dunes near Partridge Slack) and Saunton Sands (see Figure 1.1).

The transects included multiple stopping points, specifically including periods of observation of south facing slopes with bare sand and tussocky vegetation. Each area was walked predominantly moving from south to north, keeping the sun to the observer's back (Back from the Brink 2020).

Due to the exceptionally dry and hot weather conditions experienced during spring and summer 2022, extended period of survey visits were undertaken during May, June, July, August and September 2022. At least ten transect survey visits were undertaken within each survey area during suitable weather conditions as detailed by Gent & Gibson (1998). The ideal weather conditions are summarised in Table 2.1.

Table 2.1: Guidelines for Reptile Surveys (Gent & Gibson 1998)

Parameter	Value
Time of year	April – September
Time of day	9:00 – 11:00* 16:00 – 19:00*
Temperature	10 - 17°C
Sunshine	Intermittent or hazy
Wind	Little or none

* Typical timings – these may vary depending on the temperature window

2.4 Limitations

The survey area included extensive habitats suitable for reptiles. However, only a limited extent of this area could be directly surveyed, avoiding areas where disturbance of the refugia was likely, including areas grazed by cattle, agricultural fields and areas including heavy public use.

A limited number of artificial refugia within Braunton Burrows appeared to have been disturbed between survey visits. This level of disturbance was not considered to significantly alter the findings of the survey.

3. Results

3.1 Artificial & Natural Refugia Survey

At Yelland coastal grassland and scrub (Table 3.1) and grassland adjacent to the substation (Table 3.2), reptile species recorded included:

- Slow worm;
- Common lizard;
- Grass snake; and,
- Adder.

At Braunton Marsh southern trackway (Table 3.3), South Barrow Farmstead (Table 3.4) and northern trackway (Table 3.5), reptile species recorded included:

- Slow worm;
- Common lizard;
- Grass snake; and,
- Adder.

At Braunton Burrows Inner Dunes (Table 3.6), reptile species recorded included:

- Common lizard;
- Grass snake; and,
- Adder.

3.2 Reptile Transect Survey

At Brauton Burrows Foredunes (Table 3.7), reptile species recorded included:

- Sand lizard;
- Common lizard;
- Grass snake; and,
- Adder.

At Saunton Sands Foredunes (Table 3.8), reptile species recorded included:

- Common lizard; and,
- Adder.

3.3 Reptile Population Assessments

The peak counts for reptile species were relatively low. However, it is noted that the artificial and natural refugia survey covered a very limited extent of the total survey area due to limitations of deploying refugia within areas grazed by cattle, agricultural fields and areas with heavy public use. Accordingly, when the reptile survey results are extrapolated with regard to the full extent of available habitat, the survey areas are considered to support the following population estimates, in accordance with Guidance published by The Herpetofauna Group's of Britain & Ireland (1998):

Yelland coastal grassland & scrub:

- Slow worm – medium population;
- Common lizard – medium population;
- Grass snake – medium population; and,
- Adder – medium population.

Braunton Marsh:

- Slow worm – high population;
- Common lizard – medium population;
- Grass snake – high population; and,
- Adder – medium population.

Braunton Burrows:

- Sand lizard – high population;
- Common lizard – high population;
- Grass snake – high population; and,
- Adder – high population.

At Saunton Sands Foredunes:

- Common lizard – high population; and,
- Adder – high population.

Sand lizard was notably considered absent from the foredunes at Saunton Sands. It is considered that this may be due to sand lizard not colonising the northern extent of the Braunton Burrow dune system to date, potentially also combined with a high level of human activity with this area of the dune system.

Table 3.1. Artificial & Natural Refugia Survey – East Yelland coastal grassland and scrub

Visit	Date and Time	Environmental conditions		Reptiles
Set up 0	20th April 2022	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	15 80 2	Refugia set out No observations
1	9th May 2022 11:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	11 0 3	1 x common lizard
2	30th May 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	12 75 2	1 x slow worm female 1 x slow worm subadult
3	1st June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 15 0	1 x slow worm male
4	15th June 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 20 2	No observations
5	22nd June 2022 08.30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	19 <10 1	1 x slow worm male 1 x slow worm female
6	8th July 2022 09:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 10 1	1 x grass snake juvenile 1 x slow worm female
7	15th July 2022 08:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 15 0	1 x slow worm female 1 x adder
8	31st Aug 2022 07:45	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	18 80 1	No observations
9	24th Sep 2022 13:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 10 3	1 x grass snake juvenile 1 x slow worm female Refugia collected

Table 3.2. Artificial & Natural Refugia Survey – East Yelland grassland adjacent to the substation

Visit	Date and Time	Environmental conditions		Reptiles
Set up 0	20th April 2022	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	15 80 2	Refugia set out 1 x common lizard
1	9th May 2022 11.00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	12 75 3	1 x slow worm male
2	30th May 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	12 75 2	No observations
3	1st June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 15 0	1 x slow worm subadult
4	15th June 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 20 2	No observations
5	22nd June 2022 08.30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	19 <10 1	1 x slow worm subadult 1 x grass snake
6	8th July 2022	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 10 1	1 x common lizard
7	15th July 2022 08:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 15 0	No observations
8	31st Aug 2022 07:45	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	18 80 1	1 x common lizard 1 x slow worm female Refugia collected

Table 3.3. Artificial & Natural Refugia Survey – Braunton Marsh: southern trackway

Visit	Date and Time	Environmental conditions		Reptiles
Set up 0	14th May 2022	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	13 50 2	Refugia set out No observations
1	29th May 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	1 x slow worm male 1 x slow worm female
2	2nd June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	1 x slow worm male 1 x slow worm female
3	15th June 2022 16:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	1 x slow worm female 2 x slow worm juvenile 2 x common lizard 1 x common lizard juvenile
4	22nd June 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	19 <10 1	No observations
5	29th June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 60 2	No observations
6	8th July 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	22 <10 1	1 x slow worm male 1 x slow worm female 1 x slow worm juvenile
7	31th Aug 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	21 10 1	1 x slow worm male 3 x slow worm female
8	24th Sep 2022 15:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 70 2	2 x slow worm female Refugia collected

Table 3.4. Artificial & Natural Refugia Survey – Braunton Marsh: South Barrow Farmstead

Visit	Date and Time	Environmental conditions		Reptiles
Set up 0	14th May 2022	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	13 50 2	Refugia set out No observations
1	29th May 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	No observations
2	2nd June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	1 x slow worm male
3	15th June 2022 16:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	1 x grass snake
4	22nd June 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	19 <10 1	No observations
5	29th June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 60 2	No observations
6	8th July 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	22 <10 1	No observations Refugia disturbed by cattle
7	31th Aug 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	21 10 1	No observations Refugia disturbed by cattle
8	24th Sep 2022 15:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 70 2	2 x slow worm female
9	25th Sept 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	2 x slow worm female Refugia collected

Table 3.5. Artificial & Natural Refugia Survey – Braunton Marsh: northern trackway

Visit	Date and Time	Environmental conditions		Reptiles
Set up 0	14th May 2022	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	13 50 2	Refugia set out
1	29th May 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	No observations
2	2nd June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	1 x slow worm male
3	15th June 2022 16:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	1 x slow worm female
4	22nd June 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	19 <10 1	No observations
5	29th June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 60 2	No observations
6	8th July 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	22 <10 1	No observations
7	31th Aug 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	21 10 1	No observations
8	24th Sep 22 15:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 70 2	2 x slow worm female
9	25th Sept 22 09:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	1 x common lizard 1 x adder Refugia collected

Table 3.6. Artificial & Natural Refugia Survey – Braunton Inner Dunes

Visit	Date and Time	Environmental conditions		Reptiles
Set up 0	14th May 2022	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	13 50 2	Refugia set out 1 x common lizard
1	29th May 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	1 x grass snake
2	2nd June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	No observations
3	15th June 2022 16:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	1 x common lizard 1 x adder
4	22nd June 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	19 <10 1	No observations Refugia partially removed
5	29th June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 60 2	No observations
6	8th July 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	22 <10 1	No observations Refugia partially removed
7	31th Aug 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	21 10 1	1 x adder
8	24th Sep 22 15:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 70 2	1 x common lizard
9	25th Sept 22 09:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	No observations Refugia collected

Table 3.7. Reptile Transect Survey – Braunton Burrows Foredunes

Visit	Date and Time	Environmental conditions		Reptiles
1	20th April 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	15 80 2	2 x sand lizard male 4 x common lizard
2	9th May 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	12 75 3	4 x sand lizard male 1 x sand lizard female 2 x common lizard 1 x adder female
3	14th May 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	13 50 2	1 x sand lizard male 1 x common lizard
4	29th May 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	1 x sand lizard male 1 x sand lizard female 1 x common lizard 1 x grass snake
5	2nd June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	1 x common lizard
6	15th June 2022 16:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	4 x common lizard 1 x adder male
7	22nd June 2022 09:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	19 <10 1	2 x sand lizard male 2 x sand lizard female 2 x common lizard
8	29th June 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 60 2	1 x common lizard
9	15th July 2018 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	2 x sand lizard female 2 x common lizard
10	31th Aug 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	21 10 1	No observations
11	24th Sep 22 15:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 70 2	2 x common lizard 2 x adder

Table 3.8. Reptile Transect Survey – Saunton Sands Foredunes

Visit	Date and Time	Environmental conditions		Reptiles
1	20th April 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	15 80 2	2 x common lizard
2	9th May 2022 10.00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	12 75 3	2 x common lizard
3	14th May 2022 09:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	13 50 2	1 x common lizard 1 x adder female
4	29th May 2022 10:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	1 x common lizard
5	30th May 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	12 75 2	1 x common lizard
6	1st June 2022 90:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	17 15 0	4 x common lizard 1 x adder
7	15th June 2022 16:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 <10 1	2 x common lizard
8	22nd June 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	19 <10 1	No observations
9	29th June 2022 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	16 60 2	2 x common lizard
10	8th July 2022 10:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	22 <10 1	No observations
11	31th Aug 2022 19:30	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	21 10 1	No observations
12	25th Sept 22 09:00	Temp. (°C): Cloud cover (%): Wind (Beaufort scale):	14 5 1	4 x common lizard

References

Back from the Brink. 2020. Species Survey Guide – Sand Lizard *Lacerta agilis*

Breeds, J. 2021. Braunton Burrows: A survey of the sand lizard, *Lacerta agilis*. Dynamic Dunescapes Project.

Conservation of Habitats and Species (Amendment) (EU Exit) Regulations 2019. HMSO

Countryside and Rights of Way Act 2000. HMSO

Ecologic Consultants Ecologists LLP. 2022. Preliminary Ecological Appraisal – White Cross Wind Farm. Report reference: 220316 PEA.

English Nature. 2004. *Reptiles: Guidelines for Developers*. Belmont Press, English Nature, Peterborough

Gent, A. and Gibson, S. *eds.* 1998. *Herptofauna Workers Manual*. Joint Nature Conservation Committee.

Herpetofauna Groups of Britain & Ireland. 1998. *Evaluating local mitigation/translocation programmes: Maintaining Best Practice and lawful standards*. Herpetofauna Groups of Britain & Ireland.

Wildlife & Countryside Act 1981, as amended. HMSO

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.N Terrestrial Invertebrate Survey Report

Appendix 16.N Terrestrial Invertebrate Survey Report 2022

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 TI rev00
Client:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal HaskoningDHV
Survey Date/s:	June – August 2022
Report Date:	November 2022
Report Author:	Andrew Charles BSc (Hons), MSc, MCIEEM
Approved By:	Erin Reardon BSc, PhD
Surveyor/s:	Julian Prow Andrew Charles BSc (Hons), MSc, MCIEEM

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DISCLAIMER

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertaken a Terrestrial Invertebrate Survey along the proposed onshore cable corridor routes for the White Cross Windfarm ("the Project").

The proposed onshore cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1). There are two onshore cable corridor routes. The first onshore cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a second route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final preferred route is to be determined; see Figure 1-1).

The survey area consisted of the proposed Onshore Export Cable Corridor routes (see Figure 1-1).

The Royal HaskoningDHV Phase 2 ITT stipulated that the Terrestrial Invertebrate Survey utilise sampling based on sweep netting and recording of stridulations within, or within 50m of, Braunton Burrows SAC and the Taw-Torridge Estuary SSSI (see Royal HaskoningDHV Drawing Number: PC2978-RHD-ZZ-XX-DR-Z-0176).

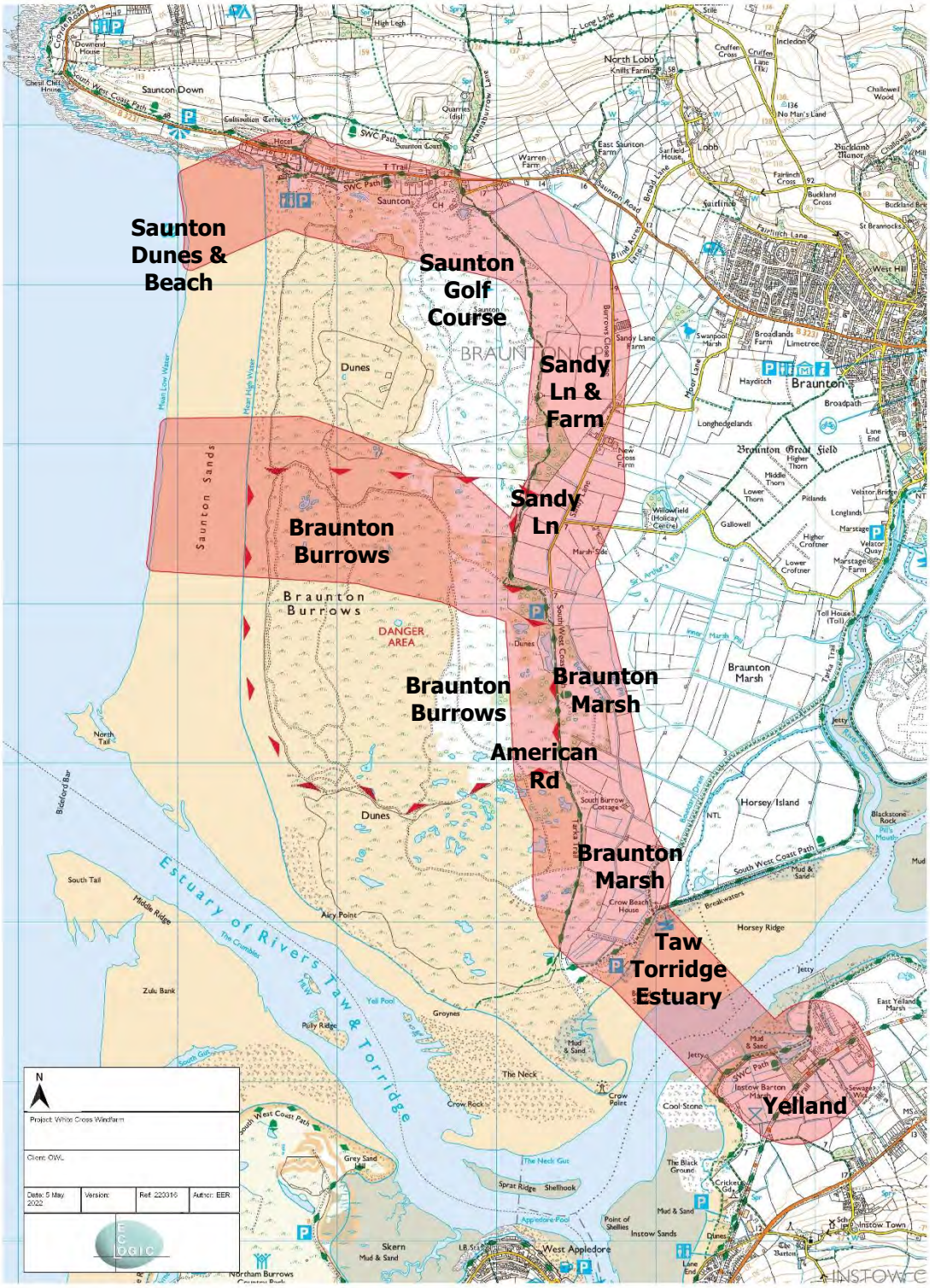


Figure 1-1 The proposed onshore cable corridor routes

1.1 Yelland

The coast along the Yelland extent of the survey area includes a lake and reedbed and coastal grassland and scrub directly adjacent to the estuary.

The lake includes a central area of standing water fringed by reedbeds. The lake included inflowing water from the agricultural field ditch system at its western extent, and from the Taka Trail ditch system at its eastern extent.

The coast included an embankment separating the lake and agricultural fields from the estuary.

The intertidal extent of the estuary at Yelland includes a rocky shoreline, saltmarsh and tidal creeks, with extensive mud/sand flats.

Photograph 1-1. The Lake

Photograph 1-2. The Yelland coastal embankment including coastal grassland & scrub

Photograph 1.3. The Yelland coastal embankment including coastal grassland & scrub

Photograph 1-4. The estuary and extent of saltmarsh at Yelland

1.2 Braunton Burrows

Extensive sand dune system including undulating mosaics of bare sand, mobile and fixed sand dunes (yellow and grey dunes), dune slack, ponds, species rich grassland, scrub and woodland.

The northern extent of the dune system includes Saunton Golf Course, Saunton Sands and residential properties. The golf course includes fairways and greens within the mosaic of dune habitats. Saunton Sands includes holiday accommodation and associated seaside amenities.

The southern tip of Braunton Burrows comprises of Crow Point. The immediate area includes Crow Point House, a carpark, a former carpark (now including no vehicle access), boatyard and the southern extent of American Road. Surrounding habitat types include

saltmarsh, sand/mud flats and tidal creeks within the estuary and a mosaic of ephemeral/short perennial, dune grassland and scrub.

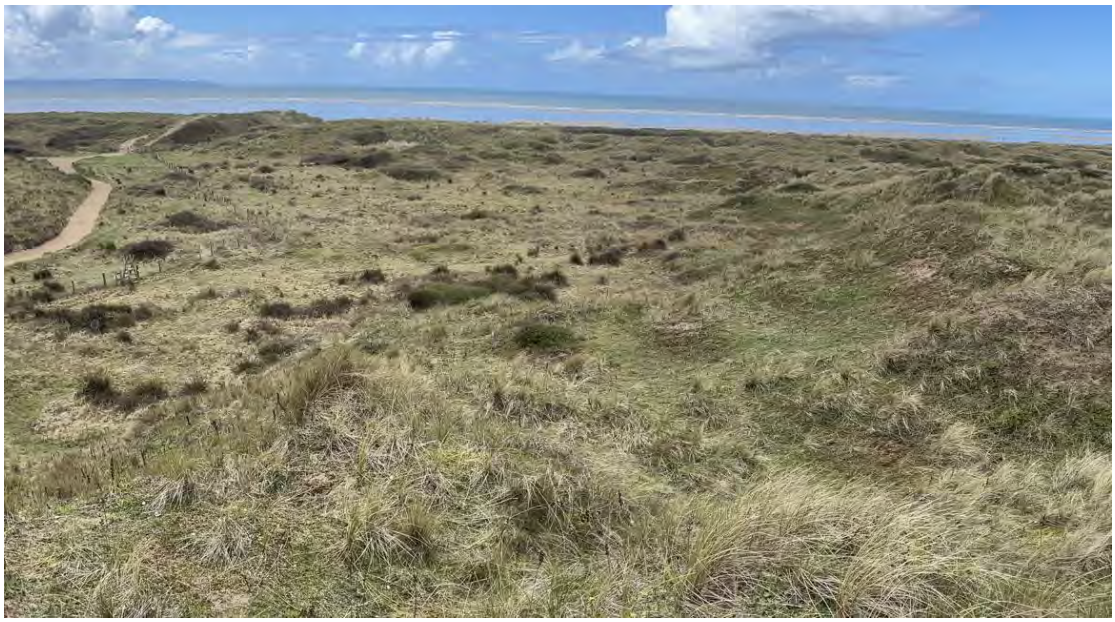
American Road continues north/south through the south-eastern extent of Braunton Burrows. A mosaic of mobile and fixed dune grassland, scrub, woodland and ditches further surround the road. Dune grassland to the east, comprised of more tightly grazed grassland with no public access. The dune grassland to the west included large grazing compartments with free roaming public access.

The outer dunes/yellow dunes/mobile dunes included bare sand and dune grassland.

The inner dune/grey dunes/fixed dune grassland included dune grassland, creeping willow, dune scrub and woodland.

Photograph 1-5. Outer dunes with mosaic of fixed and mobile dune grassland at Crow Point

Photograph 1-6. American Road



Photograph 1-7. Outer dunes with mosaic of fixed and mobile dune grassland, dune slack and scattered scrub

Photograph 1-8. Inner dunes including a dune slack grassland and scrub

Photograph 1-9 Inner dunes with mosaic of fixed dune grassland, scrub and pond (Pond 46)

Photograph 1-10. Mosaic of fixed dune scrub and woodland

Photograph 1-11. Partridge Slack with cluster of dune slack ponds

Photograph 1-12. Saunton Sands Golf Course

2. Survey Methods

The Royal HaskoningDHV Phase 2 ITT stipulated that the Terrestrial Invertebrate Survey utilise sampling based on sweep netting and recording of stridulations within, or within 50m of, Braunton Burrows SAC and the Taw-Torridge Estuary SSSI (see Royal HaskoningDHV Drawing Number: PC2978-RHD-ZZ-XX-DR-Z-0176).

2.1 Sweep Netting

Sweep netting included one sample for approximately every 50m^2 of suitable habitat. At each sample point, sweep netting was undertaken for 1 minute, followed by species identification in the field. Specimens not easily identifiable in the field were collected with forceps and preserved in vials of industrial methylated spirits (denatured ethanol) for later examination and determination under a stereoscopic microscope.

The survey involved a day time and night time June visit and August visit to each sampling location.

2.2 Stridulations

Listening for stridulations, with audio recording, was undertaken in conjunction with sweeping netting field visits, and in association nocturnal survey field visits.

2.3 Limitations

Sweep netting is only possible in areas with suitable vegetation heights and type, which included ungrazed/lightly grazed grasslands with tussocky/taller swards, margins of wetland features and areas dune scrub/grassland mosaic with only light/scattered creeping willow. Therefore, areas with very short/tightly grazed vegetation, scrub and woodland were omitted from sampling.

Additionally, sweep netting includes a basis towards species occupying mid-regions, tops and immediately above the vegetation being sampled. Therefore, species associated with substrates, bare ground, the lower extent of the vegetation, dense scrub and woodland were unlikely to be captured.

Due to extremely dry conditions during 2022 and/or grazing by cattle, rabbitats and deer, extensive areas of dune grassland were reduced to very short and/or desiccated swards, further limiting the extent of sweep netting.

3. Survey Results

3.1 Desk Study

The information provided by Devon Biodiversity Records Centre (DBRC) included 761 records for invertebrates inside, and within 1km of, the proposed onshore cable corridor routes, including:

- UK Priority Species (UK BAP);
- Devon Biodiversity Action Plan Species (D BAP);
- Substantial local decline in Devon;
- Red Data Book Species (pRDB1, pRDB2 & RDB3);
- Nationally Notable A (Na); &,
- Nationally Notable B (Nb).

See Table 3.1 for desk study records relating to species with UK and/or international protection and recognised conservation status.

3.2 Sweep Netting & Stridulation Recording

Tables 3.2 and 3.3 provide records for the species recorded at the Yelland and Braunton Burrows sample points.

Table 3.1. Desk Study invertebrate records

Species Group	Common Name	Scientific Name	UK Protection	International Protection	Status
Snails	Sandbowl snail	*Quickella arenaria*	WCA 5 (S)		Endangered (UK)
Bees	Brown-banded Carder-bee	*Bombus humilis*	NERC 41		UKBAP (P)
Dragon & damselflies	Ruddy Darter	*Sympetrum sanguineum*			Nb; KeyD (R)
Bush Crickets	Great Green Bush Cricket	*Tettigonia viridissima*			DBAP
	Grey Bush Cricket	*Platycleis albopunctata*			Nb
Butterflies	White Admiral	*Limenitis camilla*	NERC 41		Decline
	Dark Green Fritillary	*Argynnis aglaja*			Decline
	Brown Argus	*Aricia agestis*			Decline
	Small Heath	*Coenonympha pamphilus*	NERC 41		UKBAP (P)
	Dingy Skipper	*Erynnis tages*	NERC 41		UKBAP (P); Decline
	Grayling	*Hipparchia semele*	NERC 41		UKBAP (P)
	Wall	*Lasiommata megera*	NERC 41		UKBAP (P)
	Grizzled Skipper	*Pyrgus malvae*	NERC 41		UKBAP (P); Decline
	Small Blue	*Cupido minimus*	WCA 5 (S); NERC 41		UKBAP (P); Decline
	Green Hairstreak	*Callophrys rubi*			Decline
	Pearl-bordered fritillary	*Boloria euphrosyne*	WCA 5 (S); NERC 41		UKBAP (P); DBAP; Nb
	Small Pearl-Bordered Fritillary	*Boloria selene*	NERC 41		UKBAP (P); Decline
	Marsh Fritillary	*Euphydryas aurinia*	WCA 5; NERC 41	EC IIa; Bern II	UKBAP (P); DBAP; Nb; VU
	Silver-Studded Blue	*Plebejus argus*	WCA 5 (S); NERC 41		UKBAP (P); Nb
Moths	Pembroke Neb	*Monochroa elongella*			pRDB1
	Beautiful Groundling	*Caryocolum marmorea*			Nb
	Hoary Footman	*Eilema caniola*			Nb

Table 3.1. Desk Study invertebrate records

Species Group	Common Name	Scientific Name	UK Protection	International Protection	Status
	Devonshire Wainscot	*Leucania putrescens*			Na; Special Species
	Sand Dart	*Agrotis ripae*			Nb
	Cinnabar	*Tyria jacobaeae*	NERC 41		UKBAP (P)
	Small Square-spot	*Diarsia rubi*	NERC 41		UKBAP (P)
	Galium Carpet	*Epirrhoe galiata*	NERC 41		UKBAP (P)
	White-line Dart	*Euxoa tritici*	NERC 41		
	Rustic	*Hoplodrina blanda*	NERC 41		UKBAP (P)
	Rosy Rustic	*Hydraecia micacea*	NERC 41		UKBAP (P)
	Silver-barred Sable	*Pyrausta cingulata*			Nb
	Shaded Broad-bar	*Scotopteryx chenopodiata*	NERC 41		UKBAP (P)
	Hedge Rustic	*Tholera cespitis*	NERC 41		UKBAP (P)
	Feathered Gothic	*Tholera decimalis*	NERC 41		UKBAP (P)
	Garden Tiger	*Arctia caja*	NERC 41		UKBAP (P)
	Narrow Groundling	*Caryocolum alsinella*			Na
	Desert Groundling	*Bryotropha desertella*			Nb
	Bugle Marble	*Endothenia ustulana*			Nb
	Sandhill Midget	*Phyllonorycter quinqueguttella*			Nb
	Scarce Purple & Gold	*Pyrausta ostrinalis*			Nb
	Mottled Rustic	*Caradrina morpheus*	NERC 41		UKBAP (P)
	Rosy Minor	*Litoligia literosa*	NERC 41		UKBAP (P)
	Lackey	*Malacosoma neustria*	NERC 41		UKBAP (P)
	Shore Wainscot	*Mythimna litoralis*			Nb
	Portland Moth	*Actebia praecox*			Nb
	Mouse Moth	*Amphipyra tragopoginis*	NERC 41		UKBAP (P)
	Small Phoenix	*Ecliptopera silaceata*	NERC 41		UKBAP (P)

Table 3.1. Desk Study invertebrate records

Species Group	Common Name	Scientific Name	UK Protection	International Protection	Status
	Dusky Thorn	*Ennomos fuscantaria*	NERC 41		UKBAP (P)
	Oblique Carpet	*Orthonama vittata*	NERC 41		UKBAP (P)
	Buff Ermine	*Spilosoma lutea*	NERC 41		UKBAP (P)
	Keeled Skimmer	*Orthetrum coerulescens*			KeyD (N)
	Water Ermine	*Spilosoma urticae*			Nb
	Flounced Chestnut	*Agrochola helvola*	NERC 41		UKBAP (P)
	Beaded Chestnut	*Agrochola lychnidis*	NERC 41		UKBAP (P)
	Deep-brown Dart	*Aporophyla lutulenta*	NERC 41		
	Thyme Pug	*Eupithecia distinctaria*			Nb
	Shoulder-striped Wainscot	*Leucania comma*	NERC 41		UKBAP (P)
	Dot Moth	*Melanchra persicariae*	NERC 41		UKBAP (P)
	Powdered Quaker	*Orthosia gracilis*	NERC 41		UKBAP (P)
	White Colon	*Sideridis turbida*			Nb
	White Ermine	*Spilosoma lubricipeda*	NERC 41		UKBAP (P)
	Anomalous	*Stilbia anomala*	NERC 41		UKBAP (P)
	Dark-barred Twin-spot Carpet	*Xanthorhoe ferrugata*	NERC 41		UKBAP (P)
	Broom Moth	*Ceramica pisi*	NERC 41		
	Coast Dart	*Euxoa cursoria*			Nb
	Marbled Clover	*Heliothis viriplaca*			RDB3
	Sword-Grass	*Xylena exsoleta*			UKBAP (P); Nb
	Crescent Dart	*Agrotis trux lunigera*			Nb
	Essex Skipper	*Thymelicus lineola*			Decline
	Mullein Wave	*Scopula marginepunctata*	NERC 41		UKBAP (P)
	Dusky Brocade	*Apamea remissa*	NERC 41		UKBAP (P)
	Sallow	*Cirrhia icteritia*	NERC 41		UKBAP (P)

Table 3.1. Desk Study invertebrate records

Species Group	Common Name	Scientific Name	UK Protection	International Protection	Status
	Latticed Heath	*Chiasmia clathrata*	NERC 41		
	Small Emerald	*Hemistola chrysoprasaria*	NERC 41		UKBAP (P)
	Double Line	*Mythimna turca*			Nb
	Blood-Vein	*Timandra comae*	NERC 41		
	Minor Shoulder-knot	*Brachylomia viminalis*	NERC 41		UKBAP (P)
	Carline Flat-body	*Agonopterix nanatella*			Nb
	a Moth	*Bryotropha desertella*			Nb
	Small Chocolate-Tip	*Clostera pigra*			Nb
	Brown Alder Bell	*Epinotia sordidana*			Nb
	Straw Obscure	*Oegoconia caradjai*			Nb
	Sea-rush Case-bearer	*Coleophora maritimella*			Nb
	Salt-marsh Grass-veneer	*Pediasia aridella*			Nb
	Scarce Sloe Pigmy	*Stigmella prunetorum*			Nb
	Short-barred Marble	*Apotomis semifasciana*			Nb
	Sandhill Knot-horn	*Anerastia lotella*			Nb
	Spikenard Case-bearer	*Coleophora conyzae*			Nb
	September Thorn	*Ennomos erosaria*	NERC 41		UKBAP (P)
	Knot Grass	*Acronicta rumicis*	NERC 41		UKBAP (P)
	Webb's Wainscot	*Archanara sparganii*			Nb
	Marbled Green	*Cryphia muralis*			Nb
	Silver Hook	*Deltote uncula*			Nb
	Purple-shaded Piercer	*Pammene gallicana*			Nb
	Short-horned Black Legionnaire	*Beris fuscipes*			Nb
	Scarce Violet Cosmet	*Pancalia schwarzella*			pRDB2
	Toad-rush Case-bearer	*Coleophora lassella*			Nb

Table 3.1. Desk Study invertebrate records

Species Group	Common Name	Scientific Name	UK Protection	International Protection	Status
	White-dusted Owlet	*Scythris picaepennis*			Nb
	Autumnal Rustic	*Eugnorisma glareosa*	NERC 41		
	Large Wainscot	*Rhizedra lutosa*	NERC 41		
	White-line Grey	*Eudonia lineola*			Nb
	Carline Neb	*Metzneria aestivella*			Nb
	Brindled Beauty	*Lycia hirtaria*	NERC 41		UKBAP (P)
	Coastal Pearl	*Mecyna asinalis*			Nb
	Green-brindled Crescent	*Allophyes oxyacanthae*	NERC 41		UKBAP (P)
	Ghost Moth	*Hepialus humuli*	NERC 41		UKBAP (P)
	Devon Carpet	*Lampropteryx otregiata*			Nb
	L-album Wainscot	*Mythimna l-album*			Nb
	Kent Black Arches	*Meganola albula*			Nb
	Coast Shade	*Cnephasia conspersana*			Nb
	Mint Bent-wing	*Pseudopostega crepusculella*			Nb
	Red-necked Footman	*Atolmis rubricollis*			Nb
	Beautiful Brocade	*Lacanobia contigua*			Nb
	Woundwort Pearl	*Anania stachydalis*			Nb
	Ear Moth	*Amphipoea oculea*	NERC 41		UKBAP (P)
	Cloaked Carpet	*Euphyia biangulata*			Nb
	Coast Conch	*Gynnidomorpha permixtana*			pRDB1
	Dingy Meadow Pigmy	*Trifurcula subnitidella*			pRDB2
	August Thorn	*Ennomos quercinaria*	NERC 41		UKBAP (P)
	Bleached Pug	*Eupithecia expallidata*			Nb
	Lead-coloured Pug	*Eupithecia plumbeolata*			Nb
	V-Moth	*Macaria wauaria*	NERC 41		

Table 3.1. Desk Study invertebrate records

Species Group	Common Name	Scientific Name	UK Protection	International Protection	Status
	Bilberry Pug	*Pasiphila debiliata*			Nb
	Chalk Carpet	*Scotopteryx bipunctaria*	NERC 41		UKBAP (P); Nb
	Yellow-legged Clearwing	*Synanthedon vespiformis*			Nb
	Six-belted Clearwing	*Bembecia ichneumoniformis*			Nb
	Small Eggar	*Eriogaster lanestris*			Nb
	Waved Carpet	*Hydrelia sylvata*			Nb
	Red-belted Clearwing	*Synanthedon myopaeformis*			Nb
	Currant Clearwing	*Synanthedon tipuliformis*			Nb
	Pale Eggar	*Trichiura crataegi*	NERC 41		UKBAP (P)
	Eastern Groundling	*Chionodes distinctella*			Na
	Grass Eggar	*Lasiocampa trifolii*			Na
	Sandhill Groundling	*Bryotropha umbrosella*			Nb
	Pretty Chalk Carpet	*Melanthia procellata*	NERC 41		UKBAP (P)
	Grey Dagger	*Acronicta psi*	NERC 41		UKBAP (P)
	Silky Wainscot	*Chilodes maritima*			Nb
	Oak Hook-tip	*Watsonalla binaria*	NERC 41		
	Saltmarsh Knot-horn	*Ancylosis oblitella*			Nb
	Saltern Marble	*Bactra robustana*			Nb
	Glasswort Case-bearer	*Coleophora salicorniae*			Nb
	Common Sea Groundling	*Scrobipalpa nitentella*			Nb
	Tansy Plume	*Gillmeria ochrodactyla*			Nb

Table 3.2 Invertebrate species recorded from Yelland sample points

Order	Family	Scientific Name	Common Name
Odonata (dragon and damselflies)	Coenagrionidae	*Pyrrhosoma nymphula*	Large red damselfly
Odonata (dragon and damselflies)	Libellulidae	*Libellula depressa*	Broad-bodied chaser
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Chorthippus brunneus*	Field grasshopper
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Tetrix undulata*	Common groundhopper
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Tettigonia viridissima*	Great green bush-cricket
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Pholidoptera griseoaptera*	Dark bush-cricket
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Conocephalus fuscus*	Long-winged Conehead
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Leptophyes punctatissima*	Speckled Bush-cricket
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Tetrix ceperoi*	Cepero's Groundhopper
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Tetrix subulata*	Slender Groundhopper
Dermaptera (Earwigs)	Forficulidae	*Forficula auricularia*	Common earwig
Stylommatophora (Common Land Snails & Slugs)	Geomitridae	*Candidula intersecta*	Wrinkled snail
Stylommatophora (Common Land Snails & Slugs)	Helicidae	*Cepaea nemoralis*	Brown-lipped snail
Stylommatophora (Common Land Snails & Slugs)	Helicidae	*Helix aspersa*	Garden snail
Coleoptera (Beetles)	Carabidae	*Dromius angustus*	A ground bettle
Coleoptera (Beetles)	Staphylinidae	*Ischnosoma splendidum*	A rove beetle
Coleoptera (Beetles)	Staphylinidae	*Tachyporus dispar*	A rove beetle
Coleoptera (Beetles)	Elateridae	*Agrypnus murinus*	A click beetle
Coleoptera (Beetles)	Kateretidae	*Brachypterolus linariae*	A pollen beetle
Coleoptera (Beetles)	Phalacridae	*Olibrus aeneus*	A Phalacrid beetle
Coleoptera (Beetles)	Coccinellidae	*Propylea quattuordecimpunctata*	14-spot ladybird
Coleoptera (Beetles)	Coccinellidae	*Psyllobora vigintiduopunctata*	22-spot ladybird
Coleoptera (Beetles)	Coccinellidae	*Coccinella septempunctata*	7-spot ladybird
Coleoptera (Beetles)	Coccinellidae	*Coccinella septempunctata*	7-spot ladybird

Table 3.2 Invertebrate species recorded from Yelland sample points

Order	Family	Scientific Name	Common Name
Coleoptera (Beetles)	Oedemeridae	*Oedemera lurida*	An Oedemerid beetle
Coleoptera (Beetles)	Oedemeridae	*Oedemera nobilis*	An Oedemerid beetle
Coleoptera (Beetles)	Apionidae	*Apion frumentarium*	A weevil
Coleoptera (Beetles)	Apionidae	*Holotrichapion pisi*	A weevil
Coleoptera (Beetles)	Apionidae	*Ischnopterapion loti*	A weevil
Coleoptera (Beetles)	Apionidae	*Protapion fulvipes*	A weevil
Coleoptera (Beetles)	Apionidae	*Protapion fulvipes*	A weevil
Coleoptera (Beetles)	Apionidae	*Rhinusa antirrhini*	A weevil
Coleoptera (Beetles)	Apionidae	*Rhinusa antirrhini*	A weevil
Coleoptera (Beetles)	Apionidae	*Orthochaetes insignis*	A weevil
Coleoptera (Beetles)	Apionidae	*Tychius picirostris*	A weevil
Coleoptera (Beetles)	Apionidae	*Hypera rumicis*	A weevil
Coleoptera (Beetles)	Lampyridae	*Lampyris noctiluca*	Glow-worm
Lepidoptera (Butterflies & Moths)	Lycaenidae	*Polyommatus icarus*	Common blue
Lepidoptera (Butterflies & Moths)	Lycaenidae	*Polyommatus icarus*	Common blue
Lepidoptera (Butterflies & Moths)	Nymphalidae	*Vanessa atalanta*	Red admiral
Lepidoptera (Butterflies & Moths)	Nymphalidae	*Cynthia cardui*	Painted lady
Lepidoptera (Butterflies & Moths)	Nymphalidae	*Pararge aegeria*	Speckled wood
Lepidoptera (Butterflies & Moths)	Nymphalidae	*Pararge aegeria*	Speckled wood
Lepidoptera (Butterflies & Moths)	Nymphalidae	*Pararge aegeria*	Speckled wood
Lepidoptera (Butterflies & Moths)	Nymphalidae	*Pyronia tithonus*	Gatekeeper
Lepidoptera (Butterflies & Moths)	Nymphalidae	*Maniola jurtina*	Meadow brown
Lepidoptera (Butterflies & Moths)	Zygaenidae	*Tyria jacobaeae*	Cinnabar moth
Lepidoptera (Butterflies & Moths)	Zygaenidae	*Zygaena filipendulae*	Six-spot Burnet
Diptera (Flies)	Syrphidae	*Epistrophe eligans*	A hoverfly
Diptera (Flies)	Syrphidae	*Eristalis tenax*	A hoverfly

Table 3.2 Invertebrate species recorded from Yelland sample points

Order	Family	Scientific Name	Common Name
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Apidae	*Bombus terrestris*	Buff-tailed bumblebee
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Apidae	*Bombus lapidarius*	Red-tailed bumblebee
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Apidae	*Bombus lapidarius*	Red-tailed bumblebee
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Apidae	*Bombus hypnorum*	Tree bumblebee
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Apidae	*Bombus pratorum*	Early bumblebee
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Apidae	*Bombus pascuorum*	Common carder bumblebee
Araneae (Spiders)	Tetragnathidae	*Metellina segmentata*	Eurasian Armoured Long-jawed Spider
Araneae (Spiders)	Araneidae	*Araneus diadematus*	Cross Orbweaver
Araneae (Spiders)	Pisauridae	*Pisaura mirabilis*	European Nursery Web Spider
Isopoda (Isopods)	Armadillidiidae	*Armadillidium vulgare*	Common pill woodlouse

Table 3.3 Invertebrate species recorded from Braunton Burrows sample points

Order	Family	Scientific Name	Common Name
Araneae (Spiders)	Araneidae	*Agalenatea redii*	Gorse Orbweaver
Araneae (Spiders)	Araneidae	*Araneus diadematus*	Cross Orbweaver
Araneae (Spiders)	Araneidae	*Mangora acalypha*	Cricket-bat Orbweaver
Araneae (Spiders)	Araneidae	*Zygiella x-notata*	Silver-sided Sector Spider
Araneae (Spiders)	Linyphiidae	*Tenuiphantes sp.*	
Araneae (Spiders)	Lycosidae	*Xerolycosa miniata*	
Araneae (Spiders)	Philodromidae	*Philodromus aureolus*	
Araneae (Spiders)	Philodromidae	*Tibellus oblongus*	Oblong Running Spider
Araneae (Spiders)	Pisauridae	*Pisaura mirabilis*	European Nursery Web Spider
Araneae (Spiders)	Salticidae	*Heliophanus cupreus*	Sun Jumping Spider
Araneae (Spiders)	Tetragnathidae	*Metellina segmentata*	Eurasian Armoured Long-jawed Spider
Araneae (Spiders)	Tetragnathidae	*Tetragnatha sp.*	Stretch Spiders
Araneae (Spiders)	Thomisidae	*Misumena vatia*	Goldenrod Crab Spider
Araneae (Spiders)	Thomisidae	*Xysticus audax*	
Araneae (Spiders)	Thomisidae	*Xysticus cristatus*	
Blattodea (Cockroaches & Termites)	Ectobiidae	*Capraiellus panzeri*	Lesser Cockroach
Coleoptera (Beetles)	Apionidae	*Exapion ulicis*	Gorse Seed Weevil
Coleoptera (Beetles)	Apionidae	*Squamapion sp.*	
Coleoptera (Beetles)	Brentidae	*Nanophyes marmoratus*	Flower Bud Weevil
Coleoptera (Beetles)	Brentidae	*Protopirapion atratulum*	
Coleoptera (Beetles)	Carabidae	*Poecilus cupreus*	
Coleoptera (Beetles)	Chrysomelidae	*Aphthona lutescens*	
Coleoptera (Beetles)	Chrysomelidae	*Aphthona melancholica*	
Coleoptera (Beetles)	Chrysomelidae	*Aphthona pallida*	
Coleoptera (Beetles)	Chrysomelidae	*Chaetocnema concinna*	Mangold Flea Beetle
Coleoptera (Beetles)	Chrysomelidae	*Chrysolina haemoptera*	Plantain Leaf Beetle

Table 3.3 Invertebrate species recorded from Braunton Burrows sample points

Order	Family	Scientific Name	Common Name
Coleoptera (Beetles)	Chrysomelidae	*Chrysolina herbacea*	Mint Leaf Beetle
Coleoptera (Beetles)	Chrysomelidae	*Chrysomela populi*	Poplar Leaf Beetle
Coleoptera (Beetles)	Chrysomelidae	*Crepidodera aurea*	
Coleoptera (Beetles)	Chrysomelidae	*Cryptocephalus fulvus*	
Coleoptera (Beetles)	Chrysomelidae	*Galeruca tanaceti*	Black-punctured Leaf Beetle
Coleoptera (Beetles)	Chrysomelidae	*Lochmaea caprea*	Willow Leaf Beetle
Coleoptera (Beetles)	Chrysomelidae	*Longitarsus luridus*	
Coleoptera (Beetles)	Chrysomelidae	*Longitarsus lycopi*	
Coleoptera (Beetles)	Chrysomelidae	*Longitarsus pellucidus*	
Coleoptera (Beetles)	Chrysomelidae	*Neocrepidodera transversa*	
Coleoptera (Beetles)	Chrysomelidae	*Phratora vulgatissima*	Blue Willow Beetle
Coleoptera (Beetles)	Coccinellidae	*Coccinella septempunctata*	Seven-spotted Lady Beetle
Coleoptera (Beetles)	Coccinellidae	*Harmonia axyridis*	Asian Lady Beetle
Coleoptera (Beetles)	Coccinellidae	*Psyllobora vigintiduopunctata*	22-Spot Ladybird
Coleoptera (Beetles)	Coccinellidae	*Rhyzobius chrysomeloides*	Round-keeled Rhyzobius
Coleoptera (Beetles)	Coccinellidae	*Rhyzobius litura*	Pointed-keeled Rhyzobius
Coleoptera (Beetles)	Coccinellidae	*Scymnus schmidti*	Schmidt's Scymnus
Coleoptera (Beetles)	Curculionidae	*Protapion fulvipes*	
Coleoptera (Beetles)	Curculionidae	*Sitona humeralis*	
Coleoptera (Beetles)	Curculionidae	*Sitona lineatus*	Pea Weevil
Coleoptera (Beetles)	Curculionidae	*Sitona sp.*	
Coleoptera (Beetles)	Nitidulidae	*Meligethes nigrescens*	
Coleoptera (Beetles)	Phalacridae	*Olibrus aeneus*	
Dermaptera (Earwigs)	Forficulidae	*Forficula auricularia*	European Earwig
Diptera (Flies)	Asilidae	*Philonicus albiceps*	Dune Robber Fly
Diptera (Flies)	Bibionidae	*Dilophus febrilis*	Fever Fly

Table 3.3 Invertebrate species recorded from Braunton Burrows sample points

Order	Family	Scientific Name	Common Name
Diptera (Flies)	Bibionidae	*Dilophus sp.*	
Diptera (Flies)	Calliphoridae	*Lucilia sericata*	Common European Greenbottle Fly
Diptera (Flies)	Chamaemyiidae	*Chamaemyia polystigma*	
Diptera (Flies)	Chloropidae	*Dicraeus tibialis*	
Diptera (Flies)	Dolichopodidae	*Dolichopus sp.*	
Diptera (Flies)	Dolichopodidae	*Poecilobothrus nobilitatus*	Semaphore Fly
Diptera (Flies)	Ephydridae	*Mosillus subsultans*	
Diptera (Flies)	Hybotidae	*Hybos sp.*	
Diptera (Flies)	Lonchaeidae	*Lonchaea sp.*	
Diptera (Flies)	Muscidae	*Neomyia sp*	False Green Bottlefly
Diptera (Flies)	Muscidae	*Phaonia angelicae*	
Diptera (Flies)	Opomyzidae	*Opomyza germinationis*	
Diptera (Flies)	Opomyzidae	*Opomyza sp.*	
Diptera (Flies)	Sarcophagidae	*Nyctia halterata*	
Diptera (Flies)	Sciomyzidae	*Tetanocera sp.*	
Diptera (Flies)	Syrphidae	*Eristalis arbustorum*	European Drone Fly
Diptera (Flies)	Syrphidae	*Eristalis pertinax*	
Diptera (Flies)	Syrphidae	*Eristalis tenax*	Common Drone Fly
Diptera (Flies)	Syrphidae	*Helophilus pendulus*	Sun Fly
Diptera (Flies)	Syrphidae	*Melanostoma mellinum*	Variable Duskyface Fly
Diptera (Flies)	Syrphidae	*Paragus haemorrhous*	Black-backed Grass Skimmer
Diptera (Flies)	Syrphidae	*Syritta pipiens*	Thick-legged Hover Fly
Diptera (Flies)	Tabanidae	*Chrysops caecutiens*	Splayed Deer Fly
Diptera (Flies)	Tachinidae	*Eriothrix rufomaculata*	Red Spotted Parasite Fly
Diptera (Flies)	Tachinidae	*Macquartia sp.*	
Diptera (Flies)	Tephritidae	*Sphenella marginata*	Ragwort Fly

Table 3.3 Invertebrate species recorded from Braunton Burrows sample points

Order	Family	Scientific Name	Common Name
Diptera (Flies)	Tephritidae	*Terellia tussilaginis*	Banded Burdock Fly
Entomobryomorpha (Elongate Springtails)	Entomobryidae	*Orchesella villosa*	
Hemiptera (True Bugs)	Anthocoridae	*Cardiastethus fasciiventris*	
Hemiptera (True Bugs)	Aphrophoridae	*Aphrophora alni*	Alder Spittlebug
Hemiptera (True Bugs)	Aphrophoridae	*Neophilaenus campestris*	
Hemiptera (True Bugs)	Aphrophoridae	*Neophilaenus lineatus*	Lined Spittlebug
Hemiptera (True Bugs)	Aphrophoridae	*Philaenus spumarius*	Meadow Spittlebug
Hemiptera (True Bugs)	Berytidae	*Gampsocoris punctipes*	Spined Stiltbug
Hemiptera (True Bugs)	Cicadellidae	*Anaceratogallia sp.*	
Hemiptera (True Bugs)	Cicadellidae	*Elymana sulphurella*	
Hemiptera (True Bugs)	Cicadellidae	*Idiocerus lituratus*	
Hemiptera (True Bugs)	Cicadellidae	*Macropsis sp.*	
Hemiptera (True Bugs)	Coreidae	*Coreus marginatus*	Dock Bug
Hemiptera (True Bugs)	Delphacidae	*Conomelus anceps*	Yellowish Planthopper
Hemiptera (True Bugs)	Miridae	*Closterotomus norwegicus*	Potato Mirid
Hemiptera (True Bugs)	Miridae	*Dicyphus annulatus*	
Hemiptera (True Bugs)	Miridae	*Liocoris tripustulatus*	Three Spotted Nettle Bug
Hemiptera (True Bugs)	Miridae	*Phytocoris sp.*	
Hemiptera (True Bugs)	Miridae	*Phytocoris varipes*	Long-legged Plant Bug
Hemiptera (True Bugs)	Miridae	*Stenodema laevigata*	
Hemiptera (True Bugs)	Nabidae	*Nabis flavomarginatus*	Broad Damsel Bug
Hemiptera (True Bugs)	Nabidae	*Nabis limbatus*	Marsh Damsel Bug
Hemiptera (True Bugs)	Pentatomidae	*Aelia acuminata*	Bishop's Mitre Shield Bug
Hemiptera (True Bugs)	Pentatomidae	*Dolycoris baccarum*	Sloe Bug
Hemiptera (True Bugs)	Rhyparochromidae	*Graptopeltus lynceus*	Eyed Groundbug
Hemiptera (True Bugs)	Scutelleridae	*Eurygaster testudinaria*	Tortoise Bug

Table 3.3 Invertebrate species recorded from Braunton Burrows sample points

Order	Family	Scientific Name	Common Name
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Andrenidae	*Andrena sp.*	Mining Bees
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Apidae	*Apis mellifera*	Western Honey Bee
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Apidae	*Bombus pascuorum*	Common Carder Bee
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Apidae	*Bombus terrestris*	Buff-tailed Bumblebee
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Braconidae	*Meteorus sp.*	
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Formicidae	*Lasius fuliginosus*	Jet Ant
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Formicidae	*Lasius niger*	Black Garden Ant
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Formicidae	*Myrmica sp.*	
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Halictidae	*Lasioglossum sp.*	
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Halictidae	*Sphecodes sp.*	
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Megachilidae	*Osmia sp.*	Mason Bee
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Tenthredinidae	*Athalia ancilla*	
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Tenthredinidae	*Dolerus sp.*	
Hymenoptera (Ants, Bees, Wasps & Sawflies)	Vespidae	*Vespula vulgaris*	Common European Yellowjacket
Isopoda (Isopods)	Armadillidiidae	*Armadillidium vulgare*	Common Pill Woodlouse
Ixodida (Ticks)	Ixodidae	*Ixodes ricinus*	Castor Bean Tick
Lepidoptera (Butterflies & Moths)	Crambidae	*Pyrausta despicata*	Straw-barred Pearl
Lepidoptera (Butterflies & Moths)	Erebidae	*Lygephila pastinum*	Blackneck
Lepidoptera (Butterflies & Moths)	Lycaenidae	*Polyommatus icarus*	Common Blue
Lepidoptera (Butterflies & Moths)	Nymphalidae	*Maniola jurtina*	Meadow Brown
Lepidoptera (Butterflies & Moths)	Zygaenidae	*Zygaena filipendulae*	Six-spot Burnet
Opiliones (Harvestmen)	Phalangiidae	*Dicranopalpus ramosus*	Fork-palped Harvestman
Opiliones (Harvestmen)	Phalangiidae	*Phalanhium opilio*	European Harvestman
Opiliones (Harvestmen)	Sclerosomatidae	*Leiobunum rotudum*	
Orthoptera (Grasshoppers, Crickets & Katydids)	Acrididae	*Chorthippus brunneus*	Common Field Grasshopper
Orthoptera (Grasshoppers, Crickets & Katydids)	Acrididae	*Pseudochorthippus parallelus*	Meadow Grasshopper

Table 3.3 Invertebrate species recorded from Braunton Burrows sample points

Order	Family	Scientific Name	Common Name
Orthoptera (Grasshoppers, Crickets & Katydids)	Tetrigidae	*Tetrix ceperoi*	Cepero's Groundhopper
Orthoptera (Grasshoppers, Crickets & Katydids)	Tetrigidae	*Tetrix subulata*	Slender Groundhopper
Orthoptera (Grasshoppers, Crickets & Katydids)	Tetrigidae	*Tetrix undulata*	Common Groundhopper
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Conocephalus fuscus*	Long-winged Conehead
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Leptophyes punctatissima*	Speckled Bush-cricket
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Tettigonia viridissima*	Great green bush-cricket
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Pholidoptera griseoaptera*	Dark bush-cricket
Orthoptera (Grasshoppers, Crickets & Katydids)	Tettigoniidae	*Platycleis albopunctata*	Grey bush-cricket
Stylommatophora (Common Land Snails & Slugs)	Geomitridae	*Cernuella virgata*	Vineyard Snail
Stylommatophora (Common Land Snails & Slugs)	Geomitridae	*Cochlicella acuta*	Pointed Snail
Stylommatophora (Common Land Snails & Slugs)	Helicidae	*Cepaea hortensis*	White-lipped Snail
Stylommatophora (Common Land Snails & Slugs)	Helicidae	*Cepaea nemoralis*	Brown-lipped Snail
Stylommatophora (Common Land Snails & Slugs)	Helicidae	*Cornu aspersum*	Garden Snail

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.O Aquatic Macro-Invertebrate Survey Report

Appendix 16.O Aquatic Macro-invertebrate Survey Report 2022

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 AMI rev02
Client:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal HaskoningDHV
Survey Date/s:	June – August 2022
Report Date:	November 2022
Report Author:	Lee Knight MCIEEM Andrew Charles BSc (Hons), MSc, MCIEEM
Approved By:	Erin Reardon BSc, PhD
Surveyor/s:	Lee Knight MCIEEM Andrew Charles BSc (Hons), MSc, MCIEEM

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DISCLAIMER

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertaken an Aquatic Macro-invertebrate Survey along the proposed onshore cable corridor routes for the White Cross Windfarm ("the Project").

The proposed onshore cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1). There are two onshore cable corridor routes. The first onshore cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a second route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final preferred route is to be determined; see Figure 1-1).

The survey area consisted of the proposed Onshore Export Cable Corridor routes (see Figure 1-1).

The Royal HaskoningDHV Phase 2 ITT stipulated that the Aquatic Macro-invertebrate Survey utilise methodology of Palmer, Drake and Stewert (2013) focusing upon ditches within, or within 200m of, Braunton Burrows SAC and the Taw-Torridge Estuary SSSI (see Royal HaskoningDHV Drawing Number: PC2978-RHD-ZZ-XX-DR-Z-0176).

This methodology stipulation was expanded to include further aquatic habitats within, or within 200m of, Braunton Burrows SAC and the Taw-Torridge Estuary SSSI, including:

- The coastal lake/lagoon at Yelland; and,
- Stream at Saunton Golf Course and Sandy Lane Farm.

Invertebrate/infauna recorded within intertidal habitats is presented separately within the Intertidal Survey – report reference 220316 IS (Ecologic 2022).

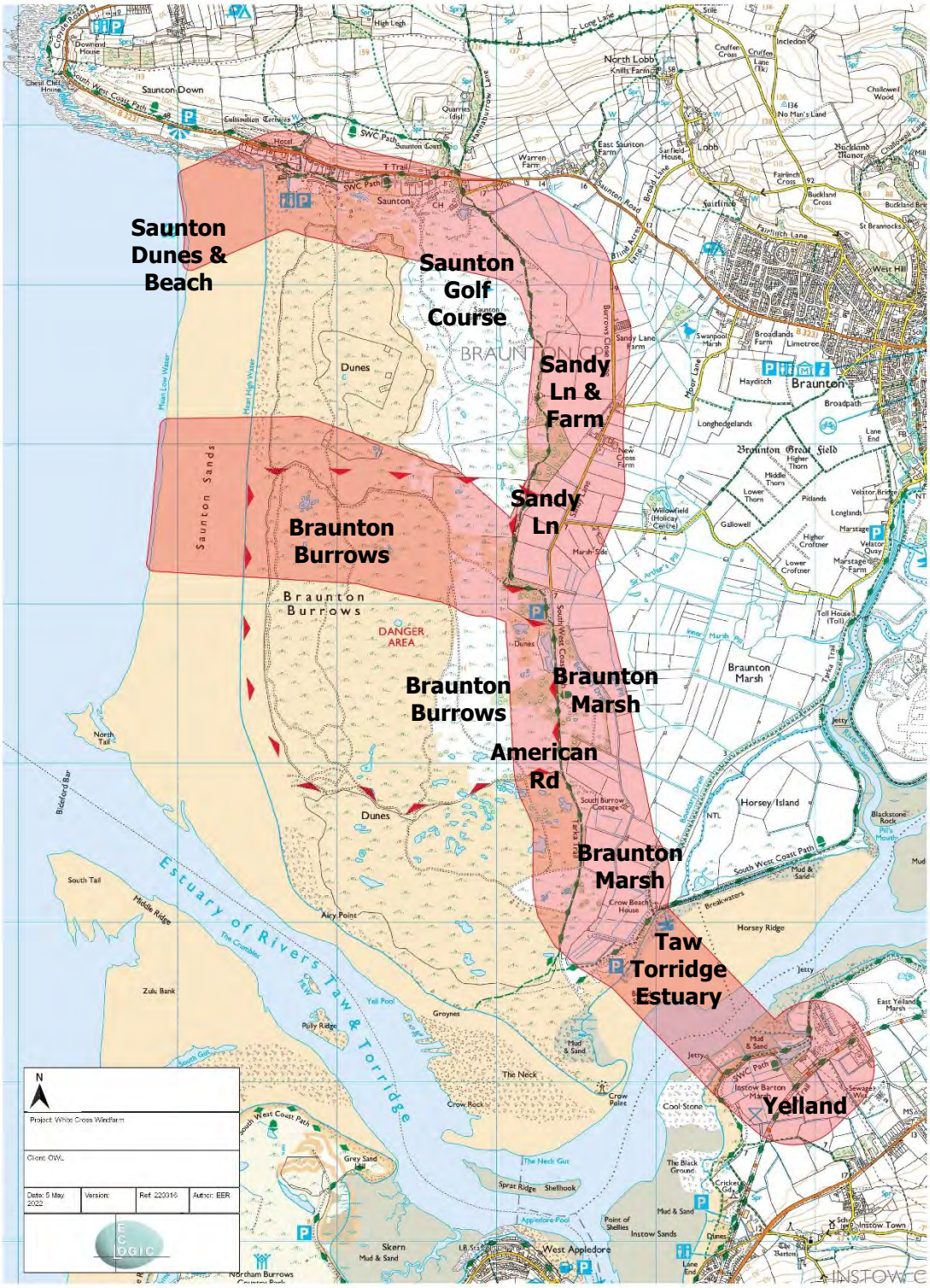


Figure 1-1 The proposed onshore cable corridor routes

1.1 Yelland

The lake/lagoon at Yelland (Site S1; Figure 1-2) borders the electricity substation to the north-west. This lagoon drains into Paige's Pill, which crosses the sand and mud flats of the adjacent Taw estuary at low tide, with a reversal of flow at high tide.

Grazing land to the west is drained by a series of small agricultural ditches that flow northwards into a drain (Site S2 ;Figure 1-2), which then flows eastwards into the lagoon, with some overflow to the estuary via a second sluice at NGR SS 4756 3219.

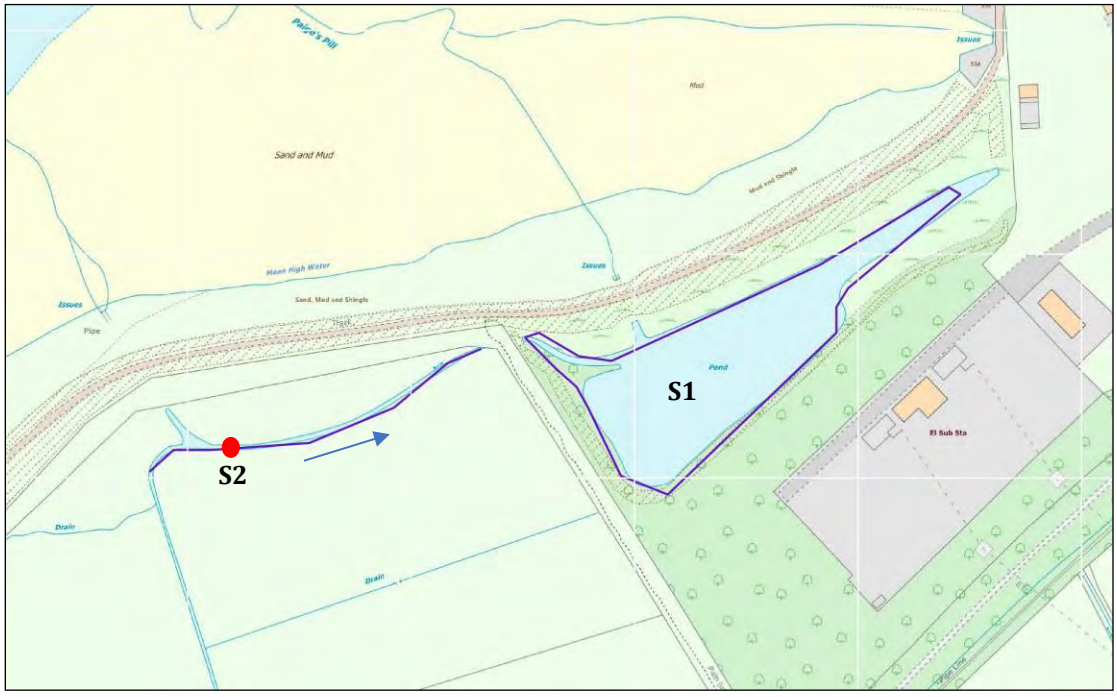


Figure 1-2: The locations of sampling sites at Yelland.

The red dot shows the location of the transect at Site S2 and blue arrow indicates direction of flow

1.2 Braunton Marsh

Braunton Marsh adjoins the Braunton Burrows being located just landwards and to the east of the dune complex. It is one the few areas of grazing marsh habitat within Devon and is thus of high wildlife interest for invertebrate and floral species in a local context. The main flow into Braunton Marsh is via an overflow channel from the River Caen during the summer months, or in the winter the marsh is fed predominately by springs between Saunton and Lobb, via Sir Arthur's Pill. Water from the marsh then drains to the southeast and exits via the 'Great Sluice' in the sea wall adjoining the Taw-Torridge Estuary at the northern end of the tidal creek separating Horsey Island from the rest of the marsh. Water levels within the marsh are regulated so that in winter the system is

managed to allow maximum drainage, whilst in summer levels are kept higher for irrigation (Knight, 1997).

North of Crow Point (Figure 1-3) water predominately flows into the southern tip of the marsh via the western arm of the Boundary Drain (Site S5; Figure 1-3) that flows around the perimeter of the marsh. The majority of this flow is then carried via two ditches, either side of a drove (Sites S3 and S4; Figure 1-3) to the eastern arm of the Boundary Drain from where it flows northwards to the sluice.

Some water continues to flow southwards via the southern arm of the Boundary Drain (Site S6; Figure 1-3), although this flow is very reduced, in affect serving as an overflow channel.

At the southern tip of the marsh the Boundary Drain flows eastwards (Site S7; Figure 1-3) and then northwards again (Site S8; see Figure 1-3) to re-join the eastern arm of the drain at the confluence of the two drove ditches (Sites S3 and S4; see Figure 1-3).

The southern arm of the Boundary Drain (Site S7; Figure 1-3) also probably carries some drainage from beneath the dunes at the southern end of the Burrows. But the whole of this reach of the Boundary Drain is very shallow with a minimal flow, and much of the channel is choked with vegetation, except where heavily shaded by bankside trees and shrubs adjoining the Crow Point car park.

During winter, flows are considerably increased and part way along the southernmost reach another channel (Site S9; Figure 1-3) carries overflow northwards across pasture and into the southernmost of the two drove ditches (Site S4; Figure 1-3).

To the north of the Crow Point ditch complex, the cable route lays between the marsh and the adjoining Burrows, close to the western arm of the Boundary Drain at the Sandy Lane car park. A site on this reach of the drain was included in the current survey (Site S10; Figure 1-4).

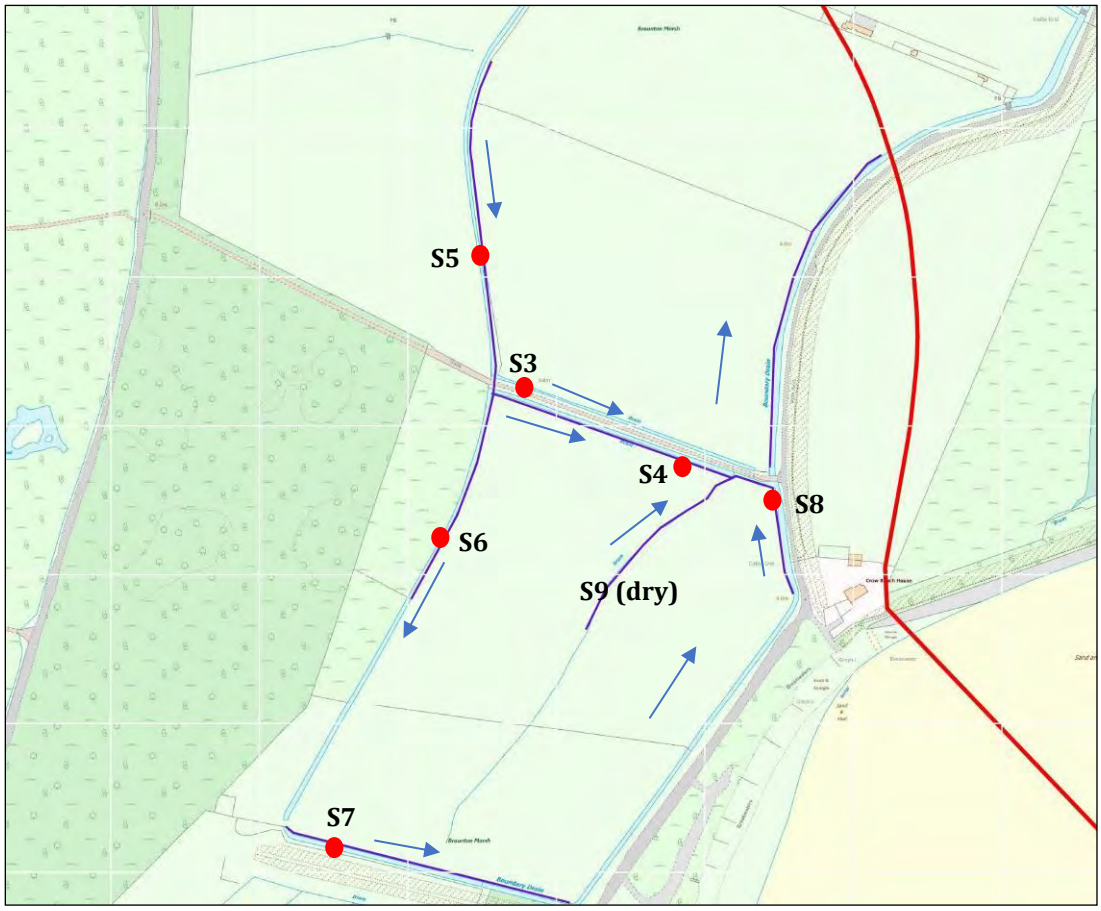


Figure 1-3: The locations of sampling transects on the southern part of Braunton Marsh (north of Crow Point).

Red dots indicate positions of transects and blue arrows predominant direction of drainage.

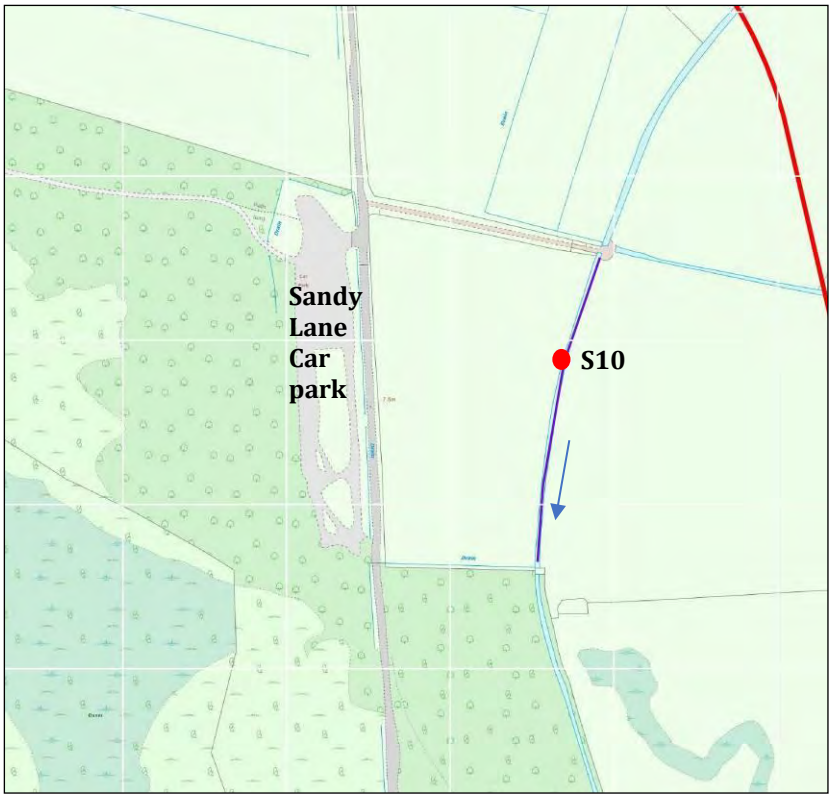


Figure 1-4: The location of Site S10 sampling transect on the Boundary Drain in the northern part of Braunton Marsh.

The red dot shows the location of the transect at Site S10 and blue arrow indicates direction of flow

1.3 Saunton Golf Course & Sandy Lane Farm

At the northern end of Braunton Burrows, to the east of Saunton Golf Course, several small springs feed water into the northern end of Braunton Great Field and the marsh via a system of agricultural ditches draining the surrounding arable land.

One of the feeder springs rises near Saunton Court, flows under the B3231 and to the east of the golf club house (Site S11; Figure 1-5) before entering another channel, via a culvert, that flows eastwards (Site S12; Figure 1-5) to feed two southward flowing ditches (Sites S13 and S15; Figure 1-5). Ditch S13 flows into S15 further to the south, which is also fed by another ditch (S14) along its course (Figure 1-5).

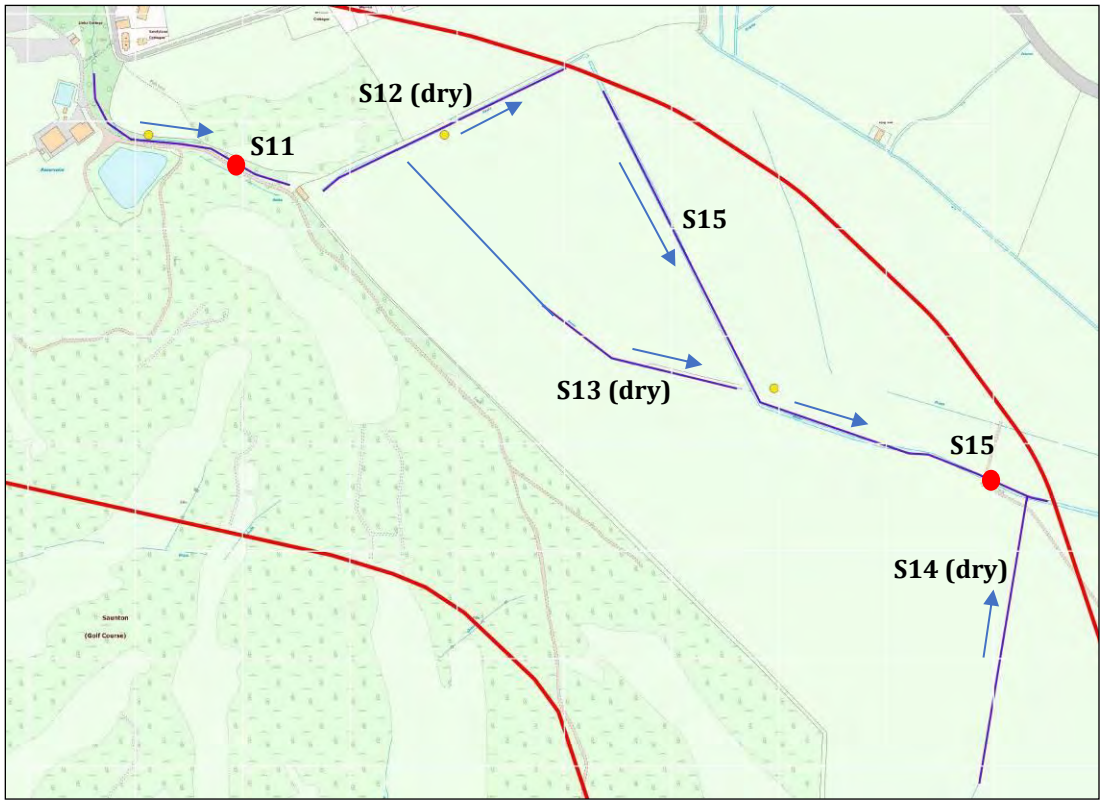


Figure 1-5: The locations of watercourses and sampling transects at Saunton Golf Course & Sandy Lane Farm.

Red dots indicate positions of transects and blue arrows predominant direction of drainage.

2. Survey Methods

2.1 Ditches

The method of Palmer et al. (2013) for surveying grazing marsh ditches involves first selecting a 20m transect on a ditch as the core sampling area. Within this area a suite of physical parameters is recorded, including:

- Position of transect with a GPS;
- Conductivity and pH recorded with a Hanna Instruments HI9812-5 portable water test meter;
- Depth and width readings using a measuring pole.

Vegetation was surveyed within the 20m transect, with all floral species within the wetted channel and banksides recorded, and abundance assessed using the DAFOR scale:

- D (Dominant): 70-100% cover;
- A (Abundant): 30-70%;
- F (Frequent): 10-30%;
- O (Occasional) 3-10%; and,
- R (Rare): <3%.

The presence of extra species within the aquatic, emergent and inundation zone of the ditch outside of the 20m transect are also noted. Terrestrial taxa on the banks are included but are mostly omitted form the calculation of indices involved in ditch evaluation (see Section 2.4). A grapnel was used to collect samples from areas of deeper water as required.

Aquatic invertebrates were collected using an FBA pattern net from a section of the ditch at least 50m in length, preferentially including, as far as possible, the full range of vegetation types present and avoiding areas of dense duckweed (Lemna) cover. Netting was undertaken over three separate periods, usually 1 to 3 minutes in duration, halting when the net begins to fill with material. Searches were also conducted of the water surface and submerged debris for surface-dwelling and attached organisms.

After each netting session the invertebrates were sorted in the field for ten minutes duration, to add up to 30 minutes of field sorting in total. Specimens not easily identifiable in the field were collected with forceps and preserved in vials of industrial

methylated spirits (denatured ethanol) for later examination and determination under a stereoscopic microscope.

2.2 Lake/Coastal Lagoon

The lake/lagoon at Yelland was sampled using the Predictive SYstem for Multimetrics (PSYM) method (Biggs et al. 2000; Environment Agency and Pond Action, 2002; Williams et al. 1996; 1998) which is used by the national environmental agencies to monitor ponds and small lakes.

First several physical parameters were recorded, then within the outer edge (defined as the first change in bank profile along the margins) of the lagoon all wetland plant species were recorded, using a combination of walking/wading the edge of the pond and a grapnel to sample the deeper water for possible submerged species.

Whilst undertaking the floral survey, meso-habitats present within the lagoon were identified for invertebrate sampling. Meso-habitats can include differing areas of substrate (e.g. shallow areas of gravel or silt) and vegetation cover, not necessarily each plant species present but more the type of habitat and structure they provide. Within the lagoon, meso-habitats were rather limited and included tall marginal Phragmites beds, beds of submerged *Potamogeton pectinatus*, areas of stony substrate and a few patches of submerged willow roots.

The aquatic invertebrate sampling was undertaken using an FBA-pattern, long-handled pond net fitted with a 1mm mesh collecting bag. An additional pole section was fitted to the handle to improve its reach into deeper areas of water. The sampling involved a timed period of three minutes net sampling, with the three minutes divided equally between the four meso-habitats described above. Sampling involved sweeping the net through the marginal and submerged vegetation and submerged roots, with occasional disturbance with the foot amongst root mats to dislodge invertebrates and kick sampling on the stony shallows. The deep accumulations of silt in the central basin were avoided as they typically support few invertebrates, which are more likely to occur in the shallower margins and amongst the submerged macrophytes. Where free of vegetation, deeper more open water provides less cover and an increased risk of predation.

The netting was accompanied by a one-minute search of the water surface, for species such as pond skaters (Gerridae), and submerged stones, branches and debris for aquatic

snails, flatworms and leeches. The PSYM method normally relies on laboratory-based sorting of invertebrate samples. However, to make it more comparable with the ditch survey methodologies, a 30 minute field sort was carried out instead.

2.3 Stream

The stream at Saunton Golf Course was sampled as a flowing watercourse using a standard method used by the Environment Agency on (as detailed in internal Environment Agency document 018_08 which has now superseded the more detailed Murray-Bligh, (1999)), involving three minutes netting and laboratory-based processing of the resultant sample. However, to make it more comparable with the ditch survey methodologies, a 30 minute field sort was carried out instead.

2.4 Data evaluation

Four indices were used to assess community structure and conservation importance of the flora and invertebrates:

- Native Species Richness: the number of target taxa recorded listed in the checklists in Table 1 (flora) and Table 2 (invertebrates) of Palmer et al. (2013);
- Native Species Conservation Status: in the checklists in Palmer et al. (2013) flora and invertebrate species are allocated a score according to their rarity. The index is calculated by summing these scores and dividing by the number of taxa recorded;
- Habitat Quality: For flora all plants species on the check lists are given habitat quality scores based on their Ellenberg nitrogen indicator values, from 1 indicating highly eutrophic conditions to 5, dystrophic. For invertebrates scores are allocated based on their affinity to the grazing marsh habitat, from 1 no affinity to 3, confined to grazing marsh or very scarce in other habitats. For both groups these scores are totalled and divided by the number of taxa used to calculate them; and,
- Community Naturalness: For all non-native flora and invertebrate species threat scores ranging from 1 to 5 (as negative values) are provide in Tables 5a and 5b respectively of Palmer et al. (2013). The Community Naturalness Score is the sum of these scores for each group.

In order to separate ditches with a degree of brackish influence from freshwater habitats, a salinity index was also calculated. Flora and invertebrate species are allocated salinity tolerance scores in the Palmer et al. (2013) checklists, with the index calculated by summing these scores and dividing by the number of taxa. The higher the score, the

more brackish the ditch. Any habitats with an electrical conductivity above 2000 µScm-1 can be regarded as brackish (Palmer et al. 2013).

In addition to the above indices the conservation value of the aquatic invertebrate communities was assessed using the Community Conservation Index (CCI; Chadd & Extence, 2004). The higher the CCI value the greater the importance of the community, either due to the presence of rare species, or its diversity. The CCI has advantages over other conservation assessment schemes, such as the species rarity score, in that it takes into account the overall diversity of an invertebrate community as well as the presence of uncommon taxa. It also includes species that nationally might be uncommon, but which are not sufficiently scarce to warrant a conservation status. See Appendix 4 for further details of the CCI and how it is calculated.

The PSYM method used at the lake/lagoon at Yelland utilises several different indices for evaluation. For the flora these include: the number of submerged and marginal plant species; the Trophic Ranking Score for aquatic and marginal plants, based on Palmer et al. (1992) in which plant species are assigned a score from 1 to 10 based on their affinity to waters of a particular nutrient status; and the number of uncommon plant species, species classified as being of 'Local' distribution or rarer. For the invertebrate fauna the metrics included: number of dragonfly (Odonata) and alderfly (Megaloptera) families; the number of beetle (Coleoptera) families; and the Average Score Per Taxon (ASPT) value, derived from the BMWP scoring system. For surveys of freshwater ponds these metrics, along with the environmental parameters recorded in the survey, can be sent to the Freshwater Habitats Trust which then enter the data into the PSYM computer program. Each of the metrics above is compared to a computer-generated predicted score (based on a hypothetical pristine waterbody) and expressed as an Ecological Quality Index (EQI), the observed value divided by the predicted value; the closer to unity the EQI, the better the ecological quality. However, this relies on invertebrate samples having been analysed under laboratory conditions (i.e. different to the field method employed in the current survey) and the PSYM method is not designed to work well with brackish waterbodies (P. Williams, pers. comm.). Examination of the taxa recorded at S1 soon revealed its brackish conditions and no subsequent analysis of the data was undertaken.

3. Survey Results

Field visits were undertaken to all sampling sites between 1st to 10th June 2022 by Andrew Charles, and between 24th to 26th August 2022 by Lee Knight. Table 3.1 summarises the various indices calculated for the flora and invertebrate data at each of the sample sites. Physical and environmental data for the eleven sites are included in the tables in Appendix 1, along with site photographs. Floral data for the ten sites surveyed using the Palmer *et al.* (2013) method is included in the table in Appendix 2, floral data for S1 is included in the table in Appendix 1. Invertebrate data for all eleven sites is presented in Appendix 3.

The metrics for the individual elements of the evaluations cannot be directly compared and plant and invertebrate scores should not be equated. For example, the number of native species is likely to be considerably higher for invertebrates given the greater length of the invertebrate species checklist compared to that for flora (Palmer *et al.* 2013). However, sites can be ranked according to their scores and some comparisons made within the marsh.

During the field work, sites S9, S12, S13 and S14 were dry.

S9 was a shallow, wide channel heavily overgrown with terrestrial grasses and *Agrostis stolonifera* and had probably been dry throughout the summer. Other vegetation in the channel and the banks included occasional *Iris pseudacorus* and a few stands of wetland plants in damper hollows, including *Mentha aquatica, Pulicaria dysenterica, Juncus inflexus, Apium nodiflorum, Equisetum palustre*, and *Carex otrubae*.

S12 was accessed in the vicinity of the confluence with S13. The channel was choked with vegetation (mostly *A. nodiflorum*, with occasional *Oenanthe crocoata, Solanum dulcamara, Fillipendula ulmaria* and *Iris*) with barely a trickle of water in the centre, further downstream there was damp mud only in the channel. Some of the flow from S11 entered S13 but this was soon absorbed into the ground. The banks of S12 were heavily overgrown with tall ruderals including *Epilobium hirsutum, Calystegia sepium, Rubus fruticosus, Urtica dioica, P. dysenterica* and occasional *Lythrum salicaria*. No aquatic invertebrate sampling was undertaken at this location.

S13 was a deep agricultural ditch approximately 1.5m wide, which was accessed near its confluence with S15, which it flows into via a culvert. At this location the ditch was

heavily overgrown with terrestrial grasses, *C. sepium* and *E. hirsutum*, with *Equisetum arvense, U. dioica, Rumex* and a few stands of *O. crocoata* and *Iris* on the banks.

S14 was a similar narrow and deep agricultural ditch, heavily overgrown with terrestrial grasses and tall ruderals including *U. dioica, Sinapis arvensis, E. hirsutum* and *Heracleum sphondylium*, with occasional *A. nodiflorum*, *O. crocoata* and *Galium palustre*, in some damper hollows in the channel.

For much of its length, S15 is a very deep narrow agricultural dich heavily choked with dense tall ruderals (*C. sepium, R. fruticosus* and *U. dioica,* with occasional *E. hirsutum, L.salicaria* and *Eupatorium cannabinum*, and dense beds of *A. nodiflorum* in the channel), making viable netting impossible. The sampling was thus conducted at a more open, ponded section, just upstream of a track bridge and culvert, close to the confluence of S14. Whilst this is unrepresentative of the majority of the ditch length it was felt that this would at least provide a site at which sampling could be undertaken, albeit in a rather 'artificial' environment.

3.1 Native Species Richness and Conservation Status

Native Species Richness and Conservation Status for the flora indicated scores comparable to those for grazing marsh systems bordering estuaries in the south-east of England, and well below some of the more important sites such as the Gwent and Somerset Levels (Drake *et al.* 2010). This is no surprise given the more extensive areas of grazing marsh habitat within the latter group of sites. The most diverse sites in terms of Native Species Richness were S3, S5 and S10.

The uncommon hybrid shore horsetail (*Equisetum x littorale*) a hybrid of *E. fluviatile* and *E. plaustre* was recorded at S4. In a local context, the lesser water parsnip (*Berula erecta*) is an uncommon plant in Devon (Preston & Croft, 1997) due to the scarcity of its preferred ditch habitat. This species is fairly common across Braunton Marsh and was present in most of what can be termed the "proper grazing marsh ditches" north of Crow Point (S3, 4, 6, 7 and 8) and on the Boundary Drain at Sandy Lane (S10). *Ceratophyllum demersum* (recorded at S3 and 4) is another plant that is uncommon across the county (Preston & Croft 1997) for similar reasons.

Table 3.1. Indices calculated for the flora and invertebrate data at each of the sample sites

	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S15
FLORA											
Total number of taxa	14	24	32	29	29	28	30	25	32	17	34
Native Species Richness	6	6	9	6	8	5	6	4	9	2	7
Species Conservation Status Score	N/A	1	1	1	1	1	1	1	1	1	1
Habitat Quality Score	N/A	1.33	1.5	1.17	1.9	1.2	1.5	1	1.25	1	1.43
Community Naturalness Score	N/A	0	-5	0	-5	0	0	0	-3	0	0
Salinity Index	N/A	2.67	2	1	1	2	1.67	4	1.5	1	1.5
INVERTEBRATES											
Nos. Identified Taxa	7	23	29	33	36	20	26	19	35	8	31
Native Species Richness	4	21	24	25	30	15	21	16	31	6	26
Species Conservation Status	1	1.05	1.29	1.08	1.14	1	1.19	1.06	1.1	1	1.08
Habitat Quality Score	1	1.09	1.17	1	1.03	1	1.05	1	1	1	1
Community Naturalness Score	-3	-4	-3	-5	-5	-3	-3	-5	0	-2	-5
Salinity Index	1.8	0.17	0.04	0.07	0.06	0.06	0.05	0.22	0	0.14	0.04
Average Conservation Score	1.2	1.95	2.62	1.71	1.97	1.53	2.04	2.22	2.03	1.83	1.67
Community Score	1	7	12	5	7	3	7	5	5	3	5
Community Conservation Index	1.2	13.65	31.44	8.55	13.79	4.59	14.28	11.1	10.15	5.49	8.35
Conservation Status	Low	Fairly High	Very High	Moderate	Fairly High	Low	Fairly High	Fairly High	Fairly High	Moderate	Moderate

In terms of aquatic invertebrates, the two most diverse sites were S5 and S10, with conservation interest, according to the CCI ranging from low (S1 and S6) to fairly high (S2, 3, 5, 7, 8 and 10) across most sites. S1 was the least diverse site, with a limited fauna of brackish-water species (see 3.4 below). The CCI values at three sites were inflated due to the presence of three beetle species formerly regarded as Nationally Notable (Foster & Eyre, 1992) but which have since been downgraded in conservation status in a more recent review of the aquatic Coleoptera (Foster, 2010) undertaken since Chadd and Extence (2004). These species included the hydrophilids *Helochares lividus* (sites S2, 3 and 5) and *Cercyon ustulatus* (S7) and the hydraenid *Ochthebius bicolon* (S7), although such species should nevertheless still be considered good indicators of habitat condition (Foster, 2010).

A noteworthy site is S3 which was of very high interest due to the presence of both *H. lividus* and several larvae of the soldier fly *Odontomyia ornata*, a Red listed species (Vulnerable) (Falk, 1991) and a good flagship indicator of grazing marsh habitat. The larvae prefer ditches with a rich and structurally diverse cover of vegetation floating near the surface, rather than those choked with emergent plants (Stubbs & Drake, 2001).

Although direct comparison cannot be made due to slight differences in method, Site S4 equated to the same location as Site 7 in the 1996 Braunton Marsh survey. It would appear that the ditch was more open in the 1990s, and although emergent *Sparganium* was also prevalent in 1996, notably absent species in 2022 included *Elodea canadensis, Potamogeton berchtoldii, Myriophyllum spicatum, Lemna trisulca, Glyceria fluitans. Veronica catenata, Alisma plantago-aquatica, Callitriche obtusangula* and *Rorippa nasturtium-aquaticum*, although overall floral taxonomic diversity was of similar levels. It was good to see the continuing presence of *Equisetum x littorale* at the site, first recorded here in 1996. The floating liverwort *Riccia fluitans*, uncommon in the far southwest, and noted in the adjacent ditch S3 in 1996 was not observed during the current survey. The growth of a dense bankside fringe of tall brambles along the southern bank of S4 is a significant change since the earlier survey. The composition of the invertebrate community was similar, although several Ephemeroptera (mayfly) and Trichoptera (caddis) species previously recorded were notably absent in the current survey.

Site S10 was located downstream of Site 5 in the 1996 survey, when the Boundary Ditch was primarily vegetated with emergent and marshland marginal plants including *Iris, Apium, Berula, Sparganium erectum* and floating *Lemna minor*. The diversity of Coleoptera and Hemiptera were greater at S10 than previously recorded at Site 5,

although overall numbers of taxa were similar. Two species of soldierfly *Odontomyia tigrina* and *Oplodontha viridula* previously recorded in 1996 were not found at S10. However, solid comparisons cannot be made between the two sites as they were located in different fields and are likely to have experienced different management regimes in the intervening decades.

3.2 Habitat Quality

Flora habitat quality scores equate to those of estuarine marsh ditches in south-east England (Drake *et al.* 2010), with the highest scores recorded at S3, 5, 7 and 15.

Habitat Quality scores were similarly low for most of the invertebrate communities, with the exception of S3, no doubt due to the presence of *O. ornata*, a typical flagship indicator species of grazing marsh ditches.

3.3 Community Naturalness

Non-native plant species recorded included Canadian pondweed (*Elodea canadensis*) at S3 and S5, also recorded at S4 outside of the 20m transect, and least duckweed (*Lemna minuta*) at S3, 5 and 10.

Non-native invertebrate species included the snails *Physella acuta* (S2) and *Potamopyrgus antipodarum* (S2,4, 5, 8, 11, and 15) and the amphipod *Crangonyx pseudogracilis / floridanus,* which was also widespread (S1, 3, 4, 5, 6, 7, 8 and 15). Although non-native, the latter two species have become widespread, naturalised species of the British fauna with little potential for invasive behaviour.

3.4 Salinity

S1 was the most obviously brackish site, essentially a brackish-water lagoon that receives incoming water from the adjacent estuary at high tide. Its limited fauna, composed entirely of brackish-water species reflected this, as did the high electrical conductivity recorded.

Other sites showing a degree of brackish influence included S2 and S8. Although it should be noted that all of the ditches north of Crow Point had relatively high conductivity levels and are likely to be influenced by spray from the nearby estuary. S2 feeds into the S1 lagoon and is also close to a tidal sluice, so it was somewhat surprising that it did not have a more brackish-water fauna than that recorded. S8 flows into the eastern arm of the Boundary Drain which then flows northwards to the Great Sluice. It is at a lower level

than both S3 and S4, the flow from which discharges into the drain over weirs at the eastern end of the ditches.

Floral species indicative of saline conditions included sea club-rush (*Bolboschoenus maritimus*), recorded at S2 and S8, and grey bulrush (*Scoenoplectus tabernaemontani*) at S2, 3, 6, 7 and 8. Aside from the brackish-water taxa at S1, including *Crangonyx*, the amphipod *Gammarus duebeni*, recorded at S2 and S8 is another indicator of brackish conditions.

4. Conclusions

- Site S1 was a brackish water lagoon with a low diversity fauna and flora indicative of the conditions. Site S2 and S8 also showed signs of slight saline influence in both high conductivity levels and indicator species of brackish conditions including the plants *Bolboscoenus maritimus* and *Schoenoplectus tabernaemontani* and the amphipod *Gammarus duebeni*.

- The most diverse floral communities were those recorded at S3, 5 and 10, with the most diverse aquatic invertebrate communities present at S5 and S10.

- The uncommon shore horsetail (*Equisetum x littorale*) was recorded at S4, the same location it was previously recorded at during the 1996 Braunton Marsh survey. Most other floral species were common and widespread, although both *Berula erecta* (recorded at S3, 4, 6,7 and 8) and *Ceratophyllum demersum* (S3 and 4) are uncommon plants across Devon and the far south west, primarily due to the scarcity of suitable habitat within the geographical area.

- The conservation interest (as assessed using CCI) of the invertebrate communities ranged from low (S1 and S6), through moderate (S4, 11 and 15) and fairly high (S2, 5, 7, 8, 10) to very high at S3.

- Uncommon invertebrate species included the hydrophilid beetles *Helochares lividus* (recorded at S2, 3 and 5) and *Cercyon ustulatus* (S7), and the hydraenid beetle *Ochthebius bicolon* (S7). All three species were formerly regarded as Nationally Notable but have since been downgraded in a more recent review of the aquatic Coleoptera. However, they can still be considered indicators of good quality habitat. Larvae of the Red Listed (Vulnerable) soldierfly *Odontomyia ornata* were recorded at S3 and this can be considered a flagship indicator species of grazing marsh ditches and was the main contributor to the very high conservation value of S3.

References

Biggs, J., Williams, P., Whitfield, M., Fox, G. and Nicolet, P. (2000). *Biological techniques of still water quality assessment. Phase 3. Method development*. R&D Technical Report E110, Bristol: Environment Agency.

Chadd, R. and Extence, C. (2004). The conservation of freshwater macro-invertebrate populations: a community-based classification scheme. *Aquatic Conservation - Marine and Freshwater Ecosystems,*14: 597-624.

Drake, C.M., Stewart, N.F., Palmer, M.A. and Kindemba, V.L. (2010). *The ecological status of ditch systems. An investigation into the current status of the aquatic invertebrate and plant communities of grazing marsh ditch systems in England and Wales. Technical Report Volume 1: Summary of methods and major findings.* Buglife – The Invertebrate Conservation Trust, Peterborough.

Environment Agency (2017). *Freshwater macro-invertebrate sampling in rivers*. Internal Environment Agency document, Operational Instruction 018_08,Version 7.

Environment Agency (2014). *Freshwater macro-invertebrate analysis of riverine samples.* Internal Environment Agency document, Operational Instruction 024_08,Version 5.

Environment Agency and Pond Action (2002). *A guide to monitoring the ecological quality of ponds and canals using PSYM*. Pond Action (now the Freshwater Habitats Trust), Oxford.

Falk, S. (1991). *A review of the scarce and threatened flies of Great Britain (Part1). Research and survey in nature conservation, 39*. Nature Conservancy Council, Peterborough

Foster, G.N. (2010). *A review of the scarce and threatened Coleoptera of Great Britain, Part 3: Water beetles of Great Britain. Species Status 1*. Joint Nature Conservation Committee, Peterborough.

Foster, G.N. and Eyre, M.D. (1992). *Classification and ranking of water beetle communities. UK Nature Conservation, No. 1*. Joint Nature Conservation Committee, Peterborough

Knight, L. (1997). *Braunton Marshes conservation survey, 1996.* Environment Agency, internal report, Devon Area.

Murray-Bligh, J. (1999). *Procedures for collecting and analysing macro-invertebrate samples*. Internal Environment Agency document BT 001.

Palmer, M.A., Bell, S.L. and Butterfield, I. (1992). A botanical classification of standing waters in Britain – applications for conservation and monitoring. *Aquatic Conservation – Marine and Freshwater Ecosystems,* 2 (2): 125-143.

Palmer, M., Drake, M., and Stewart, N. (2013). *A manual for the survey and evaluation of the aquatic plant and invertebrate assemblages of grazing marsh ditch systems*. Buglife – The Invertebrate Conservation Trust, Peterborough.

Preston, C.D. and Croft, J.M. (1997). *Aquatic plants in Britain and Ireland*. Harley Books, Colchester.

Stubbs, A. and Drake, M. (2001). *British soldierflies and their allies*. British Entomological and Natural History Society, Reading.

Williams, P., Biggs, J., Dodds, L., Whitfield, M., Corfield, A. and Fox, G. (1996). *Biological techniques of still water quality assessment. Phase 1 Scoping Study*. R&D Technical Report E7, Bristol: Environment Agency.

Williams, P., Biggs, J., Whitfield, M., Corfield, A., Fox, G. and Adare, K. (1998). *Biological techniques of still water quality assessment. Phase 2. Method development*. R&DTechnical Report E56, Bristol: Environment Agency.

Appendices

Appendix 1: Site Physical Parameters & Photos

Appendix 2: Flora Taxa Lists

Appendix 3: Aquatic Invertebrate Taxa Lists

Appendix 4: Community Conservation Index (CCI)

Appendix 1: Site Physical Parameters & Photos

Site details	
Site name	**Lake/Lagoon at Yelland**
Grid reference	**SS 4785 3218**
Environmental variables	
Altitude (m)	0
Shade (%)	<1
Inflow (0/1)	1
Grazing (%)	0
Conductivity (µS/cm)	5030
pH	8.3
Emergent plant cover (%)	40
Pond Base Silt (1-3) Sand, gravel, cobbles (1-3)	 2 (33-66%) 2 (33-66%)
Area (m^2)	8750
Plant species	
Submerged	*Potamogeton pectinatus*
Floating-leaved	None
Emergent / Marginal	*Phragmites australis, Bolboshoenus maritimus, Schoenoplectus tabernaemontani, Iris pseudoacorus, Agrostis stolonifera, Mentha aquatica, Calystegia sepium, Pulicaria dysenterica, Galium palustre, Fillipendula ulmaria, Epilobium hisutum, Carex otrubae*
Bryophytes	None
Algae	*Enteromorpha*
Plant metrics	
No. of submerged + marginal plant species (not including floating leaved) **Number of uncommon plant species** **Trophic Ranking Score (TRS)**	12 2 8.2
Invertebrate metrics	
ASPT **Odonata + Megaloptera (OM) families** **Coleoptera families**	4.5 0 0
Community Conservation Index (CCI) Average Conservation Score (CS) Community Score (CoS) **Conservation Interest**	1.2 1.2 1 **Low**

Site details		
Site number	**S2**	
Bank alignments	A: north	B: south
Date	26/08/2022	
Grid references	U/S (W): SS 47613 32112	D/S (E): SS 47629 32125
Ditch features		
Water width (m)	3	
Banktop width (m)	4	
Freeboard (cm)	60	
Water depth (cm)	10	
Silt depth (cm)	50	
Conductivity (μScm^{-1})	1917	
pH	8.42	
Turbidity	1	
Water colour	2	
Slope bank A	90 (vertical collapsed banks)	
Slope bank B	90 (vertical collapsed banks)	
Profile under water A	15	
Profile under water B	15	
Soil type	alluvium	
Vegetation cover (DAFOR)		
Open water surface	F	
Floating Lemna / Azolla	O	
Open substrate	F	
Emergent	O	
Low swamp / floating mat	F	
Exposed vegetated	F	
Shaded (%)	0	
Emergents / floating mat in channel (%)	60	
Adjacent land use	**Bank A**	**Bank B**
Semi-improved grassland	X	X
Cattle / horse grazed	X	X
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Short grass	D	D
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	None	None
Poaching	High	High
Block formation	High	High
Shelf formation	High	High
Tangledness	Medium	Medium
Grassy margin	Low	Low

Site details		
Site number	**S3**	
Bank alignments	A: north	B: south
Date	25/08/2022	
Grid references	U/S (W): SS 46792 33229	D/S (E): SS 46811 33221
Ditch features		
Water width (m)	2	
Banktop width (m)	4	
Freeboard (cm)	70	
Water depth (cm)	65	
Silt depth (cm)	13	
Conductivity (μScm^{-1})	768	
pH	7.1	
Turbidity	1	
Water colour	2	
Slope bank A	50	
Slope bank B	50	
Profile under water A	70	
Profile under water B	>90 (undercut)	
Soil type	alluvium, sand	
Vegetation cover (DAFOR)		
Open water surface	O	
Floating Lemna / Azolla	R	
Other submerged plants	F	
Emergent	A	
Low swamp / floating mat	F	
Shaded (%)	0	
Emergents / floating mat in channel (%)	80	
Adjacent land use	**Bank A**	**Bank B**
Drove		X
Unimproved grassland	X	
Cattle / horse grazed	X	
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Short grass	D	D
Tall grass / reed		R
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	Low	None
Poaching	Low	None
Block formation	Low	None
Shelf formation	None	None
Tangledness	High	High
Grassy margin	None	None

Site details		
Site number	**S4**	
Bank alignments	A: north	B: south
Date	25/08/2022	
Grid references	U/S (W): SS 46910 33145	D/S (E): SS 46934 33120
Ditch features		
Water width (m)	3	
Banktop width (m)	8	
Freeboard (cm)	70	
Water depth (cm)	75	
Silt depth (cm)	10	
Conductivity (μScm^{-1})	890	
pH	7.39	
Turbidity	1	
Water colour	1	
Slope bank A	45	
Slope bank B	45	
Profile under water A	>90 (undercut)	
Profile under water B	70	
Soil type	alluvium, sand	
Vegetation cover (DAFOR)		
Open water surface	R	
Floating Lemna / Azolla	R	
Other submerged plants	R	
Emergent	D	
Low swamp / floating mat	R	
Shaded (%)	2	
Emergents / floating mat in channel (%)	98	
Adjacent land use	**Bank A**	**Bank B**
Drove	X	
Unimproved grassland		X
Stockproof boundary		X
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Short grass	D	
Tall grass / reed	R	R
Tall herbs		R
Overhanging vegetation		O
Scrub > 1.5m		D
Shaded (%)		95
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	None	None
Poaching	None	None
Block formation	None	None
Shelf formation	None	None
Tangledness	Low	Low
Grassy margin	None	None

Site details		
Site number	**S5**	
Bank alignments	A: east	B: west
Date	25/08/2022	
Grid references	U/S (N): SS 46747 33329	D/S (S): SS 46753 33308
Ditch features		
Water width (m)	3	
Banktop width (m)	7.5	
Freeboard (cm)	120	
Water depth (cm)	80	
Silt depth (cm)	5	
Conductivity (μScm^{-1})	737	
pH	6.8	
Turbidity	2	
Water colour	2	
Slope bank A	45	
Slope bank B	45	
Profile under water A	70	
Profile under water B	70	
Soil type	alluvium	
Vegetation cover (DAFOR)		
Open water surface	D	
Floating Lemna / Azolla	F	
Other floating aquatics	O	
Other submerged plants	D	
Open substrate	O	
Emergent	F	
Low swamp / floating mat	O	
Shaded (%)	1	
Emergents / floating mat in channel (%)	15	
Adjacent land use	**Bank A**	**Bank B**
Unimproved grassland	X	X
Cattle / horse grazed		X
Stockproof boundary	X	
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Tall grass / reed		O
Tall herbs	D	D
Overhanging vegetation	F	
Scrub > 1.5m	F	
Shaded (%)	10	
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	None	High
Poaching	None	High
Block formation	None	High
Shelf formation	None	High
Tangledness	Medium	Medium
Grassy margin	None	Low

Site details		
Site number	**S6**	
Bank alignments	A: east	B: west
Date	26/08/2022	
Grid references	U/S (N): SS 46727 33139	D/S (S): SS 46842 33112
Ditch features		
Water width (m)	3	
Banktop width (m)	6	
Freeboard (cm)	100	
Water depth (cm)	15	
Silt depth (cm)	40	
Conductivity (μScm^{-1})	891	
pH	7.22	
Turbidity	5	
Water colour	5 (lots of ochre)	
Slope bank A	55	
Slope bank B	30	
Profile under water A	70	
Profile under water B	70	
Soil type	alluvium	
Vegetation cover (DAFOR)		
Floating Lemna / Azolla	F	
Emergent	A	
Low swamp / floating mat	A	
Shaded (%)	0	
Emergents / floating mat in channel (%)	90	
Adjacent land use	**Bank A**	**Bank B**
Unimproved grassland	X	X
Cattle / horse grazed	X	X
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Short grass	A	D
Tall grass / reed	R	O
Scrub > 1.5m	A	
Shaded (%)	70	
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	High	High
Poaching	High	High
Block formation	High	High
Shelf formation	High	High
Tangledness	Medium	Medium
Grassy margin	Low	Low

Site details		
Site number	**S7**	
Bank alignments	A: north	B: south
Date	25/08/2022	
Grid references	U/S (W): SS 46698 32806	D/S (E): SS 46718 32796
Ditch features		
Water width (m)	1.5	
Banktop width (m)	4	
Freeboard (cm)	90	
Water depth (cm)	7	
Silt depth (cm)	15	
Conductivity (μScm^{-1})	822	
pH	7.35	
Turbidity	1	
Water colour	1	
Slope bank A	15	
Slope bank B	55	
Profile under water A	15	
Profile under water B	15	
Soil type	alluvium, sand	
Vegetation cover (DAFOR)		
Emergent	O	
Low swamp / floating mat	D	
Shaded (%)	0	
Emergents / floating mat in channel (%)	100	
Adjacent land use	**Bank A**	**Bank B**
Unimproved grassland	X	X
Cattle / horse grazed	X	X
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Short grass	D	D
Tall grass / reed	O	O
Scrub > 1.5m		F
Shaded (%)		12
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	Low	Low
Poaching	High	High
Block formation	High	High
Shelf formation	High	High
Tangledness	Medium	Medium
Grassy margin	High	High

Site details		
Site number	**S8**	
Bank alignments	A: east	B: west
Date	26/08/2022	
Grid references	U/S (S): SS 46947 33149	D/S (N): SS 46956 33159
Ditch features		
Water width (m)	3	
Banktop width (m)	6	
Freeboard (cm)	100	
Water depth (cm)	6	
Silt depth (cm)	19	
Conductivity (μScm^{-1})	>4000	
pH	7.54	
Turbidity	southern part of transect: 1, northern: 5, thick ochreous scum in water	
Water colour	1 / 5 (see above)	
Slope bank A	45	
Slope bank B	45	
Profile under water A	0	
Profile under water B	0	
Soil type	alluvium, sand	
Vegetation cover (DAFOR)		
Open water surface	F	
Emergent	O	
Exposed vegetated	D	
Exposed mud	R	
Shaded (%)	10	
Emergents / floating mat in channel (%)	5	
Adjacent land use	**Bank A**	**Bank B**
Roadside	X	
Unimproved grassland		X
Cattle / horse grazed		X
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Short grass	A	D/S (N): SS 46956 33159
Tall herbs	R	
Tall grass / reed	R	R
Scrub > 1.5m	A	F
Shaded (%)	35	25
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	None	High
Poaching	None	High
Block formation	None	High
Shelf formation	None	High
Tangledness	Low	Low
Grassy margin	None	None

Site details		
Site number	**S10**	
Bank alignments	A: east	B: west
Date	24/08/2022	
Grid references	U/S (N): SS 46414 34986	D/S (S): SS 46460 34968
Ditch features		
Water width (m)	3	
Banktop width (m)	6	
Freeboard (cm)	175	
Water depth (cm)	25	
Silt depth (cm)	40	
Conductivity (μScm^{-1})	667	
pH	7.66	
Turbidity	1	
Water colour	1	
Slope bank A	55	
Slope bank B	55	
Profile under water A	55	
Profile under water B	55	
Soil type	alluvium, sand	
Vegetation cover (DAFOR)		
Open water surface	A	
Floating Lemna / Azolla	F	
Other floating aquatics	R	
Floating algae	O	
Other submerged plants	O	
Submerged algae	F	
Open substrate	F	
Emergent	F	
Low swamp / floating mat	F	
Shaded (%)	0	
Emergents / floating mat in channel (%)	40	
Adjacent land use	**Bank A**	**Bank B**
Unimproved grassland	X	
Semi-improved grassland		X
Cattle / horse grazed	X	
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Short grass	D	
Tall herbs	R	R
Tall grass / reed	F	D
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	Medium	None
Poaching	Medium	None
Block formation	Medium	None
Shelf formation	Medium	None
Tangledness	Medium	Low
Grassy margin	High	None

Site details		
Site number	**S11**	
Bank alignments	A: east	B: west
Date	24/08/2022	
Grid references	U/S (N): SS 45877 37472	D/S (S): SS 45892 37453
Ditch features		
Water width (m)	1	
Banktop width (m)	2.5	
Freeboard (cm)	110	
Water depth (cm)	2	
Silt depth (cm)	2	
Conductivity (μScm^{-1})	579	
pH	7.12	
Turbidity	1	
Water colour	1	
Slope bank A	55	
Slope bank B	55	
Profile under water A	0	
Profile under water B	0	
Soil type	sand	
Vegetation cover (DAFOR)		
Open water surface	O	
Open substrate	R	
Low swamp / floating mat	D	
Exposed vegetated	R	
Exposed mud	R	
Shaded (%)	0	
Emergents / floating mat in channel (%)	90	
Adjacent land use	**Bank A**	**Bank B**
Track	X	
Scrub		X
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Short grass	A	
Tall herbs	A	D
Overhanging vegetation	D	D
Shaded (%)	10	10
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	None	None
Poaching	None	None
Block formation	None	None
Shelf formation	None	None
Tangledness	Medium	Medium
Grassy margin	Low	Low

Site details		
Site number	**S15**	
Bank alignments	A: north	B: south
Date	24/08/2022	
Grid reference	U/S (W): SS 46590 37163	D/S (E): SS 46622 37158
Ditch features		
Water width (m)	3	
Banktop width (m)	6	
Freeboard (cm)	200	
Water depth (cm)	15	
Silt depth (cm)	5	
Conductivity (μScm^{-1})	624	
pH	7.76	
Turbidity	1	
Water colour	1	
Slope bank A	55	
Slope bank B	55	
Profile under water A	55	
Profile under water B	15	
Soil type	alluvium	
Vegetation cover (DAFOR)		
Open water surface	F	
Floating Lemna / Azolla	R	
Floating algae	R	
Other submerged plants	R	
Submerged algae	R	
Open substrate	F	
Low swamp / floating mat	D	
Exposed vegetated	R	
Exposed mud	R	
Shaded (%)	0	
Emergents / floating mat in channel (%)	75	
Adjacent land use	**Bank A**	**Bank B**
Arable	X	X
Bank Vegetation (DAFOR)	**Bank A**	**Bank B**
Short grass		A
Bare ground		O
Tall herbs	D	A
Overhanging vegetation	D	
Grazing / vegetation structure	**Bank A**	**Bank B**
Grazing	None	None
Poaching	None	None
Block formation	None	None
Shelf formation	None	None
Tangledness	Medium	Medium

Grassy margin	None	Low

S1: northeast corner looking south westwards

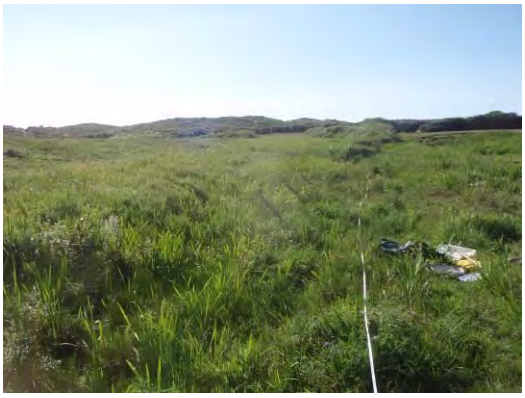
S2: West (upstream) end of transect looking east (left photo), and east (downstream) end of transect looking west (right photo)

S3: West (upstream) end of transect looking east (left photo), and east (downstream) end of transect looking west (right photo)

S4: West (upstream) end of transect looking east (left photo), and east (downstream) end of transect looking west (right photo)


S5: North (upstream) end of transect looking south (left photo), and south (downstream) end of transect looking north (right photo)


S6: North (upstream) end of transect looking south (left photo), and south (downstream) end of transect looking north (right photo)

S7: West (upstream) end of transect looking east (left photo), and east (downstream) end of transect looking west (right photo)


S8: South (upstream) end of transect looking north (left photo), and north (downstream) end of transect looking south (right photo)


S9: looking north (left photo) and south (right photo) along dry channel


S10: North (upstream) end of transect looking south (left photo), and south (downstream) end of transect looking north (right photo)


S11: North (upstream) end of transect looking south (left photo), and south (downstream) end of transect looking north (right photo)


S12: Looking east along dry channel (left photo). S13: looking west along dry channel (right photo)

S14: Looking south along dry channel

S15: West (upstream) end of transect looking east (left photo), and east (downstream) end of transect looking west (right photo)

Appendix 2: Flora Taxa Lists

W Wetted channel; B: Banks, R: Rest of ditch (X=present)	S2			S3			S4			S5			S6			S7			S8			S10			S11			S15		
	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R
Algae																														
Chara globularis															X															
Cladophora																						F						R		
Spirogyra																						O						R		
Pteridophytes																														
Equisetum arvense					R																						X	O	O	
Equisetum palustre				R					X	R	F		O	R		O	R			R								R	R	
Equisetum littorale							R	R																						
Phyllitis scolopendium											R																			
Monocotyledons																														
Agrostis stolonifera		R		O	O				X		O			O						O		O	F		O	F		O	A	
Alisma plantago-aquatica	R	R		R																		R								
Alopecurus geniculata																	R			O										
Bolboshcoenus maritimus	R	R																	O	A										
Carex otrubae					R												R			R										
Carex riparia																R														
Dactylis glomerata					O			R																						
Deschsampsia caespitosa								R																			X			
Eleocharis palustris						X									X	D	D													
Elodea canadensis				R					X	R																				
Holcus lanatus		F			D						O			F			O			O			F			D			F	
Iris pseudoacorus							R	O					O	F		F	F		R	O			F							X
Juncus bufonius																		X										R	R	
Juncus effusus	R	F									O																			
Juncus inflexus	R	F			O											R	R			R				X					R	
Lemna minor	O			R			R			F			F					X				F						R	R	

W Wetted channel; B: Banks, R: Rest of ditch (X=present)	S2			S3			S4			S5			S6			S7			S8			S10			S11			S15		
	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R
Lemna minuta				R						O												O								
Lolium perenne		R																											R	
Phragmites australis															X			X				F	D							X
Poa trivialis														R																
Poa sp.					R												R						R							
Potamogeton berchtoldii				F					X	D																				
Potamogeton crispus																						R								
Potamogeton natans						X				O																				
Schoenoplectus tabernaemontani	R			O									F	R		R	R		R	O										
Sparganium emersum				A			A			R				R																
Sparganium erectum				A			A			F			O			R	R					R								
Typha latifolia									X																					
indet. mown terr. grass species								A																						
Dicotyledons																														
Achillea millefolium																										R				
Angelica sylvestris					R						R				X															
Apium nodiflorum	F																								D	O		O	O	
Arctium minus																														X
Berula erecta				F			F						A			F	F		R	O				X						
Callitriche stagnalis	F									R														X				A		
Callitriche sp.				R																										
Calystegia sepium			X				R	O			O		R	R						R			F					R	F	
Ceratophyllum demersum				O			R																							
Cirsium arvense					R			R			R						R									R				
Cirsium vulgare																													R	
Conyza canadensis																													R	
Epilobium hirsutum									X		R			R		R	R			R		R	R						O	
Epilobium parviflorum													R	O												R				

W Wetted channel; B: Banks, R: Rest of ditch (X=present)	S2			S3			S4			S5			S6			S7			S8			S10			S11			S15		
	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R
Eupatorium cannabinum																					X									X
Fillipendula ulmaria		R			O			F			O			R						R		R							R	
Galium palustre		R																X												
Heracleum sphondylium					R																		R						R	
Hypericum tetrapterum																											X			
Lathyrus pratensis									X		R						R						R							
Lotus pedunculatus														R									R							
Lycopus europaeus																								X						
Lythrum salicaria					R			R		R	O																		R	
Mentha aquatica	R	O		R	R		R			R			R	R		O	O			O				X						
Mycelis muralis																										R				
Myosotis laxa	R	R																												
Oenanthe crocoata									X		R														R	R				
Persicaria maculata																		X												
Plantago lanceolata					R																								R	
Plantago major																				R										
Potentilla anserina		R																X						X						
Pulicaria dysenterica		R			O				X		F			R			O			O			R						O	
Ranunculus peltatus																												R		
Ranunculus repens		R									R			R		R	R							X						
Ranunculus scleratus			X															X												
Rorippa nasturtium-aquaticum									X																					
Rubus fruticosus agg.		R						D			F			R			F			F			R			O		O	F	
Rumex obtusifolius		R			R			R						R			R			R						R			R	
Rumex sp		R																												
Sapomaria caespitosa																										O				
Scrophularia auriculata					R		R	O									R			R						O		R	O	
Scutellaria galericulata																	R													

W Wetted channel; B: Banks, R: Rest of ditch (X=present)	S2			S3			S4			S5			S6			S7			S8			S10			S11			S15		
	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R	W	B	R
Smyrnium olusatrum																				A										
Solanum dulcamara																									R					
Stachys palustris									X		R				X									X						
Stellaria holostea																							R							
Taraxacum officinale agg.																								X					R	
Trifolium campestre																				R										
Trifolium pratense														R																
Trifolium sp.		R																												
Urtica dioica					R				X		R													X		O			R	
Veronica berccabunga																													R	
Veronica catenata																													O	
Viccia cracca											O			R			O			R										
Shrubs / trees																														
Cratageus monogyna																				F										
Sambucus nigra											O																			
Salix cinerea		R													X															X
Total number of taxa	**24**			**32**			**29**			**29**			**28**			**30**			**25**			**32**			**17**			**34**		
Native Species Richness	**6**			**9**			**6**			**8**			**5**			**6**			**4**			**9**			**2**			**7**		
Species Conservation Status Score	**1**			**1**			**1**			**1**			**1**			**1**			**1**			**1**			**1**			**1**		
Habitat Quality Score	**1.33**			**1.5**			**1.17**			**1.9**			**1.2**			**1.5**			**1**			**1.25**			**1**			**1.43**		
Community Naturalness Score	**0**			**-5**			**0**			**-5**			**0**			**0**			**0**			**-3**			**0**			**0**		
Salinity Index	**2.67**			**2**			**1**			**1**			**2**			**1.67**			**4**			**1.5**			**1**			**1.5**		

Appendix 3: Aquatic Invertebrate Taxa Lists

	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S15
TRICLADIDA											
PLANARIIDAE											
Polycelis nigra						X	X				
OLIGOCHAETA				X							
HIRUDINEA											
ERPOBDELLIDAE											
Erpobdella octoculata									X		X
Erpobdella testacea			X		X						
GLOSIPHONIIDAE											
Theromyzon tessulatum		X			X						
Alboglossiphonia heteroclita			X								
Helobdella stagnalis										X	
Glossiphonia complanata			X			X					
LYMNAEIDAE											
Lymnaea stagnalis			X	X					X		X
Ampullaceana balthica		X	X	X	X	X	X	X	X		X
PHYSIDAE											
Physella acuta		X									
HYDROBIIDAE											
Potamopyrgus antipodarum		X		X	X			X		X	X
Peringia ulvae	X										
PLANORBIDAE											
Gyraulus albus				X	X		X		X		
ZONITIDAE											
Zonitoides nitidus				X		X					
SUCCINEIDAE											
Oxyloma pfeifferi			X	X	X						
BIVALVIA											
SPHAERIIDAE											
Sphaerium corneum			X	X	X		X				
Euglesa milium					X	X		X	X		
Euglesa subtruncata					X						

	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S15
Pisidium sp.											X
CRUSTACEA											
GAMMARIDAE											
Gammarus pulex											X
Gammarus pulex / fossarum										X	
Gammarus zaddachi	X										
Gammarus duebeni		X						X			
CRANGONYCTIDAE											
Crangonyx pseudogracilis / floridanus	X		X	X	X	X	X	X			X
PALAEOMONIDAE											
Palaeomonetes varians	X										
AORIDAE											
Microdeutopus gryllotalpa	X										
ASELLIDAE											
Asellus aquaticus		X	X	X	X	X	X	X	X		X
SPHAEROMATIDAE											
Lekanesphaera rugicauda	X										
OSTRACODA											
Ostracoda sp.			X				X				
HYDRACHNIDIA			X						X		X
ZYGOPTERA											
COENAGRIONIDAE											
Pyrrhosoma nymphula			X	X				X			X
Coenagrion puella				X							
Ischnura elegans			X	X	X			X			X
Coenagrionidae sp. (indet.)				X	X				X		
ANISOPTERA											
CORDULEGASTRIDAE											
Cordulegaster boltonii										X	
LIBELLULIDAE											
Sympetrum striolatum											X
AESHNIDAE											
Aeshna sp.				X	X						
EPHEMEROPTERA											

	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S15
BAETIDAE											
Cloeon dipterum				X	X				X		X
HEMIPTERA											
NOTONECTIDAE											
Notonecta glauca		X	X	X	X			X	X		X
Notonecta viridis				X					X		X
PLEIDAE											
Plea minutissima		X	X		X			X	X		
CORIXIDAE											
Sigara dorsalis		X		X	X		X	X	X		X
Sigara lateralis		X									
Sigara nigrolineata		X									
Hesperocorixa moesta								X	X		X
Hesperocorixa linnaei			X	X	X				X		
Hesperocorixa sahlbergi					X		X		X		
Callicorixa praeusta											X
NAUCORIDAE											
Ilyocoris cimicoides			X	X					X		
NEPIDAE											
Nepa cinerea				X					X		X
HYDROMETRIDAE											
Hydrometra stagnorum		X			X			X			X
VELIIDAE											
Microvelia reticulata			X		X		X				
Velia caprai										X	
GERRIDAE											
Gerris thoracicus					X			X	X		
Gerris lacustris			X	X				X			
MEGALOPTERA											
SIALIDAE											
Sialis lutaria		X		X	X	X	X		X		
DIPTERA											
CHIRONOMIDAE											
Chironomidae sp.	X		X	X	X		X	X	X		X

	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S15
STRATIOMYIDAE											
Odontomyia ornata			X								
Oplodontha viridula				X							
PTYCHOPTERIDAE											
Ptychoptera scutellaris		X									
Ptychoptera lacustris						X	X				
Ptychoptera sp.										X	
TABANIDAE											
Atylotus sp.		X									
CULICIDAE											
Anopheles claviger									X		
LIMONIIDAE											
Limonia sp.						X					X
TIPULIDAE											
Tipula montium						X					
Tipula montium gp.									X		
COLEOPTERA											
DYTISCIDAE											
Colymbetes fuscus		X							X		
Hydroporus tesselatus					X				X	X	X
Hydroporus palustris						X					
Hydroporus nigrita									X		
Laccophilus minutus		X									
Laccophilus hyalinus					X						
Hyphydrus ovatus			X	X	X						
Hygrotus inaequalis									X		
Graptodytes pictus			X								
Dytiscus marginalis			X						X		
Agabus bipustulatus				X		X	X				X
Agabus sturmii					X	X	X		X		X
Agabus paludosus							X				
Agabus didymus									X		X
Ilybius quadriguttatus							X				
Ilybius fuliginosus									X		

	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S15
NOTERIDAE											
Noterus clavicornis		X		X							
GYRINIDAE											
Gyrinus substriatus					X						X
HYDROPHILIDAE											
Helochares lividus		X	X		X						
Laccobius bipunctatus		X	X		X	X	X				X
Anacaena globulus		X				X	X		X		X
Anacaena limbata			X	X	X	X	X	X	X		
Anacaena lutescens							X				
Hydrobius fuscipes							X				
Cercyon ustulatus							X				
HELOPHORIDAE											
Heloiphorus brevipalpis						X	X				
Helophorus obscurus						X		X			
HYDRAENIDAE											
Ochthebius minimus						X					
Ochthebius bicolon							X				
HALIPLIDAE											
Haliplus lineatocollis		X		X	X				X		X
Haliplus ruficollis		X	X	X	X			X	X		X
Haliplus sibiricus			X								
ELMIDAE											
Elmis aenea										X	
DRYOPIDAE											
Dryops luridus				X	X		X				
PISCES											
Chelon sp.	X										
Anguilla anguilla	X										
Gasterosteus aculeatus		X	X	X	X			X	X		X
Nos. Identified Taxa	**7**	**23**	**29**	**33**	**36**	**20**	**26**	**19**	**35**	**8**	**31**
Native Species Richness	**4**	**21**	**24**	**25**	**30**	**15**	**21**	**16**	**31**	**6**	**26**
Species Conservation Status	**1**	**1.05**	**1.29**	**1.08**	**1.14**	**1**	**1.19**	**1.06**	**1.1**	**1**	**1.08**
Habitat Quality Score	**1**	**1.09**	**1.17**	**1**	**1.03**	**1**	**1.05**	**1**	**1**	**1**	**1**

	S1	S2	S3	S4	S5	S6	S7	S8	S10	S11	S15
Community Naturalness Score	**-3**	**-4**	**-3**	**-5**	**-5**	**-3**	**-3**	**-5**	**0**	**-2**	**-5**
Salinity Index	**1.8**	**0.17**	**0.04**	**0.07**	**0.06**	**0.06**	**0.05**	**0.22**	**0**	**0.14**	**0.04**
Average Conservation Score	**1.2**	**1.95**	**2.62**	**1.71**	**1.97**	**1.53**	**2.04**	**2.22**	**2.03**	**1.83**	**1.67**
Community Score	**1**	**7**	**12**	**5**	**7**	**3**	**7**	**5**	**5**	**3**	**5**
Community Conservation Index	**1.2**	**13.65**	**31.44**	**8.55**	**13.79**	**4.59**	**14.28**	**11.1**	**10.15**	**5.49**	**8.35**
Conservation Status	**Low**	**Fairly High**	**Very High**	**Moderate**	**Fairly High**	**Low**	**Fairly High**	**Fairly High**	**Fairly High**	**Moderate**	**Moderate**

Appendix 4: Community Conservation Index (CCI)

The Community Conservation Index (Chadd & Extence, 2004) was initially developed in 1995 by biologists in the NRA Anglian region and was reviewed in October 2004 after a ten-year trial period. The CCI has advantages over other conservation assessment schemes, such as the species rarity score in that it takes into account the overall diversity of an invertebrate community and includes species that nationally might be uncommon but are not sufficiently scarce to warrant any conservation status. However, the scheme is in need of up-dating as the conservation status of several species has changed in light of current knowledge. Chadd and Extence (2004) state that the scores can be adapted to local circumstances and changing designations but the scores from the original paper have been used in this report in order to avoid discrepancies and confusion.

Conservation Scores of between 1 and 10 have been assigned to each species of aquatic macro-invertebrate based on their rarity. Most of the individual species in a sample are allocated a score.

The Community Score is based on the BMWP-score or the species in the sample with the highest conservation score: the Community Score for a site is based on whichever indicates the highest score.

Conservation scores used for the CCI (CS)

Conservation Score	Definition
10	Red Data Book Category (RDB)1, endangered
9	RDB2, vulnerable
8	RDB3, rare
7	Notable (but not RDB status) or regionally very notable
6	Regionally notable
5	Local
4	Occasional (species not in categories 10 - 5, which occur in up to 10% of all samples from similar habitats)
3	Frequent (species not in categories 10 - 5, which occur in 10 - 25% of all samples from similar habitats)
2	Common (species not in categories 10 - 5, which occur in 25 - 50% of all samples from similar habitats)
1	Very Common (species not in categories 10 - 5, which occur in 50 - 100% of all samples from similar habitats)

Categories 10 - 5 are recognised national designations developed by JNCC.

Community scores used with the CCI (CoS)

Community Score	BMWP	Highest Conservation Score
15	>301	10
12	251 - 350	9
10	201 - 250	8
7	151 - 200	7
5	101 - 150	5 or 6
3	51 - 100	3 or 4
1	1 - 50	1 or 2
0	0	scoring species absent

The CCI for a site is the product of the Community Score and the average Conservation Score. It is calculated by dividing the sum of the individual species scores (CS) by the number of species (n) then multiplying the resulting product by the community score (CoS) described above:

$CCI = (\sum CS \div n) \times CoS$

This gives a numerical index from which the conservation value of a site is derived (see numerical ranges below)

0.0 to 5.0 – sites supporting only common species and/or a community of low taxon richness. LOW CONSERVATION VALUE

5.0 to 10.0 – sites supporting at least one species of restricted distribution and/or a community of moderate species richness. MODERATE CONSERVATION VALUE

10.0 to 15.0 – sites supporting at least one uncommon species, or several species of restricted distribution and/or a community of high taxon richness. FAIRLY HIGH CONSERVATION VALUE

15.0 to 20.0 – sites supporting several uncommon species, at least one of which may be nationally rare and/or a community of high taxon richness. HIGH CONSERVATION VALUE

>20.0 – sites supporting several rarities, including species of national importance, or at least one extreme rarity (e.g. taxa included in the British RDBs) and/or a community of very high taxon richness. VERY HIGH CONSERVATION VALUE

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.P National Vegetation Classification

Appendix 16.P National Vegetation Classification Report 2022

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 NVC rev02
Client:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal HaskoningDHV
Survey Date/s:	August – October 2022
Report Date:	November 2022
Report Author:	Philip Wilson BSc, PhD, MCIEEM (FISC 6) &
Approved By:	Andrew Charles BSc (Hons), MSc, MCIEEM
Lead Surveyor/s:	Philip Wilson BSc, PhD, MCIEEM & Marion Reed
GIS:	Erin Reardon BSc, PhD, MCIEEM

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Disclaimer

It should be noted that this report is context-specific. If any changes are made to the brief and/or the development proposal Ecologic Consultant Ecologists LLP must be informed, as amendments may be required. The information provided in this report must be reviewed and updated in the time following twelve months from the date of survey. This report (including any enclosures and attachments) has been prepared for the exclusive use and benefit of the addressee(s) and solely for the purpose for which it is provided. Unless we provide express prior written consent, no part of this report should be reproduced, distributed or communicated to any third party. Ecologic Consultant Ecologists LLP do not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report.

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake a National Vegetation Classification Survey along the proposed Onshore Export Cable Corridor routes for the White Cross Wind Farm ("the Project").

The proposed onshore cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1.1). The preferred onshore cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a secondary/alternative route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final route to be determined; see Figure 1.1).

The terrestrial botanical survey was undertaken in order to identify:

- All terrestrial habitats of the Braunton Burrows SAC which are both capable of supporting botanical interest or qualifying features of the SAC (e.g. petalwort *Petalophyllum ralfsii*) and which fall within 50 m of the SAC boundary within the onshore cable corridor area (the 'terrestrial botanical survey area'); and
- Any other habitats which are identified during the Habitat and Protected Species Survey as potentially supporting notable plant species.

Figure 1.1. The terrestrial botanical quadrat survey locations within the proposed Onshore Cable Corridors for The Project. Point numbers represent quadrat numbers as detailed in Appendix 1.

2. Methods

Survey methods were designed to collect sufficient information for production of a map of National Vegetation Classification (NVC) communities present (Rodwell, 1991a; Rodwell, 1991b; Rodwell, 1993; Rodwell, 1995; Rodwell, 2000). This system enables the species composition of the vegetation to be evaluated in a local and national context.

Methods were modified slightly due the great complexity of some of the vegetation within the survey area. This applied particularly to the scrub communities, many of which corresponded poorly to the published accounts, and in practice mixed-species scrub on drier dunes was recorded as W21d, while *Salix cinerea*-dominated scrub on dunes with higher ground-water levels was recorded as W1. As a general rule vegetation polygons of more than 20 m x 20 m were mapped, although in practice some fine-grained mosaics were mapped as such and indicated on maps (for example SD8c/W24).

A total of 144 representative vegetation quadrats were sampled from the site in order to support the identification of the NVC communities. These measured 2 m x 2 m in open habitats and 10 m x 10 m in scrub Within these, all species of vascular plant, terrestrial lichen and bryophyte were recorded with abundance on the Domin scale (1 = <4%, few plants; 2 = <4%, several plants; 3 = <4%, many plants; 4 = 5%-10%; 5 = 11%-25%; 6 = 26%--33%; 7 = 34%-50%; 8 = 51%-75%; 9 = 76%-90%; 10 = 91%-100%).

These quadrat records were further analysed using the Match algorithm available within the MAVIS package (https://www.ceh.ac.uk/services/modular-analysis-vegetation-information-system-mavis). This can provide useful support for identifications of NVC communities made in the field. In practice, a Match coefficient of more than 50 is indicative of a reasonable fit. A species list was recorded from the whole site with abundances on the DAFOR scale (D = Dominant, A = Abundant, F = Frequent, O = Occasional, R = Rare; local variation is indicated by combinations of these letters and the use of the prefix L = Locally).

The location of any NERC Act Section 41 plant species and any England Red Data List (https://bsbi.org/wp-content/uploads/dlm_uploads/England_Red_List_1.pdf) species was recorded.

The survey was conducted by Dr. Philip Wilson and Marian Reed between 23rd August and 10th October 2022.

Waypoints were recorded for each quadrat location (Figure 1.1, Appendix 1). Annotated fields notes on recent aerial images were digitized in QGIS (version 3.22.10-Białowieża) by Dr. Erin Reardon with polygons representing individual NVC community and subcommunity categories and symbology representing broad community types (Appendix 2).

3 Results

3.1 Site description

The survey area is shown in Figure 1.1 and Appendix 2. It covers land from the beach at Saunton Sands eastwards across Saunton Golf Course then southwards along the eastern margin of the Braunton Burrows SSSI to Sandy Lane car park. It extends in a broad corridor from Sandy Lane car park westwards to the sea, and south from the car park to Crow Point, including the car park area at Crow Point, fields to the east of the American Road and a group of fields to the north-east of Sandy Lane car park. To the south of the Taw-Torridge Estuary the survey area included inter-tidal land and land behind the sea-wall at Yelland.

Surveyed land is within Units 101, 102, 103, 104, 105, 106 and 108 of the Braunton Burrows SSSI, Unit 2 of the Greenaways and Freshmarsh, Braunton SSSI and Unit 103 of the Taw-Torridge Estuary SSSI. The Braunton Burrows units are also within the Braunton Burrows SAC.

The survey area is considered below in nine sections (3.1.1-3.1.9). All NVC community types are described in Section 3.2 and rare species in Section 3.3.

3.1.1 Saunton Sands west of the golf course (SSSI units 102, 106)

The large public car-park and holiday development at Saunton Sands is situated to the north-west of this section. There was heavy visitor pressure on the more mobile, seaward dunes to the south of the car park, resulting in substantial erosion with areas of exposed sand and localised "blow-outs". Further inland, public access was much reduced and confined to footpaths between blocks of scrub.

The mobile dunes were characterised by very open SD6a grassland becoming more fragmentary towards the seaward edge. *Ammophila arenaria* was dominant in a relatively species-poor sward with much bare sand. The rare *Matthiola sinuata* was recorded in several places. Inland the dunes were more stable and the SD6a graded into more continuous SD7b and SD8c, although still with a substantial component of bare sand. No strand-line vegetation was present.

These dunes appeared to be ungrazed, and scrub had developed over much of this area, forming mosaics with dune grassland, but more widely forming dense and impenetrable stands. *Rubus fruticosus* was the most widespread species, with abundant *Ligustrum vulgare, Prunus spinosa* and *Clematis vitalba* on the drier dunes, and *Salix cinerea* in the damper valleys. Non-native species were prominent in some stands. Particularly notable was approximately 1.5ha of dense *Populus canescens* scrub. Other locally frequent non-natives were *Cotoneaster spp* (at least four taxa present), *Quercus ilex, Acer pseudoplatanus*, *Pinus sylvestris* and other conifers. *Pteridium aquilinum* was dominant with patches of scrub to the north of the golf course.

3.1.2 Saunton Golf Course (SSSI unit 101)

The golf course has been laid-out over semi-fixed and older stabilised dunes and occupies much of the north-east of the SSSI. The played areas of the course were not surveyed. All greens, tees and fairways were intensively managed. The golf course is not grazed.

The major vegetation type, forming the great majority of the grassland, was SD9a. This is a typical community of semi-stable, ungrazed dunes. *Ammophila arenaria, Festuca rubra, Avenula pubescens* and other perennial grasses were dominant in a relatively species-poor sward. This graded into more species-rich SD8b around the edges of some played areas where the grassland was mown, and into SD8c where the dunes were more mobile.

There were several small slacks, mostly relatively dry with SD16b, but also some areas of SD15c and SD15d were wetter. These appeared to be species-rich and in good condition, with substantial populations of *Epipactis palustris*.

Scrub was surprisingly limited in area and may be cut as part of course management. There were localised stands of *Rubus fruticosus* and mosaics of this with SD9a grassland. There were also patches of mixed W21 scrub, a screening belt of scrub along the eastern boundary and more extensive stands of *Salix cinerea* scrub in the south-east.

3.1.3 South of the golf course to Sandy Lane car park (SSSI unit 103).

This small section of the survey area runs from the southern boundary of the golf course along the eastern margin of the SSSI to the northern boundary of the central corridor, then southwards to the main track leading westwards from the Sandy Lane car park. This is an area of low, fixed dunes and mobile sand is very localised. This area is cattle grazed.

Much of the vegetation here was scrub, forming large, dense stands along the eastern SSSI boundary, and more extensively in the north and to the immediate west of Sandy Lane car park. The main scrub type was W1, dominated by *Salix cinerea* on more water-retentive soils here. There were small stands of mixed W21 scrub on drier soils, and stands of W24 largely around the margins of the W1.

The gently undulating dune topography has resulted in a varied hydrology in this area. The more lower lying land had slacks with SD16b, grading into M22b where *Salix repens* was absent. Higher, dry ground had species-rich SD8b grassland.

3.1.4 Greenaways and Freshmarsh, Braunton SSSI (Unit 2).

This is a group of five small fields to the north-east of the Sandy Lane car park. All of these apart from the south-easternmost appear to be managed as a single unit. These had been cut for hay or silage in the summer.

The grassland in the cut fields corresponded most closely to MG12a, and may have developed over formerly cultivated land. While not very species-rich, it contained a number of species not normally present in intensively managed grassland. The south-eastern corner had not been cut or grazed, and had tall swamp vegetation.

Dense hedges form the western, north-eastern and southern boundaries, and ditches run along the south-eastern boundary and between the fields.

This area may provide valuable habitat for a range of breeding birds and invertebrates.

3.1.5 The central corridor from the Sandy Lane car park to the sea (SSSI units 104, 108).

This is a large section of the central part of the dune system, extending from the low, fixed dunes in the east to the highly mobile dunes and sand of the seaward dune ridge. This part of the SSSI is grazed, with fences enabling animals to be moved around the site.

There are several distinct zones here, probably related to the age of the dunes, with the oldest and lowest dunes extending from Sandy Lane and the American Road at the landward end for approximately 1 km to the west. These old dunes have a gently undulating surface, the resulting topography giving rise to a complex mosaic of species-rich SD8 grassland on

the flat, drier areas with large slacks in shallow depressions. The most widespread slack vegetation was SD16b, dominated by varying cover of *Salix repens*, but with generally more species-rich SD15c and SD15d where water table was nearer the surface. *Salix repens* was only absent from the wettest slacks which in a normal summer might be expected to retain some water. Low dune ridges with some mobile sand had small areas of SD7c and SD8c and were characterised by much higher frequency of *Ammophila arenaria*. Scrub was frequent, both as small discrete stands, invasive stands, and larger areas of dense, more mature scrub. Much of scrub was W1, dominated by *Salix cinerea* and *Rubus fruticosus*, although mixed W21d was present in many places near the margins of the W1 and also on the drier areas of low dunes.

Semi-fixed dunes then extend for approximately 2 km. These form a dramatic landscape of steep dunes and valleys with occasional large dry slacks. In the south, there is a very large (c4ha) blow-out, with much completely unvegetated sand, and pioneer SD6a at the margins. However, the majority of the vegetation is a mosaic of SD7c and SD8c, varying depending on microtopography, with SD7c on eroded steep, south-facing slopes, and more continuous SD8c on north-facing and sheltered slopes. *Ammophila arenaria* is abundant throughout and locally dominant. Scrub forms extensive stands in many places. Much of this was low and dense, and appeared to be of recent origin. On the drier dunes, this was dominated by *Rubus fruticosus, Ligustrum vulgare* and *Clematis vitalba* with many other species at lower frequencies. The non-native *Hippophae rhamnoides* was present in a few places, but most stands had been herbicide-treated. Small areas of *Salix cinerea* scrub were present in the slacks. There were also small areas of dense *Alnus glutinosa* scrub and a stand of dominant *Populus tremula*. *Rubus fruticosus* was frequent in many of the grasslands at low cover. The slacks were generally dry, the most widespread community being SD16b, often with SD8c and SD7c on low ridges and knolls.

West from the most seaward belt of slacks the dune grassland became increasingly open. The most seawards ridge had the characteristic pioneer community SD6a. This was dominated by *Ammophila arenaria* with large areas of exposed sand. Rare species including *Matthiola sinuata, Euphorbia paralias* and *Eryngium maritima* were all recorded here. At the base of the outermost dune slope was a very narrow strand-line zone with scattered plants of *Euphorbia paralias, Cakile maritima, Salsola kali* and *Atriplex glabriuscula*. This extended along the whole length of this section.

3.1.6 Sandy Lane car park to Crow Point (SSSI unit 105).

This is a strip of the most landward part of the dune system along the west of the American Road from the Sandy Lane car park to approximately 300m north of Crow Point. This area is grazed. The remains of D-Day landing craft training mock-ups are present in the centre of the strip.

The topography here is similar to that of the landward zone of Section 6, with a gently undulating surface of old, fixed dunes and low ridges of more mobile sand. This has given rise to a mosaic of vegetation types related to hydrology.

Large areas of dense scrub were present, most extensively in the north, but with smaller areas in a mosaic with dune grasslands and slack vegetation further south. The principal scrub type was W1, dominated by *Salix cinerea*, but locally by *Betula pubescens.* There were smaller areas of W21d and W24 were drier. A large area of W1 had been cleared in the centre of this strip.

Slack vegetation is particularly well-developed in the north between areas of scrub. The most widespread community was SD16a, but there are also large areas of SD15c and SD15d and where water persists into the summer, there are small stands of SD14a. These wetter slacks are a rare vegetation type and are of particularly high conservation value. Ground-water levels are clearly relatively high here.

In the centre of this section a large area of what was probably W1 scrub has been cleared, leaving a mosaic of mire types and scrub regeneration. Some of this mire was of great interest, related to M22b and SD15. The rare *Juncus subnodulosus* was present here in one of its very few localities in south-west England, and a species of *Carex* most likely to be *C. disticha* (not possible to confirm late in the year without inflorescences) was also found.

Slacks were also well developed further south, but here they tended to be smaller and set in a matrix of slightly higher ground and low dune ridges. The extreme rarity *Scirpoides holoschoenus* was present here in several places in its only UK locality, and another Braunton speciality *Teucrium scordium* was also recorded in one slack (although probably present in others but not recorded late in the season).

There were large areas of dune grassland. Much of this was species-rich SD8b, with SD8c and more locally SD7c on the higher ridges and knolls.

3.1.7 Land to the east of American Road (SSSI unit 106).

The SSSI includes three fields to the east of the American Road. These extend the whole length of the road from Sandy Lane car park to Crow Point. These fields appear to have received some degree of agricultural improvement and have lost some of their original dune topography but still retain areas of typical dune vegetation and grassland derived from dune communities with some degree of agricultural improvement.

Much of the grassland in the northern field is moderately species-rich SD8b. To the east there is a more or less abrupt transition to a species-rich inundation grassland related to MG6d. In the southern fields, the main grassland type is still SD8d, but slightly less species-rich. Lower-lying and seasonally-wet parts of the fields have slacks, although these have been modified by agricultural activities. While the vegetation of these slacks is clearly closely related to the typical slack community SD16, some characteristic species, in particular *Salix repens* are infrequent.

All three fields have extensive stands of scrub on relatively wet soils, much of which was mapped as W1 with dominant *Salix cinerea*, although *Betula pubescens* was dominant in some areas, and where drier, there was W21 scrub. There has been extensive clearance of *Rubus fruticosus* in some areas, although much still remains.

3.1.8 Crow Point (SSSI unit 105).

This section includes the Crow Point car park, a small area to the north, the low cliff and strand line and the low dunes to the south of the car park towards Crow Point as far as the American Road. Much of the dune frontage along the estuary has been eroded recently. The car park itself was poorly vegetated, although the uncommon archaeophyte *Silybum marianum* was present in several places. It was surrounded by W21 and W24 scrub, and along the seaward edge was a narrow fringe of SD6a.

The low dunes to the south-west appeared to have suffered considerably from uncontrolled vehicular access in the past. Although now bollards have now been installed and the dune grassland is recovering. The outer face of the dune ridge nearest the estuary had a narrow zone of *Ammophila arenaria*-dominated SD6a, with a fragmentary strand-line vegetation of

SD2. Slightly further inland on the more sheltered dunes the main vegetation type was SD7c grassland, but with much invasive scrub of *Rubus fruticosus, Ligustrum vulgare* and *Crataegus monogyna*. Behind the dune ridge, the flatter land had been damaged by vehicles, and there were considerable areas of bare sand. There were however areas of early successional grassland related to SD8b, where the grassland was re-establishing. There was also a small SD16b dune slack and substantial areas of W21d scrub with an unusually large quantity of *Euonymus europaeus*.

3.1.9 Yelland (Unit 103, Taw-Torridge Estuary SSSI).

Land surveyed at Yelland includes an area of inter-tidal sediment, sea wall and a small area of land within the sea wall forming part of the Taw Torridge Estuary SSSI, and two fields and a small area of scrub outside the SSSI.

The fields to the south of the sea wall outside the SSSI have agriculturally semi-improved grassland MG10b. This is typically a species-poor grassland dominated by the grasses *Holcus lanatus, Agrostis capillaris, Agrostis stolonifera, Festuca rubra* with scattered clumps of *Juncus inflexus*. Ungrazed grassland between the fence along the northern edge of these fields and the sea-wall was species-poor MG1a with *Ulex europaeus* scrub to the east. The sea wall itself had more species-rich grassland which was closest to an atypical form of the maritime grassland MC11, more commonly found on the tops of sea-cliffs.

The seaward face of the sea wall had a mosaic of species-poor vegetation types including low W24 *Rubus fruticosus* scrub, the strand-line community SD2 and single-species stands of *Elytrigia atherica* SM24, with MG1a to the east where more sheltered from sea spray by the salt-marsh.

To the east behind the sea-wall was a large pond with a fringe of *Phragmites australis* scrub S4. At the time of survey, coot, moorhen, a water rail and 18 wigeon were present. Surrounding this to the south, east and west was dense W1 scrub dominated by *Salix cinerea* with local *Ligustrum vulgare* and *Prunus spinosa*. A cetti's warbler was heard here.

No vegetation was present on the intertidal sediment in the estuary to the west of the culvert leading from the pond. To the east of this culvert but west of the larger, more northerly culvert, was a large, single-species stand of *Spartina anglica* SM6. North of the

northern culvert was a more extensive area of salt marsh, mainly SM13c, but with stands of *Elytrigia atherica* SM24 on slightly raised areas where tidal inundation is less frequent.

3.2 NVC community descriptions

Each NVC community description below includes table listing the community codes, community names, and match coefficients from MAVIS, a description of the community within the survey area, and a table of quadrat results. In the quadrat results table, constancy is calculated as number of quadrats in which a species is recorded x (5/total number of quadrats). Where fewer than five quadrats were recorded for any community, the total number of quadrats is reported.

3.2.1 Dune slacks

SD14a *Salix repens-Campylium stellatum* dune-slack community, *Carex serotina-Drepanocladus sendtneri* sub-community

Table 3.1 SD14a communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
SD14a	*Salix repens-Campylium stellatum* dune-slack community, *Carex serotina-Drepanocladus sendtneri* sub-community	56.1
SD14b	*Salix repens-Campylium stellatum* dune-slack community, *Rubus caesius-Galium palustre* sub-community	47.0
SD14	*Salix repens-Campylium stellatum* dune-slack community	44.3
SD17d	*Potentilla anserina-Carex nigra* dune-slack community, *Hydrocotyle vulgaris-Ranunculus flammula* sub-community	44.2
SD15b	*Salix repens-Calliergon cuspidatum* dune-slack community, *Equisetum variegatum* sub-community	42.7

This dune-slack community was recorded in three places, the largest of which was a seasonally flooded pool to the south-west of the Sandy Lane carpark. The mosses *Drepanocladus sendtneri* and *Campylium stellatum* were dominant in a more or less continuous turf with abundant *Agrostis canina, Anagallis tenella, Hydrocotyle vulgaris, Mentha aquatica, Ranunculus flammula* and *Samolus valerandii*. *Bolboschoenus maritimus* and *Schoenoplectus tabernaemontani* formed a dispersed canopy layer above this. The otherwise ubiquitous *Salix repens* was rare. On the less-frequently flooded upper margins of the pools, this vegetation graded into SD15c and SD16a.

Table 3.2 SD14a species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale			Constancy
	32	**33**	**34**	
Agrostis canina	5	3	4	3
Anagallis tenella	3	2	4	3
Drepanocladus sendtneri	5	8	8	3
Hydrocotyle vulgaris	3	5	5	3
Mentha aquatica	2	4	2	3
Potentilla anserina	3	3	2	3
Ranunculus flammula	4	3	3	3
Salix repens	3	1	1	3
Bolboschoenus maritimus	3		1	2
Campylium stellatum	4		2	2
Carex demissa	2		3	2
Carex hirta	3		3	2
Equisetum variegatum	4	3		2
Juncus articulates	3		2	2
Samolus valerandii	5	3		2
Schoenoplectus tabernaemontani		4	4	2
Agrostis stolonifera	3			1
Amblystegium serpens			2	1
Carex nigra		1		1
Eleocharis palustris	4			1
Epilobium hirsutum	1			1
Glaux maritima	2			1
Juncus bufomius	3			1
Lythrum salicaria	1			1
Potentilla reptans			2	1
Salix cinerea	1			1

Anomalous stands of SD15 with abundant *Juncus spp.*

Table 3.3 SD15 with abundant *Juncus* spp. communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
SD15	*Salix repens-Calliergon cuspidatum* dune-slack community	50.9
SD16b	*Salix repens-Holcus lanatus* dune-slack community, *Rubus caesius* sub-community	50.8
SD15b	*Salix repens-Calliergon cuspidatum* dune-slack community, *Equisetum variegatum* sub-community	48.5
SD17b	*Potentilla anserina-Carex nigra* dune-slack community, *Carex flacca* sub-community	47.7
SD15d	*Salix repens-Calliergon cuspidatum* dune-slack community, *Holcus lanatus-Angelica sylvestris* sub-community	46.6

Low-lying areas to the north-west of the Sandy Lane car-park and to the west of the American Road where there had been extensive recent scrub clearance had seasonally wet vegetation related to SD16a dune-slack communities. They differed from typical SD16 in their lower constancy and cover of *Salix repens* and constant and abundant *Juncus spp*. *Juncus subnodulosus* and *Juncus inflexus* were abundant together with *Holcus lanatus, Potentilla anserina, Agrostis canina, Carex flacca, Calliergonella cuspidata* and more locally *Salix repens. Juncus subnodulosus* is a very rare species in Devon, and was not listed for the site by Smith (2017). *Carex distans* was abundant in one stand, and a *Carex* species closely resembling *C. disticha* (very rare in Devon) but lacking inflorescences was also present in the scrub-cleared area. These stands graded into adjacent SD16a with increasing cover of *Salix repens* and decreasing cover of *Juncus spp*. These stands were mapped as M22 (*Juncus subnodulosus-Cirsium palustre* fen-meadow) to reflect their unusual composition and frequency of *Juncus spp.*

Table 3.4 SD15 with abundant *Juncus* spp. community species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale					Constancy
	13	**60**	**61**	**62**	**68**	
Calliergonella cuspidate	3	4	4	6	4	5
Holcus lanatus	3	2	4	2	4	5
Potentilla anserina	4	5	5	5	5	5
Potentilla reptans	2	1	2	1	3	5
Agrostis canina	3	6	6	6		4
Carex flacca	5		4	3	5	4
Juncus inflexus	5		3	4	5	4
Salix cinerea	1	2		4	1	4
Salix repens		4	5	4	2	4
Agrostis stolonifera	3	4		4		3
Betula pubescens	1		1	4		3
Lotus corniculatus	2		2	2		3
Melilotus sp	1	2			2	3
Plantago lanceolata	1			1	4	3
Rubus caesius	3		5		1	3
Carex arenaria	2				1	2
Carex hirta	2				4	2
Crataegus monogyna	1		1			2
Equisetum variegatum		2		3		2
Hydrocotyle vulgaris				2	3	2
Jacobaea vulgaris	3				2	2
Juncus subnodulosus		8		4		2
lathyrus pratensis	3				1	2
Lythrum salicaria	3			1		2
Rosa canina	1		1			2
Rubus fruticosus		2		4		2
Schedonurus arundinacea	2			2		2
Trifolium repens	5				4	2
Bellis perennis					2	1
Carex distans			5			1
Carex disticha				3		1
Carex hostiana					1	1
Carex otrubae	3					1
Epilobium palustre		1				1
Festuca rubra					4	1
Filipendula ulmaria					2	1
Juncus maritimus			5			1
Linum catharticum	1					1
Mentha aquatica			3			1
Odontites verna	1					1
Prunella vulgaris					2	1
Pulicaria dysenterica	2					1
Trifolium fragiferum	2					1
Trifolium pratense				2		1
Vicia cracca					2	1
Vicia sativa ssp nigra	1					1

SD15c *Salix repens-Calliergon cuspidatum* dune-slack community, *Carex flacca-Pulicaria dysenterica* sub-community

Table 3.5 SD15c communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
SD15	*Salix repens-Calliergon cuspidatum* dune-slack community	60.2
SD15b	*Salix repens-Calliergon cuspidatum* dune-slack community, *Equisetum variegatum* sub-community	59.8
SD15c	*Salix repens-Calliergon cuspidatum* dune-slack community, *Carex flacca-Pulicaria dysenterica* sub-community	57.9
SD14	*Salix repens-Campylium stellatum* dune-slack community	56.3
SD16b	*Salix repens-Holcus lanatus* dune-slack community, *Rubus caesius* sub-community	54.5

This community is characteristic of slacks where inundation periods are longer and where the water table remains close to the surface in the summer. In common with the SD16 vegetation of dry slacks, *Salix repens* formed a low shrubby canopy of variable density, but *Rubus caesius* was rare. Beneath this shrubby cover the ground layer was dominated by a range of species typical of calcareous, wet conditions. These included the moss *Calliergonella cuspidata,* with abundant *Potentilla anserina, Carex flacca, Potentilla reptans, Hydrocotyle vulgaris, Mentha aquatica, Carex hirta* and *Equisetum variegatum* and more locally *Agrostis canina, Anagallis tenella, Epipactis palustris, Carex nigra* and *Filipendula ulmaria.* Species of drier grasslands were much less frequent, but included *Homalothecium lutescens, Lotus corniculatus, Plantago lanceolata, Prunella vulgaris, Trifolium repens* and *Agrostis capillaris.*

While the analysis suggests that this vegetation is closer to SD15b, the absence of *Galium palustre* the scarcity of *Carex nigra,* and the abundance of *Carex flacca* suggest that SD15c is the closest match.

Table 3.6 SD15c community species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale							Constancy
	4	**14**	**39**	**53**	**120**	**129**	**131**	
Calliergonella cuspidata	5	5	8	4	2	6	6	5
Carex flacca	5	6	5	6	1	2	4	5
Potentilla anserina	5	5	7	5	3	2	4	5
Salix repens	7	5	6	5	6	8	5	5
Potentilla reptans	1	2	3	2	2		3	5
Hydrocotyle vulgaris		5	2	4		3	2	4
Mentha aquatica	5	3			3	4	3	4
Carex hirta	3	4	1		2			4
Equisetum variegatum	1	1	2	1				4
Agrostis canina	2	3		6				3
Anagallis tenella		2		1			4	3
Homalothecium lutescens	1				8	5		3
Lotus corniculatus		3				3	2	3
Plantago lanceolata	2	2				3		3
Prunella vulgaris		2				3	3	3
Trifolium repens		4		3		3		3
Agrostis capillaris						1	5	2
Agrostis stolonifera	6		2					2
Carex arenaria					3		2	2
Carex nigra		2	3					2
Epipactis palustris	2	2						2
Filipendula ulmaria			3		4			2
Melilotus sp	2			1				2
Ranunculus acris		1		1				2
Schedonurus arundinacea	4	2						2
Agrimonia eupatorium		1						1
Amblystegium serpens		2						1
Bare ground							2	1
Carex demissa				4				1
Cirsium arvense					1			1
Crataegus monogyna	2							1
Danthonia decumbens		1						1
Festuca rubra	3							1
Galium palustre	1							1
Holcus lanatus						1		1
Hypochaeris radicata						3		1
Jacobaea vulgaris		1						1
Juncus inflexus			2					1
Juncus maritimus				4				1
Kindbergia praelongum	2							1
Leontodon saxatilis		2						1
Linum catharticum						1		1
Lythrum salicaria	1							1
Odontites verna	1							1
Poa humilis	1							1
Pseudoscleropodium purum						2		1
Ranunculus flammula				1				1
Rubus caesius		1						1
Rubus fruticosus					3			1
Salix cinerea	1							1
Senecio erucifolius						1		1

Table 3.6 SD15c community species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale							Constancy
Vicia cracca	1							1
Vicia sativa ssp nigra	1							1

SD15d *Salix repens-Calliergon cuspidatum* dune-slack community, *Holcus lanatus-Angelica sylvestris* sub-community

Table 3.7 SD15d communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
SD15	*Salix repens-Calliergon cuspidatum* dune-slack community	59.3
SD15b	*Salix repens-Calliergon cuspidatum* dune-slack community, *Equisetum variegatum* sub-community	59.1
SD15c	*Salix repens-Calliergon cuspidatum* dune-slack community, *Carex flacca-Pulicaria dysenterica* sub-community	54.3
SD15d	*Salix repens-Calliergon cuspidatum* dune-slack community, *Holcus lanatus-Angelica sylvestris* sub-community	52.7
SD14	*Salix repens-Campylium stellatum* dune-slack community	51.8

SD15c is also a community of regularly inundated slacks with a high summer water-table. At Braunton this vegetation was clearly very closely related to SD15b and the SD15c described above, but was distinguished by the constant presence of *Molinia caerulea,* which was abundant in some stands, and the higher frequency of *Schedonurus arundinacea, Filipendula ulmaria, Melilotus sp* and *Rubus caesius. Salix repens* also formed a low shrubby canopy with *Rubus caesius* and a ground flora dominated by *Calliergonella cuspidata* with *Carex flacca, Potentilla anserina, Filipendula ulmaria, Equisetum variegatum, Melilotus sp, Potentilla reptans, Carex hirta, Hydrocotyle vulgaris, Lotus corniculatus, Agrostis canina* and *Agrostis stolonifera*. The uncommon *Epipactis palustris* and *Juncus acutus* were occasional, and most species typical of drier grasslands were rare, as might be expected from these more regularly flooded slacks.

Table 3.8 SD15d species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale											Constancy
	3	**5**	**7**	**11**	**35**	**36**	**37**	**44**	**94**	**115**	**134**	
Calliergonella cuspidata	4	1	4	5	6	5	7	8	6	8	6	5
Carex flacca	4	5	5	5	6	5	6	4	4	3	4	5
Molinia caerulea	8	7	3	5	6	5	3	3	6	5	1	5
Salix repens	7	7	6	5	5	6	5	8	5	6	7	5
Potentilla anserina	2	3	6	4	5	5	5	7		4	4	5
Filipendula ulmaria	4	4	5	4	2	3	3		4	4		5
Equisetum variegatum	2	3	2	1	3	3	2				1	4
Melilotus sp	1	2	3	3	1	2	2			1		4
Potentilla reptans	2	2	1	3	2	2	2			3		4
Rubus caesius		7	7	4		2		1		1	1	4
Schedonurus arundinacea	2	4	3	2		5	5		2			4
Carex hirta	1	1	2	2					3	3		3
Hydrocotyle vulgaris				5	5			2	5	2	1	3
Lotus corniculatus		3		3	2		2	3			4	3
Agrostis canina	5		5	4	3			5				3
Agrostis stolonifera		3	3	2		2	2					3
Epipactis palustris		3	2		4				4			2
Festuca rubra	3					2	2		3			2
Holcus lanatus		3	2	2		4						2
Mentha aquatica					4	5		3			3	2
Plantago lanceolata		2	3	2		2						2
Trifolium repens	2		2	2			3					2
Carex nigra			3		3	1						2
Juncus acutus				2			2		2			2
Rubus fruticosus	2					1			1			2
Agrostis capillaris										3	3	1
Juncus inflexus			1	4								1
Poa humilis		1				2						1
Prunella vulgaris			1								2	1
Ranunculus repens					1					1		1
Salix cinerea		3		1								1
Agrimonia eupatorium		1										1
Blackstonia perfoliata											1	1
Briza media							2					1
Equisetum palustre									1			1
Iris pseudacorus	2											1
Juncus articulatus							1					1
Lythrum salicaria				2								1
Medicago lupulina			1									1
Odontites verna			2									1
Ranunculus acris									1			1
Ranunculus bulbosus											2	1
Trifolium pratense			2									1
Vicia cracca									1			1
Vicia sativa ssp nigra				2								1
lathyrus pratensis	2											1

SD16b *Salix repens-Holcus lanatus* dune-slack community, *Rubus caesius* sub-community.

Table 3.9 SD16b communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
SD16b	*Salix repens-Holcus lanatus* dune-slack community, *Rubus caesius* sub-community	57.6
SD14d	*Salix repens-Campylium stellatum* dune-slack community, *Festuca rubra* sub-community	53.7
SD16	*Salix repens-Holcus lanatus* dune-slack community	52.5
SD15	*Salix repens-Calliergon cuspidatum* dune-slack community	51.4
SD14	*Salix repens-Campylium stellatum* dune-slack community	50.9

This is the characteristic vegetation of slacks which are only flooded for short periods in the winter months and in which the water table is generally more than 50cm below the surface in the summer. *Salix repens* typically forms a low shrubby cover with *Rubus caesius*, but here there are some stands clearly related to this community where *S. repens* and *R. caesius* are absent. These areas are mainly on the Saunton golf course, and may have been affected by course management practices such as mowing. They are transitional to the inundation grassland type MG11a.

Beneath the shrubby cover there was a rather variable sward composed largely of species characteristic of unimproved mesotrophic grassland, most frequently *Holcus lanatus, Festuca rubra, Agrostis stolonifera, Trifolium repens, Carex flacca, Potentilla anserina, Carex hirta, Plantago lanceolata, Ranunculus acris, Prunella vulgaris* and *Jacobaea vulgaris*. Mosses form a minor part of the sward, and the most frequent species was *Calliergonella cuspidata.* Few species typical of wetter slacks were any more than rare, the only exception being *Mentha aquatica* which was frequent. There were however numerous species present a low frequencies which are characteristic of the dry dune grassland SD8, indicating a gradation to this community where the slacks were drier. There was typically a broad transitional zone where SD16b graded into the surrounding dry grasslands.

Table 3.10 SD16b species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale													Constancy
	15	**19**	**20**	**25**	**50**	**114**	**69**	**73**	**81**	**122**	**124**	**125**	**128**	
Trifolium repens	4	4	4	4	2		3	5	4	3	5	4	3	5
Holcus lanatus	5	6	6	4	3		5	4	5		4	3	3	5
Carex flacca	2	6	5	4	4	5	5	6	5	3				5
Agrostis stolonifera	3	4	3		3	5	5				3	6	3	4
Salix repens	6	6	6		5	8	5	7	6	6				4
Festuca rubra	3			3	5	5	6		5	5			5	4
Mentha aquatica	1	2	5		3	4		4	2		3			4
Potentilla anserina	3	4	3		2		4	3			3		5	4
Calliergonella cuspidata		5		2	3			3	3			3	3	3
Carex hirta	5			2	2		3				1	4	4	3
Plantago lanceolata				2			1		3	3	3	3	4	3
Ranunculus acris		1		1			1		2		1	3	3	3
Jacobaea vulgaris			3				1	2	2	1			1	3
Lotus corniculatus	2		4	3	3			4		3				3
Prunella vulgaris	1		3	4				1	2	2				3
Rubus caesius	7	3		1	5	5			1					3
Agrimonia eupatorium				2	3	1	2	1						2
Carex arenaria			3	3	4		1			3				2
Cirsium arvense	1	1				2	2		1					2
Dactylis glomerata			3	2	3				2	3				2
Potentilla reptans	3				1		2	2					2	2
Schedonurus arundinacea	5				5	5	4			2				2
Trifolium pratense			2	5				3	2			5	1	2
Agrostis capillaris									4	5	5		3	2
Cynosurus cristatus				4						2		3	2	2
Equisetum variegatum	1									1	4	4		2
Ranunculus repens		2		3				3			6			2
Filipendula ulmaria							3					5	5	2
Juncus inflexus	2						4						4	2
Luzula campestris				2					3	3				2
Melilotus sp	2				1		1							2
Pulicaria dysenterica					1	3					2			2
Ranunculus bulbosus				2					2			1		2
Rubus fruticosus							5			2			4	2
Ajuga reptans				2				1						1
Briza media				4						2				1
Daucus carota									1	1				1
Geranium molle												2	2	1
Juncus acutus					4		2							1
lathyrus pratensis					3		3							1
Linum catharticum		3						2						1
Poa humilis		2						2						1
Pseudoscleropodium purum	4			4						3				1
Salix cinerea					1		1							1
Vicia cracca					2						1			1
Agrostis canina								3						1
Bare ground										4				1
Bellis perennis			2											1
Blackstonia perfoliata		1												1

Table 3.10 SD16b species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale													Constancy
Brachypodium sylvaticum					2									1
Carex distans	4													1
Crataegus monogyna					1									1
Crepis capillaris										1				1
Eupatorium cannabinum						4								1
Galium verum										3				1
Hypericum tetrapterum											1			1
Iris pseudacorus											1			1
Juncus bufomius					4									1
Juncus maritimus												1		1
Leontodon saxatilis			1											1
Leucanthemum vulgare										3				1
Lolium perenne				3										1
Lotus pedunculatus												3		1
Medicago lupulina				1										1
Odontites verna													3	1
Ononis repens										3				1
Poa trivialis											3			1
Senecio aquatica							1							1
Senecio erucifolius					1									1
Taraxacum									1					1
Veronica chamaedrys				1										1
Vicia sativa ssp nigra	1													1
Viola hirta									3					1

3.2.2 Dune Grassland and mobile dune communities

SD2 *Honckenya peploides-Cakile maritima* strandline community

Fragmentary strand-line vegetation was present along the outermost edge of the dune system from Crow point to Saunton Sands. The most frequent species included *Elytrigia juncea, Salsola kali, Cakile maritima, Atriplex glabriuscula* and *Euphorbia paralias*. No quadrats were recorded in this vegetation.

SD6e *Ammophila arenaria* mobile dune community, *Festuca rubra* sub-community.

Table 3.11 SD6e communities and MAVIS match coefficients

Species name	Individual quadrat scores on the Domin scale	Constancy
SD6e	*Ammophila arenaria* mobile dune community, *Festuca rubra* sub-community	57.3
SD7c	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Ononis repens* sub-community	54.2
SD6	*Ammophila arenaria* mobile dune community	51.8
SD7	*Ammophila arenaria-Festuca rubra* semi-fixed dune community	49.9
SD18	*Hippophae rhamnoides* dune scrub	49.4

This community is characteristic of the most mobile dunes on the seaward edge of the system. It was restricted here to the outermost dune ridge and the more extensive mobile area near the Saunton Sands car park. With increasing stability of the sand, this vegetation grades into SD7c.

The characteristic dune grass *Ammophila arenaria* was dominant in a very open sward with much unvegetated sand. Other frequent species included *Calystegia soldanella, Festuca rubra, Hypochaeris radicata, Euphorbia paralias, Oenothera sp, Elytrigia juncea, Crepis capillaris* and *Crithmum maritimum*. The rare species *Matthiola sinuata* and *Eryngium maritimum* were recorded in this vegetation in several places.

Table 3.12 SD6e species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale						Constancy
	22	**115**	**116**	**65**	**76**	**77**	
Ammophila arenaria	7	8	8	7	7	6	5
Calystegia soldanella	5	3	1	4	3		5
bare sand	7	3	5	7	7	8	5
Festuca rubra	5	5	2		6	5	5
Hypochaeris radicata	3	2	3		3	3	5
Oenothera sp	2		2	2			3
Euphorbia paralias			4	4		4	3
Elytrigia juncea		3		2			2
Carex arenaria		4		3			2
Crepis capillaris		3	3				2
Rubus fruticosus		2			1		2
Ononis repens		3				2	2
Crithmum maritimum			2			2	2
Poa humilis	1						1
Cirsium vulgare		1					1
Trifolium arvense		1					1
Vulpia sp			2				1

Taraxacum sp			1				1
Jacobaea vulgaris				1			1

SD7c *Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Ononis repens* sub-community

Table 3.13 SD7c communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
SD7c	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Ononis repens* sub-community	60.7
SD7	*Ammophila arenaria-Festuca rubra* semi-fixed dune community	60.6
SD7d	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Elymus pycnanthus* sub-community	57.1
SD7a	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, typical sub-community	55.7
SD7b	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Hypnum cupressiforme* sub-community	48.0

This is the typical vegetation of semi-fixed dunes inland from the most seaward ridges, where there is still some movement of sand, but where organic matter has accumulated and where the development of vegetation cover has started to stabilise the dunes. Areas of bare sand are still however a feature of this relatively species-poor vegetation. The rhizomatous sand-accumulating grass *Ammophila arenaria* was constant and abundant in most stands together with *Festuca rubra* and *Carex arenaria. Ononis repens* was constant, and in most stands, the moss *Homalothecium lutescens* was abundant, and other frequent species included *Galium verum, Hpochaeris radicata, Taraxacum sp, Crepis capillaris, Dactylis glomerata, Oenothera sp* and *Tortula ruralis ssp ruraliformis*. MAVIS analysis suggested a closest fit with SD7d and SD7a, but given the constancy of *Ononis repens* and the absence of *Elytrigia atherica*, the vegetation here appears closest to SD7c.

On the most seaward dune ridges, this grassland became gradually more impoverished with increasing cover of bare sand, grading into the *Ammophila arenaria*–dominated SD6. With increasing consolidation of the sand, especially away from the sea where the dune profiles become less prominent, *Ammophila arenaria* became less abundant in the more continuous sward of SD8. In many areas however there were complex mosaics of SD7 and SD8, related to micro-topography. The SD16 vegetation of the more seaward slacks grades into SD7 around the slack margins, and *Salix repens* can persist even where the dunes appear dry.

Table 3.14 SD7c species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale												Constancy
	8	**10**	**17**	**21**	**56**	**71**	**75**	**78**	**104**	**109**	**118**	**132**	
Ammophila arenaria	7	5	5	5	5	3	6	8	5	7	4	5	5
Carex arenaria	3	3	2	5	3	5	5	3	5		2	2	5
Festuca rubra	7	8	2	6	3	3	3	4	6	3		2	5
Ononis repens	3	3	2	3	3	2		3	3	4	2	2	5
BG	4		6	4	5	6	7	5	4	6		3	5
Homalothecium lutescens	6	6	8	7	4	7	3	4	3		9		5
Galium verum	2	1	3		3	4	4				4	3	4
Hypochaeris radicata	1	1		2			3	2	1	2			4
Taraxacum sp				1	1		3	3	2	1	1		4
Crepis capillaris				1	3	2			3		4	2	3
Dactylis glomerata	1	3		1					3	4			3
Oenothera sp			2	2	2	1		1					3
Tortula ruraliformis			3		2	4	3	4					3
Echium vulgare	1					3					3	1	2
Geranium molle						2	2				4	2	2
Holcus lanatus		3	3		2					4			2
Daucus carota								1	1	1			2
Ligustrum vulgare		4			2				5				2
Plantago lanceolata		2						1			2		2
Poa humilis				1							2	1	2
Ranunculus bulbosus	1					1			2				2
Thymus praecox	1	3										2	2
Agrimonia eupatorium	3								1				1
Anchusa arvensis		2	2										1
Elytrigia repens				1						1			1
Euphorbia portlandica					1			2					1
Hypnum cupressiforme			4									9	1
Jacobaea vulgaris						1				2			1
Pilosella offinarum				1	2								1
Poa angustifolia					3					1			1
Rubus fruticosus		3		1									1
Sedum acre					1							1	1
Acrocarpous moss					5								1
Arenaria serpyllifolia			1										1
Avenula pubescens										1			1
Brachypodium sylvaticum		1											1
Brachythecium albicans		2											1
Centaurium erythraea						1							1
Cerastium glomeratum											1		1
Cerastium semidecandrum												3	1
Cynosurus cristatus									3				1
Erodium cicutarium	2												1
Fragaria vesca					1								1
Hypericum maculatum											3		1
Leontodon saxatilis										1			1
Lotus corniculatus	2												1

Table 3.14 SD7c species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale												Constancy
Luzula campestris												2	1
Pseudoscleropodium purum	1												1
Rubus caesius					4								1
Trifolium repens				1									1

SD8c/SD7c *Festuca rubra-Galium verum* fixed dune grassland, *Tortula ruralis ssp ruraliformis* sub-community/ *Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Ononis repens* sub-community

Table 3.15 SD8c/7c slack communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
SD7	*Ammophila arenaria-Festuca rubra* semi-fixed dune community	52.3
SD7c	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Ononis repens* sub-community	50.6
SD7d	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Elymus pycnanthus* sub-community	49.8
SD7a	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, typical sub-community	48.3
SD8	*Festuca rubra-Galium verum* fixed dune grassland	48.1

The vegetation of semi-fixed dunes shows considerable variation related to microtopography. More sheltered and shaded areas tended to have a more continuous sward with less exposed sand, while exposed sites in very close proximity were characterised by abundant bare sand. An attempt was made to distinguish this variation in the field, although in practice many vegetation mosaics were too fine-grained to map meaningfully. MAVIS analysis suggested that the closest fit was with SD7c, although it appears transitional to the fixed dune grassland SD8. Large areas of distinctive SD8c were mapped as such.

Ammophila arenaria, *Carex arenaria* and *Homalothecium lutescens* were dominant in a relatively closed sward with abundant *Galium verum, Ononis repens* and more locally *Hypochaeris radicata, Pseudoscleropodium purum* and *Taraxacum sp.* While *Festuca rubra* was abundant in some stands, *Festuca ovina* was abundant in others, suggesting greater soil stability. Other frequent species more typical of stable dunes were *Lotus corniculatus* and *Luzula campestris*.

The SD7c described above differed from this community in the constancy of *Festuca rubra,* more frequent *dactylis glomerata, Oenothera sp* and *Tortula ruralis ssp ruraliformis,* and less frequent species of fixed dunes including *Galium verum, Festuca ovina, Lotus corniculatus* and *Luzula campestris*. The rare *Viola canina* was recorded in one place.

Table 3.16 SD8c/7c species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale												Constancy
	6	**16**	**46**	**54**	**58**	**59**	**63**	**67**	**74**	**79**	**114**	**116**	
Carex arenaria	5	1	4	3	3	2	5	3	3	3	3	3	5
Ammophila arenaria		5	3	5	8	5	5	5	7	5	6	4	5
Galium verum	3	2	4	5	4	5	4	3	3			5	5
Homalothecium lutescens	7	4	6	8		6	6		8	6	3	3	5
Ononis repens	4	3		3	3	1	2	1	2	2		3	5
Hypochaeris radicata		3			4	2	2		5	4	1	3	4
Pseudoscleropodium purum		6			2	7	6	5			7	4	4
Taraxacum sp		2		1	4	3	3		2	3			4
Crepis capillaris			1	3	2			3	3			2	3
Echium vulgare	1		2				4	1	1			2	3
Festuca ovina	7		5		6	4	5	4					3
Festuca rubra		7		2				6	3	7	4		3
Jacobaea vulgaris				4	2	1		2	2			2	3
Lotus corniculatus	2				2	2	3		4		5		3
Rubus fruticosus		4		1	1		5	1			1		3
Geranium molle			4		1	3			1	3			3
Holcus lanatus		4	1				3	4		3			3
Luzula campestris			3			3	3	4				3	3
Ranunculus bulbosus					1	2	3	2			1		3
Dactylis glomerata	2	2							2			3	2
Ligustrum vulgare		4					2				2	5	2
Oenothera sp			1	1				2	2				2
Pilosella offinarum					2	1	1			3			2
Plantago lanceolata		1			2			3			2		2
Viola hirta			2		3		4	2					2
Agrimonia eupatorium	2		1					1					2
Arenaria serpyllifolia			3	1					2				2
BG	4								2			6	2
Daucus carota		1								2	2		2
Linum catharticum				3					1	1			2
Rhytidiadelphus triquetrus					1		4	5					2
Thymus praecox	2		5								3		2
Arrhenatherum elatius		2			2								1
Carex flacca							4					2	1
Cynosurus cristatus											3	1	1
Hypnum cupressiforme			5			2							1
Poa angustifolia					4					2			1
Polypodium vulgare						1				1			1
Ranunculus repens							1	1					1
Rubus caesius						1	2						1
Teucrium scorodonia				1		1							1
Achillea millefolium											1		1

Table 3.16 SD8c/7c species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale												Constancy
Agrostis capillaris	2												1
Anacamptis pyramidalis									1				1
Arabis hirsuta				3									1
briza media											3		1
Centaurium erythraea				1									1
Cladonia furcata				1									1
Cladonia rangiformis			3										1
Crataegus monogyna	2												1
Elytrigia repens								5					1
Equisetum arvense											3		1
Erigeron acer											3		1
Euonymus europaeus			1										1
Euphorbia portlandica										1			1
Euphrasia nemorosa									1				1
Fragaria vesca										3			1
Hedera helix											1		1
Polygala vulgaris										1			1
Schedonurus arundinacea												3	1
Viola canina										2			1
Vulpia sp				3									1

SD8b *Festuca rubra-Galium verum* fixed dune grassland, *Luzula campestris* sub-community

Table 3.17 SD8b communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
SD8a	*Festuca rubra-Galium verum* fixed dune grassland, typical sub-community	54.0
SD8b	*Festuca rubra-Galium verum* fixed dune grassland, *Luzula campestris* sub-community	53.5
SD8	*Festuca rubra-Galium verum* fixed dune grassland	53.5
SD8d	*Festuca rubra-Galium verum* fixed dune grassland, *Bellis perennis-Ranunculus acris* sub-community	49.6
MG5b	*Centaurea nigra-Cynosurus cristatus* grassland, *Galium verum* sub-community	48.9

More species-rich, continuous swards are able to develop over the stabilised sand of fixed dunes where organic matter has been able to accumulate in the soil, and where the topography of the more mobile systems is less pronounced. The water table in these areas is always well below the surface, even in the wettest periods, but the soils are significantly more water-retentive than on the more mobile dunes. Where the dunes are more mobile this vegetation grades into the intermediate SD7c/SD8c community described above. Where grazing or cutting management is relaxed as on the golf course, coarser, tussocky SD9

vegetation, and eventually scrub can develop. This grassland is also present around the more landward slacks, where it grades into SD16 and 15.

The species-rich vegetation was dominated by a mixture of grasses and other species including either *Festuca rubra* or *Festuca rubra, Lotus corniculatus, Galium verum, Plantago lanceolata, Ranuculus bulbosus, Carex arenaria, Agrostis capillaris, Cynosurus cristatus, Ononis repens, Luzula campestris, Carex flacca, Crepis capillaris, Homalothecium lutescens, Jacobaea vulgaris, Poa humilis* and *Thymus praecox*. At the time of survey, seedlings of annual species including *Geranium molle, Erodium cicutarium, Echium vulgare, Arenaria serpyllifolia* and several other species were prominent. In contrast with grasslands on the more mobile dunes, there was relatively low cover of bare sand, and *Ammophila arenaria* was rare.

Table 3.18 SD8b species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale																					Constancy	
	1	**2**	**12**	**24**	**30**	**31**	**42**	**49**	**57**	**64**	**70**	**92**	**111**	**112**	**117**	**121**	**123**	**126**	**127**	**130**	**133**		
Galium verum	5	5	4	5		5	5	5	6	5	5	3	4	3	3	5	4	5	3	5	4	20	5
Lotus corniculatus	4	2	5	4	4	4	3	5	3	4	4	5	4	3	2	4	3	3	3	3		20	5
Plantago lanceolata	3		3	1	2	2	2	3		3	2	3	1	2	2	3	3	3	3	4	1	19	5
Ranunculus bulbosus		1	1	3	5	3	3	2	3	3	2		4	2		3	3	4		2	2	17	5
Agrostis capillaris	2	2	5	2	3	4	3	1	2	3	6		5		3	4			1	4		16	5
Carex arenaria	4	5	5	3	2		3	5	1	3		3	2			1	4		4	5	3	16	5
Festuca rubra	7	3	6	3	4	6					6	6	5	7	4	5	5	6		2	3	16	5
Homalothecium lutescens		5	5	5		3	6	4	6		2				5	2	6	3	4	2	6	15	4
Luzula campestris				4		3	4	2	5	4	1	2	3		3	4	3	3		3	3	15	4
Cynosurus cristatus			4	5	5	4					2		5	3	3	2	3	6		3	1	13	4
Ononis repens	1					1	1		2	2	2	2		3	2	1	1	3			3	13	4
Carex flacca	3		3	3	3	2		3				4	3		3	5	3					11	3
Crepis capillaris					3		4	1	4	2	3		3		3		2			1	1	11	3
Geranium molle				5	3		3	3	2		3		2					3	3	3	5	11	3
Jacobaea vulgaris			2	2		2		1			2		1		1	2	1	1		2		11	3
Dactylis glomerata	2	2	3		2	2		1			1		3							3		9	3
Echium vulgare				4		2	2	4		1			1					2	2		3	9	3
Erodium cicutarium		3		4		4		2	4		2		3					3	4			9	3
Poa humilis	1	1		4		3	3		3	3	4	2										9	3
Pseudoscleropodium purum	5	4	4				6	5		4			2		3	3						9	3
Trifolium repens	2		3		1			2					2		1	1	1			1		9	3
BG	2	5	4		6			2											6	3	2	8	3
Thymus praecox		3					2	5	4		4		4				2				3	8	3
Holcus lanatus	3	1		2						2		1		3				2				7	3
Leontodon saxatilis			3	2	3			2							3		2		2			7	3
Rubus fruticosus	3	2	2								1			1		2				7		7	3
Taraxacum laevigatum		1				1			3		1			1	1						1	7	3
briza media		2					2					4	3	1								5	2
Agrimonia eupatorium								3		1					2	1						4	2

Table 3.18 SD8b species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale																					Constancy	
	1	**2**	**12**	**24**	**30**	**31**	**42**	**49**	**57**	**64**	**70**	**92**	**111**	**112**	**117**	**121**	**123**	**126**	**127**	**130**	**133**		
Anagallis arvensis							1										1	1	4			4	2
Arenaria serpyllifolia		1					4		2		3											4	2
Euphrasia nemorosa	2		2					2		1												4	2
Festuca ovina		6					5	6		5												4	2
Hypochaeris radicata									1	3		4	1									4	2
Achillea millefolium	3																3			3		3	2
Potentilla reptans						1								1		3						3	2
Tortula ruraliformis		4							2												1	3	2
Veronica chamaedrys																2		2		2		3	2
Viola hirta									4	2					1							3	2
Agrostis stolonifera	1		2																			2	1
Bellis perennis				1		1																2	1
Centaurea nigra					5							1										2	1
Cerastium semidecandrum											3		1									2	1
Cladonia furcata							3	2														2	1
Daucus carota												3		1								2	1
Equisetum arvense	1																			2		2	1
Lolium perenne					4			1														2	1
Oenothera sp	1								1													2	1
Plantago coronopus		1																	3			2	1
Rhytidiadelphus triquetrus								4		8												2	1
Stellaria media				1	3																	2	1
Acrocarpous moss											3											1	1
Ajuga reptans																3						1	1
Ammophila arenaria																					2	1	1
Anacamptis pyramidalis																1						1	1
Anchusa arvensis		3																				1	1
Avenula pubescens												5										1	1
Brachypodium sylvaticum	2																					1	1
Bryum capillare											1											1	1
Calliergonella cuspidata					5																	1	1

Table 3.18 SD8b species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale																				Constancy	
	1	**2**	**12**	**24**	**30**	**31**	**42**	**49**	**57**	**64**	**70**	**92**	**111**	**112**	**117**	**121**	**123**	**126**	**127**	**130**	**133**	
Cerastium glomeratum																1						1	1
Chenopodium album				1																		1	1
Cirsium arvense									1													1	1
Crataegus monogyna	4																					1	1
Ctenidium molluscum																2						1	1
Danthonia decumbens	3																					1	1
Equisetum palustre					3																	1	1
Euphorbia portlandica									1													1	1
Helminthotheca echioides																			1			1	1
Hypnum cupressiforme													2									1	1
Juncus inflexus				1																		1	1
Leucanthemum vulgare																3						1	1
Malva sylvestris																		1				1	1
Medicago lupulina													2									1	1
Myosotis ramosissima											1											1	1
Peltigera canina		2																				1	1
Prunella vulgaris																1						1	1
Pulicaria dysenterica	1																					1	1
Ranunculus repens					2																	1	1
Rubus caesius			4																			1	1
Rumex acetosa					1																	1	1
Sanguisorba minor								1														1	1
Saponaria officinalis																				2		1	1
Schedonurus arundinacea														4								1	1
Silybum marianum																		2				1	1
Trifolium pratense				2																		1	1
Vicia cracca												2										1	1
Viola riviniana									1													1	1

SD9a *Ammophila arenaria-Arrhenatherum elatius* dune grassland, typical sub-community

Table 3.19 SD9a communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
SD9a	*Ammophila arenaria-Arrhenatherum elatius* dune grassland, typical sub-community	56.5
SD9	*Ammophila arenaria-Arrhenatherum elatius* dune grassland	52.7
SD7c	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Ononis repens* sub-community	52.6
SD9b	*Ammophila arenaria-Arrhenatherum elatius* dune grassland, *Geranium sanguineum* sub-community	52.4
SD8a	*Festuca rubra-Galium verum* fixed dune grassland, typical sub-community	51.4

This grassland has developed on the non-played roughs of the Saunton Golf Course. These are stable old dunes which receive little or no management. It was a relatively species-poor community, dominated by tall, tussocky grasses, mainly *Ammophila arenaria* and *Festuca rubra,* but also *Avenula pubescens, Arrhenatherum elatius, Dactylis glomerata, Poa angustifolia* and *Poa humilis*. *Galium verum* was constant throughout and other frequent species included *Ononis repens, Plantago lanceolata, Carex arenaria, Vicia sepium* and the moss *Pseudoscleropodium purum.* Some stands were developing into W24 scrub with invasion by *Rubus spp* and other woody species. Semi-rough areas surrounding the intensively managed playing areas of the course were cut regularly, and here the SD9a graded into SD8b.

Table 3.20 SD9a communities and MAVIS match coefficients

Species name	Individual quadrat scores on the Domin scale					Constancy
	91	**93**	**101**	**103**	**113**	
Ammophila arenaria	6	6	7	5	6	5
Festuca rubra	7	5	5	8	7	5
Galium verum	4	3	3	3	2	5
Avenula pubescens	4	6	2	4		4
Ononis repens	2	2	2	3		4
Plantago lanceolata	2	2		3	1	4
Pseudoscleropodium purum	4	7		4	2	4
Arrhenatherum elatius	3			3	6	3
Carex arenaria	4	3			1	3
Dactylis glomerata		2	7	5		3
Vicia sepium			1	2	1	3
Achillea millefolium		1	2			2
Hypochaeris radicata	2	2				2
Poa angustifolia		3		2		2
Poa humilis	2			1		2
Acrocarpous moss	2					1
Crataegus monogyna		2				1
Daucus carota					3	1
Equisetum arvense					3	1
Hedera helix		3				1
Heracleum sphondylium		1				1
Holcus lanatus		3				1
Melilotus sp					3	1
Ranunculus bulbosus	1					1
Rubus caesius			4			1
Rubus fruticosus		4				1
Schedonurus arundinacea			4			1
Taraxacum laevigatum			2			1
Veronica chamaedrys					1	1
Vicia cracca		2				1

3.2.3 Scrub

Scrub was widespread within the survey area, forming both mature and probably long-established stands and much more recently-developed and invasive stands. The composition of this scrub was clearly related to the availability of water, but there were many stands with unusual combinations of species that were difficult to classify within the NVC. The principal two types are described below, but it is interesting that MAVIS analysis identified both types as falling within the same community, W21c, despite the very different

shrub species present. There were also single-species stands of *Quercus ilex, Alnus glutinosa, Betula spp, Populus canescens, Populus tremula* and *Hippophae rhamnoides*, some of which could be referred to one or other of these scrub types. For simplicity stands of scrub on dry dunes were mapped as W21d, while those in wetter areas (typically dominated by *Salix cinerea*) were mapped as W1.

Small areas dominated by dense *Rubus fruticosus* were mapped as W24, but no quadrats were recorded. *Pteridium aquilinum* was abundant in the valley to the north of Saunton Sands golf course forming dense stands of W25.

Mosaics of W1 and W21d with W24 were frequent.

Scrub at Saunton Sands was characterised by the presence of several non-native species, probably originating from neighbouring gardens and the gardens of small cabins within the dunes. *Populus canescens* formed a very large clonal stand. There was a dense ground cover of *Hedera helix* with occasional *Ligustrum vulgare, Rubus fruticosus* and *Carex arenaria*. At least four *Cotoneaster spp* were present locally, and other species included *Pinus sylvestris, Yucca sp, Acer pseudoplatanus* and *Quercus ilex.*

W1 *Salix cinerea-Galium palustre* woodland

Table 3.21 W1 communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
W21c	*Crataegus monogyna – Hedera helix* scrub, *Brachypodium sylvaticum* sub-community	44.2
W21	*Crataegus monogyna – Hedera helix* scrub	42.2
W21a	*Crataegus monogyna – Hedera helix* scrub, *Hedera helix-Urtica dioica* sub-community	40.1
W8d	*Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland, *Hedera helix* sub-community	34.8
OV27	*Epilobium angustifolium* community	34.8

This scrub type was characteristic of areas where the soil water table was sufficiently high to support dominant *Salix cinerea*, and it was particularly well developed in and around slacks. Other shrub species were present in most stands. *Rubus fruticosus* was also constant and abundant as an understorey, and *Ligustrum vulgare, Prunus spinosa, Crataegus monogyna* and *Salix capraea* were all locally present. The ground flora of most stands was species-

poor, and included occasional wet woodland species such as *Filipendula ulmaria, Urtica dioica* and *Carex remota*, but in general the soils were too freely draining to exhibit the typical vegetation of W1 scrub.

Table 3.22 W1 communities and MAVIS match coefficients

Species name	Individual quadrat scores on the Domin scale					Constancy
	27	**47**	**83**	**135**	**119**	
Salix cinerea	9	9	7	9	8	5
Rubus fruticosus	5	8	5	6	2	5
Hedera helix	6	5	4	3		4
Ligustrum vulgare	1	3		4		3
Filipendula ulmaria	1	1			1	3
Prunus spinosa	5			5		2
Circaea lutetiana	3				1	2
Crataegus monogyna g		1	2			2
Geranium robertianum	3	2				2
Iris foetidissima		1			3	2
Potentilla reptans	2				2	2
Urtica dioica	2	3				2
Clematis vitalba			5			1
Crataegus monogyna					1	1
Salix capraea			8			1
Agrostis stolonifera	6					1
Arum maculatum		1				1
Brachythecium rutabulum	2					1
Calystegia sepium		1				1
Carex arenaria					3	1
Carex flacca					1	1
Carex remota	2					1
CrocosmiaX crocosmiflora				2		1
Epilobium hirsutum	1					1
Geum urbanum	2					1
Holcus lanatus					1	1
Holcus mollis					2	1
Hypnum cupressiforme					6	1
Iris pseudacorus	1					1
Kindbergia praelonga	3					1
Pellia epiphylla	4					1
Phyllitis scolopendrium	2					1
Rubus caesius					8	1
Rumex conglomeratus	1					1
Tamus communis		1				1

W21d *Crataegus monogyna – Hedera helix* scrub, *Viburnum lantana* sub-community

Table 3.23 W21d communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
W21c	*Crataegus monogyna – Hedera helix* scrub, *Brachypodium sylvaticum* sub-community	34.8
W21	*Crataegus monogyna – Hedera helix* scrub	33.2
SD7c	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Ononis repens* sub-community	32.5
SD18	*Hippophae rhamnoides* scrub	31.8
W21d	*Crataegus monogyna – Hedera helix* scrub, *Viburnum lantana* sub-community	31.3

Stands of scrub in which *Salix repens* was not the dominant canopy species were mapped as W21d. These tended to be dominated by a mixture of *Rubus fruticosus, Ligustrum vulgare, Crataegus monogyna* and locally *Euonymus europaeus,* with trailing *Clematis vitalba, Lonicera periclymenum* and *Rubia peregrina.* Most stands were dense and difficult to enter. The non-native *Quercus ilex* was locally dominant on the golf course. The ground flora was generally sparse, with abundant *Hedera helix* and species more typical of SD7 around the margins of stands. The few characteristic scrub herbs included *Teucrium scorodonia, Brachypodium sylvaticum* and *Geranium sylvaticum*. Many of these shrubs were persistent and regenerating in cut stands.

The invasive *Hippophae rhamnoides* is not native in Devon, but was present in association with some scrub stands. Most patches of this species appear to have been treated with herbicide to control spread. Larger stands were mapped separately as SD18.

Table 3.24 W21d species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale											Constancy
	43	**45**	**51**	**52**	**55**	**72**	**80**	**95**	**97**	**98**	**102**	
Rubus fruticosus	5	9	9	5	5	5	5	8	8	4	2	5
Ammophila arenaria		2	3	3	4	3	3	4	2		2	4
Crataegus monogyna	7	5	6	4	4			5	5	4		4
Ligustrum vulgare	5		2	9	8	9	8	6	6			4
Hedera helix	6	4					4	6	9	8		3
Clematis vitalba				5	5	5		2		3		3
Teucrium scorodonia	2	1	3					3				2
Carex arenaria	2							3		3		2
Dactylis glomerata			4		2						1	2
Festuca rubra							3		2	2		2
Geranium robertianum	2		1			1						2
Pseudoscleropodium purum		5			4					3		2
Rubia tinctoria							1	3	3			2
Prunus spinosa								7	7			1
Quercus ilex										7	10	1
Salix cinerea							6			7		1
Agrimonia eupatorium				1		1						1
Brachypodium sylvaticum			2	3								1
Brachythecium rutabulum						3	3					1
Galium aparine	3					2						1
Hypochaeris radicata	1					2						1
Lonicera periclymenum								2		4		1
Phyllitis scolopendrium		2							1			1
BetulaXaurata	8											1
Cotoneaster spp										2		1
Euonymus europaeus		6										1
Chamaenerion angustifolium					3							1
Crataegus monogyna g										2		1
Euphorbia portlandica					1							1
Eurhynchium striatum										2		1
Galium verum			1									1
Glechoma hederacea										1		1
Ononis repens					2							1
Orobanche hederae										1		1
Plantago lanceolata					2							1
Polypodium vulgare		3										1
Prunella vulgaris										2		1
Quercus ilex g										1		1
Rubus caesius							1					1
Schedonurus arundinacea					3							1
Viburnum opulus g										1		1
Viola hirta							2					1
Viola riviniana										1		1

W25 *Pteridium aquilinum-Rubus fruticosus* underscrub.

Vegetation dominated by *Pteridium aquilinum* was present in the valley between the Saunton Sands car park and the golf course. *P. aquilinum* formed a closed canopy with occasional scrub species, and a ground flora similar to SD9 with the addition of *Hedera helix.*

Table 3.25 W25 species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale	
	99	**100**
Pteridium aquilinum	9	8
Festuca rubra	7	4
Cotoneaster sp	4	4
Carex arenaria	4	3
Hedera helix	3	6
Dactylis glomerata	3	4
Taraxacum sp	3	2
Rubus fruticosus	2	
Ammophila arenaria	1	3
Schedonurus arundinacea	1	1
Avenula pubescens	1	
Prunus spinosa	1	
Rubia peregrina		4
Ranunculus bulbosus		1
Euonymus europaeus		1
Vicia sepium		1
Orobanche hederae		1
Crataegus monogyna		1

3.2.4 Salt marsh

Salt marsh vegetation was only present on the southern shore of the Taw Estuary at Yelland, where it occupied the upper parts of the regularly inundated mud-flats. The area was however small, and the classic salt-marsh zonation was obscure. The major community was SM13c, in which *Puccinellia maritima* formed dense patches of turf with *Limonium vulgare, Armeria maritima, Plantago maritima, Suaeda maritima, Triglochin maritima* and *Aster tripolium,* interspersed with areas of bare mud, open pools and creeks. *Salicornia sp* was present in the more open areas, with *Spartina anglica* and *Atriplex portulacoides* along creek margins.

Slightly raised areas nearer the sea wall had extensive and species-poor stands of SM24 *Elytrigia atherica,* and to the west there were large areas of SM6 dominated by *Spartina anglica*.

SM13c *Puccinellia maritima* salt-marsh community, *Limonium vulgare-Armeria maritima* sub-community.

Table 3.26 SM13c species names, Domin quadrat scores, and constancy scores

NVC Code	*Community name*			Match coefficients from MAVIS
	138	**140**	**142**	
Puccinellia maritima	5	6	6	3
Bare mud and water	7	6	5	3
Limonium vulgare	4	5	5	3
Armeria maritima	3	5	4	3
Salicornia sp	4	4	5	3
Plantago maritima	6	3	3	3
Spartina anglica	1	3		2
Atriplex portulacoides		2	4	2
Suaeda maritima		2	2	2
Elytrigia atherica		2		1
Triglochin maritima	2			1
Aster tripolium			3	1

SM24 *Elytrigia atherica* salt-marsh

Table 3.27 SM24 species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale			Constancy
	139	**141**	**143**	
Elytrigia atherica	8	10	2	3
Festuca rubra	5		8	2
Carex extensa	2		5	2
Limonium vulgare			3	1
Triglochin maritima			2	1
Plantago maritima			2	1
Bare mud and water			4	1
Atriplex portulacoides	4			1

3.2.5 Mesotrophic grasslands

MG6d *Lolium perenne-Cynosurus cristatus* grassland, *Filipendula ulmaria* sub-community (Unit 106)

Table 3.28 MG6d communities and MAVIS match coefficients

NVC Code	Community name	Match coefficients from MAVIS
MG6d	*Lolium perenne-Cynosurus cristatus* grassland, *Filipendula ulmaria* sub-community	56.0
MG6	*Lolium perenne-Cynosurus cristatus* grassland	55.2
MG6a	*Lolium perenne-Cynosurus cristatus* grassland, typical sub-community	55.1
MG4b	*Alopecurus pratensis-Sanguisorba officinalis* grassland, typical sub-community	55.0
MG6b	*Lolium perenne-Cynosurus cristatus* grassland, *Anthoxanthum odoratum* sub-community	54.7

The enclosed fields to the east of the American Road retained some of the topography of low-lying older dunes, but there has clearly been some agricultural improvement over the years. While some of the grassland was recognisably SD8 dune grassland, more seasonally-wet areas had grassland more closely-related to MG6d. This was moderately species-rich, dominated by a mixture of species including *Cynosurus cristatus, Festuca rubra, Holcus lanatus, Plantago lanceolata* and *Trifolium repens.* Some species typical of longer-established grasslands including *Centaurea nigra, Lotus corniculatus, Pilosella officinarum, Carex flacca, Filipendula ulmaria* and *Lathyrus pratensis* were occasional.

Table 3.29 MG6d species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale			Constancy
	28	29	110	
Cynosurus cristatus	5	3	3	3
Festuca rubra	3	5	4	3
Holcus lanatus	4	5	2	3
Plantago lanceolata	5	6	4	3
Trifolium repens	6	4	3	3
Agrostis stolonifera	5	5		2
Brachythecium rutabulum	1		3	2
Carex flacca	1	2		2
Carex hirta	4	2		2
Equisetum palustre	3	3		2
Filipendula ulmaria	1	2		2
lathyrus pratensis	2	2		2
Lolium perenne	5	4		2
Odontites vernus	3	3		2
Potentilla reptans	1	2		2
Pulicaria dysenterica	4	2		2
Ranunculus acris	2	1		2
Rubus caesius	4	4		2
Trifolium pratense	5	6		2
Vicia cracca	2	3		2
Agrostis capillaris			5	1
Bromus hordaceus	1			1
Centaurea nigra		3		1
Dactylis glomerata		1		1
Hypochaeris radicata			3	1
Iris pseudacorus		2		1
Jacobaea vulgaris			1	1
Juncus inflexus		2		1
Leontodon saxatilis			3	1
Lotus corniculatus			4	1
Luzula campestris			3	1
Melilotus officinalis		5		1
Pilosella officinarum			2	1
Potentilla anserina	3			1
Ranunculus bulbosus			3	1
Rumex acetosa			4	1
Rhytidiadelphus squarrosus			1	1

MG12a *Festuca arundinacea* grassland, *Lolium perenne-Holcus lanatus* sub-community (Freshmarsh)

Table 3.30 MG12a communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
MG9b	*Holcus lanatus-Deschampsia cespitosa* grassland, *Arrhenatheurm elatius* sub-community	49.1
MG12a	*Festuca arundinacea* grassland, *Lolium perenne-Holcus lanatus* sub-community	48.0
MG9	*Holcus lanatus-Deschampsia cespitosa* grassland	47.7
MG12	*Festuca arundinacea* grassland	45.9
MG10b	*Holcus lanatus-Juncus effusus* rush-pasture, *Juncus inflexus* sub-community	45.5

A series of small fields to the east of Sandy Lane may have been at least partly under arable cultivation until relatively recently. Soils here are still sandy, but appear have a higher content of organic matter than those on the unimproved dunes to the west. The vegetation appears to have developed through natural colonisation, in a similar way to the Scottish machair.

The major community here was related to MG12. The grasses *Festuca rubra* and *Schedonurus arundinaceus* dominated together with abundant *Centaurea nigra, Carex hirta, Pulicaria dysenterica* and more locally *Juncus inflexus, Agrostis stolonifera* and *Plantago lanceolata.* Characteristic indicator species of long-established grasslands were uncommon, although *Lathyrus pratensis, Carex flacca, Mentha aquatica, Dactylorhiza praetermissa* and *Lotus corniculatus* were all present.

Table 3.31 MG12a species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale							Constancy
	84	**85**	**86**	**87**	**88**	**89**	**90**	
Centaurea nigra	4	7	7	1	4	5	3	5
Festuca rubra	7	7	5	4	5	5	7	5
Carex hirta	4	3	3	2	2	2		5
Schedonurus arundinacea	6	6	5	5	5	6		5
Equisetum arvense	2	3	5	2	3			4
Agrostis stolonifera	3		3			3	2	4
Juncus inflexus			4	5	4	3		4
Pulicaria dysenterica			7	7	8	7		4
Taraxacum sp	2	1				1	2	4
Holcus lanatus		3			2		3	3
lathyrus pratensis		2	5			2		3
Plantago lanceolata	4	2			2			3
Vicia cracca		3		2		2		3
Carex flacca		2					2	2
Dactylis glomerata	5	1						2
Lolium perenne			1				4	2
Potentilla anserina			3		1			2
Ranunculus acris					1	1		2
Persicaria hydropiper			1	4				2
Rumex conglomeratus				2			1	2
Lotus corniculatus							4	1
Potentilla reptans						2		1
Rumex acetosa							3	1
Trifolium repens		1						1
Mentha aquatica				4				1
Dactylorhiza praetermissa				1				1

Seawall grassland, Yelland

Table 3.32 Seawall grassland, Yelland communities and MAVIS match coefficients

NVC Code	*Community name*	Match coefficients from MAVIS
MC11	*Festuca rubra-Daucus carota ssp gummifer* maritime grassland	42.3
MG1a	*Arrhenatherum elatius* grassland, *Festuca rubra* sub-community	40.44
SD7c	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, *Ononis repens* sub-community	40.03
MC11b	*Festuca rubra-Daucus carota ssp gummifer* maritime grassland, *Ononis repens* sub-community	39.3
SD7a	*Ammophila arenaria-Festuca rubra* semi-fixed dune community, typical sub-community	38.1

Grassland on the steep faces of the sea-wall at Yelland was most closely related to the maritime grassland MC11, a community of dry cliff slopes. The most abundant species were *Dactylis glomerata, Festuca rubra, Lotus corniculatus, Taraxacum sp* and *Daucus carota*.

Table 3.33 Seawall grassland, Yelland species names, Domin quadrat scores, and constancy scores

Species name	Individual quadrat scores on the Domin scale			Constancy
	136	**137**	**144**	
Dactylis glomerata	6	8	7	3
Festuca rubra	6	3	7	3
Lotus corniculatus	5	4	4	3
Taraxacum sp	3	4	2	3
Daucus carota	3	5	3	3
Hypochaeris radicata	1		1	2
Rubus fruticosus	2	4		2
Elytrigia repens		4	4	2
Linum bienne		3	3	2
Vicia sepium		1	3	2
Geranium dissectum		2	1	2
Agrostis capillaris	3			1
Cynosurus cristatus	3			1
Jacobaea vulgaris			1	1
Plantago lanceolata			5	1
Potentilla reptans	4			1
Pulicaria dysenterica		1		1
Ranunculus bulbosus		1		1
Schedonurus arundinacea	5			1
Trifolium repens	4			1
Leontodon hispidus	1			1
Carex spicata		2		1
Arrhenatherum elatius		4		1
Pulicaria dysenterica		1		1
Orobanche minor		1		1

3.3 Rare species

Braunton Burrows is a well-known locality for its assemblage of rare vascular plants (Smith et al, 2014). It is now the only known site in the UK for *Scirpoides holoschoenus* and one of only two sites for *Teucrium scordium*, although at both this species is abundant. *Matthiola sinuata* is only known from a few mobile dunes in the Bristol Channel, while *Gentianella uliginosa* which has a similar distribution has not been seen since 2007. A range of other characteristic species of sand dunes and dune slacks with highly restricted distributions in the UK include *Epipactis palustris, Eryngium maritimum, Sagina nodosa, Dactylorhiza incarnata ssp coccinea, Euphorbia paralias* and *Calystegia soldanella*. *Frankaenia laevis* and *Linaria arenaria* are not native at this site.

Status: D1, D2 and D3 Devon Notable Species; S41 NERC Act Section 41 species; S8 Wildlife and Countryside Act Schedule 8; Vascular Plant Red List for England (Stroh et al, 2014) En Endangered, Vu Vulnerable, NT Near Threatened, WL Waiting List. Flora: Smith et al, 2014. Species in bold may not occur within the survey area.

Table 3.34 The Rare species records table which includes species, status, previous records, and records from this survey.

Species	Status	Previous records	Records from this survey
Samolus valerandii	D2	Flora: frequent	SD14a at SS463347, SS463328, SS453353
Matthiola sinuata	S41, D1, Vu	SS439378, SS450354, SS SS440378, SS441378, SS442378. c.5000 plants in 2005.	Occasional in SD6 in Section 1: SS446375, SS446374, SS447374, SS446373, SS447373. Also in Section 5 SS445359
Limonium binervosum	**D1, WL**	**SS440379**	**None**
Marrubium vulgare	D1	SS443378, SS468328	None
Frankaenia laevis	**D1, NT**	**SS443378, SS444377. Not native here**	**None**
Phleum arenarium	D1, NT	SS446368	None
Gentianella uliginosa	**S8, S41, EN, WL**	**SS446368. Not seen recently**	**None**
Gentianella amarella	D1, NT	SS446368, SS450354, SS462349	Rare in SD8b grassland SS460351
Lavatera arborea	**D3**	**SS447377**	**None**
Ophrys apifera	D1	SS449350, SS450354	None
Epipactis palustris	D1, NT	SS450345, SS450354, SS458353, SS459374, SS462349	Frequent in slacks. Eg SS461370, SS459351, SS458353, SS458351, SS459350, SS462347
Anacamptis pyramidalis	D2	SS450354, SS450358, SS459374, SS461338,	SS452355, SS459350

Table 3.34 The Rare species records table which includes species, status, previous records, and records from this survey.

Species	Status	Previous records	Records from this survey
		SS462348, SS463334, SS474334, SS475337,	
Erigeron acer	D2	SS450354	SS452359
Eryngium maritimum	D1, NT	SS450354, SS450358	Occasional in SD6: 445359 to SS445351
Euphorbia portlandica	D3	SS450354, SS463346	Occasional in SD7c, eg SS435359, SS446356
Gymnadenia conopsea	D1	SS450354	None
Linaria arenaria	D1	SS450354, SS462349. Not native	None
Pyrola rotundifolia	D1	SS450354. Flora: widespread in slacks	None
Reseda lutea	D1	SS450354	None
Sagina nodosa	D3, Vu	SS450354	None
Teucrium scordium	S8, S41, D1, En	SS450354, SS462349. Flora: SS456336, SS457334, SS451334, SS452332, SS450330, SS458327, SS452338, SS458353, SS454355, SS452370, SS463328, SS461330, SS449362	Slack at SS463328
Scirpoides holoschoenus	S41, D1, Vu	SS450354. Flora: SS4533, SS4535, SS4436, SS462333, SS463336	Several patches between SS462331 and SS463329
Dactylorhiza incarnata ssp coccinea	D2, NT	SS450354, SS460349, SS460350	None
Euphorbia paralias	D1	SS450354	Frequent in SD6 in Sections 1 and 5
Lactuca serriola	D2	SS450354	None
Lysimachia vulgaris	D2	SS450354	None
Parentucellia viscosa	D2	SS450354, SS462349, SS478322	SS453353, SS463328, SS464328, SS453353
Spiranthes spiralis	D2, NT	SS450354, SS479322	None
Lithospermum officinale	D2	SS455347	None
Gentianella anglica	**S41, D1, WL**	**SS457337. Two localities, hybrid swarm with *G. amarella***	**None**
Trifolium scabrum	**D2**	**SS458365**	**None**
Ammophila arenaria	D1	SS459374	Abundant throughout
Carex arenaria	D2	SS459374	Abundant throughout
Juncus acutus	D1	SS459374	Frequent throughout
Oenothera biennis	D1	SS459374	Frequent in all areas of more mobile dunes
Cyperus longus	**D1, NT**	**SS464376. Native but not in the SSSI**	**None**
Ophioglossum vulgatum	D1	SS460350	None
Schoenus nigricans	D2	SS460363	None
Trifolium ornithopodioides	D1	SS462355	None
Fumaria bastardii	D1	463370, 468327	None

Table 3.34 The Rare species records table which includes species, status, previous records, and records from this survey.

Species	Status	Previous records	Records from this survey
Papaver argemone	**D1, En**	**466360. Mainly on farmland adjacent to SSSI**	**None**
Trifolium squamosum	D1	SS477322, SS480323	None
Elytrigia atherica	D3		Locally dominant in Yelland salt-marsh 478323
Juncus maritimus	D2		SS457357, SS464313, SS465332
Trifolium fragiferum	D1, Vu		SS459354
Carex riparia	D2		Locally dominant at Fresh marsh SS463352
Aster tripolium	D3		Locally abundant in Yelland salt-marsh SS478323
Atriplex portulacoides	D2		Locally abundant in Yelland salt-marsh SS478323
Carex distans	D2		Locally abundant at SS457353, SS464313
Puccinellia maritima	D2		Locally dominant in Yelland salt-marsh SS478323
Schoenoplectus tabernaemontani	D2		In SD14a wet slacks; SS463347, SS463328, SS453353
Suaeda maritima	D2		Locally frequent in Yelland salt-marsh SS478323
Blackstonia perfoliata	D2	SS477321	SS450353, SS463335
Carex disticha		Not known previously	Confirmation required, SS423331
Juncus subnodulosus		Not known previously	Abundant in a small area, SS423331
Potamogeton coloratus	D1	SS470355, also SS457356, SS457357, SS460354, SS460357, SS460358 (Flora)	None
Calystegia soldanella	Vu		Frequent on most seaward dunes, Section 2 & 5
Hydrocotyle vulgaris	NT		Frequent in SD14 and SD15 slacks

Bryophytes

Braunton Burrows is an important locality for *Petalophyllum ralfsii* which is included on Section 41 of the NERC Act 2007 and on Schedule 8 of the Wildlife and Countryside Act, and for *Didymodon cordatus* which is included on Schedule 8 of the Wildlife and Countryside Act. It is not known whether either of these species occurs within the survey corridor. The ideal time to find *Petalophyllum ralfsii* is between November and March, it aestivates during the drier months and would therefore not have been visible during the survey period.

4. References

Rodwell J (1991a). *British Plant Communities, Volume 1, Woodlands and Scrub*. Cambridge University Press.

Rodwell J (1991b). *British Plant Communities, Volume 2, Mires and Heaths*. Cambridge University Press.

Rodwell J (1993). *British Plant Communities, Volume 3, Grasslands and Montane Communities*. Cambridge University Press.

Rodwell J (1995). *British Plant Communities, Volume 4, Aquatic Communities, Swamps and Tall-herb Fens*. Cambridge University Press.

Rodwell J (2000). *British Plant Communities, Volume 5, Maritime Communities and Vegetation of Open Habitats*. Cambridge University Press.

Smith R, Hodgson R. Ison R (2014). *A New Flora of Devon*. The Devonshire Association. https://devonassoc.org.uk/devon-flora/a-new-flora-of-devon-online-edition/

Stroh PA, Leach SJ, August TA, Walker KJ, Pearman DA, Rumsey FJ, Harrower CA, Fay MF, martin JP, Pankhurst T, Preston CD & Taylor I (2014). *A Vascular Plant Red List for England*. Botanica Society of the British Isles and Ireland, https://bsbi.org/wp-content/uploads/dlm_uploads/England_Red_List_1.pdf

https://www.ceh.ac.uk/services/modular-analysis-vegetation-information-system-mavis

Appendix 1. Quadrat Locations

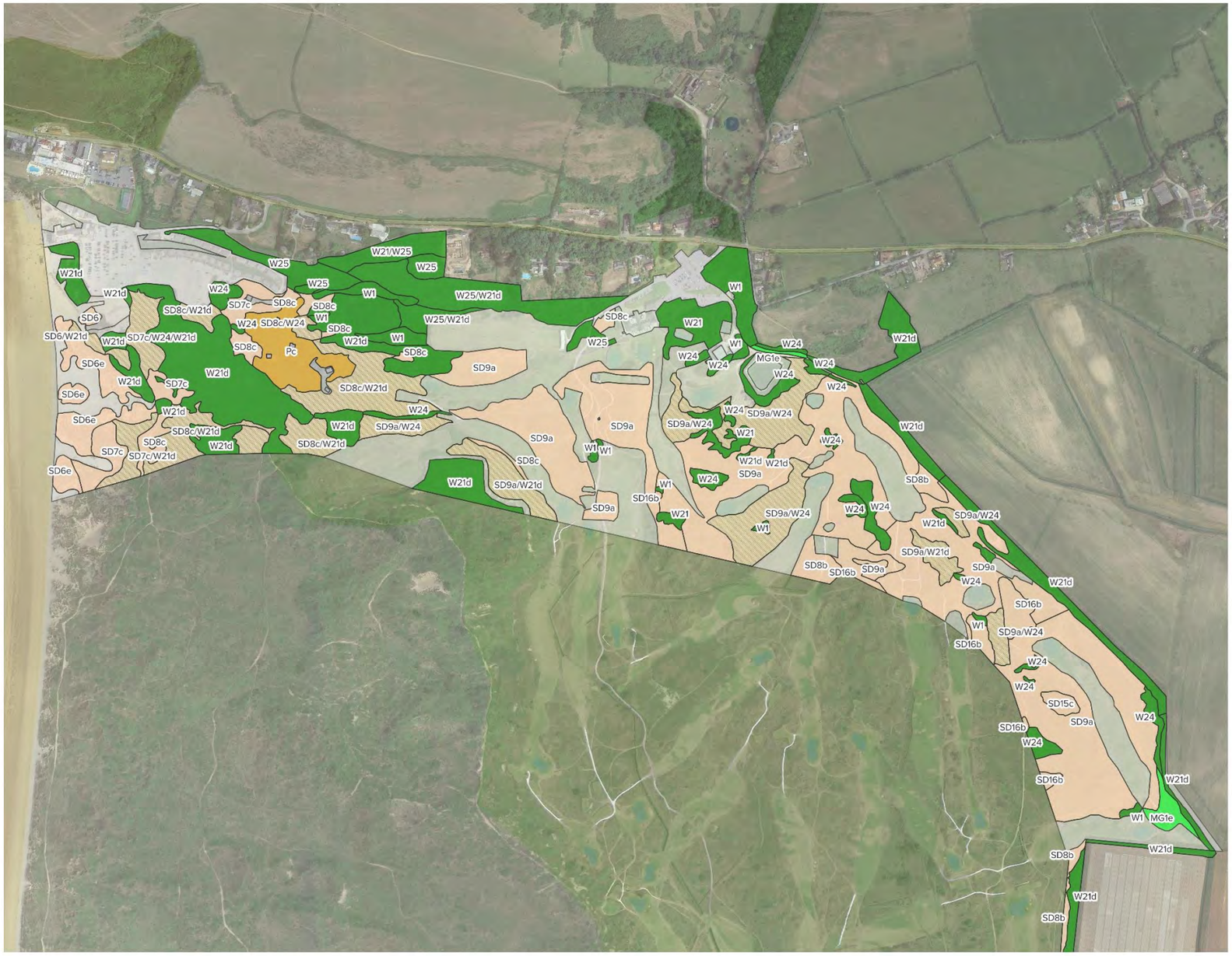
Number	NVC	Section	Grid Reference
1	SD8b	5	SS4605935168
2	SD8b	5	SS4603435182
3	SD15d	5	SS4598835149
4	SD15c	5	SS4593035184
5	SD15d	5	SS4583635193
6	SD8c	5	SS4581335086
7	SD15d	5	SS4594235060
8	SD7c	5	SS4563935057
9	W1	5	SS4600035195
10	SD7c	3	SS4596235381
11	SD15d	3	SS4598535348
12	SD8b	3	SS4605535274
13	M22b	5	SS4592635455
14	SD15c	5	SS4582835343
15	SD16b	5	SS4579835331
16	SD7c	5	SS4554235473
17	SD7c	5	SS4544135415
18	SD15d	5	SS4534735357
19	SD16b	5	SS4503535398
20	SD16b	5	SS4476235375
21	SD7c	5	SS4460635361
22	SD6e	5	SS4453635321
23	SD6e	5	SS4451235330
24	SD8b	7	SS4650034384
25	SD16b	7	SS4651034438
26	W1	7	SS4642434769
27	W1	7	SS4646434692
28	MG6d	7	SS4662334485
29	MG6d	7	SS4665134443
30	SD8b	7	SS4667234215
31	SD8b	7	SS4657534184
32	SD14a	6	SS4632034774
33	SD14a	6	SS4631634755
34	SD14a	6	SS4632034737
35	SD15d	6	SS4628934777
36	SD15d	6	SS4623734654
37	SD15d	6	SS4621834545
38	W1	6	SS4621934480
39	SD15b	6	SS4616834328
40	W1	6	SS4626834438
41	W1	6	SS4632434326
42	SD8b	6	SS4628934221
43	W21d	6	SS4624434179
44	SD15d	6	SS4620834123
45	W21d	6	SS4630933998
46	SD8c	6	SS4636334026
47	W1	3	SS4613735488
48	W1	3	SS4620535722
49	SD8b	3	SS4612035612

Number	NVC	Section	Grid Reference
50	SD16b	5	SS4604635479
51	W21d	5	SS4595835559
52	W21d	5	SS4568635684
53	SD15c	5	SS4576735763
54	SD8c	5	SS4535335733
55	W21d	5	SS4535035802
56	SD7c	5	SS4535935965
114	SD16b	5	SS4527435948
115	W212d	5	SS4457535822
116	SD6e	5	SS4455235821
57	SD8b	6	SS4630232898
58	SD8c	6	SS4630032936
59	SD8c	6	SS4637032991
60	M22b	6	SS4627733162
61	M22b	6	SS4641731328
62	M22b	6	SS4635433108
63	SD8c	6	SS4642033089
64	SD8b	6	SS4634132991
65	SD6e	8	SS4660132523
66	SD7c	8	SS4660032540
67	SD8c	8	SS4669832725
68	M22b	5	SS4585435463
69	SD16b	5	SS4585035527
70	SD8b	5	SS4571435555
71	SD7c	5	SS4555835548
72	W21d	5	SS4554835535
73	SD16b	5	SS4542135547
74	SD8c	5	SS4520035500
75	SD7c	5	SS4458835610
76	SD6e	5	SS4453635609
77	SD6e	5	SS4453035647
78	SD7c	5	SS4466835626
79	SD8c	5	SS4467035632
80	W21d	5	SS4490135529
81	SD16b	5	SS4503535530
82	SD7c	5	SS4540235453
83	W21d	5	SS4562835448
84	MG12	4	SS4645835386
85	MG12	4	SS4638235294
86	MG12	4	SS4641235169
87	MG12	4	SS4648535215
88	MG12	4	SS4652235273
89	MG12	4	SS4657335309
90	MG12	4	SS4652035461
91	SD9	2	SS4581837319
92	SD8b	2	SS4608137240
93	SD9a	2	SS4600737114
94	SD16b	2	SS4619637068
95	W21d	1	SS4510537569
96	W21c	1	SS4500637530
97	W21d	1	SS4518037482

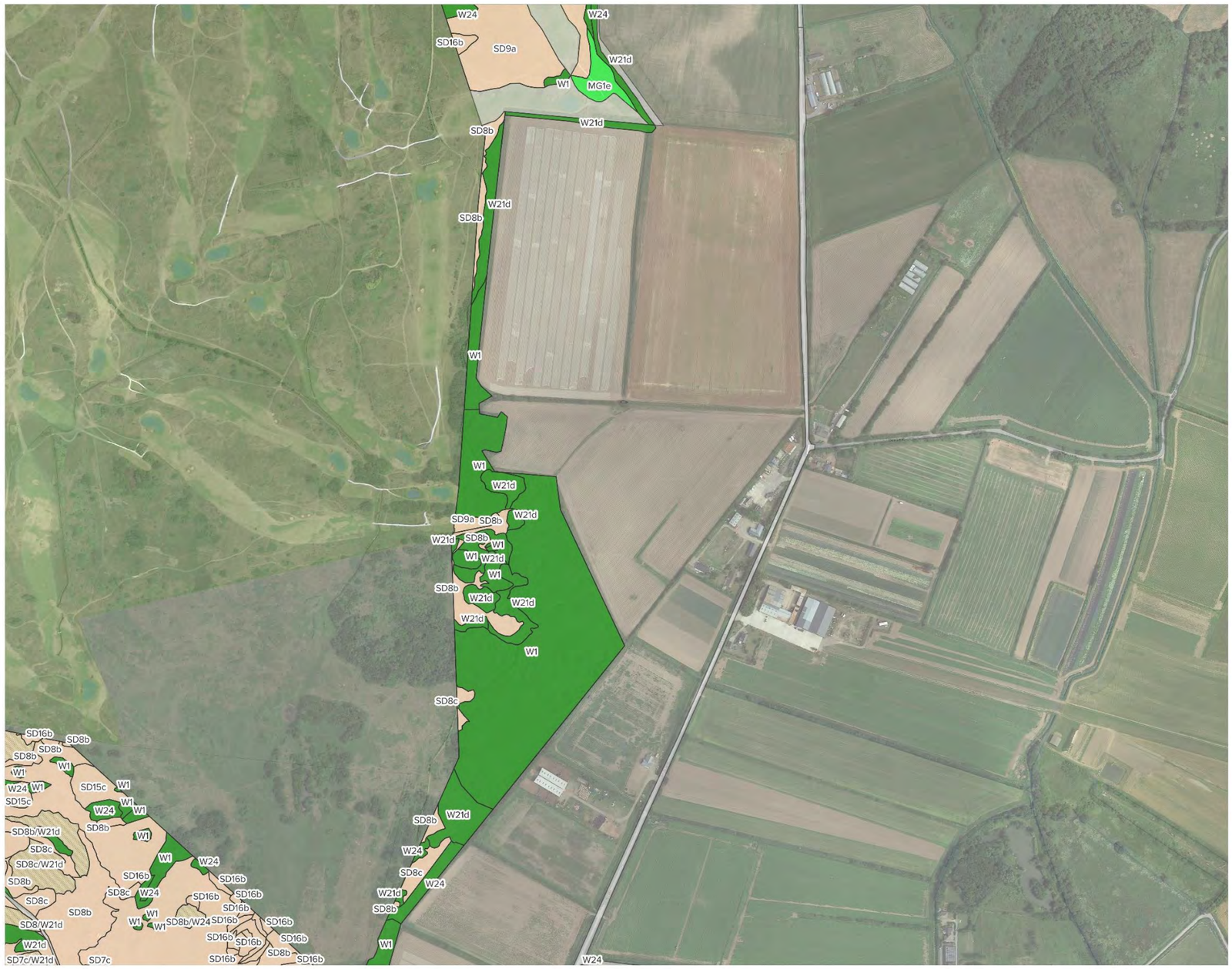
Number	NVC	Section	Grid Reference
98	W21d	1	SS4523937478
99	W25	1	SS4524337556
100	W25	1	SS4529737558
101	SD9a	2	SS4554437431
102	W21d	2	SS4570637360
103	SD9a	2	SS4565737246
104	SD7c	1	SS4485437355
105	W21d	1	SS4486437430
106	SD6e	1	SS4481137540
107	SD6e	1	SS4475537455
108	SD6e	1	SS4474137314
109	SD7c	1	SS4474337320
110	U1f	9	SS4765232148
111	SD8b	3	SS4615235859
112	SD8b	2	SS4613436140
113	SD9a	2	SS4616336372
145	SD8c	2	SS4616036421
146	SD16b	5	SS4607135065
147	SD8c	5	SS4585335021
117	SD8b	5	SS4581634959
118	SD7c	5	SS4564434987
119	W1	5	SS4592234935
120	SD16b	6	SS4616734860
121	SD8b	5	SS4594335013
122	SD16b	5	SS4599235039
123	SD8b	7	SS4647632886
124	SD16b	7	SS4662233118
125	SD16b	7	SS4658233200
126	SD8b	7	SS4664133179
127	SD8b	7	SS4668133230
128	SD16b	7	SS4650533127
129	SD16b	7	SS4652632602
130	SD8b	7	SS4656633659
131	SD15c	6	SS4629933621
132	SD7c	6	SS4637833537
133	SD8b	6	SS4647133518
134	SD15d	6	SS4634133564
135	W1	9	SS4777832103
136	MC11	9	SS4782632178
137	MC11	9	SS4787132206
138	SM13c	9	SS4789732450
139	SM24	9	SS4791932432
140	SM13c	9	SS4777232417
141	SM24	9	SS4783832383
142	SM13c	9	SS4790432347
143	SM13c	9	SS4794332330
144	MC11	9	SS4762232143

Appendix 2. NVC Community Maps

Map 1: Saunton Sands area



Map 2: Sandy Lane Farm area



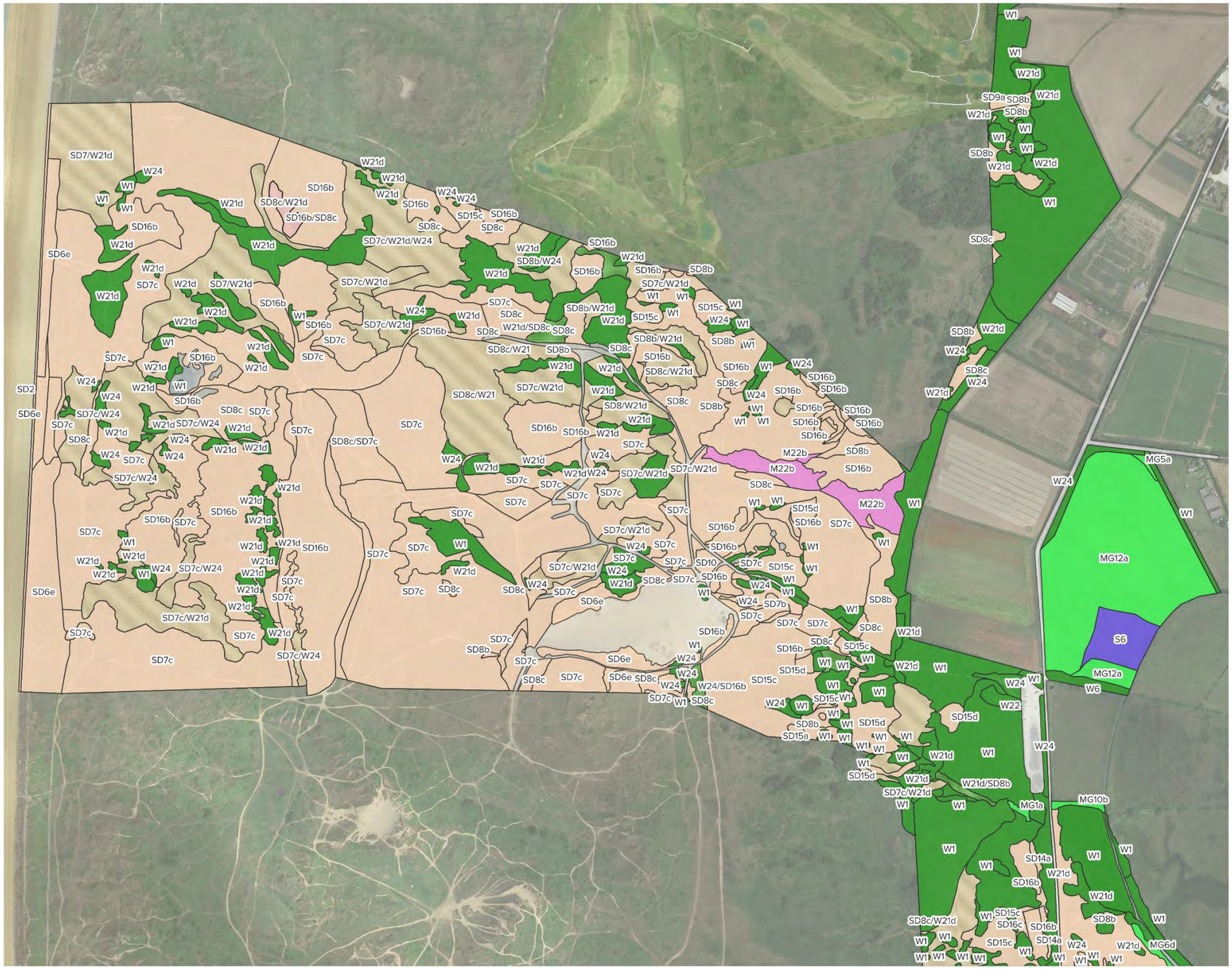
Key

- Acid grassland (U)
- Maritime cliff communities (MC)
- Mire/woodland matrix (M/W)
- Other mires (M)
- Other vegetation (OV)
- Populus canescens scrub (Pc)
- Sand dunes (SD)
- Sand dune/mire matrix (SD/M)
- Sand dune/woodland matrix (SD/W)
- Salt marshes (SM)
- Salt marshes/sand dune/ maritime cliff matrix (SM/SD/MC)
- Swamps and fens (S)
- Unimproved/improved grasslands (MG)
- Woodland (W)
- Woodland/sand dune matrix (W/SD)
- No NVC classification

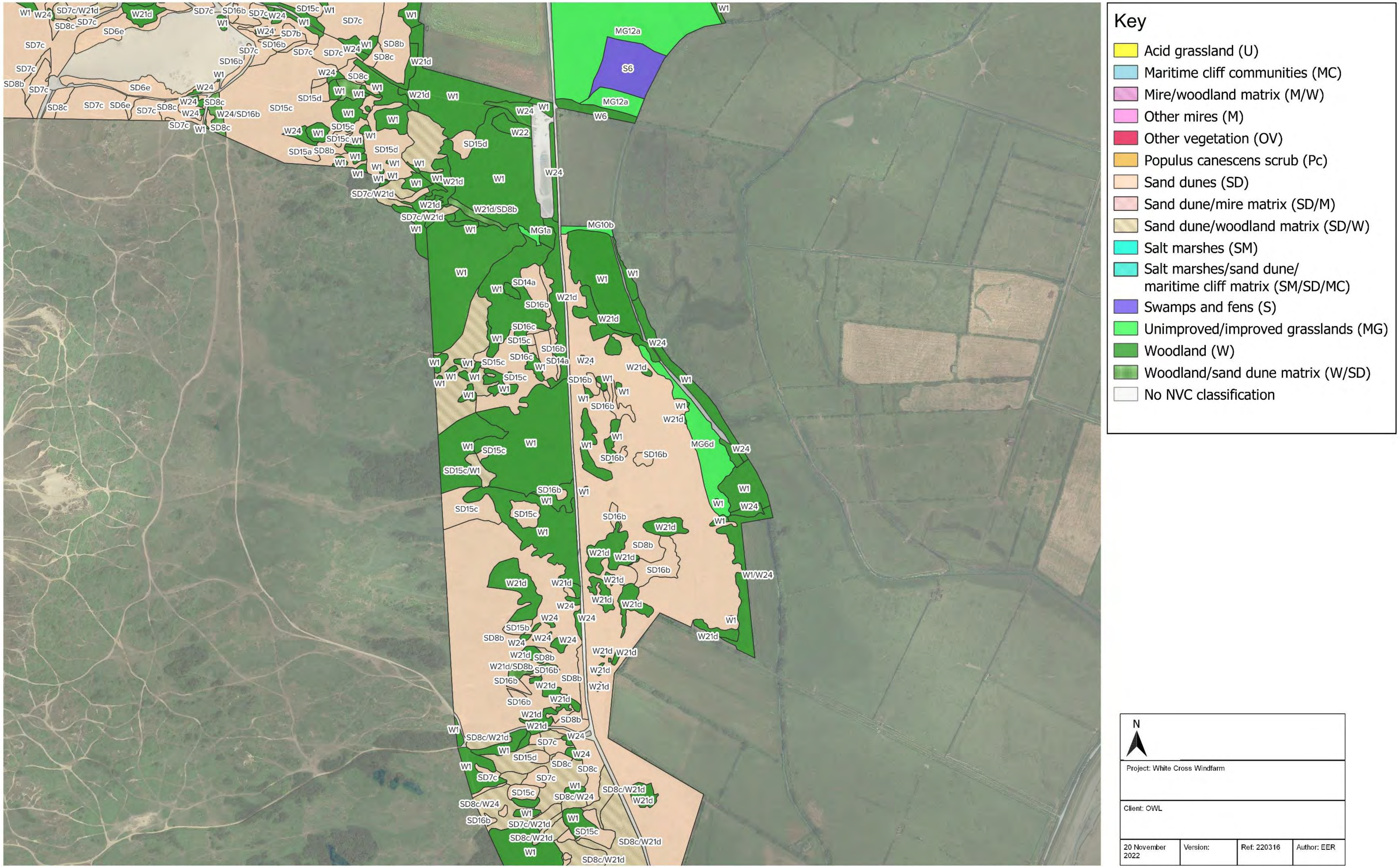
N

Project: White Cross Windfarm			
Client: OWL			
20 November 2022	Version:	Ref: 220316	Author: EER

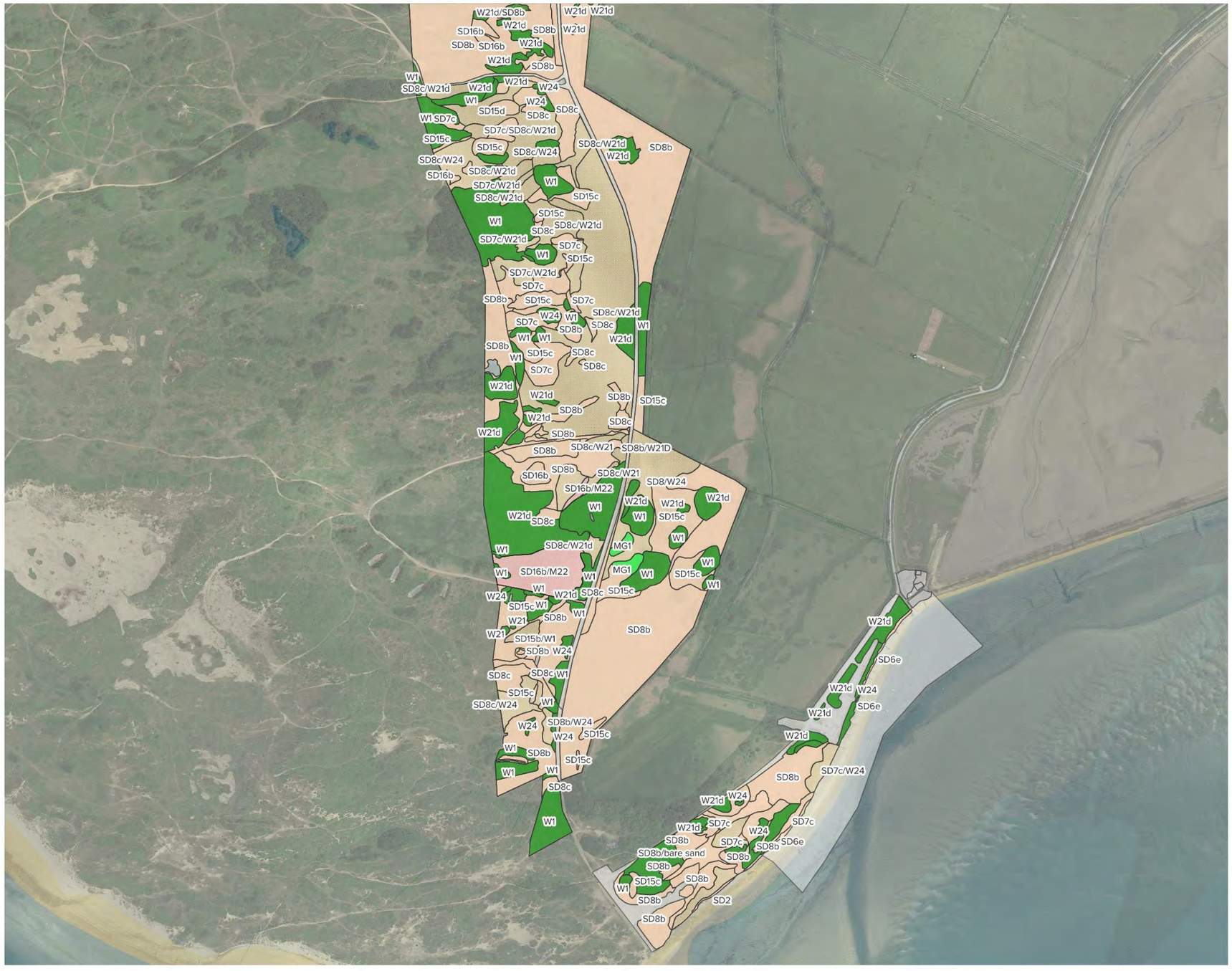
Map 3: Braunton Burrows central dune area



Map 4: American Road northern area



Map 5: American Road southern area



Key

- Acid grassland (U)
- Maritime cliff communities (MC)
- Mire/woodland matrix (M/W)
- Other mires (M)
- Other vegetation (OV)
- Populus canescens scrub (Pc)
- Sand dunes (SD)
- Sand dune/mire matrix (SD/M)
- Sand dune/woodland matrix (SD/W)
- Salt marshes (SM)
- Salt marshes/sand dune/ maritime cliff matrix (SM/SD/MC)
- Swamps and fens (S)
- Unimproved/improved grasslands (MG)
- Woodland (W)
- Woodland/sand dune matrix (W/SD)
- No NVC classification

N

Project: White Cross Windfarm			
Client: OWL			
20 November 2022	Version:	Ref: 220316	Author: EER

Map 6: East Yelland

Key

- Acid grassland (U)
- Maritime cliff communities (MC)
- Mire/woodland matrix (M/W)
- Other mires (M)
- Other vegetation (OV)
- Populus canescens scrub (Pc)
- Sand dunes (SD)
- Sand dune/mire matrix (SD/M)
- Sand dune/woodland matrix (SD/W)
- Salt marshes (SM)
- Salt marshes/sand dune/ maritime cliff matrix (SM/SD/MC)
- Swamps and fens (S)
- Unimproved/improved grasslands (MG)
- Woodland (W)
- Woodland/sand dune matrix (W/SD)
- No NVC classification

N

Project: White Cross Windfarm			
Client: OWL			
20 November 2022	Version:	Ref: 220316	Author: EER

NVC Code	Map Letter	NVC Community and Sub-community
M22b	M	Juncus subnodulosus-Cirsium palustre fen-meadow, Briza media-Trifolium spp. sub-community
MC11	MC	Festuca rubra-Daucus carota ssp. gummifer maritime grassland
MG1	MG	Arrhenatherum elatius grassland
MG10b	MG	Holcus lanatus-Juncus effusus rush-pasture, Juncus inflexus sub-community
MG12a	MG	Festuca arundinacea grassland, Lolium perenne-Holcus lanatus sub-community
MG1a	MG	Arrhenatherum elatius grassland, Festuca rubra sub-community
MG1a/W24	M/W	Arrhenatherum elatius grassland, Festuca rubra sub-community/Rubus fruticosus-Holcus lanatus underscrub
MG1e	MG	Arrhenatherum elatius grassland, Centaurea nigra sub-community
MG5a	MG	Cynosurus cristatus-Centaurea nigra grassland, Lathyrus pratensis sub-community
MG6d	MG	Filipendula ulmaria subcommunity of Lolium perenne-Cynosurus cristalus
OV23	OV	Lolium perenne-Dactylis glomerata community
Pc	P	Populus canescens scrub
S4	S	Phragmites australis swamp and reed-beds
S6	S	Carex riparia swamp
SD10	SD	Carex arenaria dune community
SD14a	SD	Salix repens-Campylium stellatum dune-slack community, Carex serotina-Drepanocladus sendtneri sub-community
SD15a	SD	Salix repens-Calliergon cuspidatum dune-slack community, Carex nigra sub-community
SD15b	SD	Salix repens-Calliergon cuspidatum dune-slack community, Equisetum variegatum sub-community
SD15b/W1	SD/W	Salix repens-Calliergon cuspidatum dune-slack community, Equisetum variegatum sub-community/Salix cinerea-Galium palustre woodland
SD15c	SD	Salix repens-Calliergon cuspidatum dune-slack community, Carex flacca-Pulicaria dysenterica sub-community
SD15c/W1	SD/W	Salix repens-Calliergon cuspidatum dune-slack community, Carex flacca-Pulicaria dysenterica sub-community/Salix cinerea-Galium palustre woodland
SD15d	SD	Salix repens-Calliergon cuspidatum dune-slack community, Holcus lanatus-Angelica sylvestris sub-community
SD16b	SD	Salix repens-Holcus lanatus dune-slack community, Rubus caesius sub-community
SD16b/M22	SD/M	Salix repens-Holcus lanatus dune-slack community, Rubus caesius sub-community/Juncus subnodulosus-Cirsium palustre fen-meadow
SD16b/SD8c	SD/M	Salix repens-Holcus lanatus dune-slack community, Rubus caesius sub-community/Juncus subnodulosus-Cirsium palustre fen-meadow
SD16c	SD	Salix repens-Holcus lanatus dune-slack community, Prunella vulgaris-Equisetum variegatum sub-community
SD2	SD	Honkenya peploides-Cakile maritima strandline community
SD6	SD	Ammophila arenaria mobile dune community
SD6/W21d	SD/W	Ammophila arenaria mobile dune community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community
SD6e	SD	Ammophila arenaria mobile dune community, Festuca rubra sub-community
SD7/W21d	SD/W	Ammophila arenaria-Festuca rubra semi-fixed dune community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community
SD7b	SD	Ammophila arenaria-Festuca rubra semi-fixed dune community, Hypnum cupressiforme sub-community

NVC Code	Map Letter	NVC Community and Sub-community
SD7c	SD	Ammophila arenaria-Festuca rubra semi-fixed dune community, Ononis repens sub-community
SD7c/SD8c/W21d	SD/W	Ammophila arenaria-Festuca rubra semi-fixed dune community, Ononis repens sub-community/Festuca rubra-Galium verum fixed dune grassland, Tortula ruralis ssp. ruraliformis sub-community/Crataegus monogyna-Hedera helix scrub
SD7c/W21d	SD/W	Ammophila arenaria-Festuca rubra semi-fixed dune community, Ononis repens sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community
SD7c/W21d/W24	SD/W	Ammophila arenaria-Festuca rubra semi-fixed dune community, Ononis repens sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community/Rubus fruticosus-Holcus lanatus underscrub
SD7c/W24	SD/W	Ammophila arenaria-Festuca rubra semi-fixed dune community, Ononis repens sub-community/Rubus fruticosus-Holcus lanatus underscrub
SD7c/W24/W21d	SD/W	Ammophila arenaria-Festuca rubra semi-fixed dune community, Ononis repens sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community/Rubus fruticosus-Holcus lanatus underscrub
SD8/W21d	SD/W	Festuca rubra-Galium verum fixed dune grassland/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community
NVC Code	Map Letter	NVC Community and Sub-community
SD8/W24	SD/W	Festuca rubra-Galium verum fixed dune grassland/Ammophila arenaria-Festuca rubra semi-fixed dune community, Ononis repens sub-community
SD8b	SD	Festuca rubra-Galium verum fixed dune grassland, Luzula campestris sub-community
SD8b/bare sand	SD	Festuca rubra-Galium verum fixed dune grassland, Luzula campestris sub-community/bare sand matrix
SD8b/W21d	SD/W	Festuca rubra-Galium verum fixed dune grassland, Luzula campestris sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community
SD8b/W24	SD/W	Festuca rubra-Galium verum fixed dune grassland, Luzula campestris sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community/Festuca rubra-Galium verum fixed dune grassland, Luzula campestris sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community/Rubus fruticosus-Holcus lanatus underscrub
SD8b/W24	SD/W	Festuca rubra-Galium verum fixed dune grassland, Luzula campestris sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community/Festuca rubra-Galium verum fixed dune grassland, Luzula campestris sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community
SD8c	SD	Festuca rubra-Galium verum fixed dune grassland, Tortula ruralis ssp. ruraliformis sub-community
SD8c/bare sand	SD	Festuca rubra-Galium verum fixed dune grassland, Tortula ruralis ssp. ruraliformis sub-community/bare sand matrix
SD8c/SD7c	SD	Festuca rubra-Galium verum fixed dune grassland, Tortula ruralis ssp. ruraliformis sub-community/Ammophila arenaria-Festuca rubra semi-fixed dune community, Ononis repens sub-community
SD8c/W21	SD/W	Festuca rubra-Galium verum fixed dune grassland, Tortula ruralis ssp. ruraliformis sub-community/Crataegus monogyna-Hedera helix scrub
SD8c/W21d	SD/W	Festuca rubra-Galium verum fixed dune grassland, Tortula ruralis ssp. ruraliformis sub-community/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community

NVC Code	Map Letter	NVC Community and Sub-community
SD8c/W24	SD/W	Festuca rubra-Galium verum fixed dune grassland, Tortula ruralis ssp. ruraliformis sub-community/Rubus fruticosus-Holcus lanatus underscrub
SD9a	SD	Ammophila arenaria-Arrhenatherum elatius dune grassland, typical sub-community
SD9a/W21d	SD/W	Ammophila arenaria-Arrhenatherum elatius dune grassland, typical sub-community/Crataegus monogyna-Hedera helix scrub
SD9a/W24	SD/W	Ammophila arenaria-Arrhenatherum elatius dune grassland, typical sub-community/Rubus fruticosus-Holcus lanatus underscrub
SM13c	SM	Puccinellia maritima salt-marsh community, Limonium vulgare-Armeria maritima sub-community
SM24	SM	Elymus pycnanthus salt-marsh community
SM24/SD2/MC11	SM/SD/MC	Elymus pycnanthus salt-marsh/Honkenya peploides-Cakile maritima strandline community/Festuca rubra-Daucus carota ssp. gummifer maritime grassland
U1f	U	Festuca ovina-Agrostis capillaris-Rumex acetosella grassland, Hypochoeris radicata sub-community
W1	W	Salix cinerea-Galium palustre woodland
W1/SD16b	W	Salix cinerea-Galium palustre woodland/Salix repens-Holcus lanatus dune-slack community, Rubus caesius sub-community
W1/W24	W	Salix cinerea-Galium palustre woodland/Rubus fruticosus-Holcus lanatus underscrub
W21	W	Crataegus monogyna-Hedera helix scrub
W21/W25	W	Crataegus monogyna-Hedera helix scrub/Pteridium aquilinum-Rubus fruticosus underscrub
W21d	W	Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community
W21d/SD8b	W/SD	Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community/Festuca rubra-Galium verum fixed dune grassland, Luzula campestris sub-community
W21d/SD8c	W/SD	Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community/Festuca rubra-Galium verum fixed dune grassland, Tortula ruralis ssp. ruraliformis sub-community
W22	W	Prunus spinosa-Rubus fruticosus scrub
W23	W	Ulex europaeus-Rubus fruticosus scrub
W24	W	Rubus fruticosus-Holcus lanatus underscrub
W24/SD16b	W/SD	Rubus fruticosus-Holcus lanatus underscrub/Salix repens-Holcus lanatus dune-slack community, Rubus caesius sub-community
W25	W	Pteridium aquilinum-Rubus fruticosus underscrub
W25/W21d	W	Pteridium aquilinum-Rubus fruticosus underscrub/Crataegus monogyna-Hedera helix scrub, Viburnum lantana sub-community
W6	W	Alnus glutinosa-Urtica dioica woodland

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.Q Aquatic Vegetation Survey

Appendix 16.Q Aquatic Vegetation Survey Report 2022

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 AV rev02
Client:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal HaskoningDHV
Survey Date/s:	April – September 2022
Report Date:	November 2022
Report Author:	Erin Reardon BSc, PhD, MCIEEM
Approved By:	Andrew Charles BSc (Hons), MSc, MCIEEM
Surveyor/s:	Lee Knight MCIEEM Erin Reardon BSc, PhD, MCIEEM Andrew Charles BSc (Hons), MSc, MCIEEM

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Disclaimer

1. Introduction

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake a Aquatic Vegetation Survey along the proposed Onshore Export Cable Corridor routes for the White Cross Wind Farm ("the Project").

The proposed onshore cable corridor routes extend from the onshore substation at East Yelland, across the Taw-Torridge Estuary to Crow Point, and through Braunton Marsh and Braunton Burrows (Figure 1.1). The preferred onshore cable corridor route extends to the coast midway within the Braunton Burrows sand dunes, with a secondary/alternative route extending through/below Saunton Golf Course and extending to the coast at Saunton Sands (final route to be determined; see Figure 1.1).

The survey areas consisted of linear aquatic habitats (ditches) and pond habitats within the proposed Onshore Export Cable Corridors (see Figure 1.1).

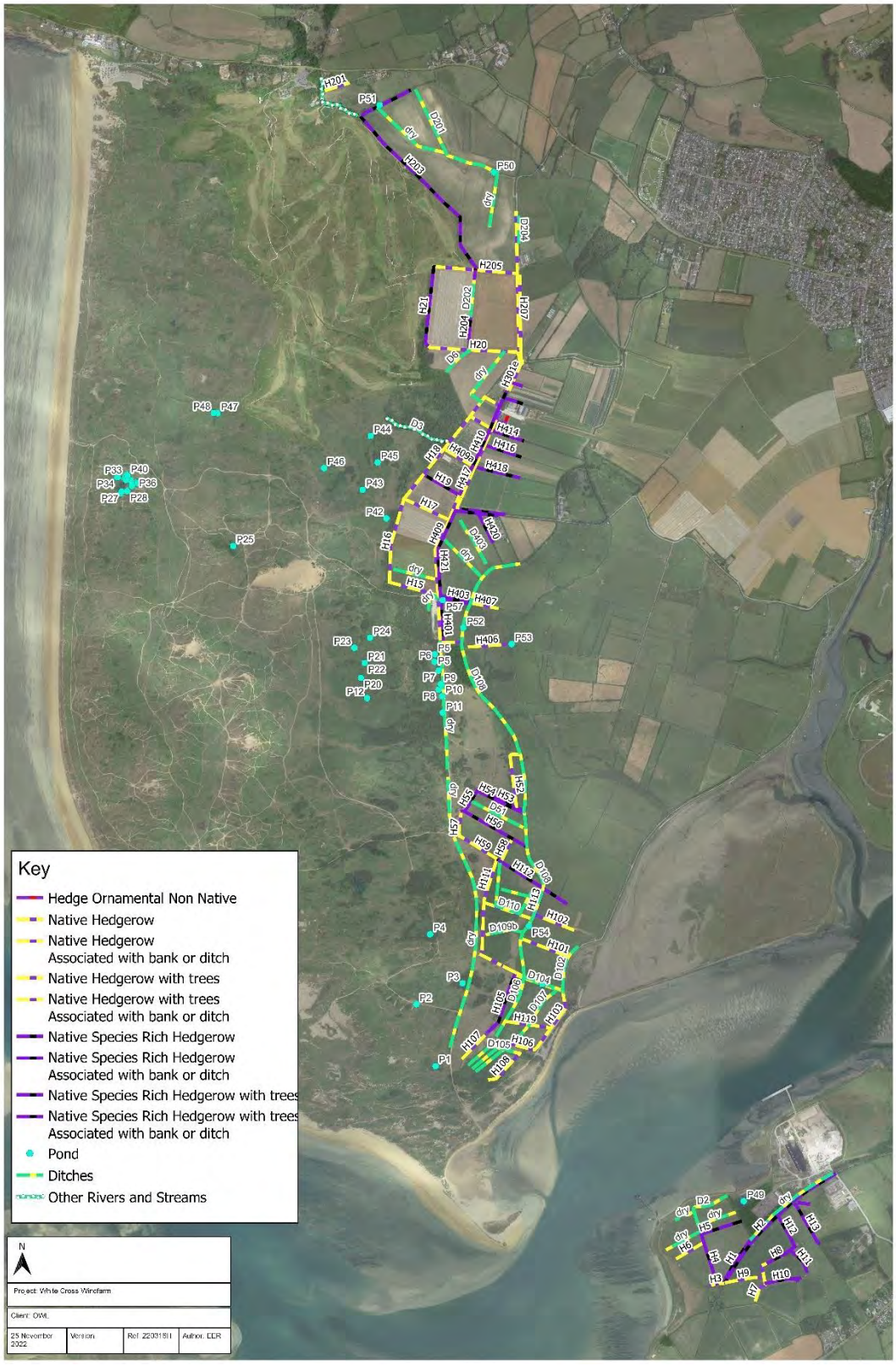


Figure 1.1. The surveyed aquatic locations within the proposed Onshore Cable Corridors for the Project.

2. Survey Methods

An aquatic vegetation survey of ditches was undertaken in partial accordance with the methodology used in Leach and Doarks (1991). Leach and Doarks (1991) focuses upon grazing marsh ditches/rhynes, with the current study additionally including survey of ditches associated with hedgerows/hedgebanks, arable fields, sand dune grassland and ponds.

The botanical survey of aquatic habitats comprised of the following:

- Within each length of ditch, 20 m sample sections were chosen per ditch that appears to contain homogenous or representative vegetation for both aquatic and emergent communities;
- For ponds, the full margin, submerged and emergence vegetation were sampled;
- Photographs were taken and grid references noted at each sampling location;
- All species within the aquatic zone were noted, and relative abundances (quantified within DAFOR – see Table 2.1) and general notes about the ditch recorded. Local cover values were also be noted, where relevant. Emergent species were defined as those within the aquatic zone, which for most of the summer have the majority of their biomass above the water surface.

Aquatic and emergent species for each grazing marsh ditch/rhyne was attributed an 'End Group'. Species and abundances were defined accordance with Leach and Doarks (1991) to identify an aquatic and emergent 'endgroups' for each sampling location (see Tables 2.2 & 2.3).

Sampling location endgroups were mapped to provide an indication of local vegetation distribution.

Any nationally scarce species will be noted with reference to The Vascular Plant Red Data List for Great Britain (Cheffings and Farrell, 2005).

Survey visits were undertaken between May and September 2022 by Andrew Charles, Lee Knight and Erin Reardon.

Table 2.1 The DAFOR scale and local cover values.

	Cover (%)	Local cover values
Dominant (D)	70-100	Abundant – Locally Dominant
Abundant (A)	30-70	Frequent – Locally Dominant Frequent – Locally Abundant
Frequent (F)	10-30	Occasional – Locally Dominant Occasional – Locally Abundant
Occasional (O)	3-10	Rare – Locally Dominant Rare – Locally Abundant Occasional – Locally Frequent
Rare (R)	<3	Rare – Locally Frequent Rare – Locally Occasional

Table 2.2: The aquatic vegetation communities, as defined in Doarks and Leach (1990).

Community	Binomial Names	Common names
A1	Scirpus fluitans-Potamogeton natans	Floating club rush-broad leaved pondweed
A2	Potamogeton natans-Hottonia palustris-Myriophyllum verticillatum	Broad leaved pondweed-Water violet-Whorled water milfoil
A3a	Potamogeton natans	Broad leaved pondweed
A3b	Stratiotes aloides-Hydrocharis morsus-ranae	Water soldier-Frogbit
A4	Ceratophyllum demersum	Rigid hornwort
A5a	Elodea Canadensis-Ceratophyllum demersum	Canadian pondweed-Rigid hornwort
A5b	Lemna minor-Lemna trisulca-Filamentous algae	Common duckweed-Ivy leaved duckweed-Filamentous algae
A6	Callitriche stagnalis/platycarpa	Common/Various leaved water starwort
A7a	Filamentous algae-Enteromorpha	Filamentous algae-Gutweed
A7b	Potamogeton pectinatus – Myriophyllum spicatum	Fennel pondweed-Spiked water milfoil

Table 2.3: The emergent vegetation communities, as defined in Doarks and Leach (1990).

Community	Binomial Names	Common names
E1	Carex riparia/acutiformis-Phragmities australis	Greater/Lesser pond sedge-Common reed
E2	Glyceria maxima-Berula erecta	Reed canary grass/Lesser water parsnip
E3	Juncus effusus	Soft rush
E4	Phragmities australis	Common reed
E5	Scirpus maritimus-Scirpus lacustris subsp, tabernaemontani-Eleocharis uniglumis	Saltmarsh bulrush-Common club rush-Slender spike rush
E6	Scirpus maritimus-Juncus gerardii	Saltmarsh bulrush-Saltmarsh rush

3. Results

3.1 Surveyed Ditches, Ponds/Lake

See Tables 3.1 and 3.2 for the attributes of the surveyed ditches and ponds/lake respectively.

3.2 Native Species Richness & Conservation Status

The most diverse ditches in terms of native species richness included those within Braunton Marsh: D101 to D110.

The uncommon hybrid shore horsetail (*Equisetum x littorale*) a hybrid of *E. fluviatile* and *E. plaustre* was recorded at D104.

In a local context, the lesser water parsnip (*Berula erecta*) is an uncommon plant in Devon (Preston & Croft, 1997) due to the scarcity of its preferred ditch habitat. This species is fairly common across Braunton Marsh and was present within grazing marsh ditches/rhynes D101, D102, D103, D104, D106 and D108.

Rigid hornwort *Ceratophyllum demersum*, recorded at D101 & D104, is another plant that is uncommon across the county (Preston & Croft 1997) for similar reasons.

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D1	SS 47681 31788	Channel 0.5 m wide, Water 5 cm deep, still water Endgroup E3	H4	bittersweet	*Solanum dulcamara*	R	
				broadleaved willowherb	*Epilobium montanum*	O	
				club rush	*Schoenoplectus lacustris*	F	
				creeping buttercup	*Ranunculus repens*	R	
				duckweed	*Lemna minor*	A	
				fool's watercress	*Apium nodiflorum*	A	
				gypsy wort	*Lycopus europaeus*	R	
				meadowsweet	*Filipendula ulmaria*	A	
				purple loosestrife	*Lythrum salicaria*	O	
				reed mace	*Typha latifolia*	R	
				soft rush	*Juncus effusus*	O	
				water forget-me-not	*Myosotis scorpioides*	R	
				water mint	*Mentha aquatica*	F	
				water plantain	*Alisma plantago-aquatica*	R	
				yellow flag iris	*Iris pseudacorus*	R	
D2ew	SS 47617 32114	Channel 1 m wide, water 5 cm deep, slow flow, salinity index 2.67 Endgroup E5		bramble	*Rubus fruticosus agg.*	F	
				club rush	*Schoenoplectus lacustris*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				compact rush	*Juncus conglomeratus*	D	
				duckweed	*Lemna minor*	O	
				fool's watercress	*Apium nodiflorum*	R	
				grey bulrush	*Scoenoplectus tabernaemontani*	O	
				grey willow	*Salix cinerea subsp. oleifoli*	F	
				goat willow	*Salix caprea*	F	
				gut weed	*Ulva intestinalis*	O	
				sea club rush	*Bolboschoenus maritimus*	O	
				soft rush	*Juncus effusus*	O	
				water forget-me-not	*Myosotis scorpioides*	R	
				water mint	*Mentha aquatica*	O	
D2ns	SS 47591 32078	Channel 2 m bank, water 10 cm deep Endgroup E5		bittersweet	*Solanum dulcamara*	O	
				club rush	*Schoenoplectus lacustris*	R	
				duckweed	*Lemna minor*	A	
				fool's watercress	*Apium nodiflorum*	A	
				gypsy wort	*Lycopus europaeus*	O	
				Meadowsweet	*Filipendula ulmaria*	O	
				false fox sedge	*Carex otrubae*	R	
				reed mace	*Typha latifolia*	R	
				water mint	*Mentha aquatica*	O	
				water plantain	*Alisma plantago-aquatica*	O	
				yellow flag iris	*Iris pseudacorus*	R	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D3	SS 46276 35905	Dry stream bed		no aquatic veg			
D5ew	SS 47654 31993	Channel 1 m deep, water 5 cm deep, slow flow	H5	bramble	*Rubus fruticosus agg.*	F	
				club rush	*Schoenoplectus lacustris*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				compact rush	*Juncus conglomeratus*	O	
				duckweed	*Lemna minor*	O	
				fool's watercress	*Apium nodiflorum*	O	
				grey willow	*Salix cinerea subsp. oleifoli*	F	
				goat willow	*Salix caprea*	F	
				gut weed	*Ulva intestinalis*	O	
				soft rush	*Juncus effusus*	O	
				water forget-me-not	*Myosotis scorpioides*	R	
D5n	SS 47624 31966	North riverside field portion runs north-south then curves running east west. Channel 2 m wide, water 10 cm deep, no flow	H5	bittersweet	*Solanum dulcamara*	O	
				club rush	*Schoenoplectus lacustris*	R	
				duckweed	*Lemna minor*	A	
				fool's watercress	*Apium nodiflorum*	A	
				gypsy wort	*Lycopus europaeus*	O	
				meadowsweet	*Filipendula ulmaria*	O	
				reed mace	*Typha latifolia*	R	
				water mint	*Mentha aquatica*	O	
				water plantain	*Alisma plantago-aquatica*	O	
				yellow flag iris	*Iris pseudacorus*	R	
				false fox sedge	*Carex otrubae*	R	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D6	SS 46432 36241	dry		no aquatic veg			
D7	SS 47865 31644	Dry, channel 0.5 m deep	H7	bittersweet	*Solanum dulcamara*	O	
				common fleabane	*Pulicaria dysenterica*	F	
				fool's watercress	*Apium nodiflorum*	O	
				meadowsweet	*Filipendula ulmaria*	R	
				soft rush	*Juncus effusus*	R	
				reed mace	*Typha latifolia*	D	
				water mint	*Mentha aquatica*	O	
				yellow flag iris	*Iris pseudacorus*	R	
D8	SS 48003 31870	Dry, channel 0.5 m deep both sides	H8	bittersweet	*Solanum dulcamara*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				fool's watercress	*Apium nodiflorum*	A	
				meadowsweet	*Filipendula ulmaria*	O	
				reed mace	*Typha latifolia*	O	
				soft rush	*Juncus effusus*	O	
				water mint	*Mentha aquatica*	A	
				yellow flag iris	*Iris pseudacorus*	O	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D9	SS 47850 31764	Dry, channel 1 m deep	H9	fool's watercress	*Apium nodiflorum*	O	
				meadowsweet	*Filipendula ulmaria*	O	
				water mint	*Mentha aquatica*	O	
D10	SS 47996 31754	Dry, channel 0.5 m deep	H10	no aquatic veg			
D12	SS 48051 31964	Dry, channel 0.5 m deep	H12	no aquatic veg			

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D13	SS 48164 31982	Dry, channel 5 m wide	H13	common reed	*Phragmites communis*	D	
D14		Dry, east side H14, channel 0.5 m deep	H14	compact rush	*Juncus conglomeratus*	O	
				soft rush	*Juncus effusus*	O	
				reed mace	*Typha latifolia*	O	
				water mint	*Mentha aquatica*	F	
D16	SS 46091 35258	Dry, channel 0.5 m deep	H16	no aquatic veg			

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D17	SS 46234 35533	Dry, channel 0.5 m deep	H17	no aquatic veg			
D19	SS 46317 35651	Dry, channel 0.5 m deep	H19	no aquatic veg			
D20	SS 46556 36288	Channel 2m deep	H20	fool's watercress	*Apium nodiflorum*	O	
				horsetail	*Equisetum sp.*	O	
				yellow flag iris	*Iris pseudacorus*	O	
D21	SS 46290 36442	Channel 2m deep	H21	broadleaved willowherb	*Epilobium montanum*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				compact rush	*Juncus conglomeratus*	O	
				horsetail	*Equisetum sp.*	O	
				meadowsweet	*Filipendula ulmaria*	O	
				purple loosestrife	*Lythrum salicaria*	O	
				water mint	*Mentha aquatica*	O	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D51	SS 46613 34029			bramble	*Rubus fruticosus agg.*	A	
				broadleaved willowherb	*Epilobium montanum*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				creeping thistle	*Cirsium arvense*	O	
				grey willow	*Salix cinerea subsp. oleifoli*	*D*	
				goat willow	*Salix caprea*	*D*	
				horsetail	*Equisetum sp.*	O	
D54a	SS 46564 34134	Channel 0.5 m deep, slow flow	H54	broadleaved willowherb	*Epilobium montanum*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				common reed	*Phragmites communis*	O	
				fool's watercress	*Apium nodiflorum*	O	
				greater mullein	*Verbascum thapsus*	O	
				harts tongue fern	*Asplenium scolopendrium*	O	
				horsetail	*Equisetum sp.*	O	
				red campion	*Silene dioica*	O	
				tufted hair grass	*Deschampsia caespitosa*	O	
				yellow flag iris	*Iris pseudacorus*	A	
D54b	SS 46564 34134	Dry	H54	no aquatic veg			
D56n	SS 46582 33982	Dry, channel 0.5 m deep	H56	ash	*Fraxinus excelsior*	O	
				harts tongue fern	*Asplenium scolopendrium*	O	
				hogweed	*Heracleum sphondylium*	F	
				sycamore	*Acer pseudoplatanus*	O	
				tufted hair grass	*Deschampsia caespitosa*	O	
				tufted vetch	*Vicia cracca*	O	
				watercress	*Rorippa nasturtium-aquaticum*	F	
D56s			H56	ash	*Fraxinus excelsior*	O	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
	SS 46582 33982	Dry, channel 0.5 m deep		harts tongue fern	*Asplenium scolopendrium*	O	
				hogweed	*Heracleum sphondylium*	F	
				sycamore	*Acer pseudoplatanus*	O	
				tufted hair grass	*Deschampsia caespitosa*	O	
				tufted vetch	*Vicia cracca*	O	
				watercress	*Rorippa nasturtium-aquaticum*	F	
D58	SS 46662 33834	Dry	H58	no aquatic veg			
D101	SS 46897 33502	Channel 2 m wide, water 1 m deep, salinity index 1 Endgroup A5a & E5		bramble	*Rubus fruticosus agg.*	F	
				bur reed	*Sparganium erectum*	A	
				club rush	*Schoenoplectus lacustris*	F	
				common figwort	*Scrophularia nodosa*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				cow parsley	*Anthriscus sylvestris*	R	
				fool's watercress	*Apium nodiflorum*	A	
				grey bulrush	*Scoenoplectus tabernaemontani*	O	
				horsetail	*Equisetum sp.*	O	
				least duckweed	*Lemna minuta*	O	
				lesser water parsnip	*Berula erecta*	O	
				meadowsweet	*Filipendula ulmaria*	O	
				nettle	*Urtica dioica*	F	
				Canadian pondweed	*Elodea canadensis*	F	
				false fox sedge	*Carex otrubae*	F	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
				soft rush	*Juncus effusus*	F	
				reed mace	*Typha latifolia*	A	
				water mint	*Mentha aquatica*	F	
				water plantain	*Alisma plantago-aquatica*	O	
				yellow flag iris	*Iris pseudacorus*	A	
				Rigid hornwort	*Ceratophyllum demersum*	R	
				bramble	*Rubus fruticosus agg.*	F	
D102	SS 47089 33415	Adjacent road, channel bank 3 m, water 1 m deep & 2 m wide, salinity index 3 Endgroup A7a & E5		broadleaved willowherb	*Epilobium montanum*		
				common fleabane	*Pulicaria dysenterica*	F	
				fool's watercress	*Apium nodiflorum*	A	
				glasswort	*Salicornia europaea*	O	
				grey bulrush	*Scoenoplectus tabernaemontani*	O	
				lesser water parsnip	*Berula erecta*	O	
				meadowsweet	*Filipendula ulmaria*	A	
				nettle	*Urtica dioica*	F	
				pondweed	*Potamogeton sp.*	F	
				sea club rush	*Bolboschoenus maritimus*	O	
				sea purslane	*Halimione portulacoides*	O	
				false fox sedge	*Carex otrubae*	A	
				soft rush	*Juncus effusus*	F	
				yarrow	*Achillea millefolium*	F	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

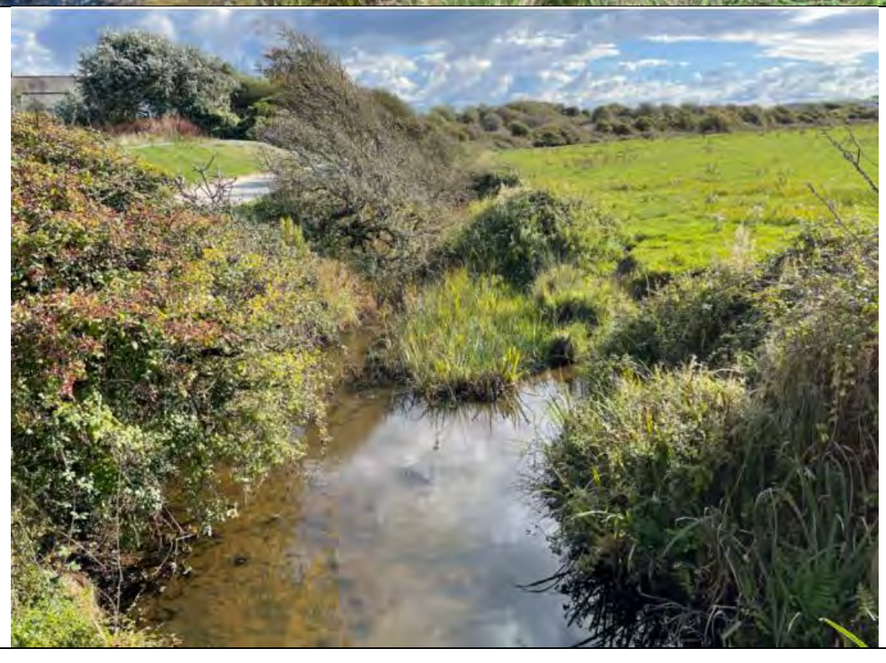
Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
				yellow flag iris	*Iris pseudacorus*	O	
D103	SS 46947 33071	Water 0.5 m deep & 2 m wide, salinity index 2 Endgroup A7a & E5	H103	sea purslane	*Halimione portulacoides*	O	
				false fox sedge	*Carex otrubae*	O	
				yellow flag iris	*Iris pseudacorus*	A	
D104	SS 46885 33184	Bank 2 m high, channel 2 m wide, water 1 m deep, salinity index 1		blunt-fruited water starwort	*Callitriche obtusangula*	O	
				bramble	*Rubus fruticosus agg.*	F	
				bur reed	*Sparganium erectum*	A	
				club rush	*Schoenoplectus lacustris*	F	
				common figwort	*Scrophularia nodosa*	O	
				common fleabane	*Pulicaria dysenterica*	O	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
		Endgroup A5a & E5		cow parsley	*Anthriscus sylvestris*	R	
				floating sweet grass	*Glyceria fluitans*	O	
				fool's watercress	*Apium nodiflorum*	A	
				grey bulrush	*Scoenoplectus tabernaemontani*	O	
				hybrid shore horsetail	*Equisetum x littorale*; hybrid of *E. fluviatile* and *E. plaustre*	O	
				ivy-leaved duckweed	*Lemna trisulca*	O	
				least duckweed	*Lemna minuta*	O	
				lesser water parsnip	*Berula erecta*	O	
				meadowsweet	*Filipendula ulmaria*	O	
				nettle	*Urtica dioica*	F	
				pink water speedwell	*Veronica catenata*	O	
				Canadian pondweed	*Elodea canadensis*	F	
				soft rush	*Juncus effusus*	F	
				spike watermilfoil	*Myriophyllum spicatum*	O	
				reed mace	*Typha latifolia*	A	
				water cress	*Rorippa nasturtium-aquaticum*	O	
				water mint	*Mentha aquatica*	F	
				water plantain	*Alisma plantago-aquatica*	O	
				yellow flag iris	*Iris pseudacorus*	F	
				Rigid hornwort	*Ceratophyllum demersum*	R	
D105	SS 46729 32859	3 x runnels across field		broadleaved willowherb	*Epilobium montanum*	O	
				club rush	*Schoenoplectus lacustris*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				common reed	*Phragmites australis*	F	
				creeping willow	*Salix repens*	R	
				fool's watercress	*Apium nodiflorum*	A	
				greater bird's foot trefoil	*Lotus pedunculatus*	A	
				grey bulrush	*Scoenoplectus tabernaemontani*	O	
				horsetail	*Equisetum sp.*	A	
				meadowsweet	*Filipendula ulmaria*	A	
				lesser water parsnip	*Berula erecta*	O	
				red clover	*Trifolium pratense*	O	
				redshank	*Adenostoma sparsifolium*	R	
				smooth tare	*Vicia tetrasperma*	O	
				St. Johns wort	*Hypericum perforatum*	O	
				water mint	*Mentha aquatica*	F	
				yellow flag iris	*Iris pseudacorus*	A	
				yellow rattle	*Rhinanthus minor*	O	
D106a	SS 46710 33090	bank 1 m, channel 2-3 m wide, salinity index 2	H106	bur reed	*Sparganium erectum*	D	
				club rush	*Schoenoplectus lacustris*	A	
				reed mace	*Typha latifolia*	O	
				soft rush	*Juncus effusus*	O	
				water mint	*Mentha aquatica*	A	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
		Endgroup E2/E5		common reed	*Phragmites australis*	O	
				fool's watercress	*Apium nodiflorum*	A	
D106	SS 46750 33199	Bank 0.5 m high, channel 6 m wide, salinity index 2 Endgroup E2/E5		fool's watercress	*Apium nodiflorum*	A	
				club rush	*Schoenoplectus lacustris*	F	
				grey willow	*Salix cinerea subsp. oleifoli*	R	
				goat willow	*Salix caprea*	R	
				horsetail	*Equisetum sp.*	A	
				lesser water parsnip	*Berula erecta*	O	
				pondweed	*Potamogeton sp.*	A	
				purple loosestrife	*Lythrum salicaria*	O	
				redshank	*Adenostoma sparsifolium*	R	
				bramble	*Rubus fruticosus agg.*	F	
				yellow flag iris	*Iris pseudacorus*	A	
D107	SS 46885 33148	Bank 0.5 m high, channel 5 m wide		bramble	*Rubus fruticosus agg.*	F	
				broadleaved dock	*Rumex obtusifolius*	O	
				broadleaved willowherb	*Epilobium montanum*	F	
				celery-leaved buttercup	*Ranunculus sceleratus*	R	
				club rush	*Schoenoplectus lacustris*	D	
				common fleabane	*Pulicaria dysenterica*	F	
				false fox sedge	*Carex otrubae*	O	
				fool's watercress	*Apium nodiflorum*	F	
				grey willow	*Salix cinerea subsp. oleifoli*	O	
				goat willow	*Salix caprea*	O	
				hard rush	*Juncus inflexus*	O	
				horsetail	*Equisetum palustre*	O	
				red clover	*Trifolium pratense*	O	
				silver weed	*Potentilla anserina*	O	
				smooth tare	*Vicia tetrasperma*	O	
				water mint	*Mentha aquatica*	F	
				yellow flag iris	*Iris pseudacorus*	O	
D108	SS 46857 33686	Bank 2 m high; channel		blackthorn	*Prunus spinosa*	O	
				bramble	*Rubus fruticosus agg.*	O	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
		4 m wide, water 1 m deep, salinity index: southern extent: 1 & northern extent: 1.5 Endgroup A5b & E2/E4		broadleaved willowherb	*Epilobium montanum*	O	
				bur reed	*Sparganium erectum*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				elder	*Sambucus nigra*	O	
				elm	*Ulmus procera*	O	
				greater bird's foot trefoil	*Lotus pedunculatus*	O	
				hemp agrimony	*Eupatorium cannabinum*	O	
				least duckweed	*Lemna minuta*	O	
				lesser water parsnip	*Berula erecta*	O	
				meadowsweet	*Filipendula ulmaria*	O	
				pondweed	*Potamogeton sp.*	F	
				purple loosestrife	*Lythrum salicaria*	F	
				smooth tare	*Vicia tetrasperma*	O	
				reed mace	*Typha latifolia*	F	
				yellow flag iris	*Iris pseudacorus*	A	
D109	SS 46679 33462	Bank 0.5-1 m high, channel 2 m wide		broadleaved dock	*Rumex obtusifolius*	O	
				broadleaved willowherb	*Epilobium montanum*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				common vetch	*Vicia sativa*	O	
				field bindweed	*Convolvulus arvensis*	O	
				fool's watercress	*Apium nodiflorum*	O	
				greater bird's foot trefoil	*Lotus pedunculatus*	O	
				horsetail	*Equisetum sp.*	O	
				meadow buttercup	*Ranunculus acris*	O	
				meadowsweet	*Filipendula ulmaria*	O	
				redshank	*Adenostoma sparsifolium*	O	
				silver weed	*Potentilla anserina*	O	
				soft rush	*Juncus effusus*	O	
				water dock	*Rumex hydrolapathum*	O	
				water mint	*Mentha aquatica*	A	
				yellow flag iris	*Iris pseudacorus*	A	
D110	SS 46688 33555	Bank 1 m, channel 2 m wide		broadleaved willowherb	*Epilobium montanum*	O	
				club rush	*Schoenoplectus lacustris*	O	
				fool's watercress	*Apium nodiflorum*	A	
				hemp agrimony	*Eupatorium cannabinum*	O	
				purple loosestrife	*Lythrum salicaria*	O	
				reed mace	*Typha latifolia*	O	
				water mint	*Mentha aquatica*	O	
				hoary ragwort	*Senecio erucifolius*	O	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D201	SS 46336 37331	Bank 3-4 m high, channel 6 m wide, salinity index 1.5		bramble	*Rubus fruticosus agg.*	D	
				broadleaved willowherb	*Epilobium montanum*	R	
				dropwort	*Filipendula vulgaris*	R	
				evening primrose	*Oenothera agg.*	R	
				fool's watercress	*Apium nodiflorum*	D	
				great willowherb	*Epilobium hirsutum*	O	
				hedge bindweed	*Calystegia sepium*	D	
				hemp agrimony	*Eupatorium cannabinum*	O	
				horsetail	*Equisetum sp.*	R	
				nettle	*Urtica dioica*	D	
				purple loosestrife	*Lythrum salicaria*	O	
				reed mace	*Typha latifolia*	O	
				yellow flag iris	*Iris pseudacorus*	O	
D201S	SS 45778 37531	Bank 3-4 m high, channel 6 m wide		common reed	*Phragmites australis*	O	
				fool's watercress	*Apium nodiflorum*	D	
				greater burdock	*Arctium lappa*	O	
				hedge bindweed	*Calystegia sepium*	O	
				nettle	*Urtica dioica*	O	
				purple loosestrife	*Lythrum salicaria*	O	
S201	SS 45802 37560	Stream bank 2 m high, stream channel 2-4 m wide, salinity index 1	H201	bramble	*Rubus fruticosus agg.*	A	
				common polypody	*Polypodium vulgare*	O	
				crocosmia	*Crocosmia sp.*	O	
				dogwood	*Cornus sanguinea*	O	
				elder	*Sambucus nigra*	F	
				elm	*Ulmus procera*	F	
				grey willow	*Salix cinerea subsp. oleifoli*	F	
				goat willow	*Salix caprea*	F	
				harts tongue fern	*Asplenium scolopendrium*	F	
				honeysuckle	*Lonicera periclymenum*	F	
				ivy	*Hedera helix*	F	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
				nettle	*Urtica dioica*	F	
S201a	SS 45801 37488	Stream bank 1.5 m high; channel 2 m wide, salinity index 1		dropwort	*Filipendula vulgaris*	O	
				evening primrose	*Oenothera crocoata*	O	
				fool's watercress	*Apium nodiflorum*	D	
				soapwort	*Saponaria officinalis*	O	
				tufted hair grass	*Deschampsia caespitosa*	O	
S201b	SS 46006 37467	Stream bank 1.5 m high, salinity index1	H202	bittersweet	*Solanum dulcamara*	O	
				broadleaved willowherb	*Epilobium montanum*	O	
				common figwort	*Scrophularia nodosa*	O	
				creeping thistle	*Cirsium arvense*	O	
				dropwort	*Filipendula vulgaris*	O	
				evening primrose	*Oenothera agg.*	O	
				fool's watercress	*Apium nodiflorum*	D	
				gypsy wort	*Lycopus europaeus*	O	
				hedge bindweed	*Calystegia sepium*	O	
				hedge mustard	*Sisymbrium officinale*	O	
				hedge woundwort	*Stachys sylvatica*	O	
				mugwort	*Artemisia vulgaris*	O	
				purple loosestrife	*Lythrum salicaria*	O	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
				yellow flag iris	*Iris pseudacorus*	O	
D202	SS 46498 36524	Bank 2-3 m, channel 3 m wide, V shaped	H204	broadleaved willowherb	*Epilobium montanum*	F	
				fool's watercress	*Apium nodiflorum*	A	
				hawthorn	*Crataegus monogyna*	F	
				hedge mustard	*Sisymbrium officinale*	F	
				hemp agrimony	*Eupatorium cannabinum*	F	
				horsetail	*Equisetum sp.*	A	
D203	SS 46722 36756	Bank 1 m high	H206	broadleaved willowherb	*Epilobium montanum*	F	
				common reed	*Phragmites communis*	D	
				fool's watercress	*Apium nodiflorum*	F	
				hedge bindweed	*Calystegia sepium*	F	
				hedge mustard	*Sisymbrium officinale*	F	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

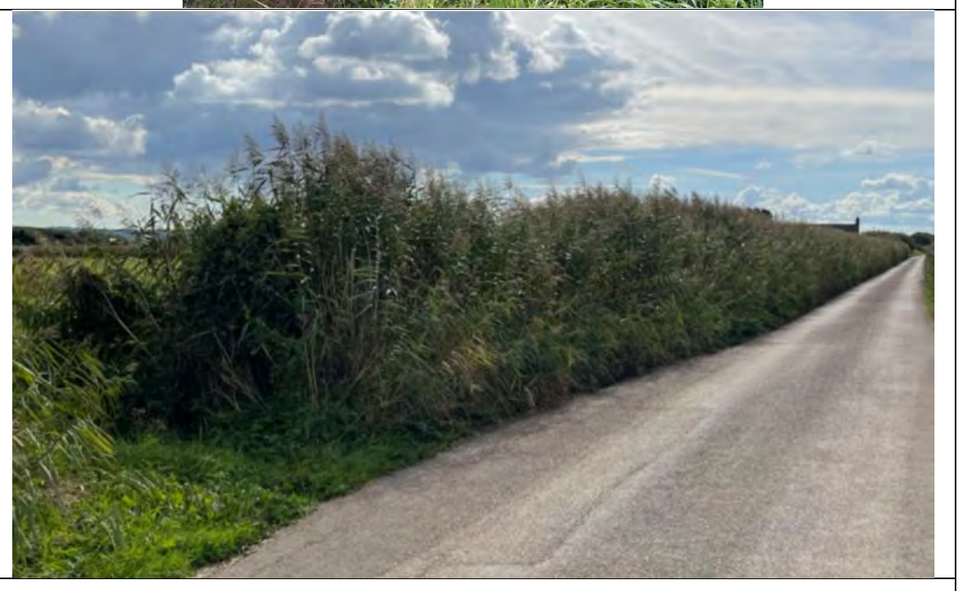
Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
				horsetail	*Equisetum sp.*	A	
D204	SS 46731 36859	Dominated by tall common reed Endgroup E4		bramble	*Rubus fruticosus agg.*	F	
				broadleaved dock	*Rumex obtusifolius*	O	
				comfrey	*Symphytum officinale*	O	
				common reed (4 m high)	*Phragmites communis*	D	
				cow parsley	*Anthriscus sylvestris*	F	
				creeping thistle	*Cirsium arvense*	O	
				greater burdock	*Arctium lappa*	O	
				ground elder	*Aegopodium podagraria*	O	
				hedge bindweed	*Calystegia sepium*	O	
				nettle	*Urtica dioica*	F	
D205	SS 46744 36529	Channel 7 m wide; bank 1-2 m Endgroup E4	H209	bramble	*Rubus fruticosus agg.*	F	
				broadleaved dock	*Rumex obtusifolius*	O	
				comfrey	*Symphytum officinale*	O	
				common reed (4 m high)	*Phragmites communis*	D	
				cow parsley	*Anthriscus sylvestris*	F	
				creeping thistle	*Cirsium arvense*	O	
				greater burdock	*Arctium lappa*	O	
				ground elder	*Aegopodium podagraria*	O	
				hedge bindweed	*Calystegia sepium*	O	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
				nettle	*Urtica dioica*	F	
D206	SS 46740 36335	Channel 10 m wide Endgroup E4	H210	bramble	*Rubus fruticosus agg.*	F	
				broadleaved dock	*Rumex obtusifolius*	O	
				comfrey	*Symphytum officinale*	O	
				common reed	*Phragmites communis*	D	
				cow parsley	*Anthriscus sylvestris*	F	
				creeping thistle	*Cirsium arvense*	O	
				greater burdock	*Arctium lappa*	O	
				ground elder	*Aegopodium podagraria*	O	
				hedge bindweed	*Calystegia sepium*	O	
				mugwort	*Artemisia vulgaris*	O	
D301	SS 46725 36202	Dry, adjacent to road	H301w	no aquatic veg			
D401	SS 46357 34981	Bank 0.5 m high, water 0.5 deep, east side of track Endgroup E4	H401	bittersweet	*Solanum dulcamara*	O	
				broadleaved willowherb	*Epilobium montanum*	O	
				common figwort	*Scrophularia nodosa*	O	
				common fleabane	*Pulicaria dysenterica*	O	
				common reed	*Phragmites communis*	A	
				fool's watercress	*Apium nodiflorum*	A	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D402	SS 46344 34979	Bank 1.5 m high, water 0.5 m deep, west side of track Endgroup E3	H402	broadleaved willowherb	*Epilobium montanum*	F	
				yellow flag iris	*Iris pseudacorus*	F	
				common figwort	*Scrophularia nodosa*	F	
				meadowsweet	*Filipendula ulmaria*	F	
D403	SS 46504 35368	Dry with vegetated strip		blackthorn	*Prunus spinosa*	F	
				broadleaved willowherb	*Epilobium montanum*	F	
				burdock	*Arctium lappa*	F	
				greater knapweed	*Centaurea scabiosa*	F	
				hedge bindweed	*Calystegia sepium*	F	
				tufted hair grass	*Deschampsia caespitosa*	F	
D404	SS 46365 35074	Bank 0.5 m high, water 0.1 m deep	H404	bittersweet	*Solanum dulcamara*	F	
				broadleaved willowherb	*Epilobium montanum*	F	
				common figwort	*Scrophularia nodosa*	F	
				common fleabane	*Pulicaria dysenterica*	F	
				common reed	*Phragmites communis*	O	
				fool's watercress	*Apium nodiflorum*	A	
D405	SS 46371 34864	Dry	H405	no aquatic veg			
D406	SS 46560 34846	Dry	H406	broadleaved dock	*Rumex obtusifolius*	F	
				common fleabane	*Pulicaria dysenterica*	F	
				common rush	*Juncus effusus*	A	
				fool's watercress	*Apium nodiflorum*	A	
				grey willow	*Salix cinerea subsp. oleifoli*	F	

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
				goat willow	*Salix caprea*	F	
				soft rush	*Juncus effusus*	O	
				yellow flag iris	*Iris pseudacorus*	A	
D407	SS 46525 35047	Water 0.5 m deep, channel 3 m wide Endgroup E2	H407	broadleaved willowherb	*Epilobium montanum*	F	
				fool's watercress	*Apium nodiflorum*	A	
				horsetail	*Equisetum sp.*	A	
				watercress	*Rorippa nasturtium-aquaticum*	F	
				yellow flag iris	*Iris pseudacorus*	F	
D408e	SS 46339 35128	Dry, bank 0.5 m high	H408	no aquatic veg			
D408w	SS 46334 35138	Dry, bank 1 m high	H408	no aquatic veg			
D409a	SS 46387 35448	Dry, roadside bank 0.5 m high, within road verge	H409	no aquatic veg			
D409b	SS 46380 35450	Dry, field side bank 1 m high	H409	no aquatic veg			

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D410a	SS 46540 35784	Dry, bank 0.5 m high, within road verge	H410	no aquatic veg			
D410b	SS 46531 35782	Dry, field side to H410, bank 1 m high	H410	no aquatic veg			
D414	SS 46640 35887	Dry	H414	no aquatic veg			
D415	SS 46580 35856	Dry	H415	no aquatic veg			

Table 3.1. The aquatic communities and DAFOR scale of the surveyed ditches.

Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
D417	SS 46557 35806	Dry	H417	no aquatic veg			

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P1	SS 46327 32800	Linear shallow pond within dune grassland	club rush	*Phragmites communis*	D	
			creeping willow	*Salix repens*	O	
			water mint	*Mentha aquatica*	F	
			yellow flag iris	*Iris pseudoacorus*	O	
			horsetail	*Equisetum sp.*	O	
			Common fleabane	*Pulicaria dysenterica*	O	
P2	SS 46297 33139	Linear shallow pond within dune grassland	club rush	*Phragmites communis*	D	
			creeping willow	*Salix repens*	O	
			water mint	*Mentha aquatica*	F	
			yellow flag iris	*Iris pseudoacorus*	O	
			horsetail	*Equisetum sp.*	O	
P3	SS 46455 33203	Irregularly shaped, shallow pond within wooded fringe included an island	Common fleabane	*Pulicaria dysenterica*	O	
			club rush	*Phragmites communis*	D	
			creeping willow	*Salix repens*	O	
			water mint	*Mentha aquatica*	F	
			yellow flag iris	*Iris pseudoacorus*	O	
			horsetail	*Equisetum sp.*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

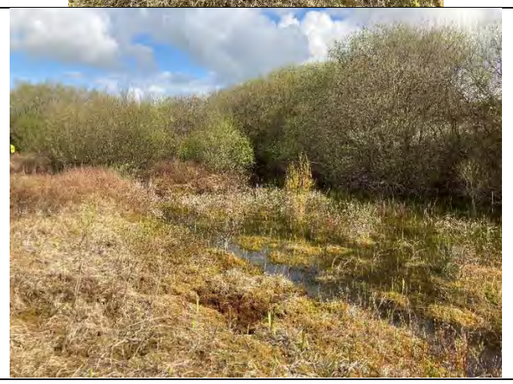
Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P4	SS 46294 33445	Irregularly-shaped, shallow pond within wooded fringe included an island	white water lily	*Nymphaea alba*	F	
			club rush	*Phragmites communis*	A	
			horsetail	*Equisetum sp.*	O	
			creeping willow	*Salix repens*	O	
			pond weed	*Potamogeton sp.*	A	
P5	SS 46330 34794	Shallow pond with wooded and dune grassland fringe	yellow flag iris	*Iris pseudacorus*	F	
			common reed	*Phragmites communis*	F	
			silver weed	*Potentilla anserina*	F	
			water forget-me-not	*Myosotis scorpioides*	O	
			water mint	*Mentha aquatica*	O	
P6	SS 46310 34776	Large, shallow pond forming pond complex south of Sandy Lane car park	water mint	*Mentha aquatica*	A	
			marsh pennywort	*Hydrocotyle vulgaris*	A	
			water forget-me-not	*Myosotis scorpioides*	O	
			creeping cinquefoil	*Potentilla reptans*	O	
			purple loosestrife	*Lythrum salicaria*	O	
			common reed	*Phragmites communis*	D	
			tufted hair grass	*Deschampsia caespitosa*	O	
			soft rush	*Juncus effusus*	A	
			red fescue	*Festuca rubra*	O	
			redshank	*Adenostoma sparsifolium*	O	
			club rush	*Schoenoplectus lacustris.*	O	
			yellow flag iris	*Iris pseudacorus*	O	
			silver weed	*Potentilla anserina*	O	
			water forget-me-not	*Myosotis scorpioides*	O	
			chalk hook moss	*Drepanocladus sendtneri*	F	
			star moss	*Campylium stellatum*	F	
			spear moss	*Callieregonella cuspidata*	F	
			creeping bent	*Agrostis stolonifera*	F	
			spike rush	*Eleocharis palustris*	O	
			creeping willow	*Salix repens*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P7	SS 46339 34758	Shallow pond with wooded fringe forming pond complex south of Sandy Lane car park	water mint	*Mentha aquatica*		
			marsh pennywort	*Hydrocotyle vulgaris*		
			club rush	*Schoenoplectus lacustris.*		
			common reed	*Phragmites communis*		
			chalk hook moss	*Drepanocladus sendtneri*	F	
			star moss	*Campylium stellatum*	F	
			spear moss	*Callieregonella cuspidata*	F	
			creeping cinquefoil	*Potentilla reptans*	O	
			purple loosestrife	*Lythrum salicaria*	O	
			common reed	*Phragmites communis*	D	
P8	SS 46332 34639	Large shallow pond with wooded and dune grassland fringe forming pond complex south of Sandy Lane car park	water mint	*Mentha aquatica*	A	
			marsh pennywort	*Hydrocotyle vulgaris*	A	
			water forget-me-not	*Myosotis scorpioides*	O	
			creeping cinquefoil	*Potentilla reptans*	O	
			purple loosestrife	*Lythrum salicaria*	O	
			common reed	*Phragmites communis*	D	
			tufted hair grass	*Deschampsia caespitosa*	O	
			soft rush	*Juncus effusus*	A	
			red fescue	*Festuca rubra*	O	
			redshank	*Adenostoma sparsifolium*	O	
			club rush	*Schoenoplectus lacustris.*	O	
			yellow flag iris	*Iris pseudacorus*	O	
			silver weed	*Potentilla anserina*	O	
			water forget-me-not	*Myosotis scorpioides*	O	
			chalk hook moss	*Drepanocladus sendtneri*	F	
			star moss	*Campylium stellatum*	F	
			pointed spear moss	*Callieregonella cuspidata*	F	
			creeping bent	*Agrostis stolonifera*	F	
			spike rush	*Eleocharis palustris*	O	
			creeping willow	*Salix repens*	O	
			reed mace (south end)	*Typha latifolia*	R	
P9	SS 46353 34656	Shallow pond with wooded and dune grassland fringe forming pond complex south of Sandy Lane car park	common reed	*Phragmites communis*	F	
			water forget-me-not	*Myosotis scorpioides*	F	
			club rush	*Schoenoplectus lacustris.*	O	
			yellow flag iris	*Iris pseudacorus*	O	
			silver weed	*Potentilla anserina*	O	
			water mint	*Mentha aquatica*	F	
			star moss	*Campylium stellatum*	F	
			spear moss	*Callieregonella cuspidata*	F	
			marsh pennywort	*Hydrocotyle vulgaris*	F	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P10	SS 46359 34591	Shallow pond with wooded and dune grassland fringe forming pond complex south of Sandy Lane car park	yellow flag iris	*Iris pseudacorus*	O	
			common reed	*Phragmites communis*	O	
			water forget-me-not	*Myosotis scorpioides*	O	
			water mint	*Mentha aquatica*	F	
P11	SS 46358 34545	Linear shallow pond with wooded fringe	water mint	*Mentha aquatica*	F	
			star moss	*Campylium stellatum*	F	
			spear moss	*Callieregonella cuspidata*	F	
			marsh pennywort	*Hydrocotyle vulgaris*	F	
P12	SS 46004 34589	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P13	SS 45980 34649	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	
P14	SS 45968 34659	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	
P15	SS 45972 34664	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	
P16	SS 45962 34665	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
P17	SS 45973 34675	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P18	SS 45969 34683	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
P19	SS 45969 34695	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	
P20	SS 45968 34718	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	
P21	SS 45981 34767	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P22	SS 45985 34755	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	
P23	SS 45985 34755	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	
P24	SS 46002 34881	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
			horsetail	*Equisetum sp.*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P25	SS 45331 35339	Shallow pond within dune grassland nar Flagpole Dune	club rush	*Schoenoplectus lacustris*	O	
			water mint	*Mentha aquatica*	O	
			creeping cinquefoil	*Potentilla reptans*	O	
			brookweed	*Samolus valerandi*	O	
			toad rush	*Juncus bufonius*	O	
			broadleaved willowherb	*Epilobium montanum*	O	
			creeping thistle	*Cirsium arvense*	O	
			marsh pennywort	*Hydrocotyle vulgaris*	O	
P26	SS 45331 35339	Forms part of a pond complex within Partridge slack	club rush	*Schoenoplectus lacustris*	O	
			water mint	*Mentha aquatica*	F	
			creeping cinquefoil	*Potentilla reptans*	F	
			brookweed	*Samolus valerandi*	O	
			creeping thistle	*Cirsium arvense*	O	
P27	SS 44803 35626	Largest pond within Partridge slack pond complex; island, deeper in western area	club rush	*Schoenoplectus lacustris*	O	
			water mint	*Mentha aquatica*	F	
			creeping cinquefoil	*Potentilla reptans*	O	
			brookweed	*Samolus valerandi*	O	
			creeping thistle	*Cirsium arvense*	O	
			marsh pennywort	*Hydrocotyle vulgaris*	F	
			sharp rush	*Juncus acutus*	O	
			pond weed	*Potamogeton sp.*	F	
			spear moss	*Calliergonella cuspidata*	F	
P28	SS 44825 35597	Linear, shallow pond forms part of a pond complex within Partridge slack	club rush	*Schoenoplectus lacustris*	O	
			water mint	*Mentha aquatica*	O	
			creeping cinquefoil	*Potentilla reptans*	O	
			brookweed	*Samolus valerandi*	O	
			creeping thistle	*Cirsium arvense*	O	
			marsh pennywort	*Hydrocotyle vulgaris*	O	
			spear moss	*Calliergonella cuspidata*	F	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P29	SS 44848 35633	Shallow pond forms part of a pond complex within Partridge slack	club rush	*Schoenoplectus lacustris*	O	
			water mint	*Mentha aquatica*	F	
			creeping cinquefoil	*Potentilla reptans*	O	
			brookweed	*Samolus valerandi*	O	
			creeping thistle	*Cirsium arvense*	O	
			marsh pennywort	*Hydrocotyle vulgaris*	F	
			sharp rush	*Juncus acutus*	O	
			silver weed	*Potentilla anserina*	O	
P30	SS 44837 35659	Linear, shallow pond forms part of a pond complex within Partridge slack	club rush	*Schoenoplectus lacustris*	O	
			water mint	*Mentha aquatica*	F	
			creeping cinquefoil	*Potentilla reptans*	O	
			brookweed	*Samolus valerandi*	O	
			creeping thistle	*Cirsium arvense*	O	
			marsh pennywort	*Hydrocotyle vulgaris*	F	
			spear moss	*Calliergonella cuspidata*	F	
			sharp rush	*Juncus acutus*	F	
P31	SS 44810 35667	Shallow pond forms part of a pond complex within Partridge slack	club rush	*Schoenoplectus lacustris*	O	
			water mint	*Mentha aquatica*	O	
			creeping cinquefoil	*Potentilla reptans*	O	
			brookweed	*Samolus valerandi*	O	
			creeping thistle	*Cirsium arvense*	O	
			marsh pennywort	*Hydrocotyle vulgaris*	O	
			sharp rush	*Juncus acutus*	O	
					O	
P32	SS 44805 35657	Shallow pond forms part of a pond complex within Partridge slack	sharp rush	*Juncus acutus*	O	
P33	SS 44816 35676	Shallow pond forms part of a pond complex within Partridge slack	sharp rush	*Juncus acutus*	O	
P34	SS 44777 35665	Shallow pond forms part of a pond complex within Partridge slack	sharp rush	*Juncus acutus*	O	
			pond weed	*Potamogeton sp.*	O	
			water mint	*Mentha aquatica*	O	
P35	SS 44822 35678	Shallow pond forms part of a pond complex within Partridge slack	sharp rush	*Juncus acutus*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P36	SS 44871 35637	Shallow pond forms part of a pond complex within Partridge slack	sharp rush	*Juncus acutus*	O	
			pond weed	*Potamogeton sp.*	O	
			water mint	*Mentha aquatica*	O	
			spear moss	*Calliergonella cuspidata*	O	
			creeping cinquefoil	*Potentilla reptans*	O	
P37	SS 44875 35645	Shallow pond forms part of a pond complex within Partridge slack	club rush	*Schoenoplectus lacustris*	O	
			water mint	*Mentha aquatica*	F	
			creeping cinquefoil	*Potentilla reptans*	O	
			creeping thistle	*Cirsium arvense*	O	
			marsh pennywort	*Hydrocotyle vulgaris*	F	
			sharp rush	*Juncus acutus*	O	
			pond weed	*Potamogeton sp.*	F	
			spear moss	*Calliergonella cuspidata*	F	
P38	SS 44878 35638	Shallow pond forms part of a pond complex within Partridge slack	sharp rush	*Juncus acutus*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P39	SS 44815 35654	Shallow pond forms part of a pond complex within Partridge slack	sharp rush	*Juncus acutus*	O	
P40	SS 44825 35676	Shallow pond forms part of a pond complex within Partridge slack	sharp rush	*Juncus acutus*	O	
P41	SS 44824 35676	Shallow pond forms part of a pond complex within Partridge slack	sharp rush	*Juncus acutus*	O	
P42	SS 46081 35469	Shallow pond within dune grassland dominated by bare earth	creeping willow	*Salix repens*	O	
			silver weed	*Potentilla anserina*	O	
			sharp rush	*Juncus acutus*	O	
P43	SS 45965 35610	Shallow pond within dune grassland	sharp rush	*Juncus acutus*	F	
			creeping willow	*Salix repens*	O	
			water mint	*Mentha aquatica*	O	
			spear moss	*Calliergonella cuspidata*	F	
			pond weed	*Potamogeton sp.*	F	
P44	SS 46014 35859	Shallow pond within dune grassland dominated by bare earth (poached by cattle)	no aquatic vegetation			

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P45	SS 46035 35738	Irregular shaped pond, surrounded by scrub and dune grassland	pond weed	*Potamogeton sp.*	F	
			water mint	*Mentha aquatica*	O	
			creeping willow	*Salix repens*	O	
			spear moss	*Calliergonella cuspidata*	O	
P46	SS 45757 35701	Irregular shaped pond, surround by dune grassland	pond weed	*Potamogeton sp.*	F	
			water mint	*Mentha aquatica*	O	
			purple loose strife	*Lythrum salicaria*	O	
P47	SS 45263 35978	Irregularly shaped, shallow pond, dominated by mud	water plantain	*Alisma plantago-aquatica*	O	
			sharp rush	*Juncus acutus*	O	
			creeping willow	*Salix repens*	O	
			goat willow	*Salix caprea*	O	
P48	SS 45237 35973	Irregularly-shaped, shallow pond surrounded by dune grassland	yellow flag iris	*Iris pseudacorus*	O	
			sharp rush	*Juncus acutus*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P49	SS 4782832148	Large pond linked to coastal lagoon in East Yellan	common reed	*Phragmites communis*	A	
			grey willow	*Salix cinerea subsp. oleifoli*	A	
			goat willow	*Salix caprea*	A	
			broadleaved willowherb	*Epilobium montanum*	O	
			rosebay willowherb	*Chamaenerion angustifolium*	O	
			water mint	*Mentha aquatica*	F	
			fennel pondweed	*Potamogeton pectinatus*	F	
			sea clubrush	*Bolboshoenus maritimus*	O	
			grey club rush	*Schoenoplectus tabernaemontani*	O	
			yellow flag iris	*Iris pseudoacorus*	F	
			creeping bent	*Agrostis stolonifera*	F	
			hedge bindweed	*Calystegia sepium*	O	
			common fleabane	*Pulicaria dysenterica*	O	
			marsh bedstraw	*Galium palustre*	O	
			meadowsweet	*Filipendula ulmaria*	O	
			hairy willowherb	*Epilobium hisutum*	O	
			false fox sedge	*Carex otrubae*	O	
P50	SS 46480 36286	Shallow pond associated with D201	bramble	*Rubus fruticosus agg.*	D	
			broadleaved willowherb	*Epilobium montanum*	R	
			dropwort	*Filipendula vulgaris*	R	
			evening primrose	*Oenothera agg.*	R	
			fool's watercress	*Apium nodiflorum*	D	
			great willowherb	*Epilobium hirsutum*	O	
			hedge bindweed	*Calystegia sepium*	D	
			hemp agrimony	*Eupatorium cannabinum*	O	
			horsetail	*Equisetum sp.*	R	
			nettle	*Urtica dioica*	D	
			purple loosestrife	*Lythrum salicaria*	O	
			reed mace	*Typha latifolia*	O	
			yellow flag iris	*Iris pseudacorus*	O	
P57	SS 46360 35070	Shallow pond in field corner with associated ditches	fool's watercress	*Apium nodiflorum*	D	
			creeping buttercup	*Ranunculus repens*	O	
			horsetail	*Equisetum sp.*	O	
			common reed	*Phragmites communis*	O	

Table 3.2. The surveyed ponds/lake attributes and species.

Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P58	SS 46242 34374	Shallow pond with wooded fringe	moss sp	*Sphagnum sp.*	O	
			horsetail	*Equisetum sp.*	O	
			creeping willow	*Salix repens*	O	
			water mint	*Mentha aquatica*	O	
			silver weed	*Potentilla anserina*	O	
P59	SS 46208 34381	Shallow pond with wooded fringe, dominated by bare earth	yellow flag iris	*Iris pseudacorus*	O	
			horsetail	*Equisetum sp.*	O	
			silver weed	*Potentilla anserina*	O	
			sharp rush	*Juncus acutus*	O	
			moss sp	*Sphagnum sp.*	O	
			creeping willow	*Salix repens*	O	
P60	SS 45250 35941	dry	no aquatic veg			
P61	SS 45246 35928	dry	no aquatic veg			

References

Conservation of Habitats & Species Regulations. 2010. HMSO

Countryside and Rights of Way Act 2000. HMSO

Leach & Doarks (1991), *A classification of grazing marsh dyke vegetation in Broadland*. NCC England Field Unit Report (Project No.76). Unpublished report to Nature Conservancy Council

UK Biodiversity Action Plan. www.ukbap.org/uk

Wildlife & Countryside Act 1981, as amended. HMSO

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 16.R: Arboricultural Impact Assessment Report

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Appendices

Glossary of Acronyms

Acronym	Definition
AIA	Arboricultural Impact Assessment
AMS	Arboricultural Method Statement
BS	British Standards
CEZ	Construction Exclusion Zone
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
ES	Environmental Statement
m	Metre
m^2	Metre squared
MLWS	Mean Low Water Springs
RPA	Root Protection Area
TPO	Tree Preservation Order

Glossary of Terminology

Defined Term	Description
Applicant	Offshore Wind Limited
Environmental Impact Assessment (EIA)	Assessment of the potential impact of the proposed Project on the physical, biological and human environment during construction, operation and decommissioning.
Landfall	Where the offshore export cables come ashore
Mean Low Water Springs (MLWS)	The average tidal height throughout a year of two successive low waters during those periods of 24 hours when the range of the tide is at its greatest.
Mitigation	Mitigation measures have been proposed where the assessment identifies that an aspect of the development is likely to give rise to significant environmental impacts and discussed with the relevant authorities and stakeholders in order to avoid, prevent or reduce impacts to acceptable levels. For the purposes of the EIA, two types of mitigation are defined: • Embedded mitigation: consisting of mitigation measures that are identified and adopted as part of the evolution of the project design, and form part of the project design that is assessed in the EIA ▪ Additional mitigation: consisting of mitigation measures that are identified during the EIA process specifically to reduce or eliminate

Defined Term	Description
	any predicted significant effects. Additional mitigation is therefore subsequently adopted by WCOWL as the EIA process progresses.
the Onshore Project	The Onshore Project for the onshore TCPA application includes all components onshore of MLWS. This includes the infrastructure associated with the offshore export cable (from MLWS), landfall, onshore export cable and associated infrastructure and new onshore substation (if required).
the Project	the Project is a proposed floating offshore windfarm called White Cross located in the Celtic Sea with a capacity of up to 100MW. It encompasses the project as a whole, i.e. all onshore and offshore infrastructure and activities associated with the Project.
White Cross Offshore Windfarm	100MW capacity offshore windfarm including associated onshore and offshore infrastructure

1. Introduction

1. This report presents the potential arboricultural impacts of the White Cross Offshore Windfarm ("the Onshore Project") and has been compiled in support of the Environmental Statement (ES). Specifically, it considers impacts landward of Mean Low Water Springs (MLWS) during its construction, operation and maintenance, and decommissioning phases.

2. This assessment has been undertaken in accordance with recommendations provided within British Standard (BS) 5837:2012 Trees in relation to design, demolition and construction – Recommendations (British Standards Institution, 2012) (BS 5837).

3. The scope of assessment has been defined with reference to BS 5837 Clause 5.4. The assessment fulfils the following requirements:

   - Baseline data collection, including an arboricultural survey
   - Arboricultural Impact Assessment (AIA)
   - Identification of the scope of an Arboricultural Method Statement (AMS).

4. Root protection areas (RPAs) have been identified and represent the minimum area around a tree (m^2) deemed to contain sufficient roots and rooting volume to maintain a tree's viability. The RPA, initially plotted as a circle, has been adjusted to account for constraints to root growth such as retaining walls, carriageways and building foundations.

1.1 Assessment Methodology

1.1.1 Study Area

5. The arboricultural assessment utilises a study area which encompasses the Red Line Boundary plus a 15m buffer.

6. The purpose of the 15m buffer is to ensure compliance with BS 5837 which recommends that all arboricultural features whose RPAs extend into the developable area are identified, surveyed and subsequently assessed. The BS 5837 caps RPAs with a maximum radius of 15m meaning that arboricultural features positioned in excess of 15m from an area of construction will not suffer adverse impacts.

7. The extent of the arboricultural study area is shown in **Annex C: Tree Constraints Plans**.

1.1.2 Approach to Assessment

8. The assessment methodology has used baseline data and information on the Onshore Project to identify likely adverse arboricultural impacts. Likely impacts have been identified by reference to BS 5837 and through the application of professional judgement.

9. Typically, in terms of Environmental Impact Assessment (EIA), effects are defined as the consequence of an impact and are assigned a level of significance based upon the sensitivity (value) of a receptor and the anticipated magnitude of change.

10. Although BS 5837 requires an evaluation of effects it does not provide explicit parameters for measuring the sensitivity of an arboricultural feature nor does it provide a methodology for the classification of effects. On this basis the arboricultural assessment methodology has been confined to a quantitative evaluation of effects and has avoided the adoption of a more qualitative approach where a defined framework for assessment would be required.

11. Arboricultural effects have been expressed with specific reference to the numbers and extent of the arboricultural features which is impacted. Reference to the quality of each arboricultural feature has been made as a means of expressing their value from an arboricultural, landscape and cultural/conservation perspective. Quality has been identified with reference to BS 5837 Table 1, a summary of which is provided in **Table 1.1**.

Table 1.1 Summary of BS 5837 quality categories and descriptors

Quality	BS5837 category	Descriptor
High	A	An estimated remaining life-expectancy of at least 40 years plus one or more of the following attributes. ▪ Particularly good examples of species, especially if rare or unusual ▪ Essential components of groups or formal/semi-formal arboricultural features ▪ Those of particular visual/landscape importance ▪ Those of significant conservation, historical, commemorative or other value.
Moderate	B	An estimated remaining life-expectancy of at least 20 years plus one or more of the following attributes. ▪ Examples that may be regarded as of high-quality, but which are downgraded due to the presence of remediable defects which reduce estimated life-expectancy below 40 years

Quality	BS5837 category	Descriptor
		▪ Collections of trees/woodlands which have a higher visual value than they would as individuals ▪ Collections of trees whose situation means they are of limited visual merit ▪ Examples with material conservation or cultural value.
Low	C	An estimated remaining life-expectancy of at least ten years plus one or more of the following attributes. ▪ Unremarkable specimens of limited merit or in such poor condition that they have an estimate life-expectancy below 20 years ▪ Collections of trees/woodlands of limited visual merit ▪ Examples offering only low, temporary or transient landscape benefits ▪ Examples with no material conservation or cultural value.
Very-Low (Unsuitable for retention)	U	An estimated remaining life-expectancy of less than ten years plus one or more of the following attributes. ▪ Examples with serious irremediable structural defects or those that would be unviable following the removal of other trees in poor structural condition ▪ Examples that are dead or subject to immediate and irreversible decline ▪ Examples infected with serious and transmissible pathogens ▪ Very-low quality specimens suppressing other better quality examples.

1.1.3 Baseline Data Sources

1.1.3.1 Desktop Study

12. A desktop study was undertaken in July 2023. The purpose of the desktop study is to identify the presence of statutory and environmental designations which may apply to arboricultural features within the study area.

13. The desktop study reviewed existing information available in the public domain. The sources of information presented in **Table 1.2** were consulted to inform the arboricultural assessment.

Table 1.2 Data sources used to inform the arboricultural assessment

Source	Summary
North Devon Council	Tree Preservation Orders and Conservation Areas
Ancient Tree Forum	Ancient and veteran trees

1.1.3.2 Site Specific Survey

14. An arboricultural survey was undertaken in July 2023. The survey was conducted by John Mitchener (Arboricultural Consultant) with Ordnance Survey MasterMap, and aerial photography used as base mapping.

15. The arboricultural survey has been undertaken with reference to BS 5837. The survey was undertaken without reference to any site layout proposals; tree quality assessments account for health, condition and an estimated remaining contribution based on current site conditions.

16. In accordance with BS 5837 trees have been recorded as tree groups where they combine to form distinct arboricultural features either aerodynamically, visually or because they contain trees of similar cultural and biodiversity value.

17. Limitations to the survey include an absence of access to three areas of land north of the River Taw. These areas are shown in **Annex C: Tree Constraints Plans**.

18. Further details on the methodology used to obtain arboricultural survey data are provided in **Annex A: Arboricultural Survey Methodology**.

1.1.3.2.1 Limitations

19. At the time of the survey access was unavailable to three area of land north of the River Taw. These land parcels are identified in **Annex C: Tree Constraints Plans**, **Figure 1.7** to **Figure 1.11**.

1.1.4 Scope

20. Upon consideration of the baseline environment and the project description outlined in **Chapter 5: Project Description**, potential arboricultural impacts have been scoped in or out. These impacts are outlined, together with a justification for why they are or are not considered further, in **Table 1.3** and **Table 1.4** respectively.

Table 1.3 Summary of impacts scoped into the arboricultural assessment

Potential Impact	Justification
Removal of arboricultural features during construction.	These have been scoped in on the basis that they have the capacity to generate significant adverse arboricultural impacts.
Damage to arboricultural features during construction.	These have been scoped in on the basis that they have the capacity to generate significant adverse arboricultural impacts.

Table 1.4 Summary of impacts scoped out of the arboricultural assessment

Potential Impact	Justification
Arboricultural impacts which may arise during operation	These have been scoped out on the basis that they would primarily relate to the undertaking of routine tree maintenance activities. Tree maintenance activities include activities such as the pruning of branches or the removal of trees where they become unsafe or infected by disease. Such activities do not generate avoidable adverse impacts, nor do they result in impacts which exceed those which arise during construction.
Arboricultural impacts which may arise during decommissioning	These have been scoped out on the basis that they are not reasonably foreseeable. Notwithstanding, it is also unlikely that they will exceed those which arise during construction.

2. Current Baseline

2.1.1 Desktop Study

21. Findings from the desktop study indicate that none of the arboricultural features within the study area are afforded statutory protection by virtue of a conservation area nor are there any records of any ancient or veteran trees being present.

22. The desktop study identified the presence of a single Tree Preservation Order (TPO). This TPO was made in 2000 (TPO No.327) and covers a group of pine and poplar trees located on land to the south of the former Yelland Power Station. The TPO describes the location of the protected trees as "situated at the former power station site, south of the former power station and north of the Tarka Trail, Yelland, Barnstaple, Devon". The location of TPO No.327 is shown in **Annex C: Tree Constraints Plans, Figure 1.16**.

2.1.2 Site Specific Survey

23. The arboricultural survey recorded the presence of 146 features which comprise 76 individual trees, 41 tree groups and 29 hedges.

24. Surveyed features include specimens which have been assessed as being of moderate, low and very-low quality. These include:

- 15 moderate quality trees and seven tree groups. Moderate-quality features make up approximately 15% of the overall survey
- 56 low-quality trees, 33 tree groups and 26 hedges. Low-quality features make up approximately 79% of the overall survey
- Five very-low quality trees, one tree group and three hedges. These make up approximately 6% of the overall survey.

25. Arboricultural features within the study area are generally reflective of the coastal environment within which they are located. From an arboricultural perspective, significant environmental factors include regular exposure to salt laden winds and poor-quality soils, including sand dunes and those which are slowly permeable and seasonally wet.

26. Environmental conditions are reflected in the fact that the most frequently recorded tree species include goat willow *Salix caprea*, common hawthorn *Crataegus monogyna*, sycamore *Acer pseudoplatanus*, blackthorn *Prunus spinosa* and common alder *Alnus glutinosa*. These are all species which exhibit a tolerance for coastal conditions albeit that they are unlikely to reach their full potential in terms of rate of growth, ultimate size and longevity.

27. The arboricultural survey includes 15 moderate-quality trees and seven tree groups. These are formed from or include mature trees which have achieved sufficient size for them to become distinct visual features within the immediate landscape. Moderate-quality features include tree group G96 which is covered by TPO No. 327.

28. Low-quality features make up the majority of the arboricultural resource. They are distributed throughout the study area and include a substantial number of semi-mature and early mature trees and tree groups. They also include all of the surveyed hedges on the basis that these are of negligible arboricultural interest and offer only limited value in terms of visual amenity.

29. The arboricultural resource includes five trees, one tree group and three hedges which are of very-low value. These features are formed almost solely from common ash *Fraxinus excelsior* and elm *Ulmus sp.* trees. In most instances, these trees are either dying or exhibit symptoms of infection with potentially fatal diseases including

Dutch elm disease *Ophiostoma novo ulmi* and ash dieback *Hymenoscyphus fraxineus*.

2.1.2.1 Limitations

30. Limitations relating to land access mean that tree survey data relating to moderate-quality tree group G111 has been estimated. Data has been estimated based upon observations made from a track to the south.

31. Physical restrictions to land access in the form of a water filled ditch mean that tree survey data relating to moderate-quality tree group G109 and low-quality tree group G110 have been estimated. Data has been estimated based upon observations made from a track to the north.

3. Arboricultural Impact Assessment

32. The scope of this AIA has been established with reference to BS 5837 Clause 5.4 'Arboricultural Impact Assessment'. The scope of assessment is defined as including an evaluation of the direct and indirect arboricultural effects of the Onshore Project.

33. This AIA includes specific reference to the effects of any arboricultural losses and other potentially damaging activities which may foreseeably impact retained trees. Effects are expressed in terms of the number of features that are likely to be impacted and their quality.

34. The quality of arboricultural features is described with reference to the BS 5837 category classifications. For the purposes of this AIA these are described as follows:

- **Moderate-quality category B** features include those which, by virtue of age and/or size, may qualify as high-quality specimens were it not for the presence of remedial defects, limited visibility or a life-expectancy which may not exceed 40 years. Due to their age and size, moderate-quality features generally offer limited opportunities for substitution within the foreseeable future.
- **Low-quality category C** features include specimens with no particular arboricultural merits and those which present few visual, conservation or cultural benefits. While they have life-expectancies which exceed ten years, they are generally insufficiently aged or unique so as to limit opportunities for effective substitution.
- **Very low-quality category U** features include specimens which, by virtue of poor health or structural condition, are unsuitable for retention beyond ten years. Their short life-expectancy dictates that they are of negligible arboricultural or visual value and, in the context of development, their substitution with new trees is often desirable.

3.1 Assumptions

35. This AIA has been based on the following assumptions:

- That the Red Line Boundary has been located so as to encompass the minimum amount of land required for construction
- That construction activities, including access, will be confined to land within the Red Line Boundary
- That land use within the Red Line Boundary during construction will substantially prohibit the substantial retention of trees, tree groups and hedges. However, options will remain for the retention and protection of arboricultural features which are located in proximity to the edge of the Red Line Boundary. This applies in instances where tree protection measures will not significantly constrain land use during construction
- That, trenchless construction methodologies will be applied to the installation of cabling in various locations. These shall include the area from landfall to the cable corridor, crossings across the Boundary Drain, the crossing of the Tarka Trail and the crossing of the River Taw. Therefore, notwithstanding prior assumptions regarding land use within the Red Line Boundary, it is further assumed that the use of trenchless techniques will permit the retention of trees within these areas.

3.2 Recommendations for Additional Mitigation

36. This AIA includes recommendations for additional mitigation which is necessary to reduce, or eliminate, predicted arboricultural impacts which may arise during construction. Mitigation is specified with reference to BS 5837 and includes matters which require inclusion within an AMS.

3.3 Arboricultural Removals

37. The requirement to remove trees, tree groups and hedges has been identified as including any feature which cannot be sustainably retained throughout the construction process. For the purposes of this assessment this includes features which, if retained, would either prohibit construction or suffer irremediable damage leading to foreseeable structural failure or death.

38. It is estimated that the Onshore Project will require the removal of 20 trees, two tree groups and three hedges. It is also estimated that a further two tree groups and 11 hedges will require removal in part. Arboricultural features identified for retention and removal are shown in **Annex D: Tree Protection Plans**.

39. Only a single moderate-quality tree is likely to require removal. This tree, referenced as T28, is a common alder and has a stem diameter of 1200mm. This tree has an

unusually large stem diameter for its species and, on this basis, is of some arboricultural interest. Tree T28 is positioned towards the centre of the Red Line Boundary and, with an RPA which has a radius of 14.4m, it is unlikely that it will be retained and sustainably protected during construction.

40. It is likely that 15 low-quality trees, two tree groups and two hedges will also need to be removed. These are referenced as T16, T19, T20, T21, T25, T26, T27, T29, T30, T39, T40, T43, G109, G118, H94 and H123.

41. Other low-quality features which are likely to be removed in part include two tree groups and nine hedges. These are referenced as G97, G126, H87, H89, H90, H93, H124, H127, H129, H130 and H133.

42. Combined, low-quality removals equate to 15 individual trees, 129 linear metres of tree group and 451 linear metres of hedge.

43. Removals associated with very-low quality features include two trees, one hedge and the partial removal of a further two hedges. These features are referenced as T46, T47, H117, H134 and H135. Aside from the two trees, removals equate to 180 linear metres of very-low quality hedge.

3.4 Potential Construction Impacts

44. Potential construction impacts are defined as anything which has the capacity to adversely affect the health, growth, life expectancy or safety of any retained tree. Potential construction impacts may arise as a result of damage to a tree's rooting environment, roots, stem or branches.

45. Significant adverse construction impacts are defined as those which may materially affect the retention, health, life-expectancy or quality of a tree, tree group or hedge. These will be avoided by ensuring that retained arboricultural features are suitably protected during construction. Tree protection shall include the identification of RPAs within the Onshore Development Area as a Construction Exclusion Zones (CEZ) within which potentially damaging activities shall be avoided.

46. Subject to the implementation of these tree protection measures there will be no foreseeable construction impacts.

3.5 Access Facilitation Pruning

47. Tree pruning may be required in order to provide access during construction. This is known as 'access facilitation pruning' and most frequently includes the removal of low branches to provide access beneath the crown of a tree.

48. The Onshore Project does not include any currently identifiable requirement for access facilitation pruning.

49. However, if previously unforeseen access facilitation pruning is required, then all work shall be specified in accordance with British Standard BS 3998:2010 Tree work – recommendations (British Standards Institution, 2010) (BS 3998). Pruning shall be specified by the Project Arboriculturist and shall be undertaken by a competent tree work contractor. This will ensure that pruning is undertaken to an appropriate standard and does not adversely impact the health or appearance of any retained tree.

4. Arboricultural Method Statement

4.1 Scope

50. BS 5837 defines an AMS as a "methodology for the implementation of any aspect of development that is within the root protection area, or has the potential to result in loss of, or damage, to a tree that is to be retained". BS 5837 further identifies the requirement to compile an AMS during detailed design and prior to the commencement of construction.

51. An AMS shall be produced in accordance with recommendations set out in BS 5837. The AMS shall specify the tree protection measures which shall be applied and will address all construction activities which have the potential to result in the loss of, or damage to, any retained tree, tree group or hedge. The AMS shall be supported by a Tree Protection Plan and shall be implemented prior to the commencement of any potentially damaging construction activities or site clearance works. The AMS shall be implemented under the supervision of the Environmental Clerk of Works (ECoW).

52. The AMS shall adopt a precautionary approach to tree protection and shall seek, where practicable, to further reduce the extent of arboricultural removals and construction impacts across the Onshore Project. This shall include reviewing opportunities to retain trees located within areas currently allocated for construction, and any other locations where detailed design changes could facilitate retention.

53. The AMS shall accurately specify the location and specification for all tree protection measures. These shall include, but shall not be limited to, the following matters:

- The phasing of tree protection measures
- Arboricultural monitoring and supervision for any construction work within, or adjacent to, the RPA of any retained feature

- The specification of construction exclusion zones
- Tree protection fencing.

54. This AMS shall be a 'living document.' This means that it shall be reviewed, and where necessary updated, in response to changes to the design and/or construction methodology. It is envisaged that this AMS will be compiled, reviewed and, where necessary updated, at the following stages of design and construction:

- Detailed design
- Contractor engagement
- Pre-commencement
- Prior to any instance where the overarching site clearance or construction methodology is amended.

4.2 Heads of Terms for an Arboricultural Method Statement

55. The scope of the AMS shall include the following tree protection measures.

4.2.1 Phasing

56. It is essential that tree protection measures are phased correctly during construction. Tree protection measures may be phased in the following manner:

- Undertake agreed arboricultural removals
- Install tree protection measures around CEZ
- Undertake site clearance and construction
- Remove tree protection measures once all construction activities have ceased
- Complete soft landscaping (if required).

4.2.2 Arboricultural Monitoring and Supervision

57. Arboricultural monitoring and supervision may be implemented in accordance with the following details.

4.2.2.1 Nominated Persons

58. The client/contractor shall appoint a Project Arboriculturist. This person shall be suitably qualified and experienced in the field of trees in relation to construction, and shall be available to:

- Attend an initial pre-commencement meeting and supervisory visits as required
- Undertake site monitoring
- Advise on all ad-hoc arboricultural matters which may arise.

59. The client/contractor shall further nominate a person to be responsible for all arboricultural matters onsite (e.g., an ECoW). This person must:

- Be present on site whenever work which has the potential to cause damage to retained trees is being undertaken
- Be aware of their arboricultural responsibilities
- Have the authority to stop any work that is causing or has the potential to cause harm to any retained tree
- Be responsible for ensuring that all site operatives are aware of their responsibilities toward retained trees and the consequences of any failure to observe those responsibilities
- Make immediate contact with the Project Arboriculturist in the event of any tree related problems occurring, whether actual or potential.

4.2.2.2 Timing of Monitoring and Supervision

60. Once works commence the Project Arboriculturist will undertake a programme of monitoring. This may include phone and email contact with the ECoW, regular site visits and the direct supervision of work which has the capacity to cause damage to retained trees. The frequency of any monitoring will be determined by the intensity and proximity of works to trees and will be flexible enough to accommodate changes in the scheduling of tasks as they occur.

4.2.2.3 Records

61. The ECoW will maintain a record of the arboricultural monitoring. This will provide a record of compliance with any agreed tree protection measures and will assist in the efficient discharge of planning conditions or reserved matters, where required.

4.2.3 Construction Exclusion Zone

62. A CEZ shall be specified for all retained trees, tree groups and hedges within, or adjacent to, the red line boundary.

63. The CEZ is an area within which all construction activities are prohibited throughout the construction period. The default method of excluding access to the CEZ is through the installation of tree protection fencing.

64. The CEZ is an arboriculturally sensitive area within which the following activities are prohibited unless approved and supervised by the Project Arboriculturist:

- The lowering or raising of soil levels
- Any form of excavation (whether mechanical of using hand tools)
- The storage of plant or materials

- The storage, handling, or disposal of any chemical (including cement washings)
- Vehicular access
- Fires or other means of waste disposal.

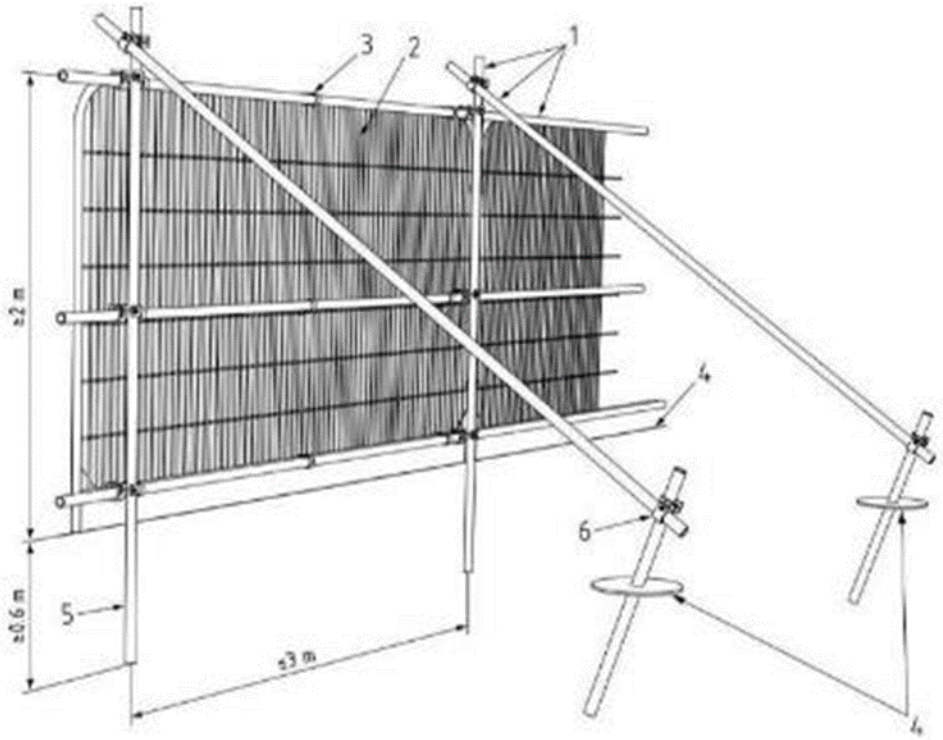
4.2.4 Tree Protection Fencing

65. Tree protection fencing will be erected in order to create a vertical barrier which prevents unauthorised or unintentional access to the CEZ. It shall be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the CEZ. Tree protection fencing shall be adequately maintained to ensure that it remains rigid and complete.

66. Once erected, tree protection fencing shall not be altered or removed without the explicit approval from the Project Arboriculturist.

67. A recommended specification for the tree protection fencing is provided in **Figure 1**.

Figure 1: Recommended specification for tree protection fencing.



Key to Figure 1

1. *Standard scaffold poles*
2. *Heavy gauge 2m tall, galvanised tube and welded mesh infill panels.*
3. *Panels secured to uprights and cross-members with wire ties.*
4. *Ground level.*

5. *Uprights driven into the ground until secure (minimum depth 0.6m).*
6. *Standard scaffold clamps.*

5. References

British Standards Institution, 2010. BS 3998:2010 Tree work – Recommendations. London: British Standards Institution.

British Standards Institution, 2012.BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations. London: British Standards Institution.

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Annex A: Arboricultural Survey Methodology

Annex A: Arboricultural Survey Methodology

6. Methodology

69. The arboricultural survey was undertaken in accordance with the following methodology:

- The trees have been inspected using the Visual Tree Assessment methodology as developed by Mattheck and Breloer
- The arboricultural survey was carried out from ground level only
- No tissue samples were taken nor was any internal investigation of the subject trees undertaken
- Tree heights and crown spreads have been estimated to the nearest 1m
- Notes have been recorded where they relate to the quality of the arboricultural feature. Management recommendations have been provided where work is necessary for the abatement of a hazard which presents an unacceptable or intolerable level of risk to persons or property
- Stem diameters have been measured in accordance with Annex C of BS 5837. Diameters of single stem trees on level ground have been measured at 1.5m above ground level. The combined stem diameters for multi-stemmed trees have been calculated in accordance with BS 5837 paragraph 4.6.1
- By default, RPAs are calculated as an area equivalent to a circle with a radius 12 times the stem diameter and are capped at a distance of 15 metres.

6.1 Quality Assessment

70. The quality of arboricultural features has been determined in accordance with BS 5837 Table 1, a summary of which is provided in Table 2. The purpose of the quality assessment is to enable informed decisions to be made regarding site layout, land use and design. The quality assigned to each survey item is recorded within **Appendix B: Arboricultural Survey Schedule**.

Table 2: BS 5837:2012 Table 1 – Cascade chart for tree quality assessment

Category and definition	Criteria (including subcategories where appropriate)		
Trees unsuitable for retention			
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g., where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low-quality trees suppressing adjacent trees of better quality		
	1) Mainly arboricultural qualities	**2) Mainly landscape qualities**	**3) Mainly cultural values, including conservation**
Category A Trees of high quality with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g., the dominant and/or principal trees within an avenue)	Trees, groups, or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g., veteran trees or wood-pasture)
	1) Mainly arboricultural qualities	**2) Mainly landscape qualities**	**3) Mainly cultural values, including conservation**
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 40 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g., presence of significant though remediable defects, including unsympathetic past	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to	Trees with material conservation or other cultural value

Category and definition	Criteria (including subcategories where appropriate)		
	management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	make little visual contribution to the wider locality	
Category C **Trees of low quality with an estimated remaining life expectancy of at least 40 years**	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value

6.2 Limitations

71. Arboricultural survey data is typically valid for a period of two years unless otherwise stated. Significant environmental events (such as extreme weather conditions) or changes to the Site may render it invalid within a shorter timescale.

72. The survey has only been undertaken from land within the client's ownership, from public land or from areas where formal access has been arranged.

73. The position of arboricultural features not recorded on a topographical survey has been estimated using aerial imagery.

74. Whilst arboricultural surveys are not seasonally limited it is the case that certain pests and diseases may be more or less evident at different times of the year. This is especially true of certain wood decaying fungi such as the Giant Polypore (Meripilus giganteus) where fruiting bodies are short-lived, and the early stages of root decay may not result in other identifiable symptoms. Walkover survey data is therefore based upon observations made at the time of the site visit and may be subject to change should further or more detailed inspections be undertaken.

6.3 Health and Safety

75. This report in no way constitutes a health and safety survey. Where concerns for tree health and safety exist the necessary and appropriate tree inspections should be carried out.

76. Arboricultural survey data is of a preliminary nature and has been collected based on a walkover survey. Only defects visible from the ground have been noted and each individual feature may not have been inspected closely due to access difficulties, the presence of dense ivy or vegetation or safety constraints. Safety related features have recorded on the basis that the arboricultural features will be subject to a normal programme of tree hazard assessment and only those features which materially affect the quality of the feature or pose a real and immediate safety concern have been recorded.

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Annex B: Arboricultural Survey Schedule

Annex B: Arboricultural Survey Schedule

Table 6.1 Arboricultural survey schedule descriptors

Key:	Description:
Reference Nos	Individual reference number
Type:	T - tree; G - tree group; H - hedge
Species:	Botanical name (common name)
Height:	Overall height (m)
DBH:	Stem diameter (mm) - calculated in accordance with BS 5837 paragraph 4.6.1. Maximum and minimum diameters are provided for tree groups and hedges
Crown Spread:	Spread of crown(m) - based upon the maximum lateral dimension
LCH:	Lowest crown height (m)
LBH:	Height of lowest significant branch (m)
Life Stage:	Young; Semi-Mature; Early Mature; Mature
PC:	Physiological condition - Good, Fair, Poor, Dead
SC:	Structural condition - Good, Fair, Poor
ERC:	Estimated remaining contribution (life expectancy) - <10 years, 10+ years, 20+ years, 40+ years
Category:	BS 5837 Category - A (high-quality) B (moderate-quality) C (low-quality) U (very-low quality/unsuitable for retention)
Sub-Category:	BS 5837 Sub-Category - the primary area of value - 1) Arboricultural, 2) Visual, 3) Cultural/Conservation
Notes:	General observations, particularly where relevant to the assigned BS 5837 category
RPA Radius:	Root Protection Area Radius (m). The radius of the circular Root Protection Area associated with the tree as measured from the centre of the stem. For tree groups, wooded areas and hedges the RPA radius is calculated using the maximum stem diameter.

Table 6.2 Arboricultural survey schedule

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius	Statutory Status
1	T	Acer pseudoplatanus (sycamore)	6.0	150	3.0	1.0	1.0	Semi-Mature	Good	Fair	+10	C	2	-	1.8	-
2	T	Acer pseudoplatanus (sycamore)	9.0	500	4.0	2.0	2.0	Mature	Good	Good	+20	B	2	-	6.0	-
3	T	Salix babylonica var.pekinensis 'Tortuosa' (corkscrew willow)	5.0	500	2.0	0.0	2.0	Mature	Fair	Fair	+10	C	2	Historically topped	6.0	-
4	T	Acer pseudoplatanus (sycamore)	6.0	200	2.0	1.0	1.0	Semi-Mature	Good	Fair	+10	C	2	-	2.4	-
5	T	Salix caprea (goat willow)	4.0	125	2.0	0.5	0.5	Semi-Mature	Good	Fair	+10	C	2	-	1.5	-
6	T	Malus sp. (apple)	6.0	300	2.0	1.0	1.5	Mature	Good	Good	+10	C	2	Within garden of residential property	3.6	-
7	T	Fraxinus excelsior (common ash)	13.0	350	3.0	2.0	2.0	Early-Mature	Fair	Fair	+10	C	2	-	4.2	-
8	T	Quercus robur (English oak)	13.0	350	3.0	2.0	2.0	Early-Mature	Fair	Fair	+10	C	2	-	4.2	-
9	T	Quercus robur (English oak)	13.0	300	3.0	2.0	2.0	Early-Mature	Fair	Fair	+10	C	2	-	3.6	-
10	T	Quercus robur (English oak)	8.0	500	5.0	4.0	4.0	Early-Mature	Good	Fair	+20	B	2	Twin-stemmed	6.0	-
11	T	Quercus robur (English oak)	7.0	350	4.0	3.0	3.0	Early-Mature	Good	Fair	+20	B	2	-	4.2	-
12	T	Ulmus sp. (elm)	11.0	650	5.0	4.0	4.0	Early-Mature	Good	Fair	+20	B	2	Multi-stemmed	7.8	-
13	T	Quercus robur (English oak)	12.0	550	6.0	5.0	4.0	Early-Mature	Good	Good	+20	B	2	-	6.6	-
14	T	Poplus tremula (aspen)	15.0	350	3.0	3.0	3.0	Early-Mature	Fair	Fair	+10	C	2	Poor form	4.2	-
15	T	Salix caprea (goat willow)	4.0	75	1.5	0.5	0.5	Semi-Mature	Good	Fair	+10	C	2	-	0.9	-
16	T	Salix caprea (goat willow)	4.0	200	2.0	0.0	1.0	Semi-Mature	Good	Fair	+10	C	2	-	2.4	-
17	T	Quercus robur (English oak)	8.0	550	5.0	3.0	3.0	Early-Mature	Good	Good	+20	B	2	-	6.6	-
18	T	Crataegus monogyna (common hawthorn)	4.0	150	2.0	1.5	1.5	Mature	Fair	Fair	+10	C	2	-	1.8	-
19	T	Crataegus monogyna (common hawthorn)	3.0	100	1.0	1.5	1.5	Semi-Mature	Fair	Fair	+10	C	2	-	1.2	-
20	T	Crataegus monogyna (common hawthorn)	3.0	100	1.0	1.5	1.5	Mature	Fair	Fair	+10	C	2	-	1.2	-
21	T	Crataegus monogyna (common hawthorn)	3.0	100	1.0	1.5	1.5	Mature	Fair	Fair	+10	C	2	-	1.2	-

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius	Statutory Status
22	T	Crataegus monogyna (common hawthorn)	3.0	100	1.0	1.5	1.5	Mature	Fair	Fair	+10	C	2	-	1.2	-
23	T	Crataegus monogyna (common hawthorn)	2.5	100	1.0	1.5	1.5	Mature	Fair	Fair	+10	C	2	-	1.2	-
24	T	Crataegus monogyna (common hawthorn)	2.5	100	1.0	1.5	1.5	Mature	Fair	Fair	+10	C	2	-	1.2	-
25	T	Crataegus monogyna (common hawthorn)	2.5	100	1.0	1.5	1.5	Mature	Fair	Fair	+10	C	2	-	1.2	-
26	T	Crataegus monogyna (common hawthorn)	2.5	100	1.0	1.5	1.5	Mature	Fair	Fair	+10	C	2	-	1.2	-
27	T	Salix caprea (goat willow)	3.5	125	2.0	1.0	1.0	Semi-Mature	Good	Good	+10	C	2	-	1.5	-
28	T	Alnus glutinosa (common alder)	8.0	1200	6.0	1.0	2.0	Mature	Good	Good	+20	B	1	Some hollowing of stem	14.4	-
29	T	Salix caprea (goat willow)	5.0	250	3.0	2.0	2.0	Mature	Fair	Fair	+10	C	2	-	3.0	-
30	T	Salix caprea (goat willow)	6.0	350	4.0	1.0	1.0	Mature	Good	Fair	+10	C	2	-	4.2	-
31	T	Salix caprea (goat willow)	3.5	250	3.0	1.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	3.0	-
32	T	Alnus glutinosa (common alder)	11.0	925	8.0	1.0	1.0	Mature	Good	Fair	+20	B	1	Four stems; Age related features including some stem decay	11.1	-
33	T	Crataegus monogyna (common hawthorn)	4.0	425	5.0	1.0	1.0	Mature	Fair	Fair	+20	B	1	Old tree with age related features including stem decay	5.1	-
34	T	Salix caprea (goat willow)	6.0	275	3.0	1.0	1.0	Semi-Mature	Good	Fair	+10	C	2	-	3.3	-
35	T	Salix fragilis (crack willow)	4.0	200	1.5	1.0	1.0	Early-Mature	Good	Fair	+10	C	2	Topped	2.4	-
36	T	Salix caprea (goat willow)	6.0	325	3.0	1.0	1.0	Semi-Mature	Good	Fair	+10	C	2	-	3.9	-
37	T	Alnus glutinosa (common alder)	7.0	350	4.0	3.0	3.0	Mature	Poor	Fair	<10	U	-	Dying tree	4.2	-
38	T	Alnus glutinosa (common alder)	9.0	300	5.0	3.0	3.0	Mature	Good	Fair	+20	B	2	-	3.6	-
39	T	Salix caprea (goat willow)	5.0	200	3.0	1.0	1.0	Semi-Mature	Good	Fair	+10	C	2	-	2.4	-
40	T	Salix caprea (goat willow)	4.0	125	2.0	1.0	1.0	Semi-Mature	Good	Fair	+10	C	2	-	1.5	-
41	T	Alnus glutinosa (common alder)	9.0	350	5.0	3.0	3.0	Mature	Good	Fair	+20	B	2	-	4.2	-
42	T	Alnus glutinosa (common alder)	9.0	350	5.0	3.0	3.0	Mature	Good	Fair	+20	B	2	-	4.2	-
43	T	Ulmus sp. (elm)	7.0	150	3.0	2.0	2.0	Semi-Mature	Fair	Fair	+10	C	2	-	1.8	-
44	T	Alnus glutinosa (common alder)	7.5	400	5.0	2.0	2.0	Mature	Poor	Poor	+10	C	2	Major crown dieback	4.8	-
45	T	Alnus glutinosa (common alder)	9.0	400	5.0	3.0	3.0	Mature	Good	Fair	+20	B	2	-	4.8	-
46	T	Sambucus nigra (elder)	5.0	225	2.5	3.0	3.0	Mature	Poor	Poor	<10	U	-	Dying tree	2.7	-
47	T	Sambucus nigra (elder)	5.0	225	2.5	3.0	3.0	Mature	Poor	Poor	<10	U	-	Dying tree	2.7	-
48	T	Salix caprea (goat willow)	4.0	200	3.0	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	-	2.4	-

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius	Statutory Status
49	T	Salix caprea (goat willow)	5.0	250	2.0	0.0	0.5	Semi-Mature	Good	Fair	+10	C	2	-	3.0	-
50	T	Salix caprea (goat willow)	5.0	250	2.0	0.0	0.5	Semi-Mature	Good	Fair	+10	C	2	-	3.0	-
51	T	Salix caprea (goat willow)	5.0	250	2.0	0.0	0.5	Semi-Mature	Good	Fair	+10	C	2	-	3.0	-
52	T	Sambucus nigra (elder)	3.0	125	1.5	0.0	0.0	Semi-Mature	Good	Good	+10	C	2	-	1.5	-
53	T	Quercus ilex (holm oak)	4.0	200	2.5	0.0	0.5	Semi-Mature	Fair	Fair	+10	C	2	-	2.4	-
54	T	Acer pseudoplatanus (sycamore)	6.0	250	3.0	0.0	0.5	Early-Mature	Fair	Fair	+10	C	2	-	3.0	-
55	T	Quercus ilex (holm oak)	6.0	275	4.0	1.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	3.3	-
56	T	Acer pseudoplatanus (sycamore)	7.0	275	3.0	0.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	3.3	-
57	T	Acer pseudoplatanus (sycamore)	7.0	275	3.0	0.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	3.3	-
58	T	Fraxinus excelsior (common ash)	7.0	350	4.0	1.0	2.0	Mature	Poor	Poor	<10	U	-	Dying tree	4.2	-
59	T	Acer pseudoplatanus (sycamore)	7.0	275	3.0	0.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	3.3	-
60	T	Acer pseudoplatanus (sycamore)	8.0	500	5.0	2.0	2.0	Mature	Good	Fair	+20	B	2	Multi-stemmed	6.0	-
61	T	Acer pseudoplatanus (sycamore)	7.0	275	3.0	0.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	3.3	-
62	T	Acer pseudoplatanus (sycamore)	7.0	350	3.0	0.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	4.2	-
63	T	Quercus ilex (holm oak)	6.0	350	4.0	3.0	3.0	Mature	Fair	Fair	+10	C	2	-	4.2	-
64	T	Crataegus monogyna (common hawthorn)	2.0	75	0.5	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	-	0.9	-
65	T	Crataegus monogyna (common hawthorn)	2.0	75	0.5	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	-	0.9	-
66	T	Fraxinus excelsior (common ash)	5.0	150	2.0	1.0	1.0	Semi-Mature	Poor	Poor	<10	U	-	Dying tree	1.8	-
67	T	Crataegus monogyna (common hawthorn)	2.0	75	0.5	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	-	0.9	-
68	T	Crataegus monogyna (common hawthorn)	2.0	75	0.5	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	-	0.9	-
69	T	Crataegus monogyna (common hawthorn)	2.0	75	0.5	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	-	0.9	-
70	T	Crataegus monogyna (common hawthorn)	2.0	75	0.5	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	-	0.9	-
71	T	Crataegus monogyna (common hawthorn)	2.0	75	0.5	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	-	0.9	-

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius	Statutory Status
72	T	Crataegus monogyna (common hawthorn)	2.0	75	0.5	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	-	0.9	-
73	T	Acer pseudoplatanus (sycamore)	7.0	350	3.0	1.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	4.2	-
74	T	Fraxinus excelsior (common ash)	6.0	300	4.0	1.0	2.0	Mature	Fair	Fair	+10	C	2	Multi-stemmed	3.6	-
75	T	Acer pseudoplatanus (sycamore)	9.0	300	4.0	1.0	2.0	Early-Mature	Good	Fair	+20	B	2	-	3.6	-
76	T	Poplus alba (white poplar)	8.0	300	3.0	0.0	1.0	Early-Mature	Good	Fair	+10	C	2	-	3.6	-
77	G	Acer pseudoplatanus (sycamore)	4.0-6.0	150-225	3.0	1.0	1.0	Early-Mature	Good	Fair	+10	C	2	Group of 3 trees	2.7	-
78	G	Salix caprea (goat willow)	6.0	300	4.0	1.0	1.0	Mature	Good	Fair	+10	C	2	-	3.6	-
79	H	Ulmus sp. (elm)	2.0	75	1.0	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	Maintained hedge	0.9	-
80	G	Ulmus sp. (elm)	8.0	75-125	2.0	3.0	3.0	Semi-Mature	Poor	Fair	<10	U	-	Some trees with Dutch elm disease (Ophiostoma novo-ulmi)	1.5	-
81	G	Quercus robur (English oak),Salix caprea (goat willow),Ulmus sp. (elm)	6.0-8.0	75-250	2.0	1.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	3.0	-
82	H	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn),Sambucus nigra (elder)	1.5-3.0	75-150	1.0	0.0	0.0	Mature	Fair	Fair	+10	C	2	Sporadic sections of hedge interspersed with dense bramble	1.8	-
83	H	Crataegus monogyna (common hawthorn)	1.0-1.5	75	0.5	0.0	0.0	Mature	Fair	Fair	+10	C	2	Gappy hedge comprising common hawthorn interspersed with dense bramble	0.9	-
84	H	Crataegus monogyna (common hawthorn)	1.0-1.5	75	0.5	0.0	0.0	Mature	Fair	Fair	+10	C	2	Gappy hedge comprising common hawthorn interspersed with dense bramble	0.9	-
85	H	Crataegus monogyna (common hawthorn)	1.0-1.5	75	0.5	0.0	0.0	Mature	Fair	Fair	+10	C	2	Gappy hedge comprising common hawthorn interspersed with dense bramble	0.9	-
86	H	Crataegus monogyna (common hawthorn)	1.0-1.5	75	0.5	0.0	0.0	Mature	Fair	Fair	+10	C	2	Gappy hedge comprising common hawthorn interspersed with dense bramble	0.9	-
87	H	Crataegus monogyna (common hawthorn)	1.0-1.5	75	0.5	0.0	0.0	Mature	Fair	Fair	+10	C	2	Gappy hedge comprising common hawthorn interspersed with dense bramble	0.9	-
88	G	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn)	1.5-2.5	75	1.0	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	Well-spaced trees interspersed with dense bramble	0.9	-
89	H	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn)	1.5	75	0.5	0.0	0.0	Mature	Fair	Fair	+10	C	2	Some gaps: Sections formed from dense bramble	0.9	-
90	H	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn)	1.6	75	0.5	0.0	0.0	Mature	Fair	Fair	+10	C	2	Some gaps: Sections formed from dense bramble	0.9	-

Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius	Statutory Status
91	G	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn),Salix caprea (goat willow)	4.0-6.0	75-150	1.5	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	-	1.8	-
92	G	Crataegus monogyna (common hawthorn),Quercus robur (English oak),Salix caprea (goat willow)	3.0-6.0	100-350	3.0	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	Somewhat sporadic and gappy group of trees; Provides a useful degree of low level screening	4.2	-
93	H	Salix caprea (goat willow)	6.0	100-300	2.0	0.0	1.0	Early-Mature	Good	Fair	+10	C	2	-	3.6	-
94	H	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn)	3.0-4.0	75	1.5	0.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	0.9	-
95	G	Crataegus monogyna (common hawthorn),Salix caprea (goat willow)	3.0-6.0	100-350	3.0	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	Somewhat sporadic and gappy group of trees; Provides a useful degree of low level screening	4.2	-
96	G	Pinus nigra (Austrian pine),Poplus x canadensis (hybrid black poplar)	15.0	600-800	6.0	5.0	5.0	Mature	Good	Fair	+20	B	2	Some visual presence within local landscape	9.6	TPO No. 327
97	G	Salix caprea (goat willow)	3.0-5.0	75-150	1.5	0.0	0.5	Semi-Mature	Good	Fair	+10	C	2	Self-set trees growing within fence line	1.8	-
98	G	Salix caprea (goat willow)	6.0	100-300	2.0	0.0	1.0	Early-Mature	Good	Fair	+10	C	2	-	3.6	-
99	G	Quercus robur (English oak),Salix caprea (goat willow),Ulmus sp. (elm)	5.0-6.0	75-150	1.5	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	-	1.8	-
100	G	Crataegus monogyna (common hawthorn),Quercus robur (English oak),Salix caprea (goat willow)	6.0-9.0	200-400	3.0	1.0	2.0	Mature	Good	Fair	+20	B	2	Grazing has removed understorey and is preventing natural regeneration	4.8	-
101	H	Prunus spinosa (blackthorn)	2.0	75	0.5	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	Maintained hedge	0.9	-
102	G	Quercus robur (English oak),Salix caprea (goat willow)	4.0-6.0	100-250	2.0	0.0	1.0	Semi-Mature	Good	Fair	+10	C	2	-	3.0	-
103	G	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn)	4.0-6.0	75-200	2.0	0.0	0.0	Mature	Good	Fair	+10	C	2	Scattered trees interspersed with dense bramble	2.4	-
104	G	Crataegus monogyna (common hawthorn),Poplus alba (white poplar)	6.0-8.0	150-350	3.0	0.0	0.0	Mature	Good	Fair	+10	C	2	Boundary screening to residential property	4.2	-
105	H	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn)	1.5-3.0	75-125	1.0	0.0	0.5	Mature	Fair	Fair	+10	C	2	Dense, wide hedge; Limited annual maintenance	1.5	-
106	G	Crataegus monogyna (common hawthorn)	5.0	100-150	1.5	0.5	0.5	Mature	Fair	Fair	+10	C	2	Group of 5 trees	1.8	-
107	G	Salix caprea (goat willow),Salix fragilis (crack willow)	4.0-7.0	75-125	2.5	0.0	0.0	Semi-Mature	Good	Fair	+10	C	2	-	1.5	-
108	H	Crataegus monogyna (common hawthorn),Sambucus nigra (elder)	1.5-2.0	75	0.5	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	Maintained hedge	0.9	-
109	G	Salix caprea (goat willow)	3.0-4.0	75-150	2.0	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	-	1.8	-

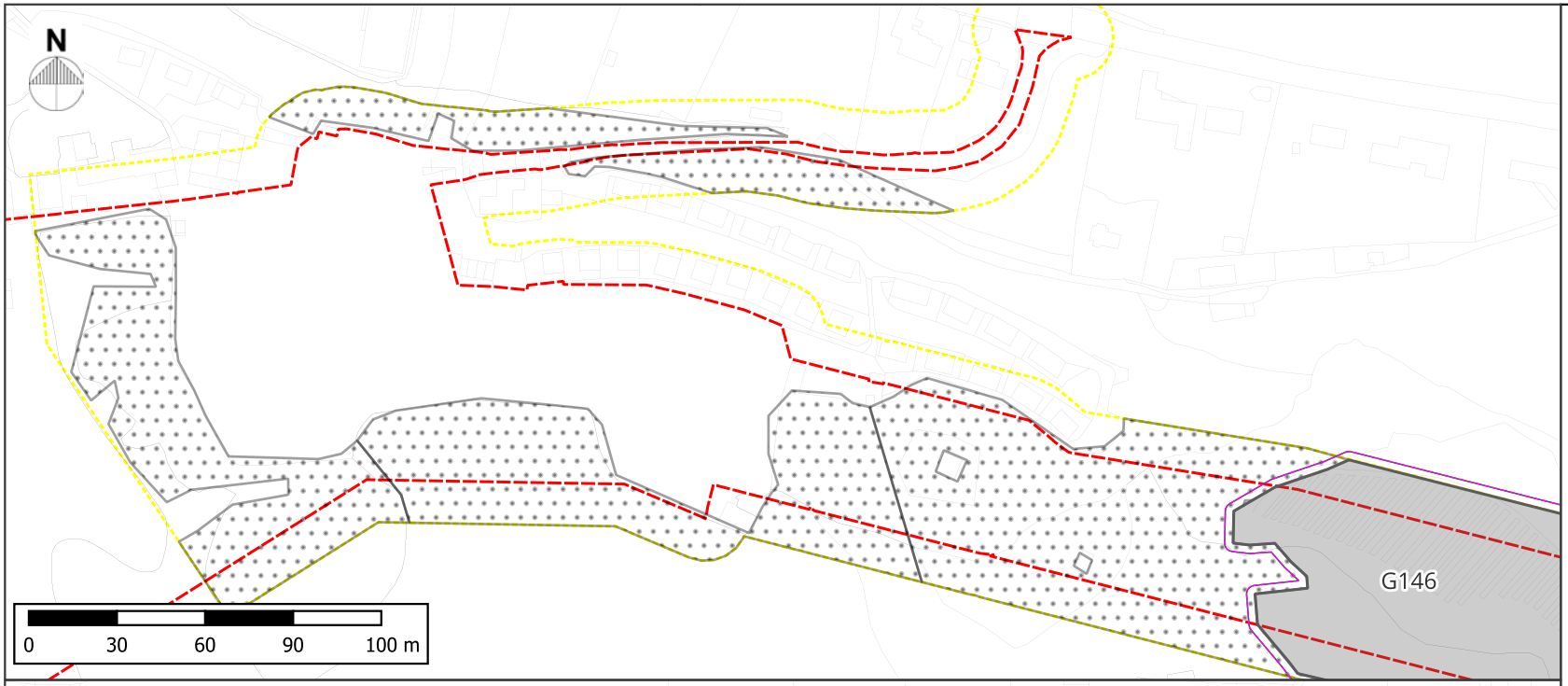
Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius	Statutory Status
110	G	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn),Salix caprea (goat willow)	3.0-10.0	150-500	4.0	0.0	0.0	Mature	Good	Fair	+10	C	2	Predominately formed from widely spaced goat willow interspersed with smaller common hawthorn and blackthorn	6.0	-
111	G	Alnus glutinosa (common alder),Crataegus monogyna (common hawthorn),Salix caprea (goat willow)	3.0-7.0	200-600	4.0	1.0	1.0	Mature	Fair	Fair	+20	B	2	All data estimated; Appears to comprise individual mature common alder interspersed with smaller goat willow and common hawthorn; Limited visual amenity value when viewed from road	7.2	-
112	G	Salix caprea (goat willow)	3.0-5.0	75-125	2.0	1.0	1.0	Semi-Mature	Good	Fair	+10	C	2	-	1.5	-
113	G	Alnus glutinosa (common alder)	8.0	250-400	4.5	1.5	2.0	Early-Mature	Good	Fair	+20	B	2	-	4.8	-
114	G	Prunus spinosa (blackthorn),Salix caprea (goat willow)	3.0-5.0	75-225	2.0	0.0	0.0	Semi-Mature	Fair	Fair	+10	C	2	Dense understorey	2.7	-
115	G	Salix caprea (goat willow)	5.0-6.0	100-225	3.0	2.0	2.0	Early-Mature	Fair	Fair	+10	C	2	-	3.0	-
116	G	Alnus glutinosa (common alder)	8.0	100-300	4.5	1.5	2.0	Early-Mature	Good	Fair	+20	B	2	Group of approximately 10 trees	3.6	-
117	H	Ulmus sp. (elm)	5.0-6.0	75-150	1.5	1.0	1.0	Semi-Mature	Poor	Fair	<10	U	-	Infected with Dutch elm disease (Ophiostoma novo-ulmi)	1.8	-
118	G	Salix caprea (goat willow)	4.0-6.0	75-150	2.0	1.0	1.0	Mature	Fair	Fair	+10	C	2	Some trees in decline; Group exhibits some natural regeneration	1.8	-
119	H	Prunus spinosa (blackthorn)	2.0-3.0	75	1.5	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	Dense, wide hedge; Limited annual maintenance	0.9	-
120	G	Salix caprea (goat willow)	3.0-5.0	100-250	2.0	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	-	3.0	-
121	G	Salix caprea (goat willow)	7.0	200-350	3.0	2.0	2.0	Mature	Fair	Fair	+10	C	2	-	4.2	-
122	G	Salix caprea (goat willow)	4.0-6.0	75-200	1.5	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	-	2.4	-
123	H	Prunus spinosa (blackthorn)	3.0	75	1.0	0.0	0.0	Early-Mature	Good	Good	+10	C	2	-	0.9	-
124	H	Ulmus sp. (elm)	5.0-6.0	100-225	2.0	2.0	2.0	Semi-Mature	Good	Fair	+10	C	2	-	2.7	-
125	H	Salix caprea (goat willow)	4.0-6.0	75-200	1.5	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	-	2.4	-
126	G	Ulmus sp. (elm)	5.0-6.0	100-225	2.0	2.0	2.0	Semi-Mature	Good	Fair	+10	C	2	-	2.7	-
127	H	Prunus spinosa (blackthorn),Salix caprea (goat willow)	3.0-4.0	75-125	1.0	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	-	1.5	-

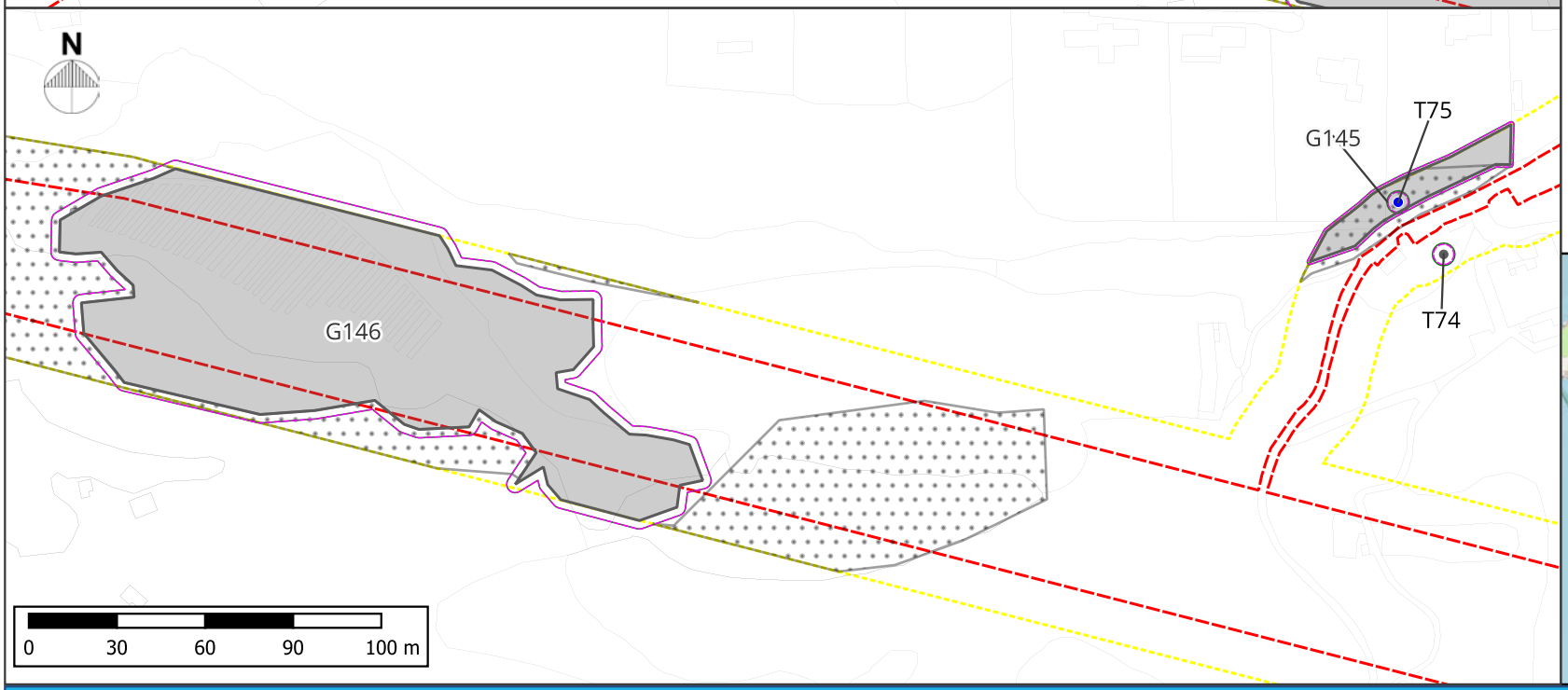
Reference Nos	Type	Species	Height	DBH	Crown Spread	LCH	LBH	Life Stage	PC	SC	ERC	Category	Sub-Category	Notes	RPA Radius	Statutory Status
128	G	Salix caprea (goat willow)	4.0-6.0	75-200	1.5	0.0	0.0	Early-Mature	Good	Fair	+10	C	2	-	2.4	-
129	H	Prunus spinosa (blackthorn)	2.0-3.0	75	1.0	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	-	0.9	-
130	H	Prunus spinosa (blackthorn)	3.0-5.0	75-125	1.0	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	-	1.5	-
131	H	Crataegus monogyna (common hawthorn)	1.5	75	-	-	-	-	-	-	+10	C	2	Domestic hedge	0.9	-
132	H	Prunus spinosa (blackthorn)	3.0-4.0	75-100	1.5	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	Dense, wide hedge; Limited annual maintenance	1.2	-
133	H	Prunus spinosa (blackthorn),Salix caprea (goat willow)	2.0-4.0	75-100	1.5	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	-	1.2	-
134	H	Ulmus sp. (elm)	2.0-4.0	75-100	1.0	0.0	0.0	Semi-Mature	Good	Fair	<10	U	-	Self-set trees; Likely to succumb to Dutch elm disease (Ophiostoma novo-ulmi)	1.2	-
135	H	Ulmus sp. (elm)	2.0-4.0	75-100	1.0	0.0	0.0	Semi-Mature	Good	Fair	<10	U	-	Self-set trees; Likely to succumb to Dutch elm disease (Ophiostoma novo-ulmi)	1.2	-
136	H	Prunus spinosa (blackthorn)	2.0-4.0	75-100	1.0	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	Scrubby group of trees about 4m in width	1.2	-
137	G	Acer pseudoplatanus (sycamore),Ilex aquifolium (common holly)	2.0-5.0	100	2.5	1.0	1.0	Semi-Mature	Fair	Fair	+10	C	2	-	2.4	-
138	H	Acer pseudoplatanus (sycamore),Prunus spinosa (blackthorn)	2.0-6.0	75-150	2.0	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	Scrubby group of trees about 4m in width; Some emerging sycamore	1.8	-
139	G	Crataegus monogyna (common hawthorn),Prunus spinosa (blackthorn)	2.0-5.0	75	1.5	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	Generally scrubby trees	0.9	-
140	G	Salix caprea (goat willow)	3.0-4.0	75-150	1.5	0.0	0.0	Semi-Mature	Good	Fair	+10	C	2	-	1.8	-
141	G	Salix caprea (goat willow)	4.0-6.0	100	2.0	1.0	1.0	Early-Mature	Good	Fair	+10	C	2	-	3.0	-
142	G	Acer pseudoplatanus (sycamore),Fraxinus excelsior (common ash)	6.0-10.0	250-500	4.0	1.0	1.0	Mature	Fair	Fair	+20	B	2	Predominately sycamore; Common ash heavily infected with ash dieback; Some localised amenity value	6.0	-
143	G	Acer pseudoplatanus (sycamore),Fraxinus excelsior (common ash)	6.0-9.0	100-225	3.0	1.0	1.0	Early-Mature	Fair	Fair	+10	C	2	-	3.0	-
144	G	Quercus ilex (holm oak)	6.0-8.0	250-375	3.0	2.0	2.0	Early-Mature	Good	Good	+20	B	2	Group of 3 trees	4.5	-
145	G	Prunus spinosa (blackthorn)	2.0-3.0	75	1.0	0.0	0.0	Early-Mature	Fair	Fair	+10	C	2	Sporadic group of scrubby trees	0.9	-
146	G	Acer pseudoplatanus (sycamore),Pinus sylvestris (Scots pine),Prunus spinosa (blackthorn),Salix caprea (goat willow)	2.0-10.0	75-250	3.0	0.0	0.0	Mature	Fair	Fair	+10	C	2	Predominately scrubby trees with occasional larger Scots pine and emerging sycamore	3.0	-

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Annex C: Tree Constraints Plans





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

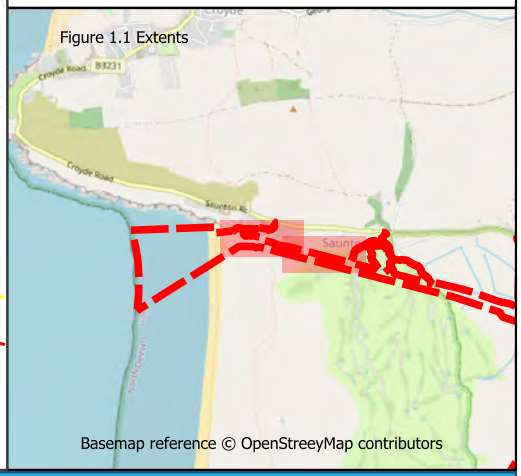
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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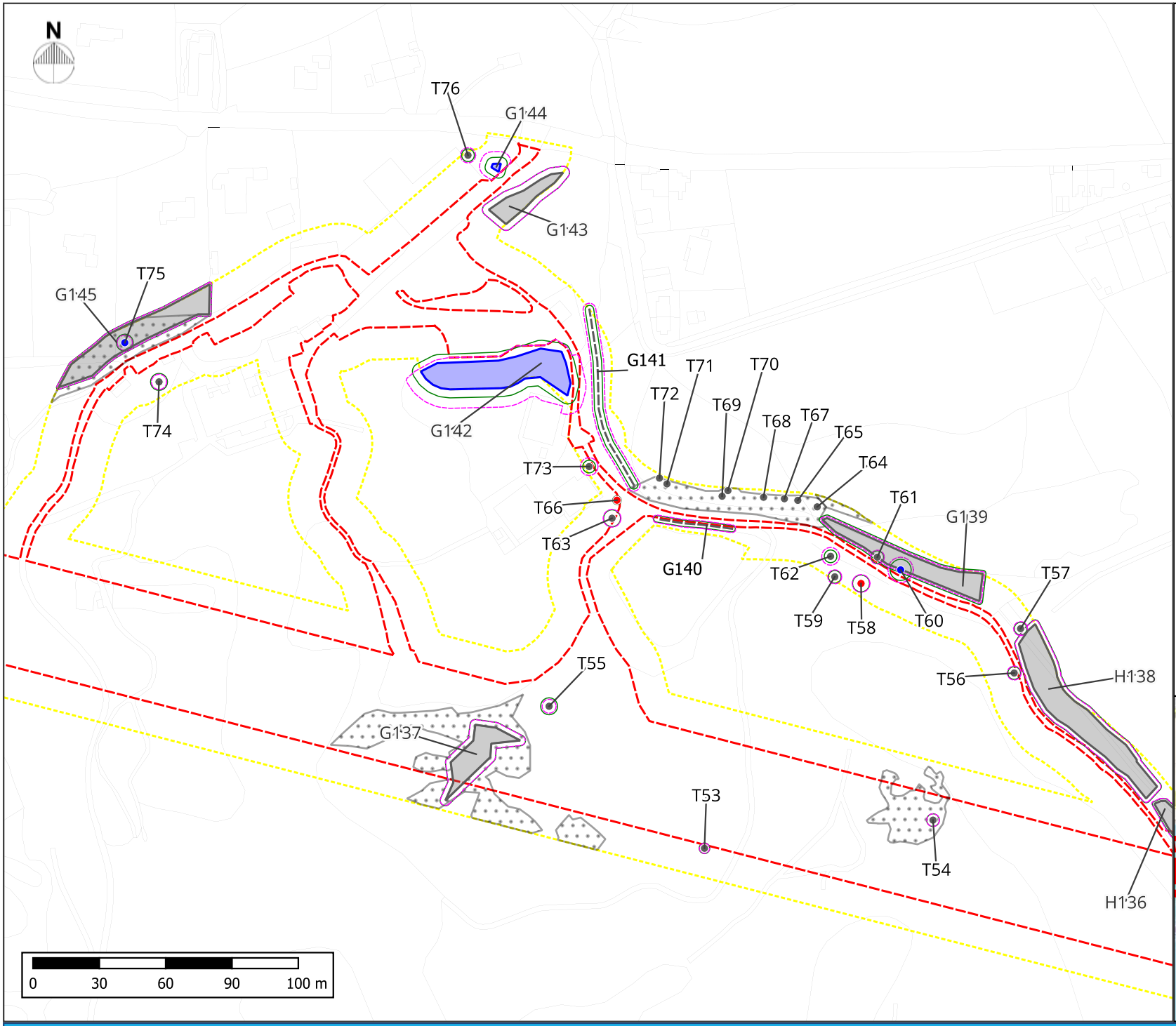
Tree Constraints Plan Figure 1.1



Key

Baseline Survey Data

Tree (Individual)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Tree Group (Polygon)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C

Tree Group / Hedge (Linear)

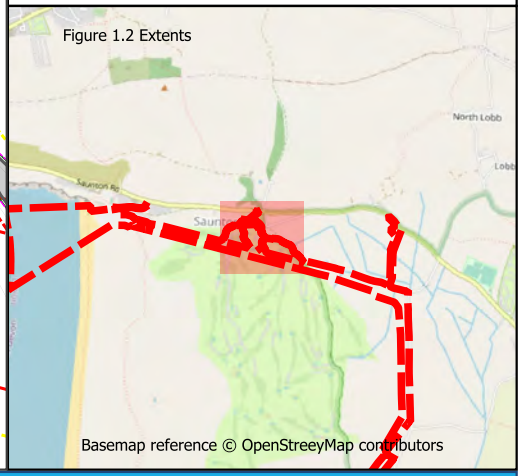
- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Arboricultural Constraints

- Root Protection Area
- Crown Spread

Other Item

- Red Line Boundary
- Arboricultural Study Area
- No Access for Survey
- Scrub / Shrubs



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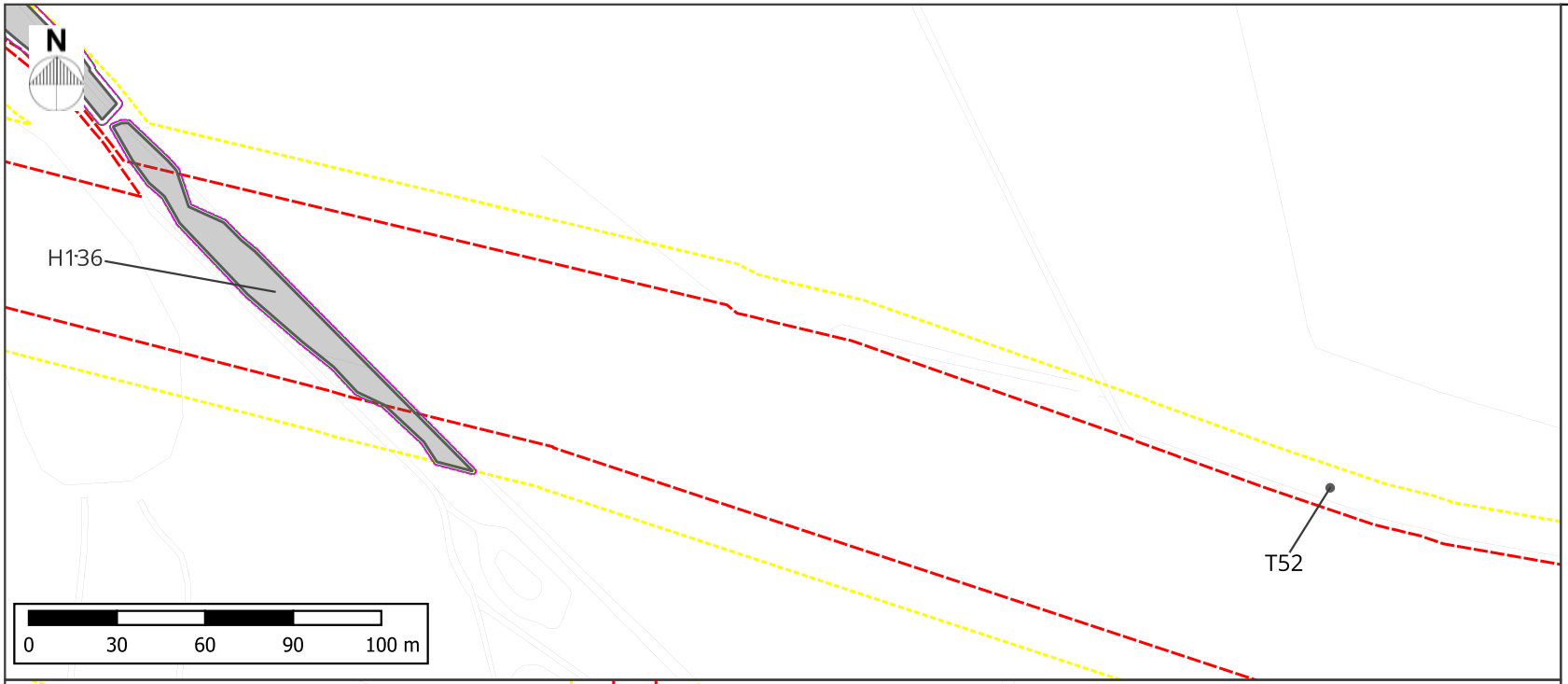
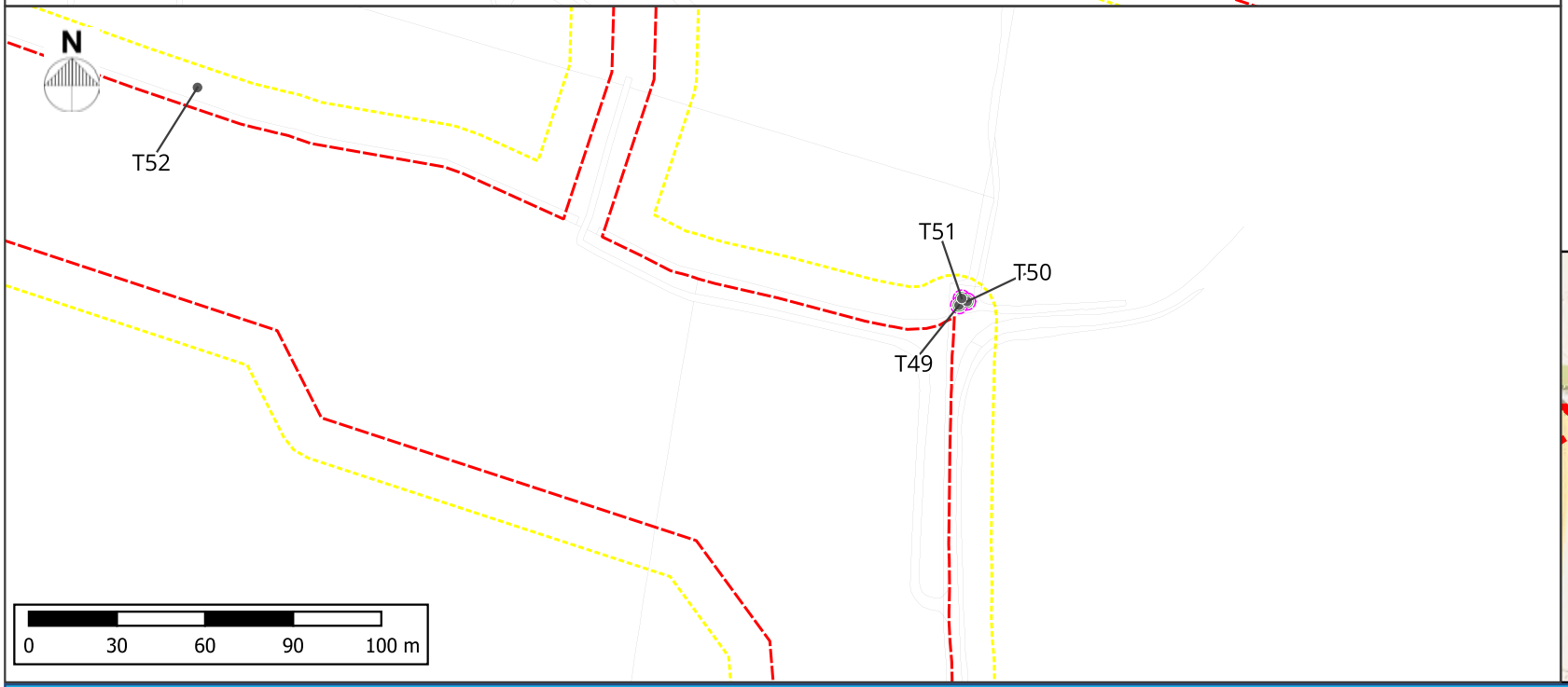
Tree Constraints Plan Figure 1.2





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

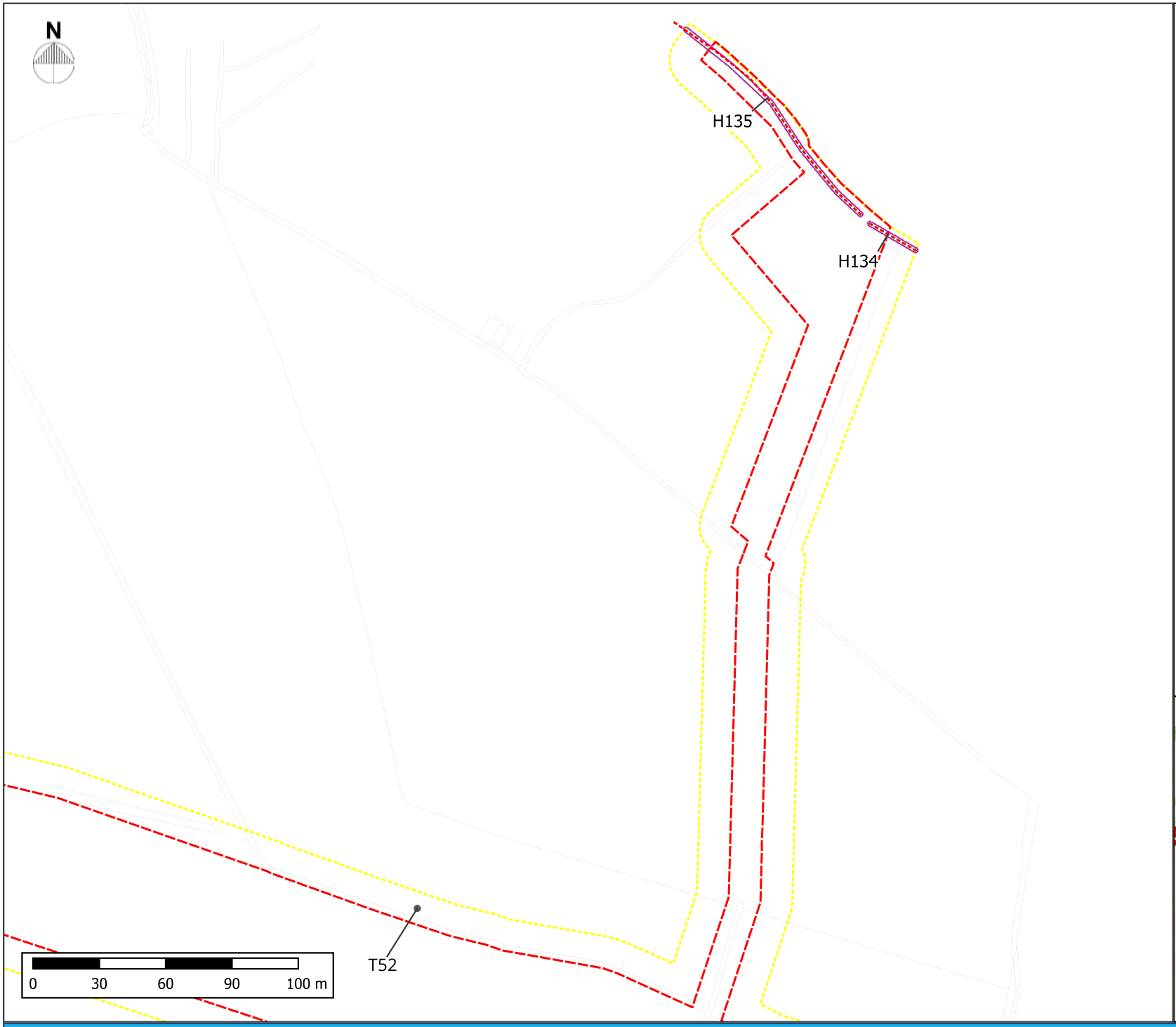
- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*

Scale:1:2500 @A3

Tree Constraints Plan Figure 1.3



Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

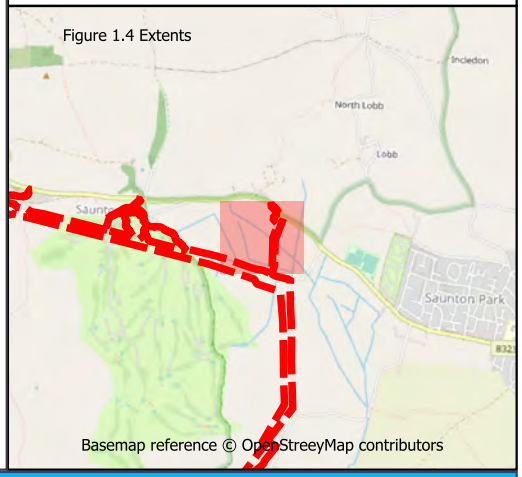
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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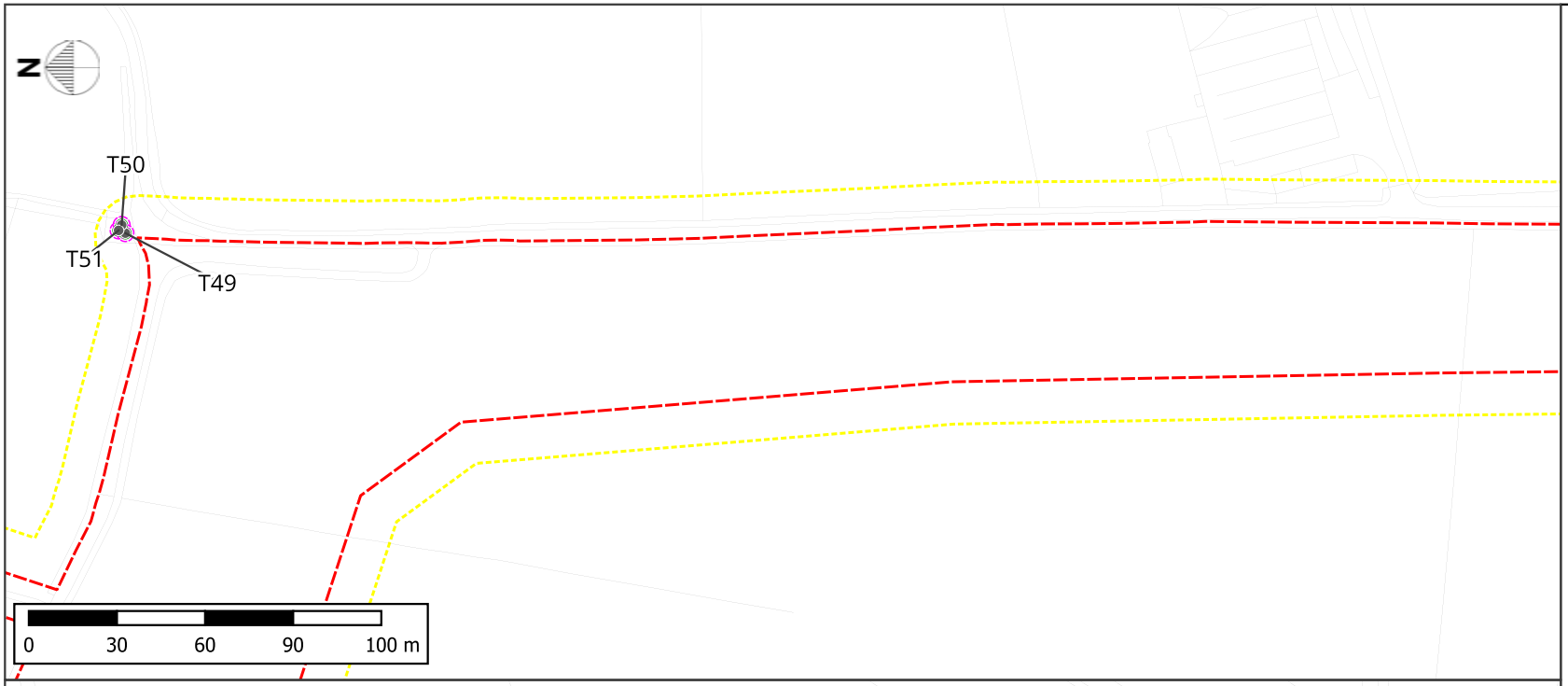
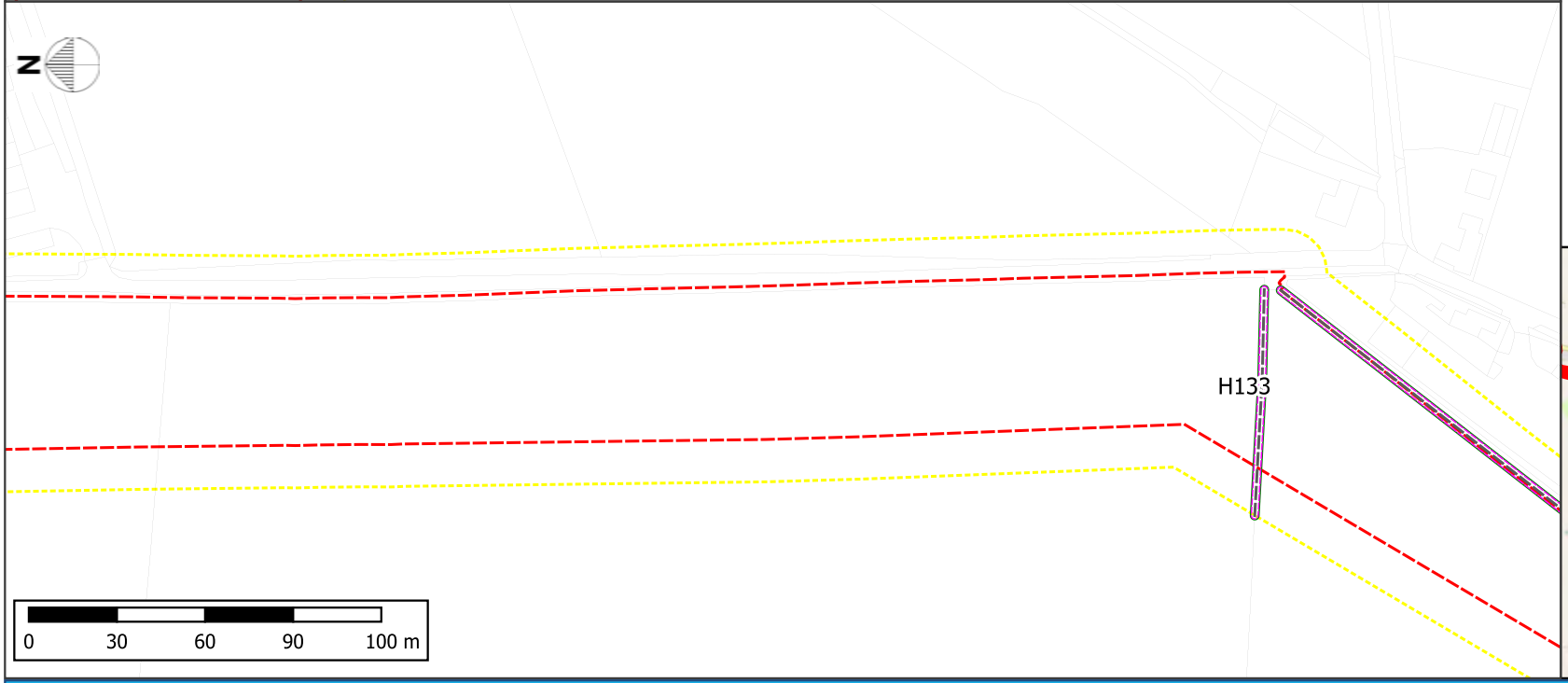
Tree Constraints Plan Figure 1.4





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

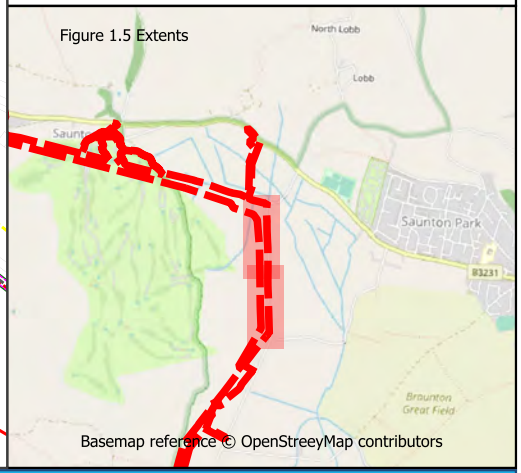
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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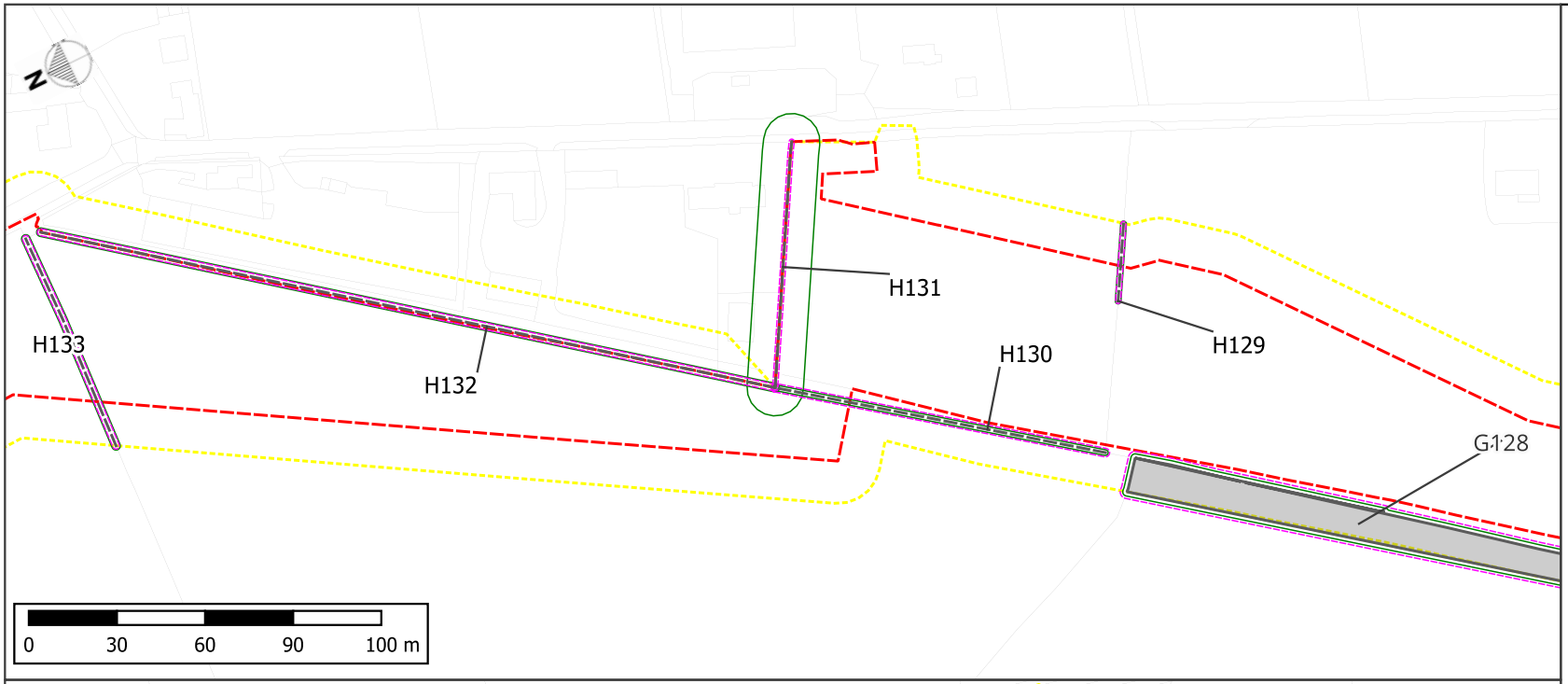
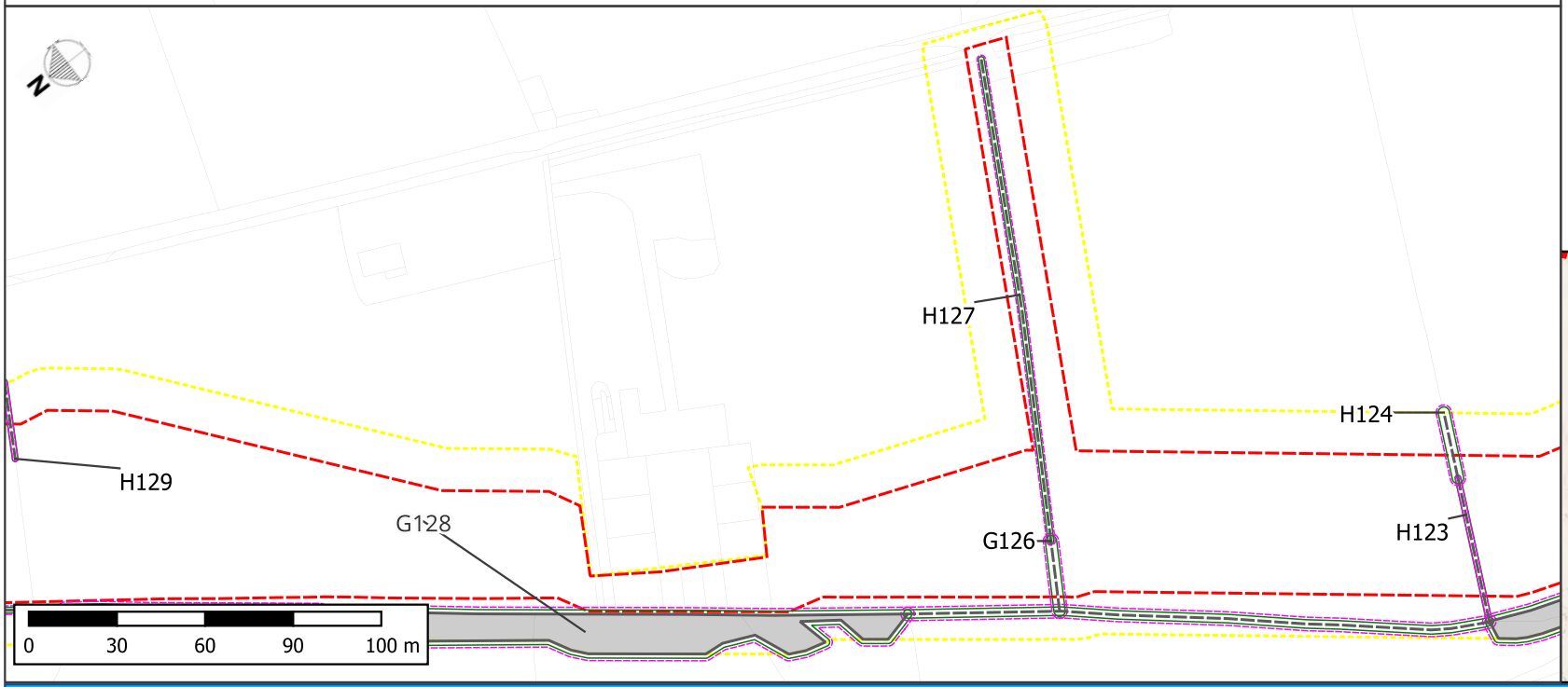
Tree Constraints Plan Figure 1.5





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

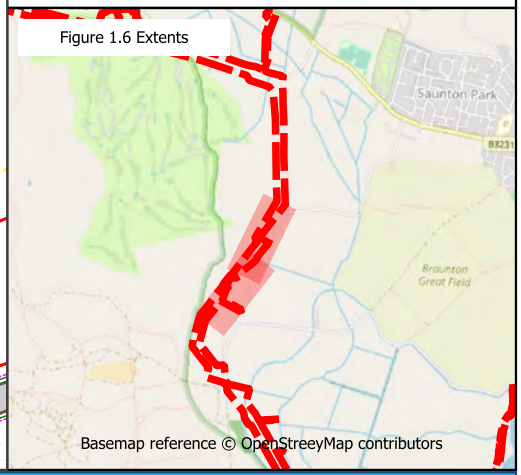
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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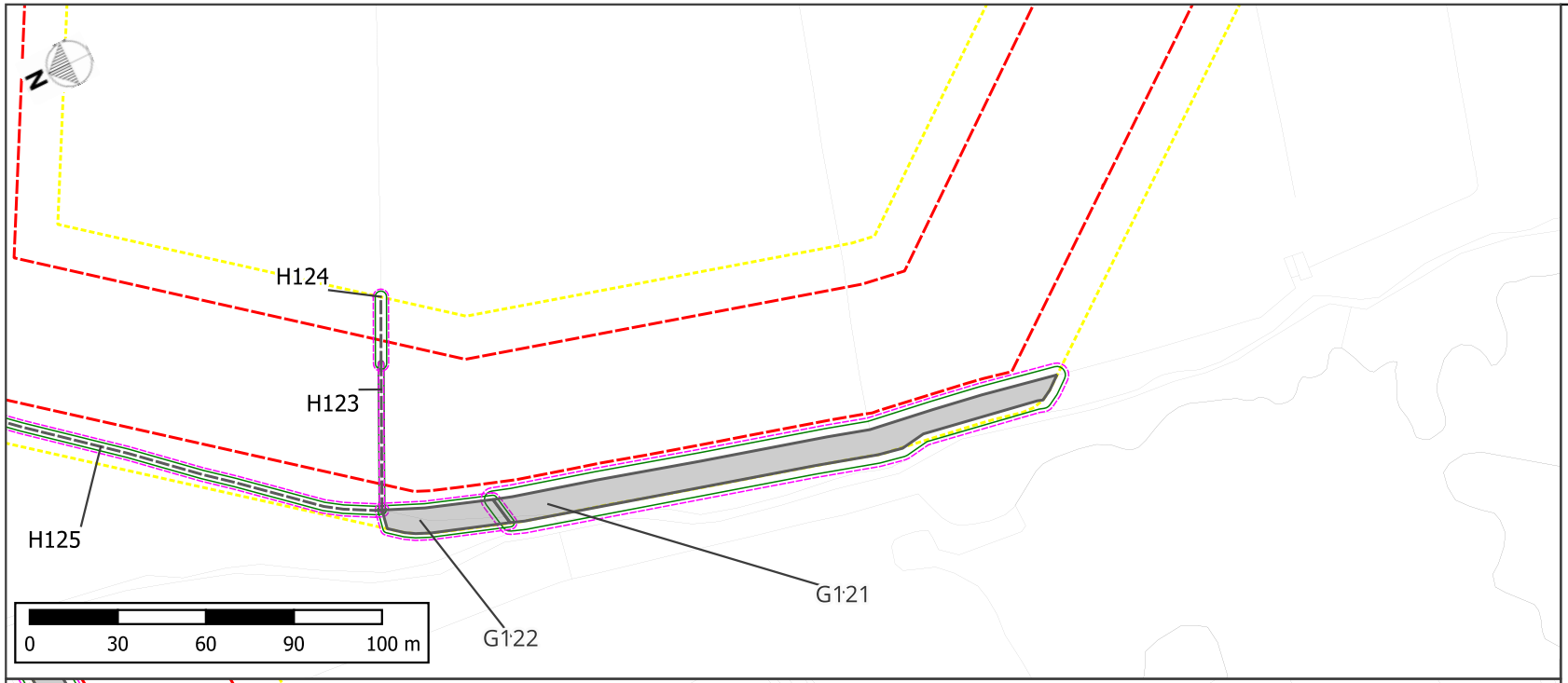
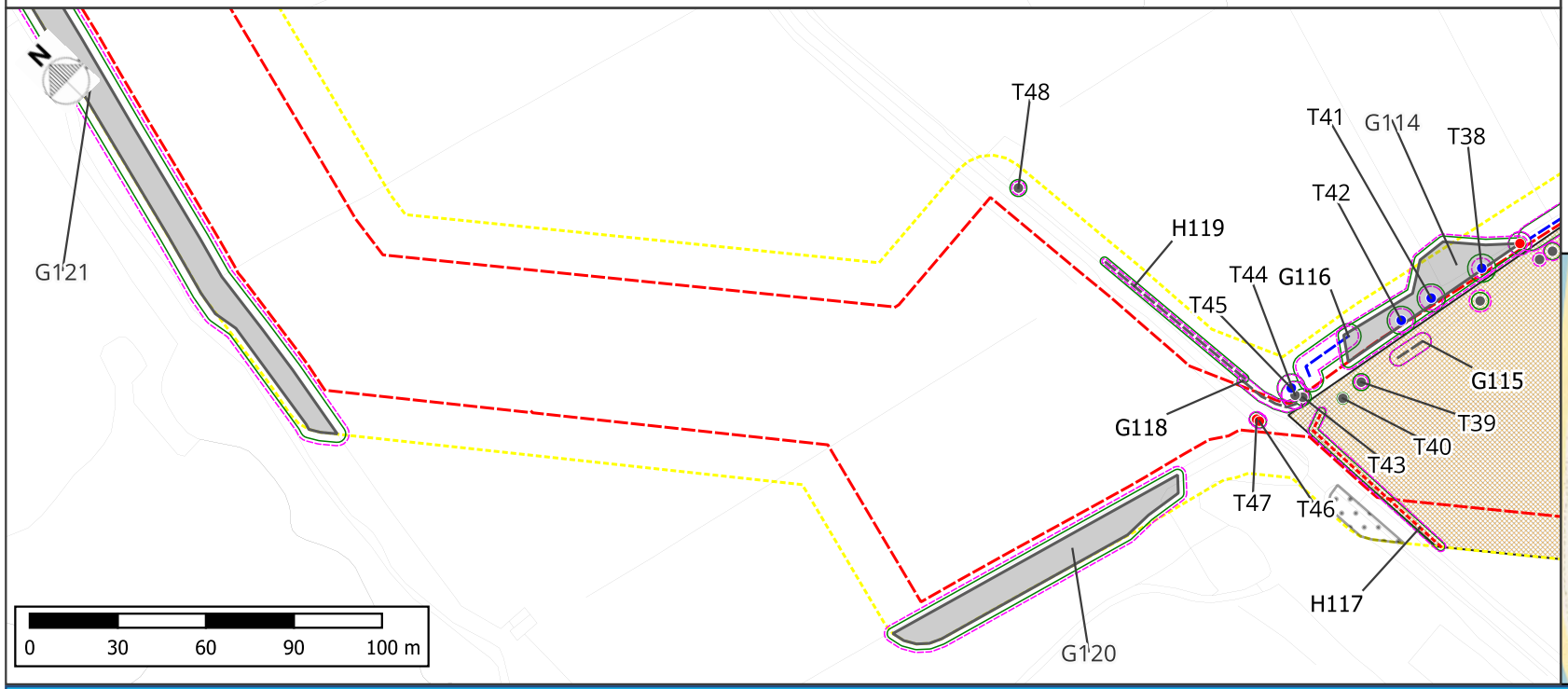
Tree Constraints Plan Figure 1.6





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

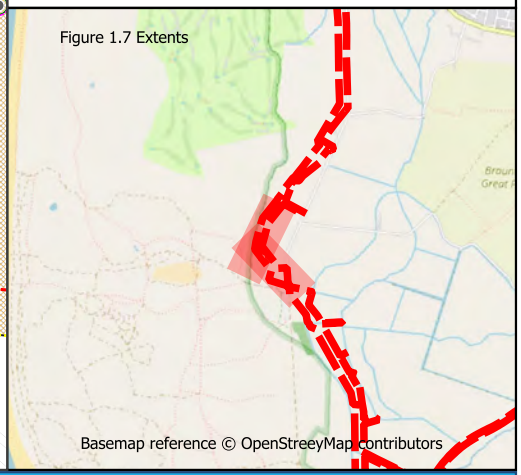
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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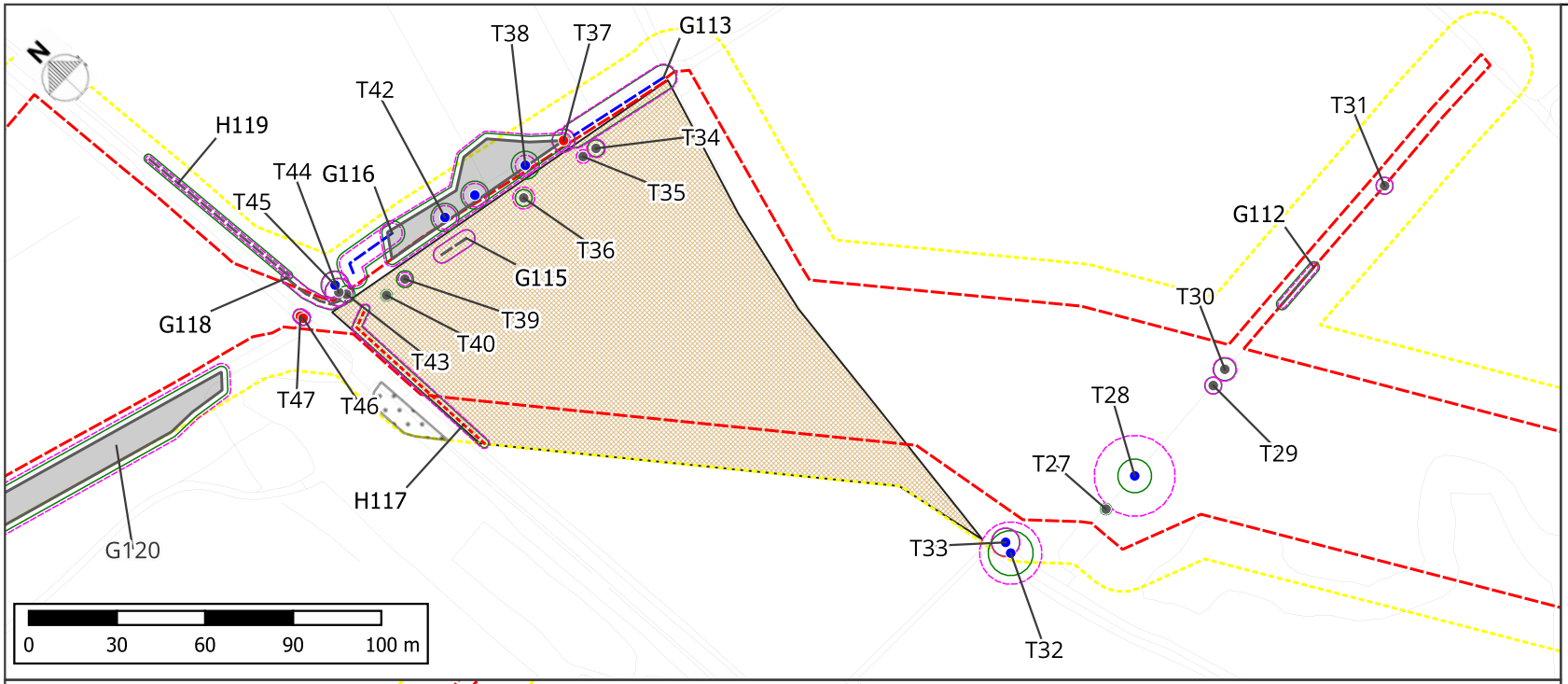
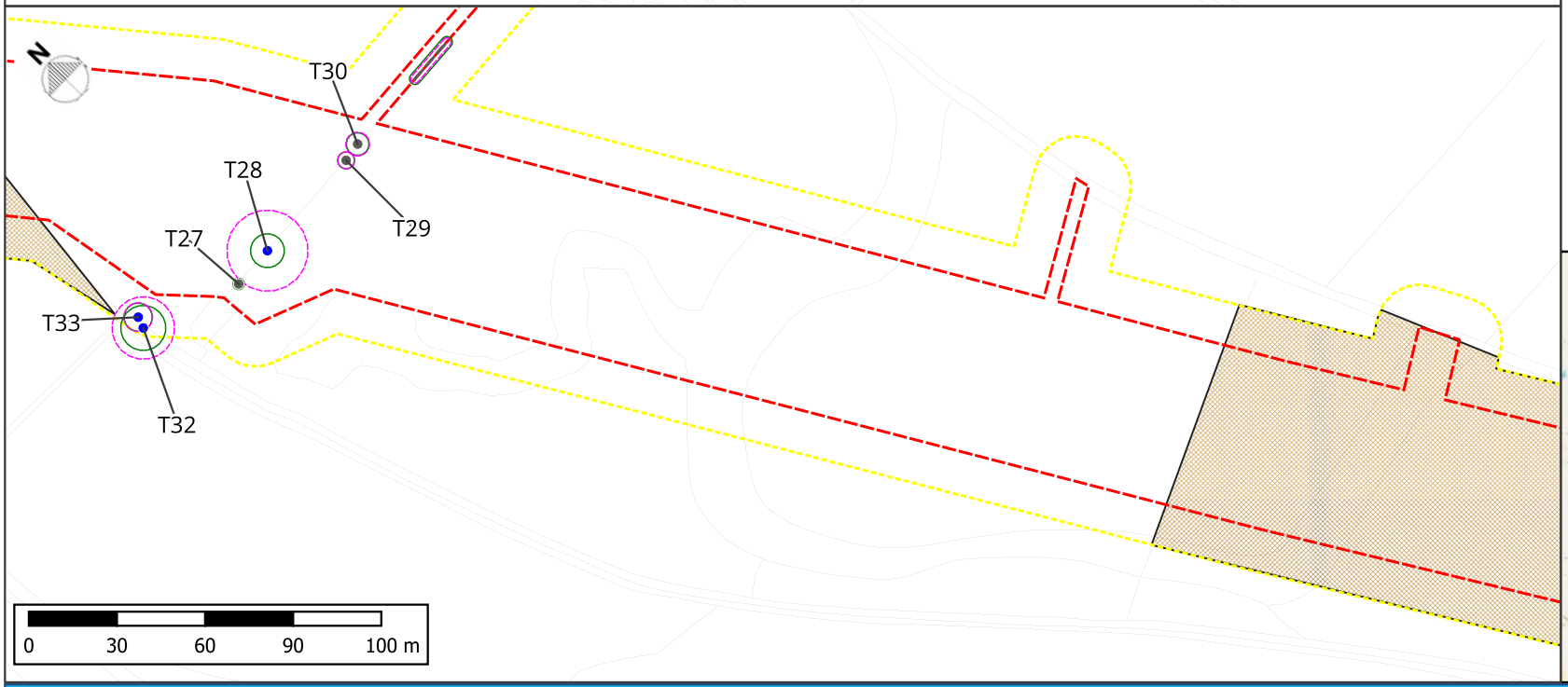
Tree Constraints Plan Figure 1.7





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

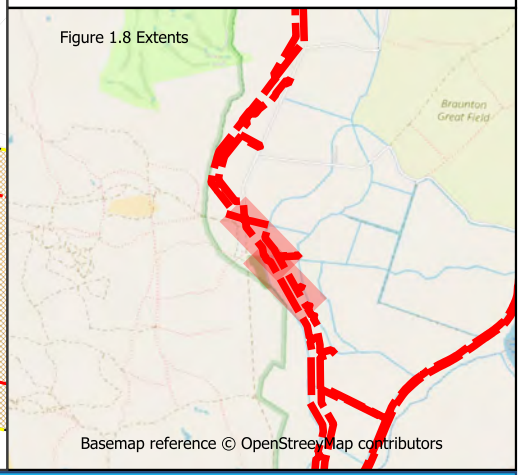
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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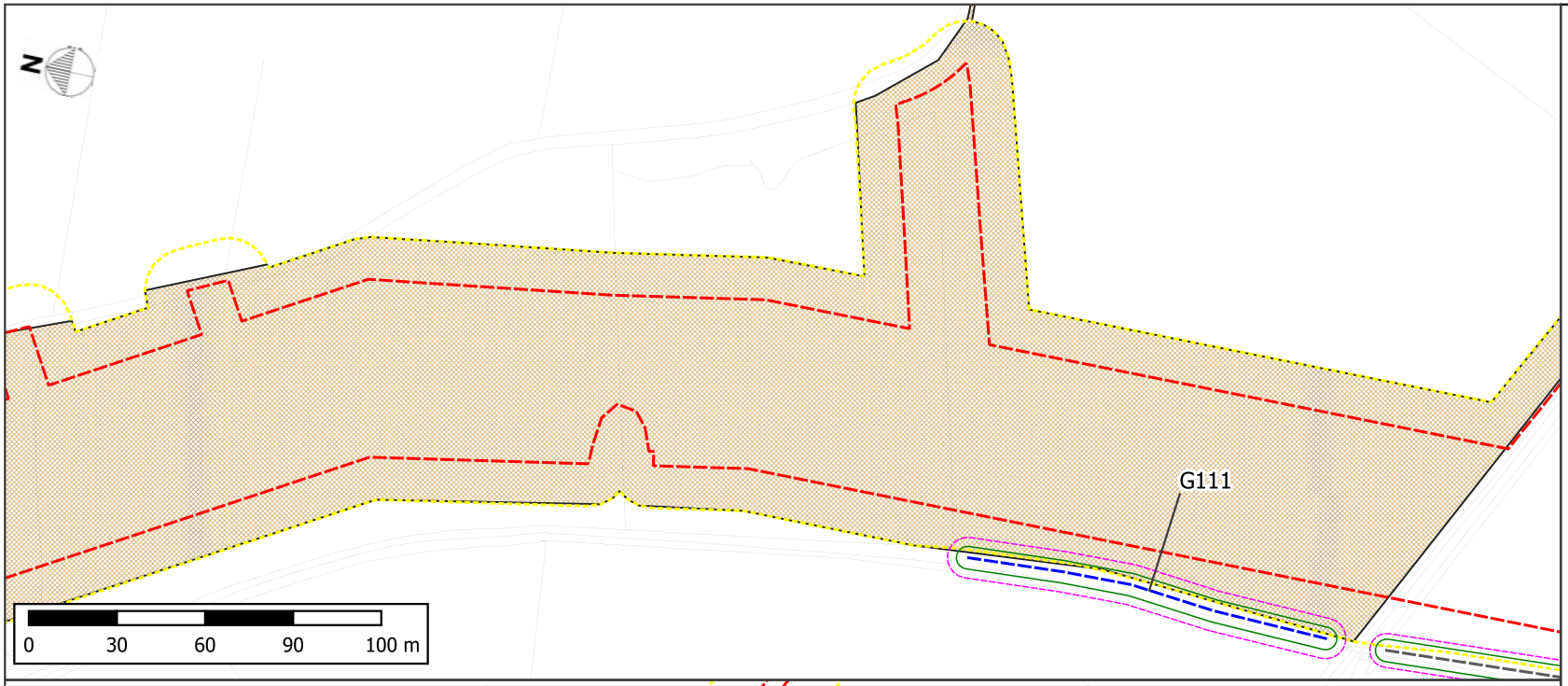
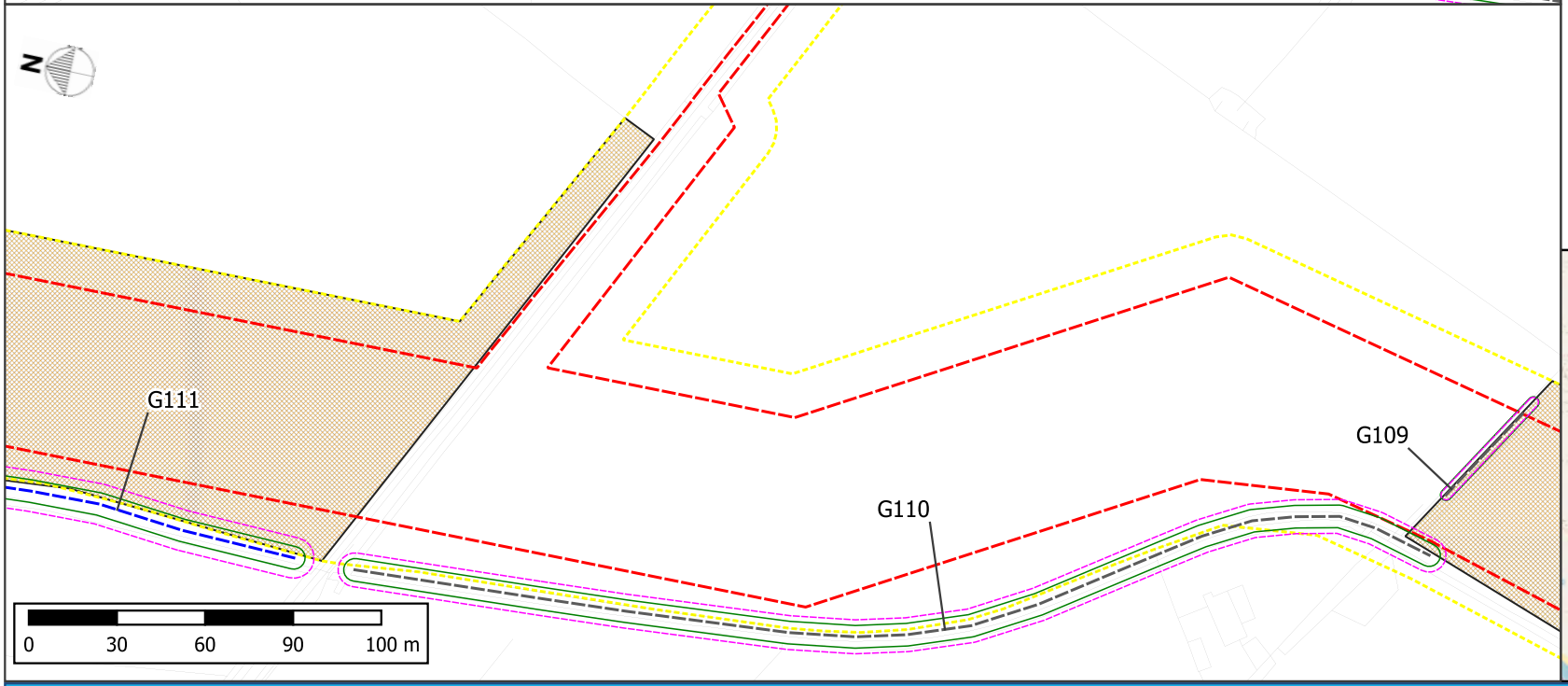
Tree Constraints Plan Figure 1.8





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

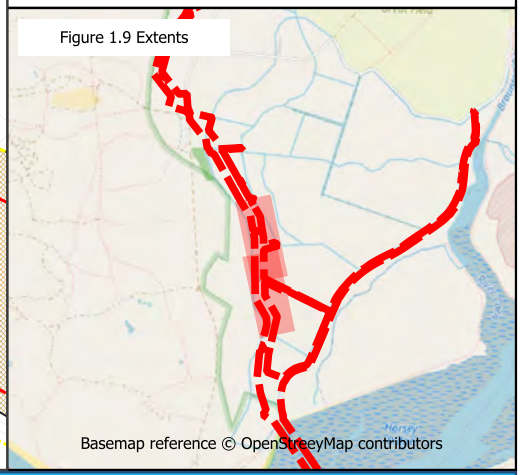
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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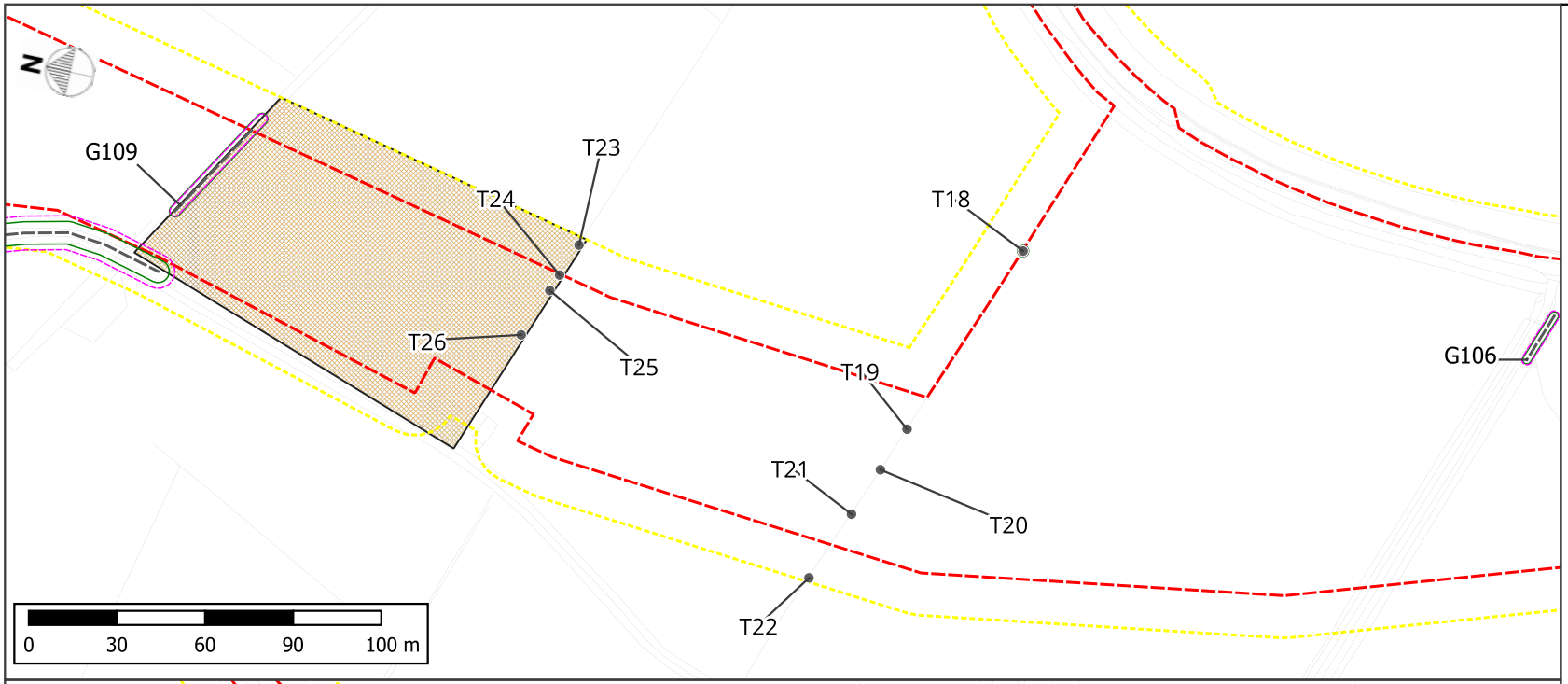
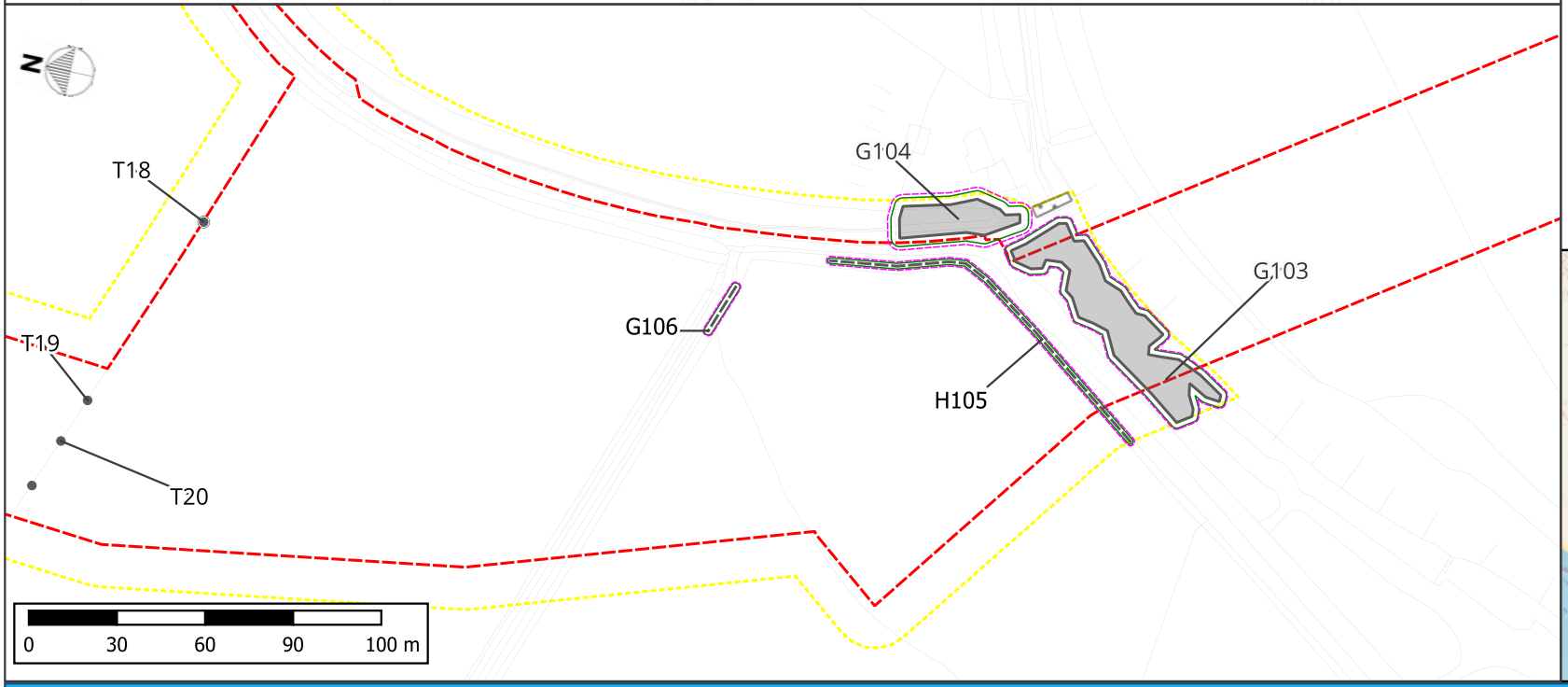
Tree Constraints Plan Figure 1.9





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

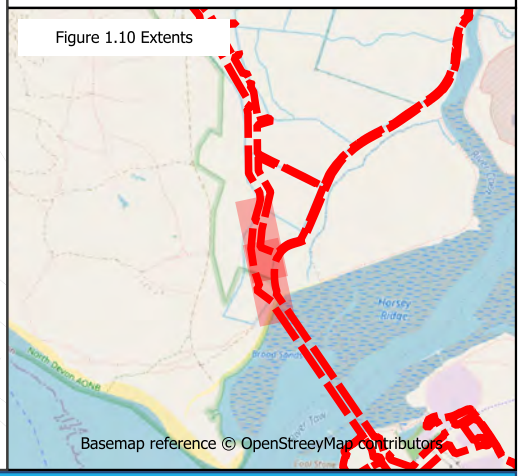
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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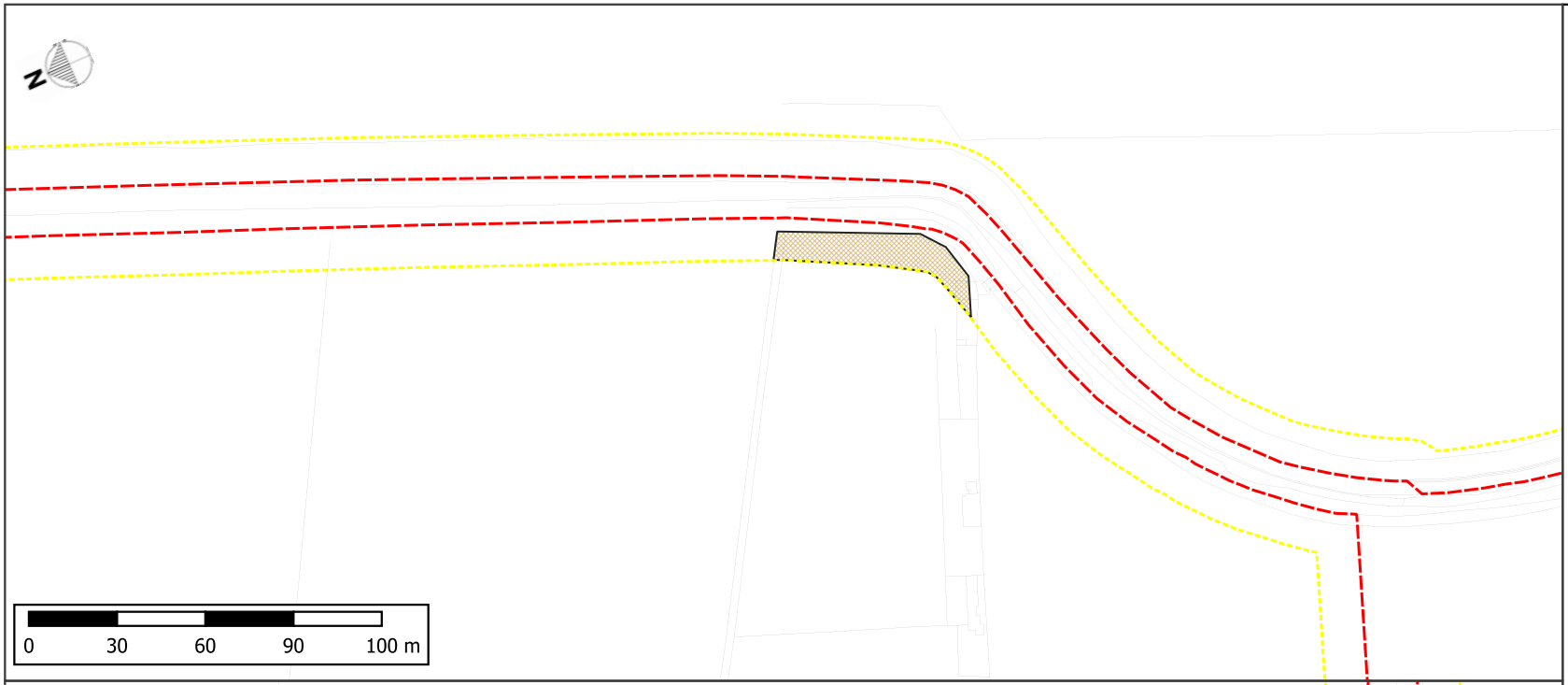
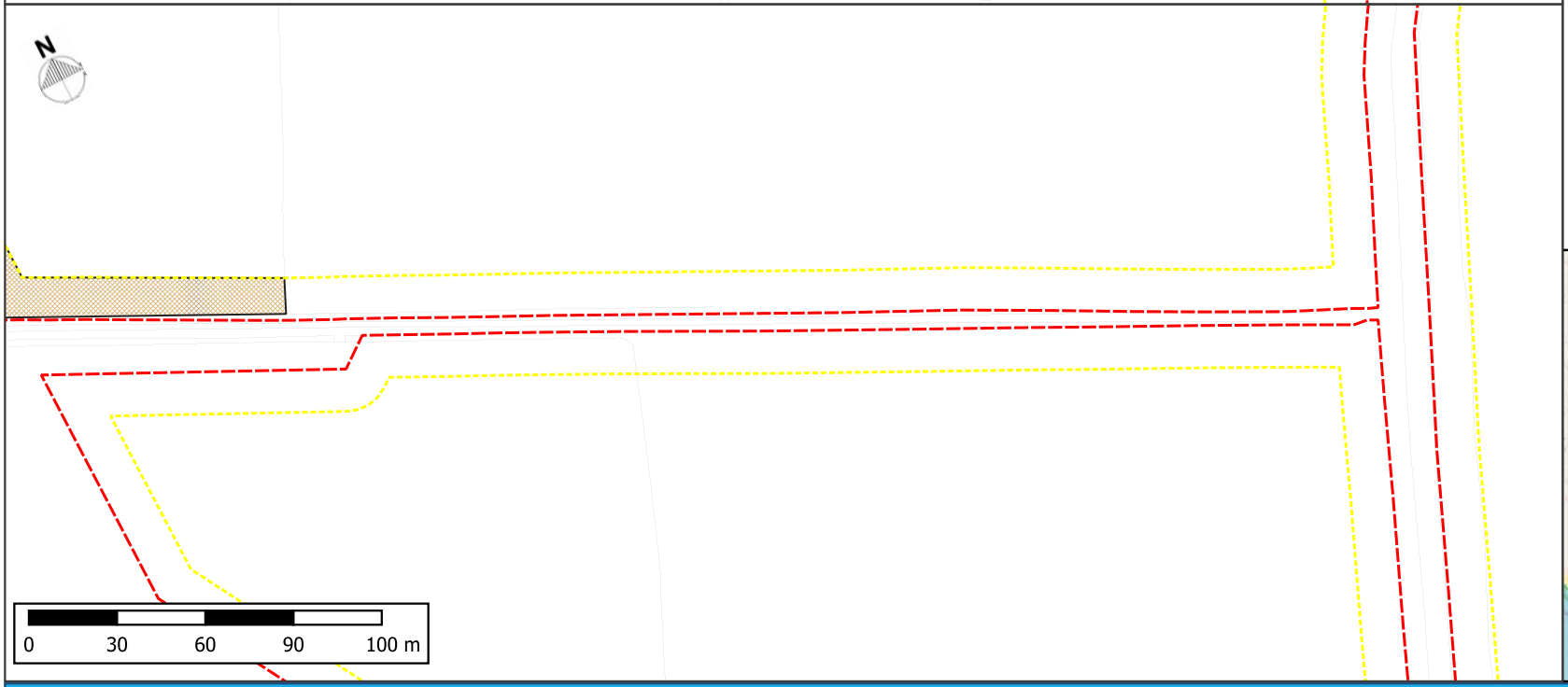
Tree Constraints Plan Figure 1.10





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

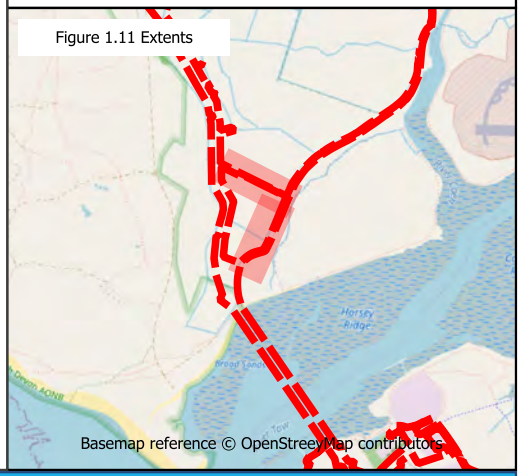
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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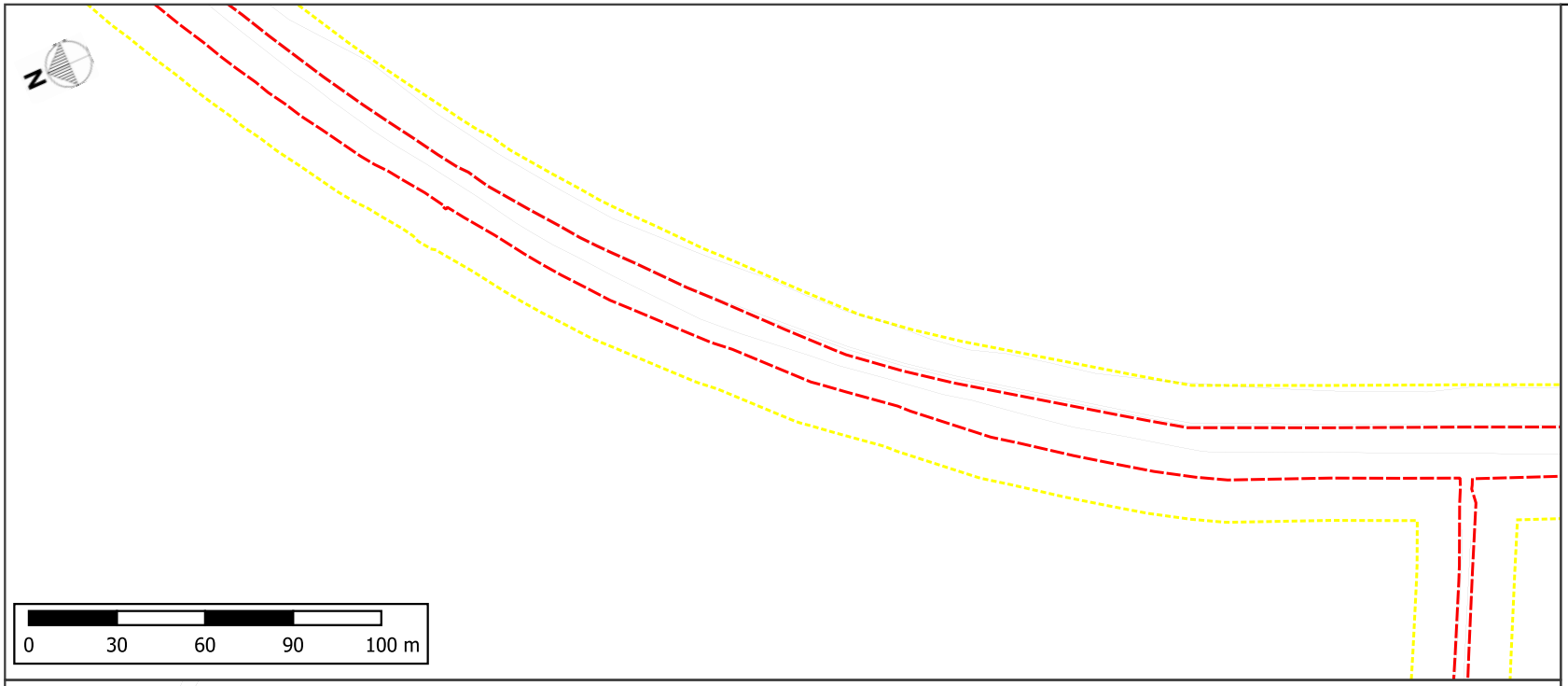
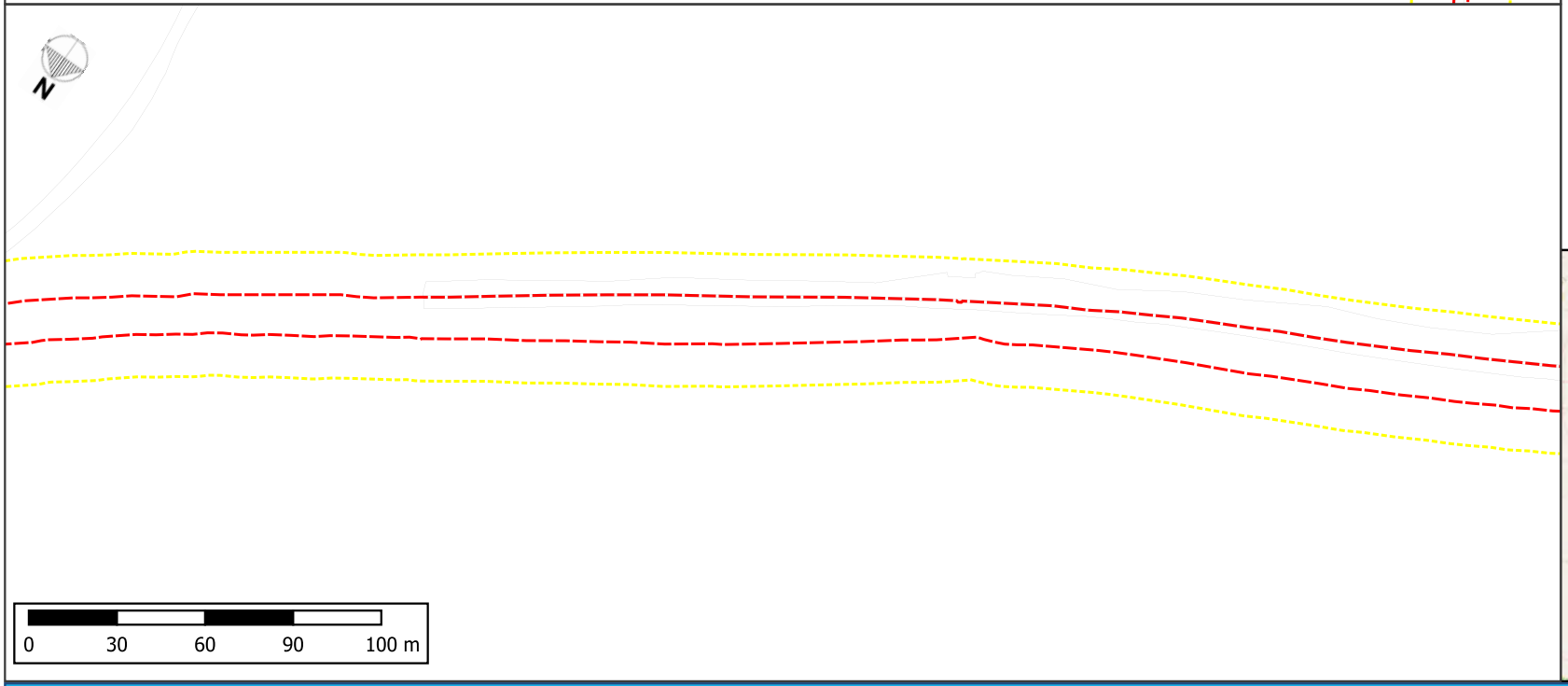
Tree Constraints Plan Figure 1.11





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

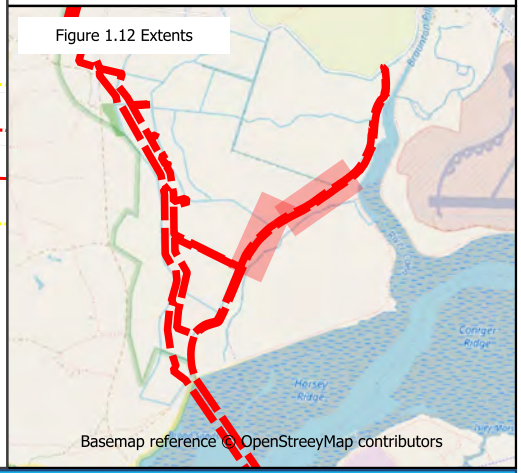
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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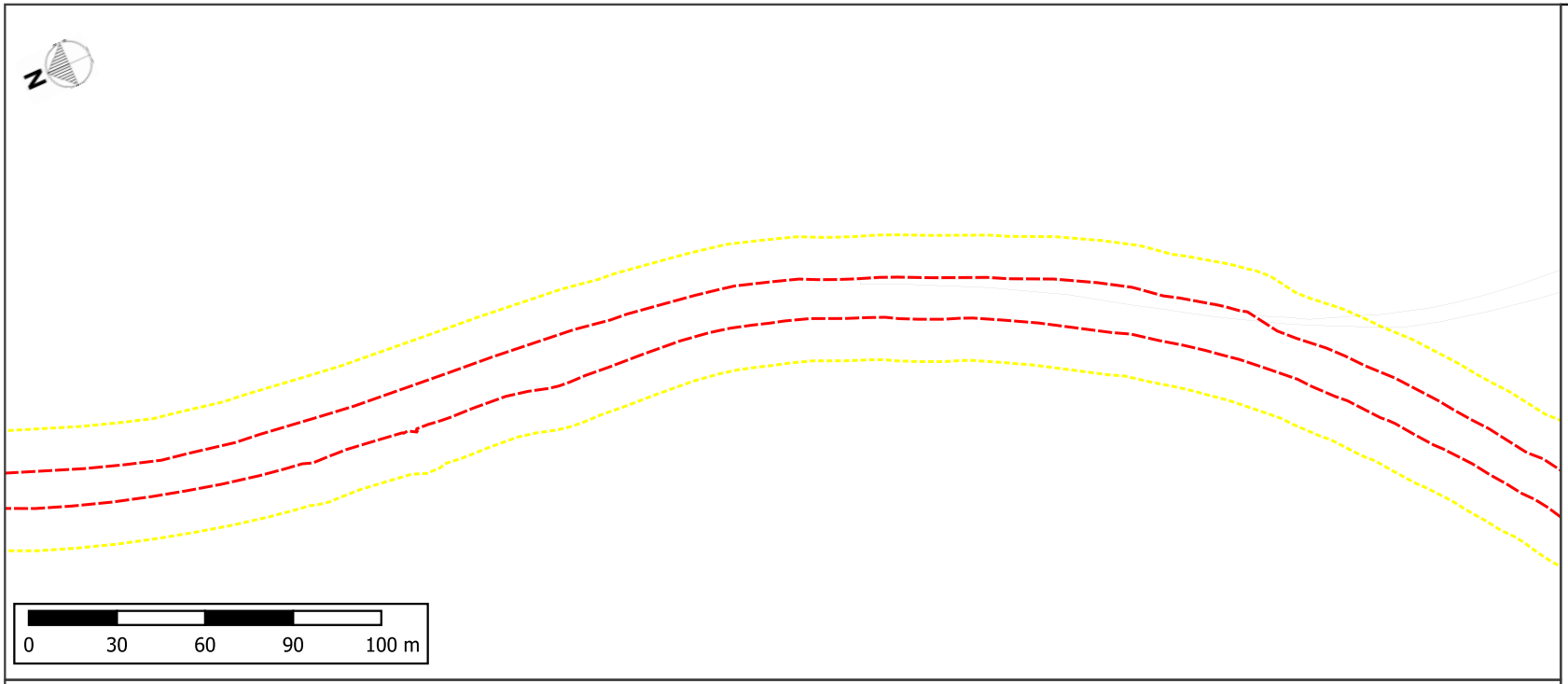
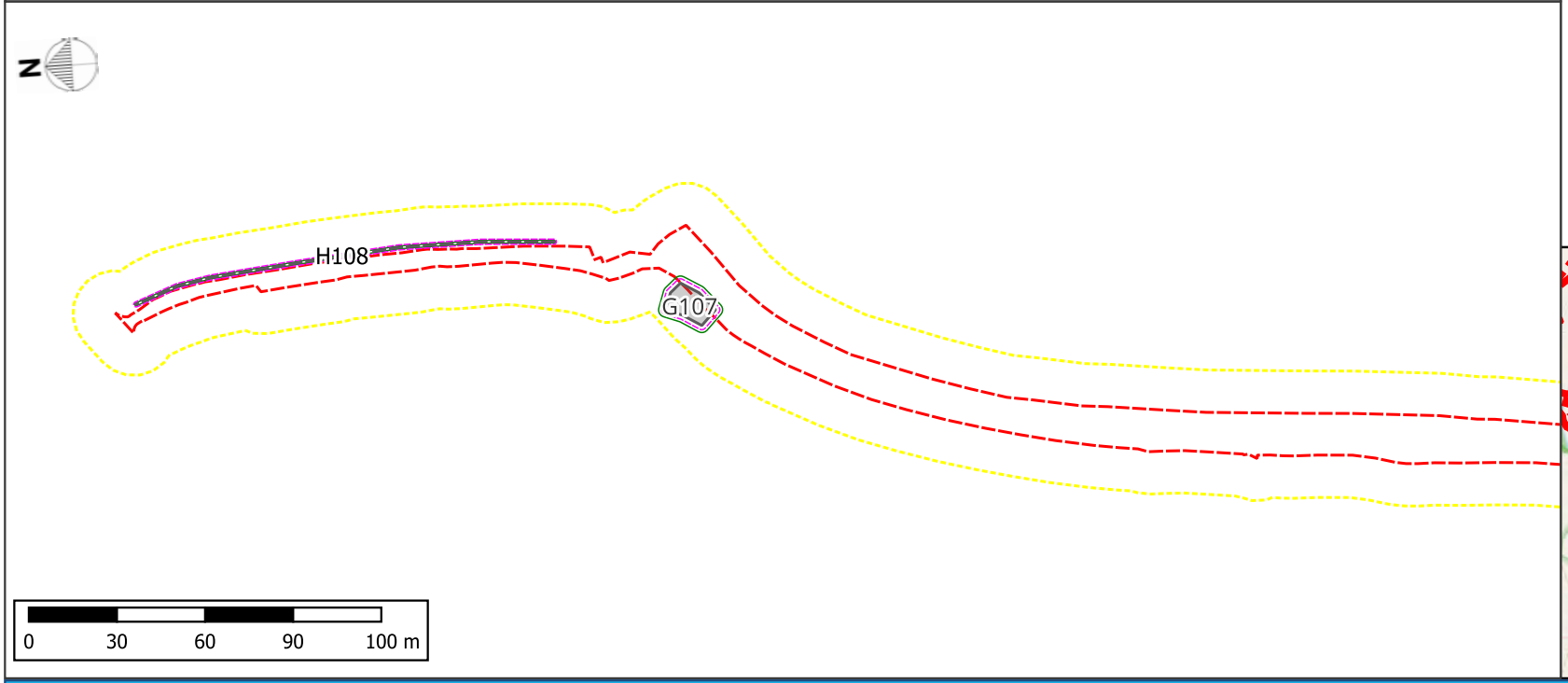
Tree Constraints Plan Figure 1.12





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

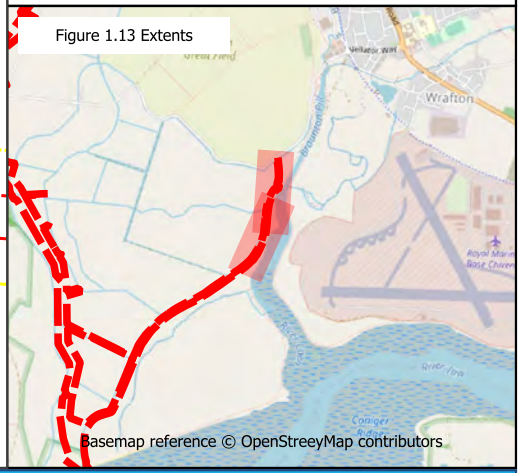
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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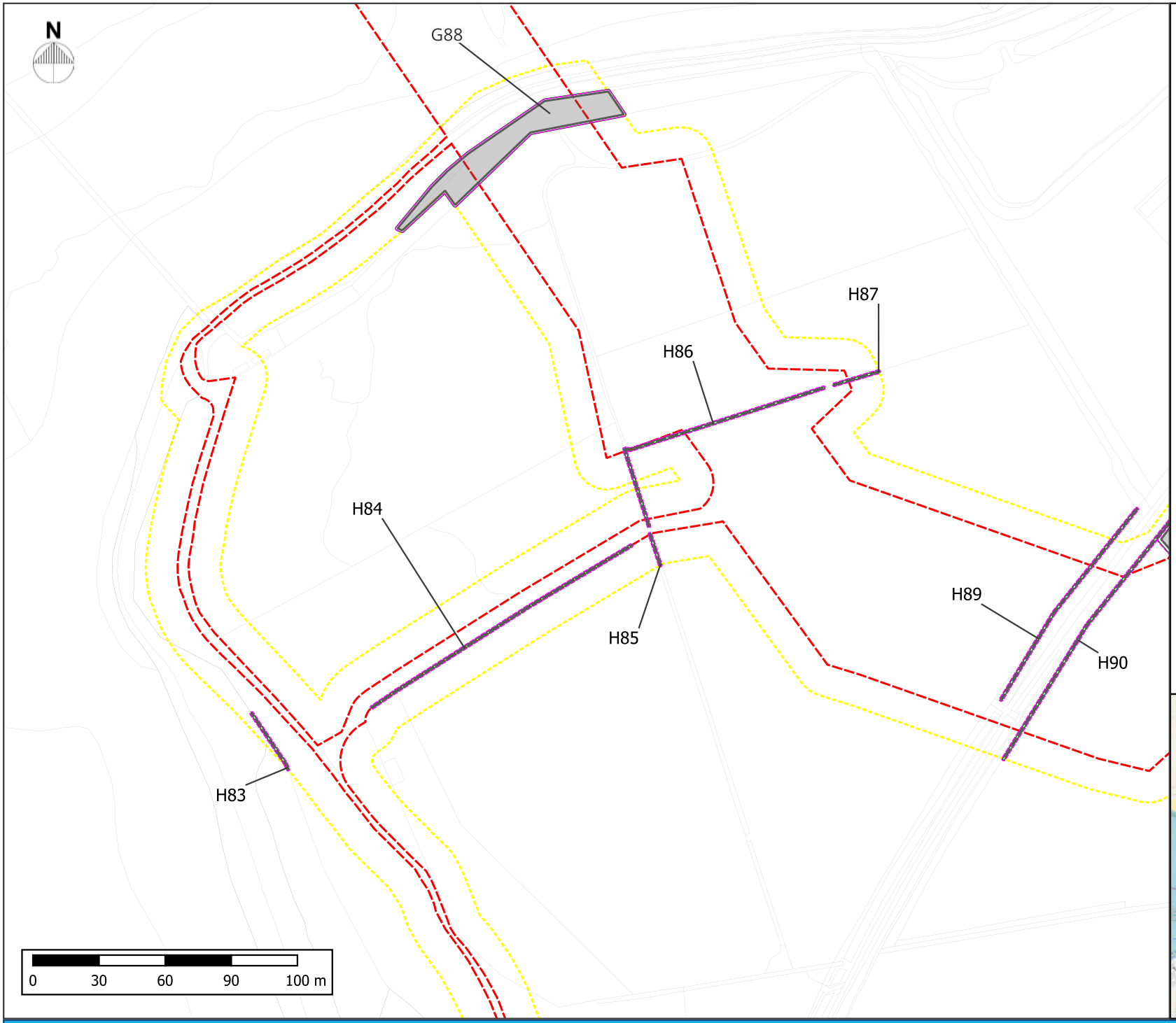
Tree Constraints Plan Figure 1.13



Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

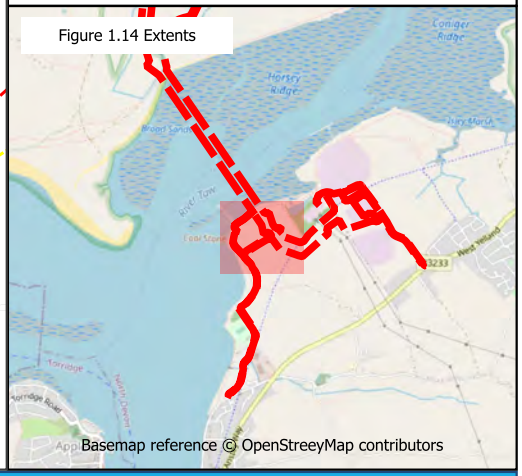
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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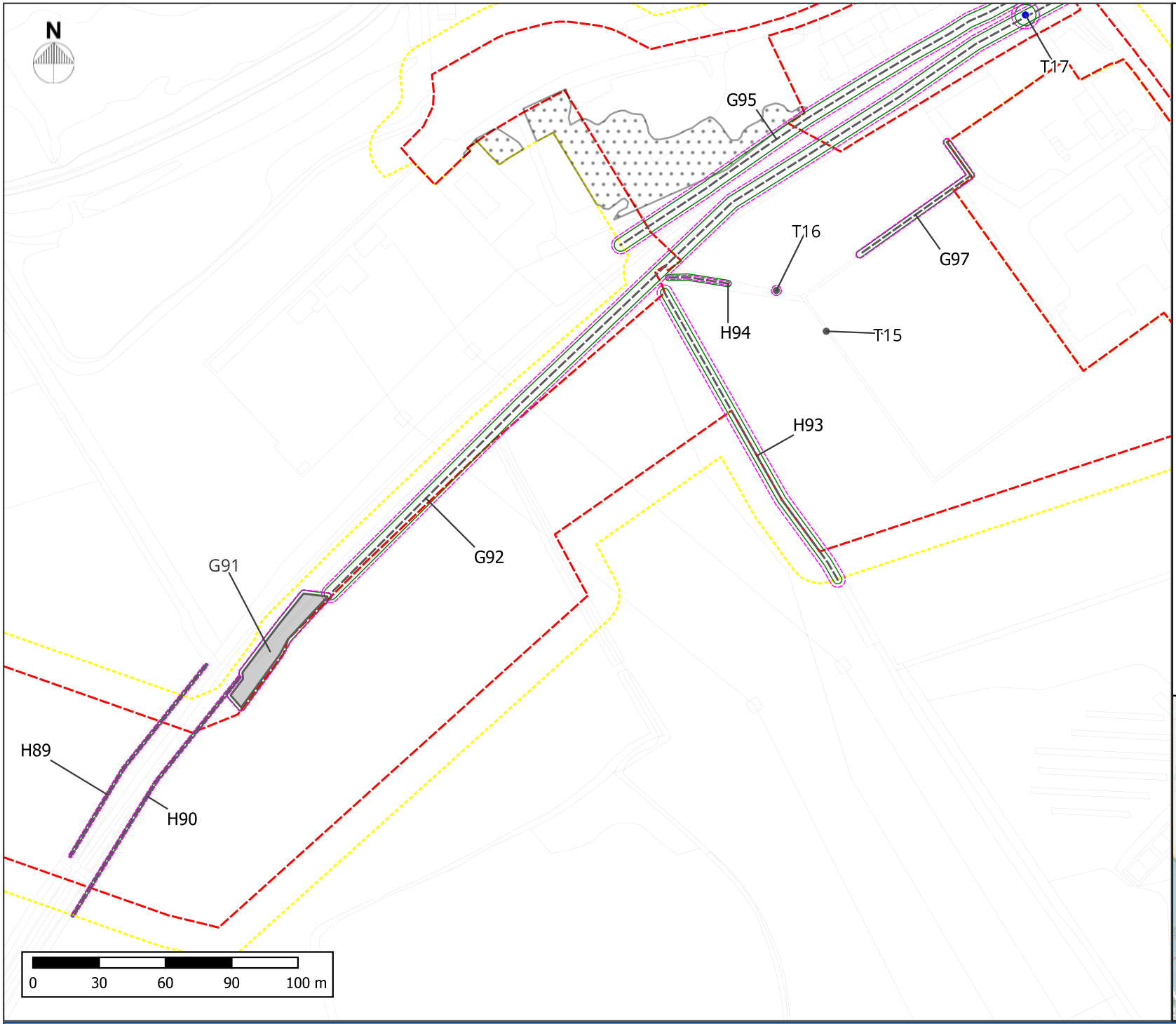
Tree Constraints Plan Figure 1.14



Key

Baseline Survey Data

Tree (Individual)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Tree Group (Polygon)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C

Tree Group / Hedge (Linear)

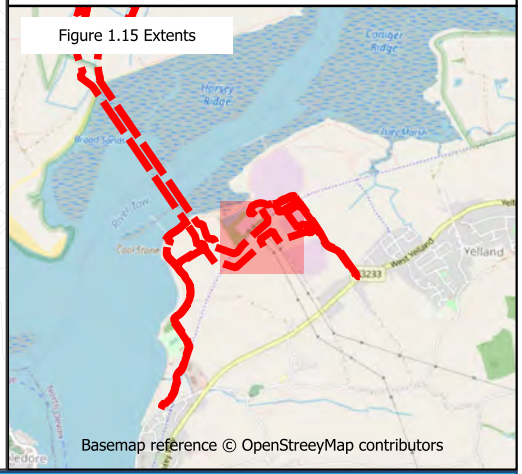
- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Arboricultural Constraints

- Root Protection Area
- Crown Spread

Other Item

- Red Line Boundary
- Arboricultural Study Area
- No Access for Survey
- Scrub / Shrubs



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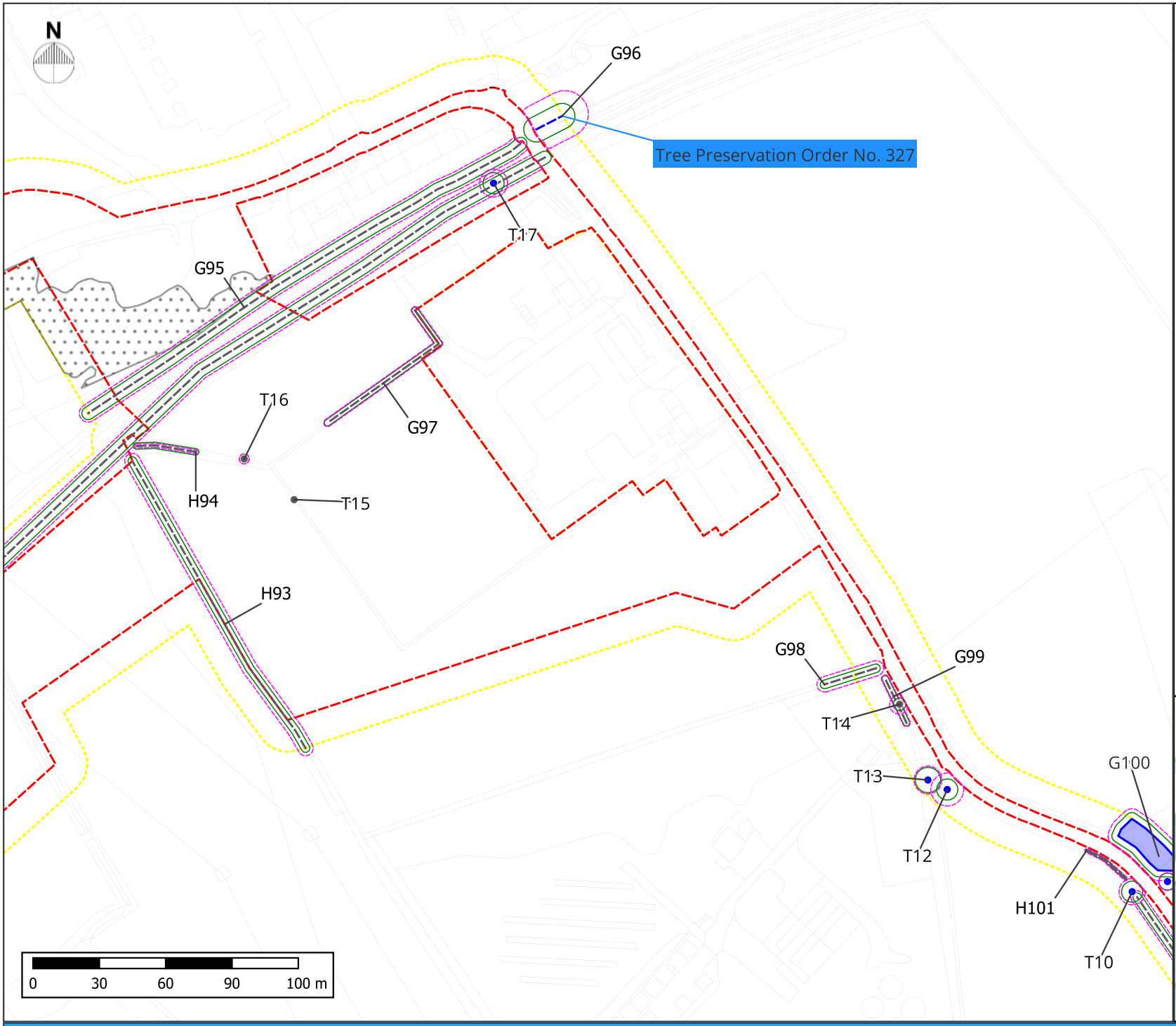
Tree Constraints Plan Figure 1.15



Key

Baseline Survey Data

Tree (Individual)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Tree Group (Polygon)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C

Tree Group / Hedge (Linear)

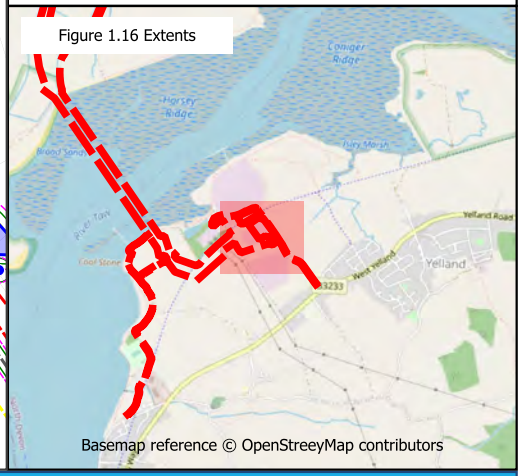
- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Arboricultural Constraints

- Root Protection Area
- Crown Spread

Other Item

- Red Line Boundary
- Arboricultural Study Area
- No Access for Survey
- Scrub / Shrubs



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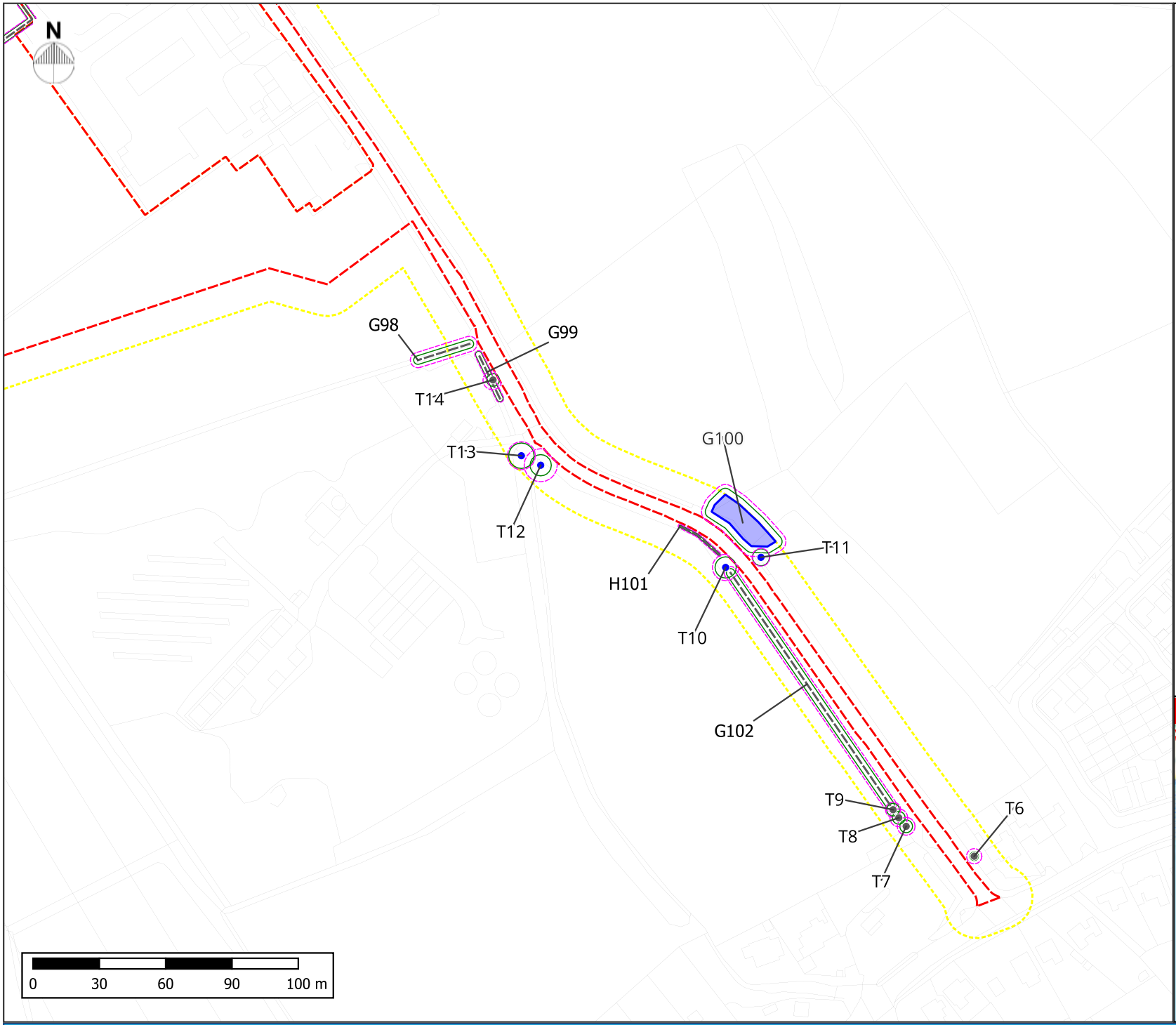
Tree Constraints Plan Figure 1.16



Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

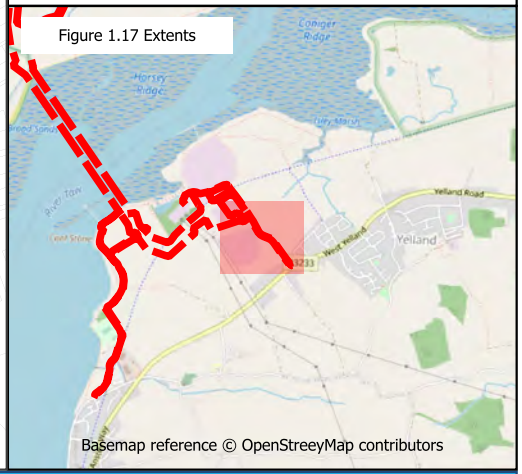
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*



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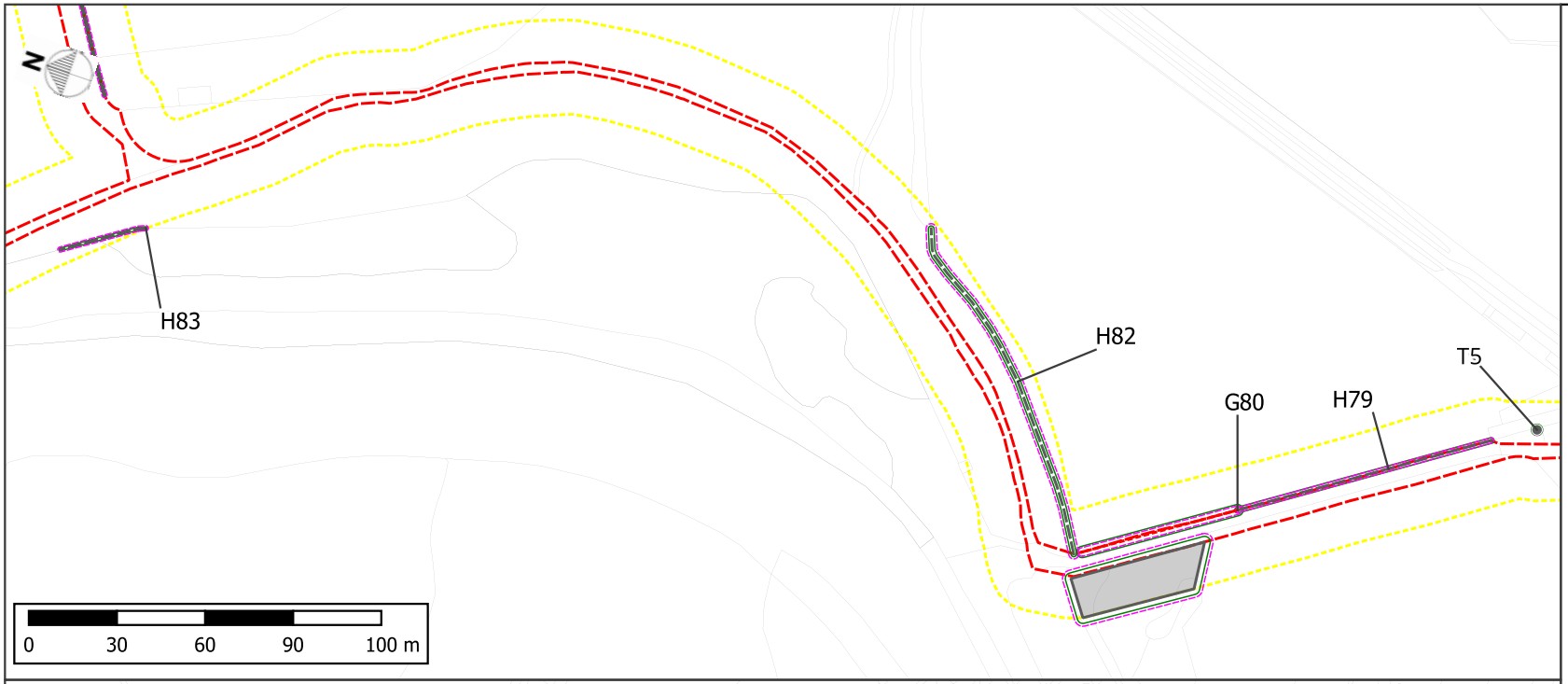
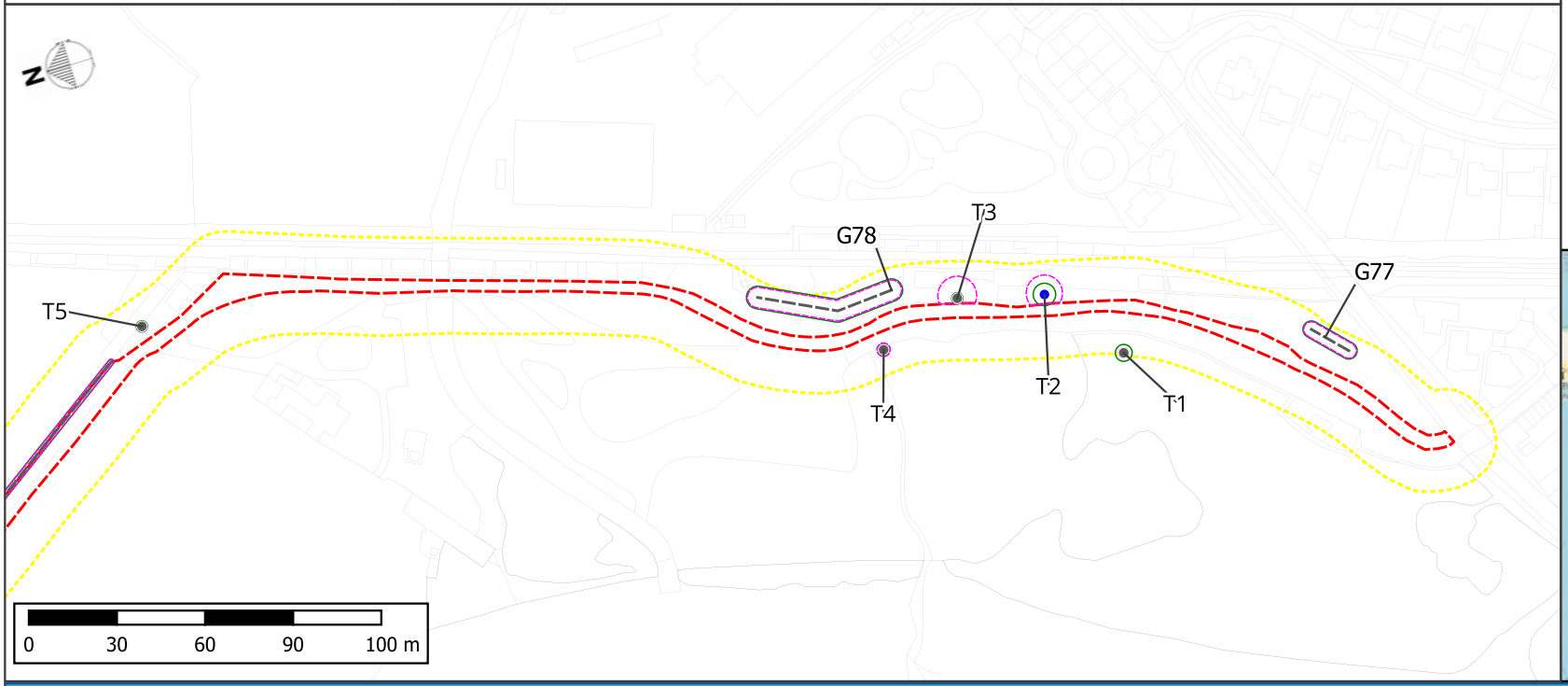
Tree Constraints Plan Figure 1.17





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Constraints

- *Root Protection Area*
- *Crown Spread*

Other Item

- *Red Line Boundary*
- *Arboricultural Study Area*
- *No Access for Survey*
- *Scrub / Shrubs*

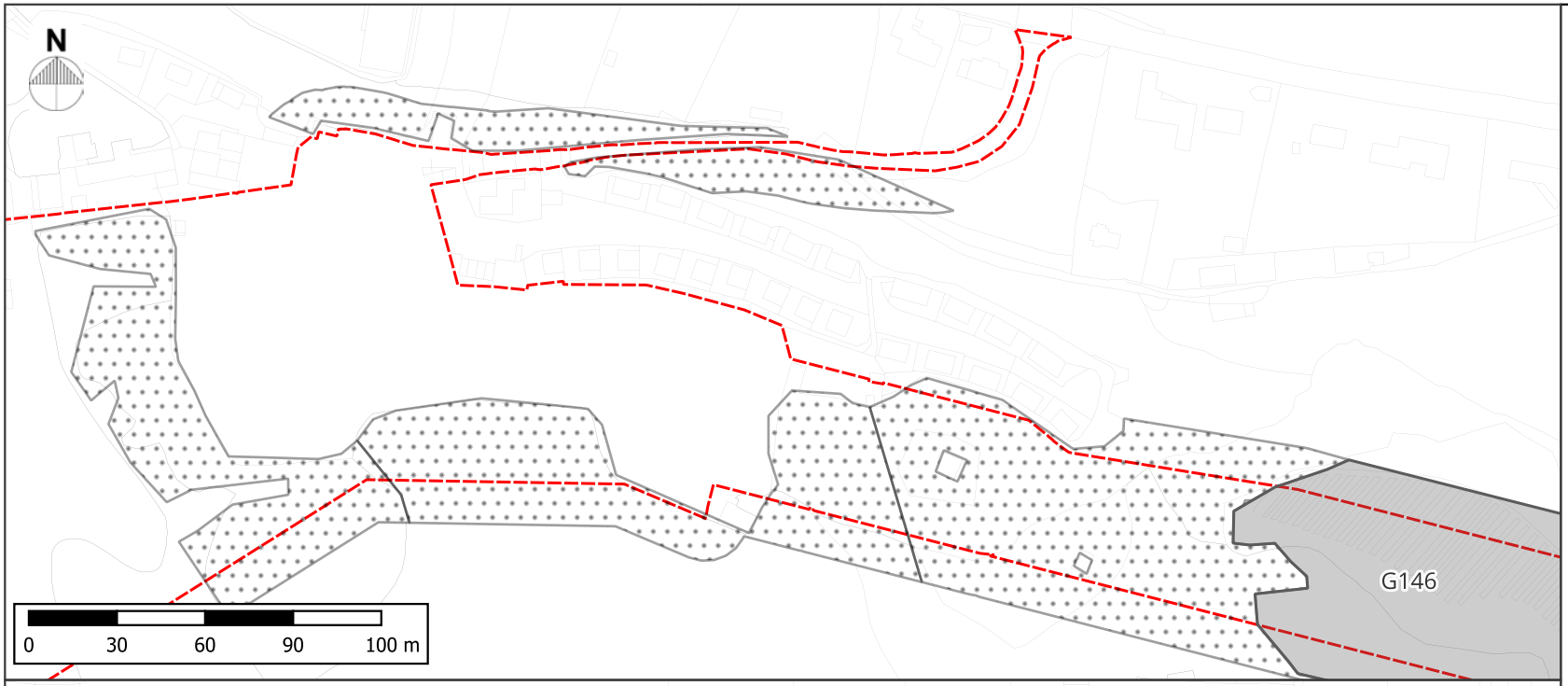
Scale:1:2500 @A3

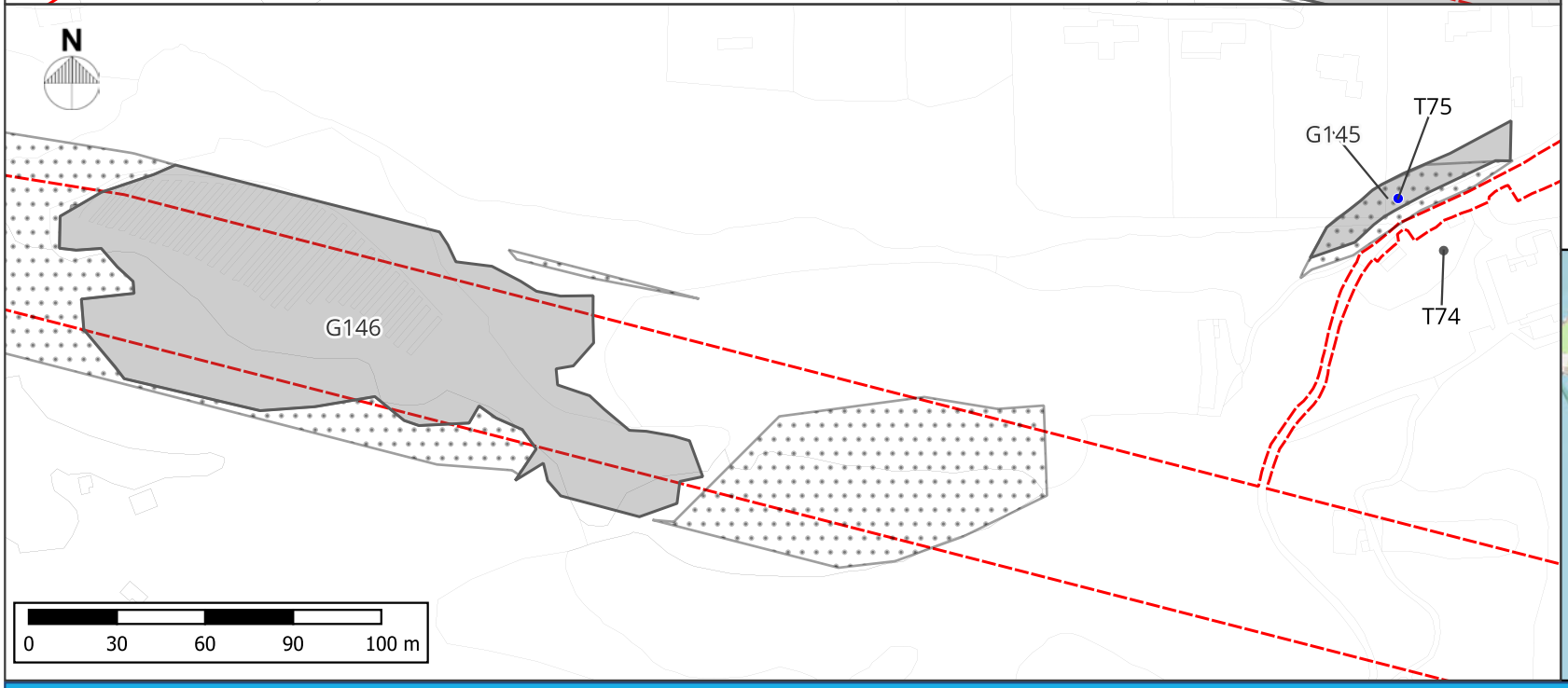
Tree Constraints Plan Figure 1.18

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Annex D: Tree Protection Plans





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

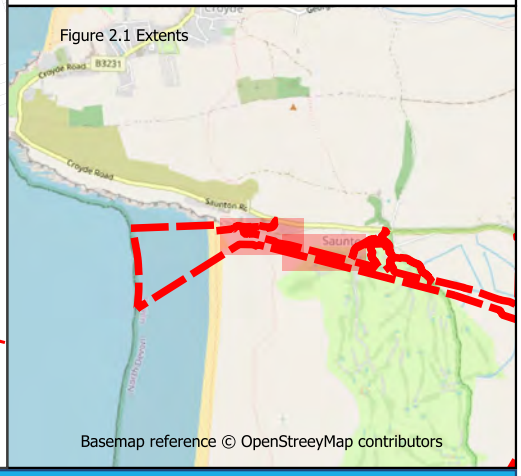
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

Other Item

- *Srub / Shrubs*
- *Red Line Boundary*



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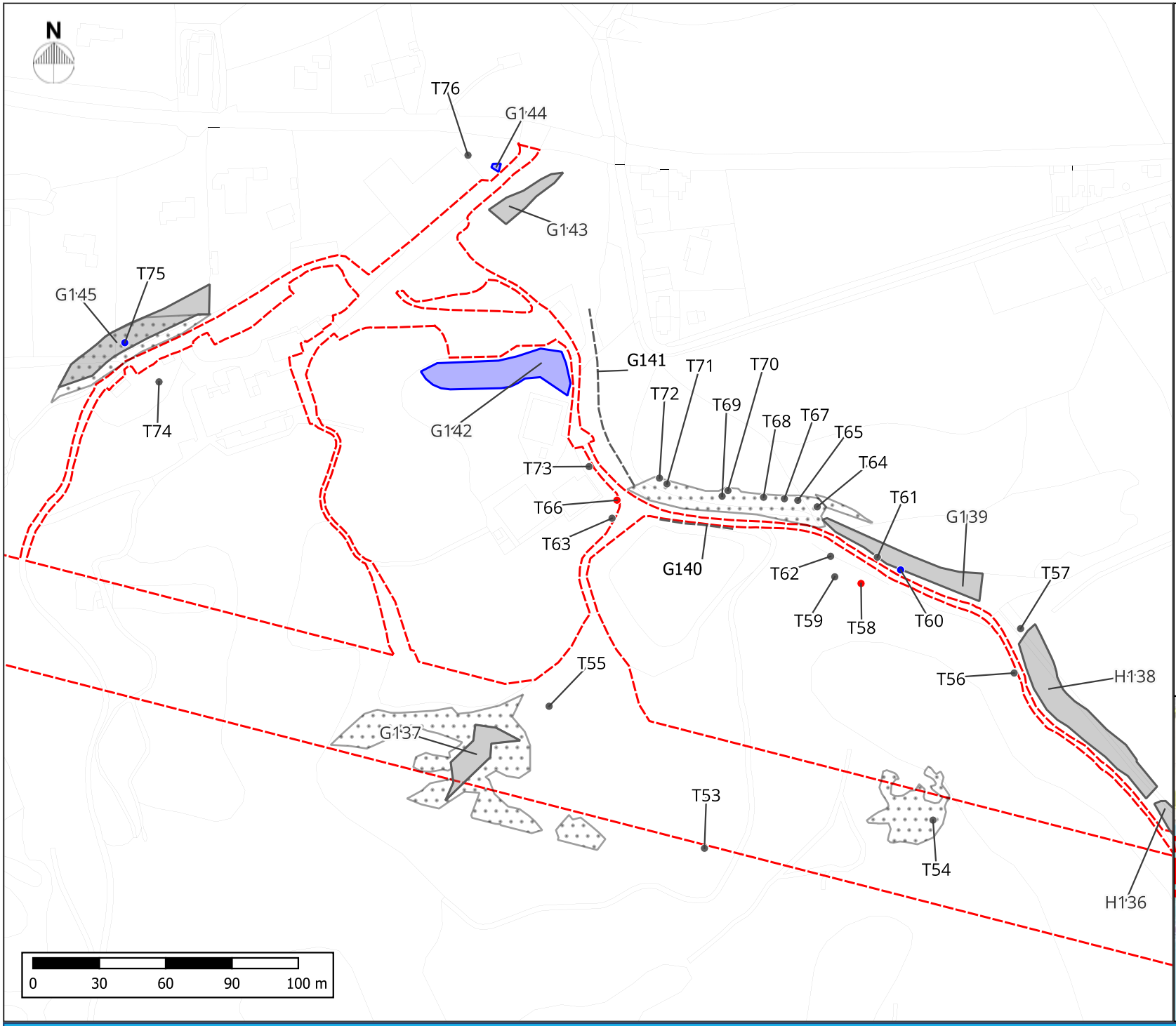
Tree Protection Plan Figure 2.1



Key

Baseline Survey Data

Tree (Individual)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Tree Group (Polygon)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C

Tree Group / Hedge (Linear)

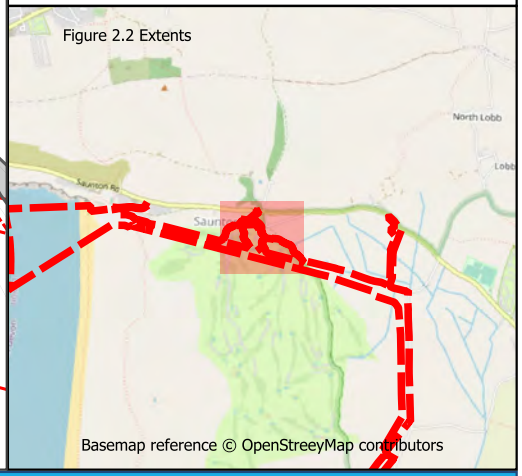
- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Arboricultural Removals

- Tree (Individual)
- Tree Group / Hedge (Linear)

Other Item

- Srub / Shrubs
- Red Line Boundary



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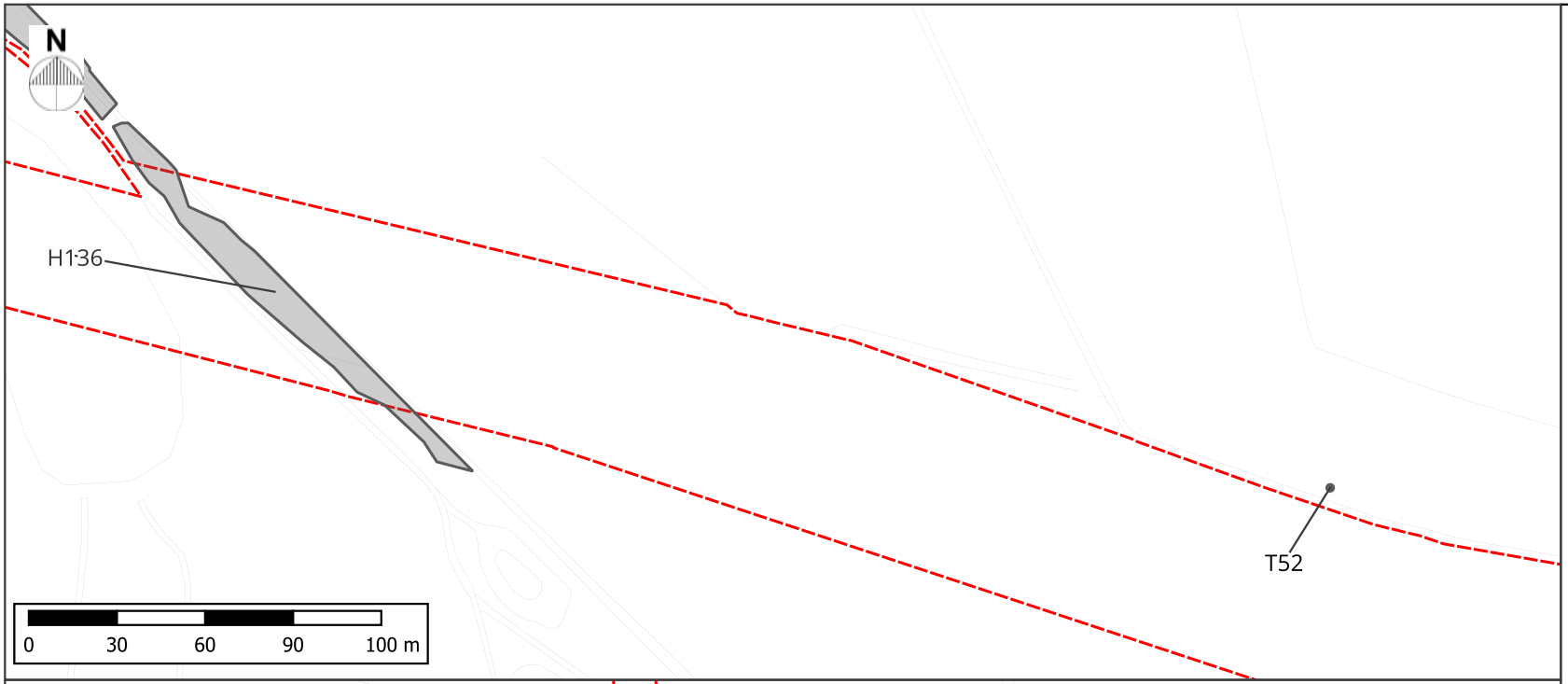
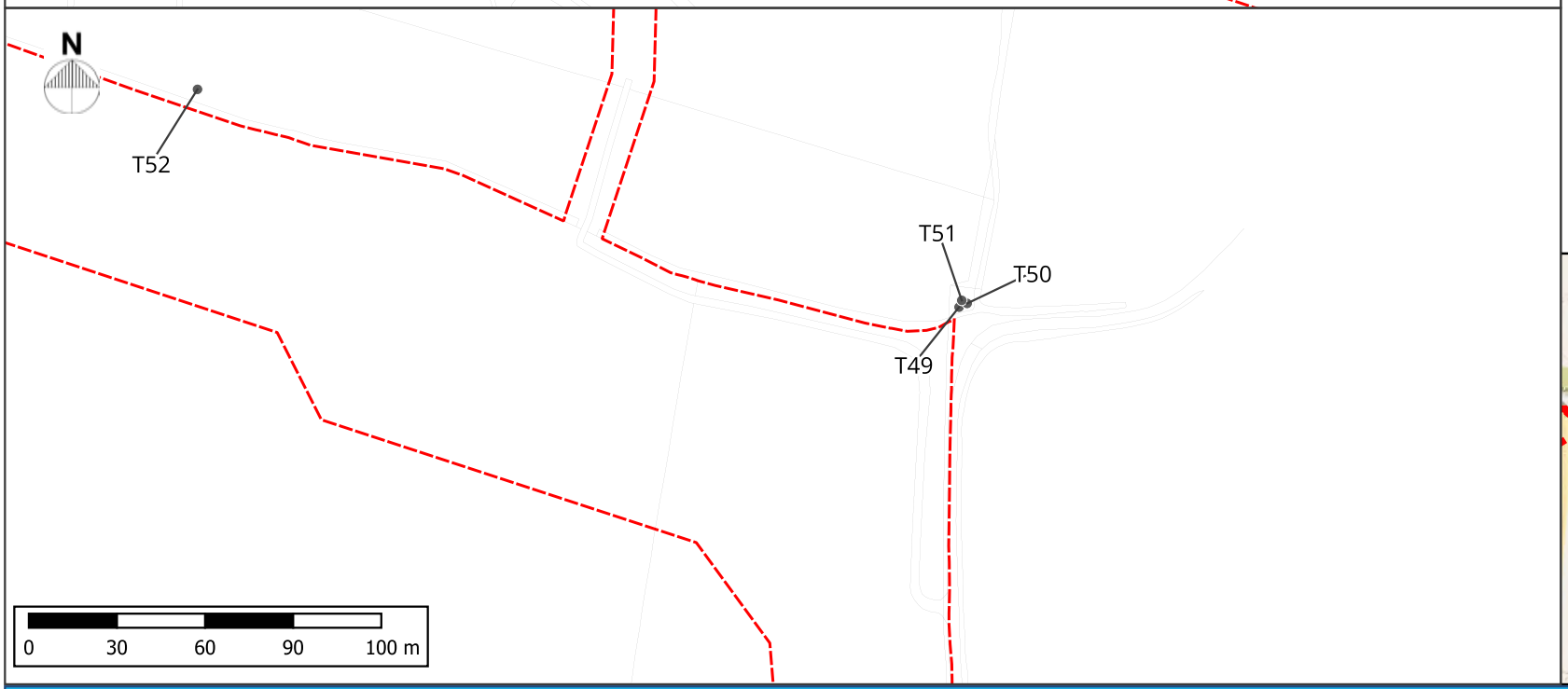
Tree Protection Plan Figure 2.2





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

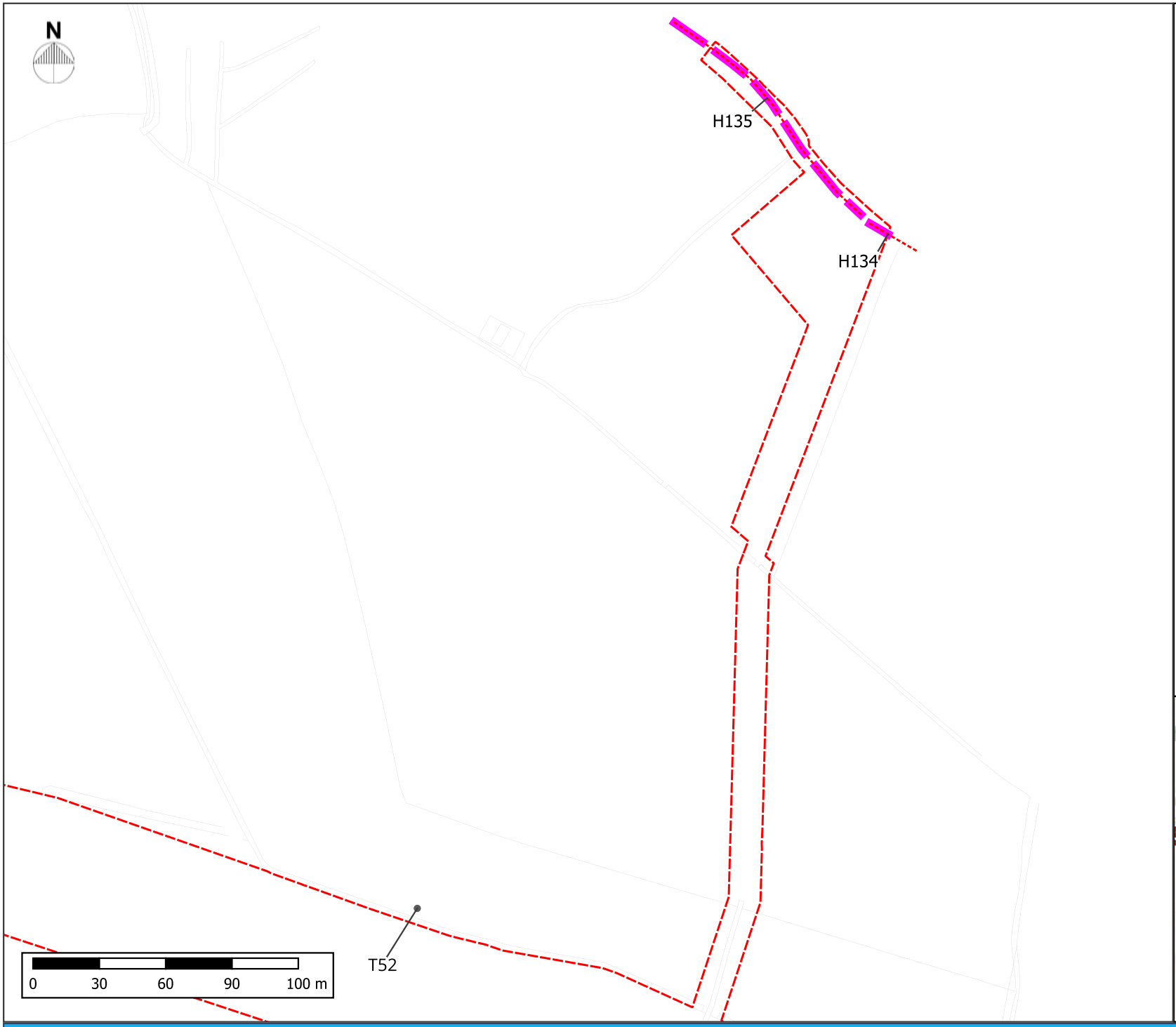
- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

Other Item

- *Srub / Shrubs*
- *Red Line Boundary*

Scale:1:2500 @A3

Tree Protection Plan Figure 2.3



Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

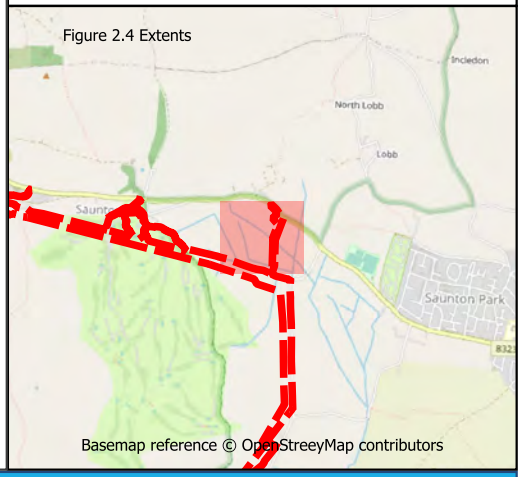
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

Other Item

- *Srub / Shrubs*
- *Red Line Boundary*



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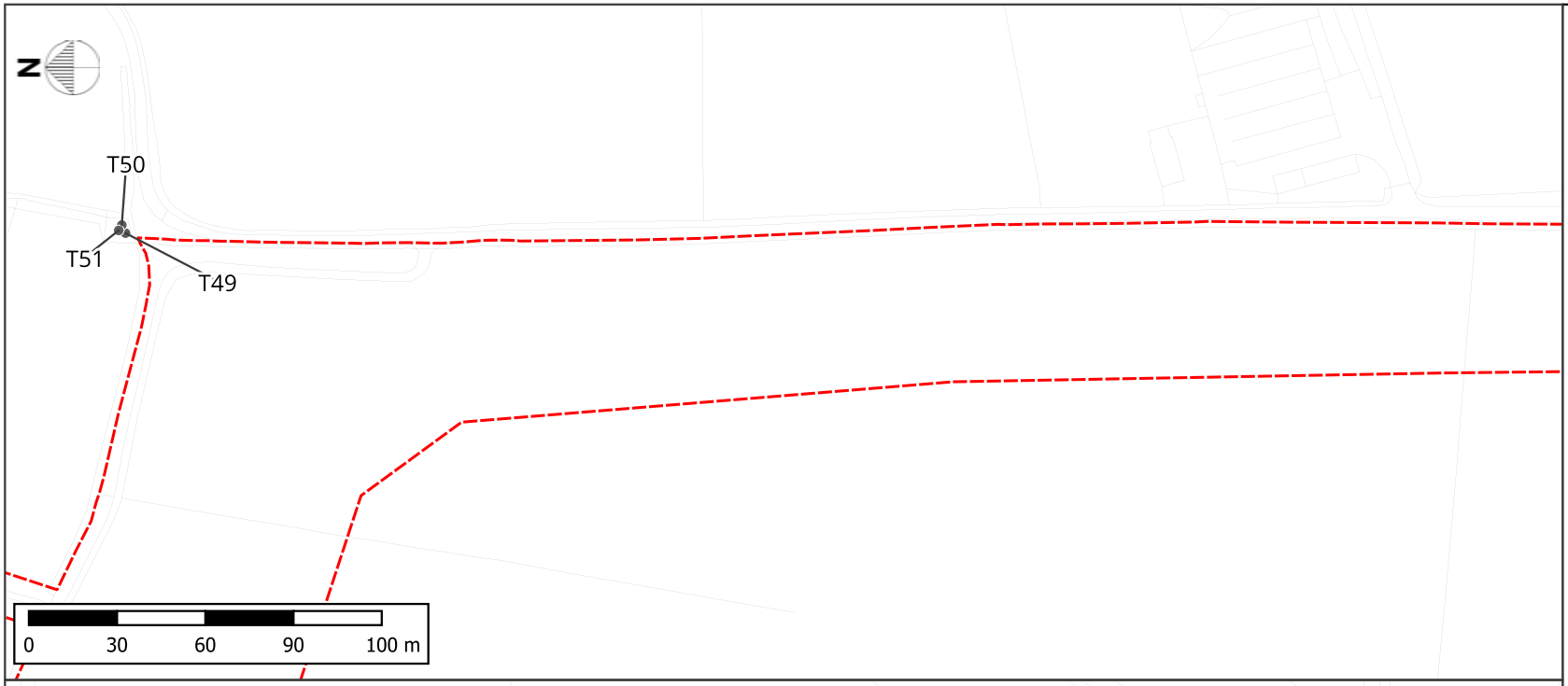
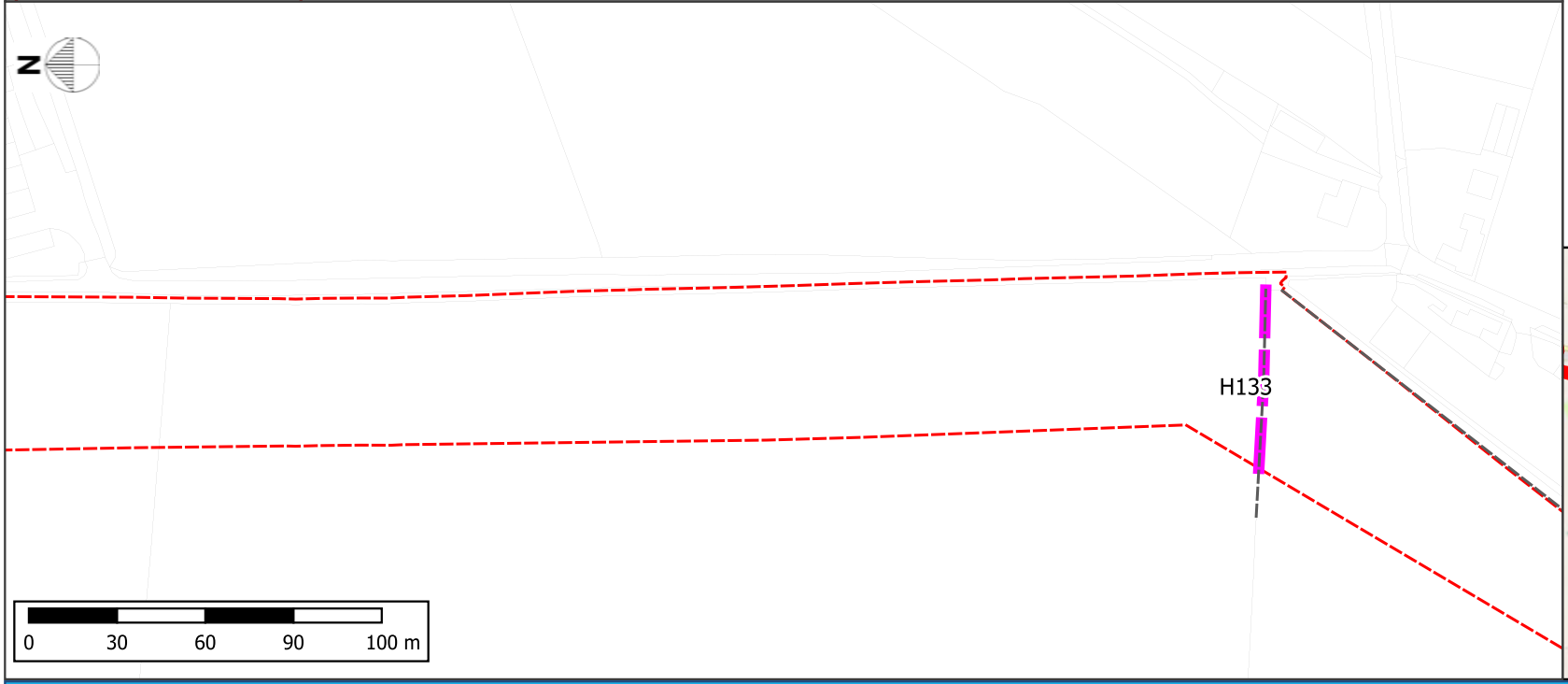
Tree Protection Plan Figure 2.4





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

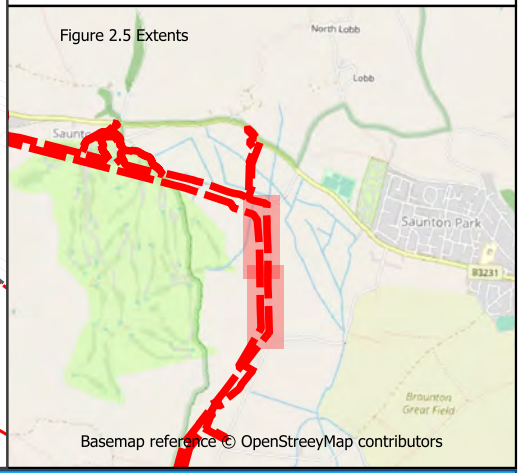
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

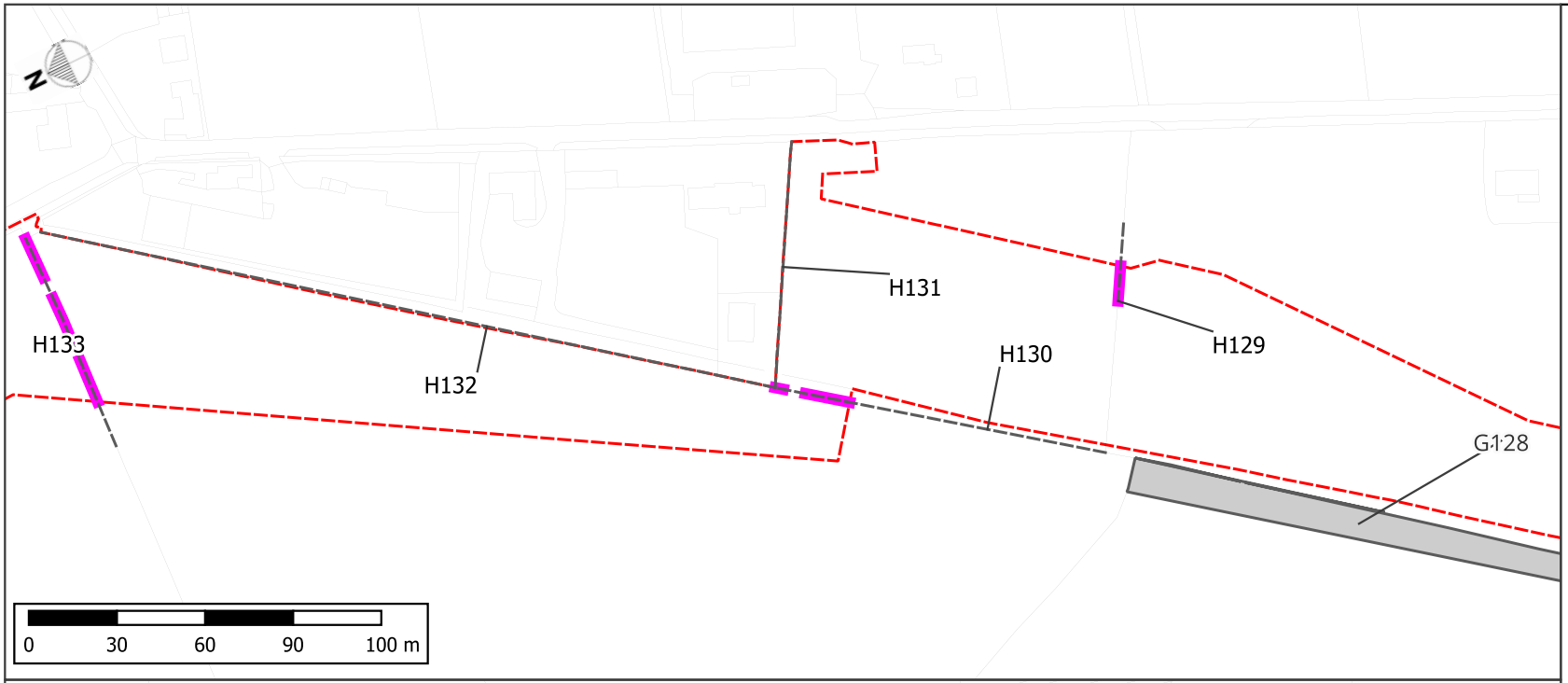
Other Item

- *Srub / Shrubs*
- *Red Line Boundary*



Scale:1:2500 @A3

Tree Protection Plan Figure 2.5



Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

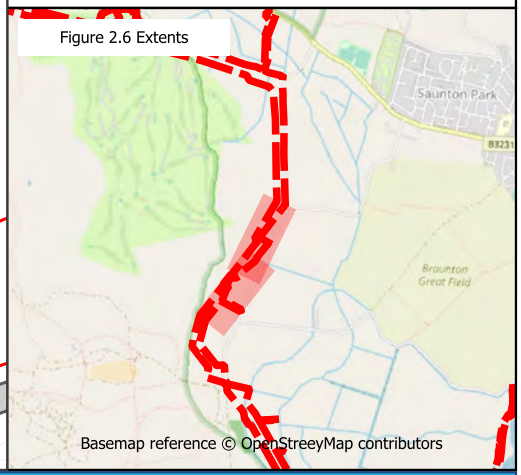
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

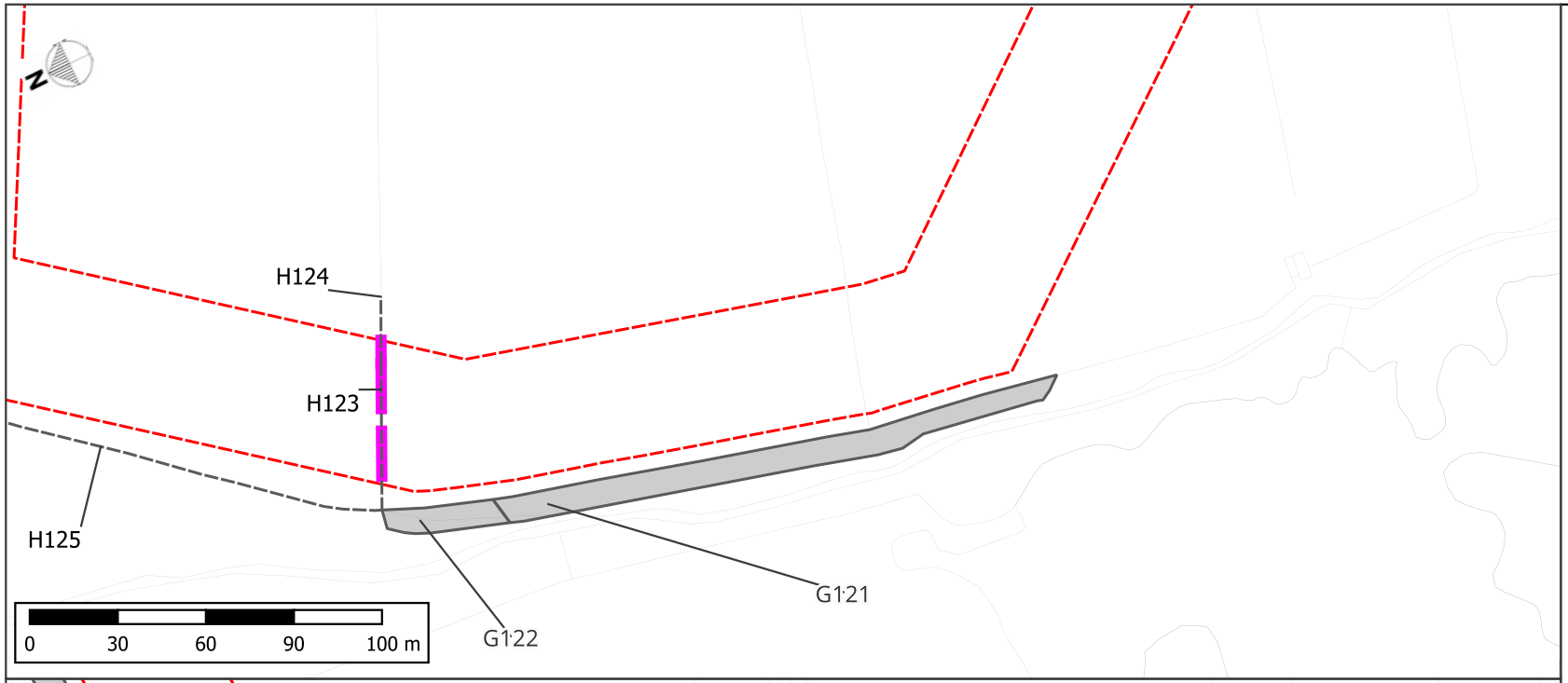
Other Item

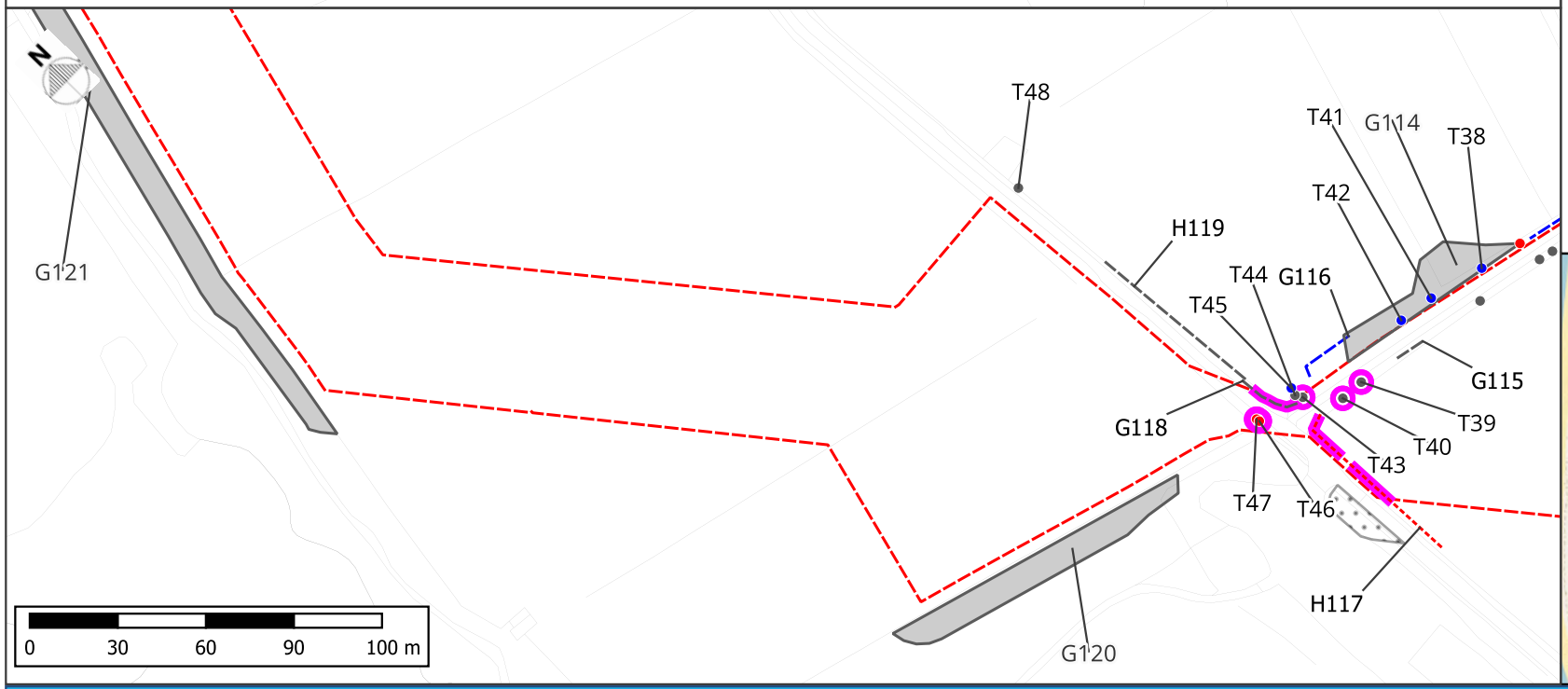
- *Srub / Shrubs*
- *Red Line Boundary*



Scale:1:2500 @A3

Tree Protection Plan Figure 2.6





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

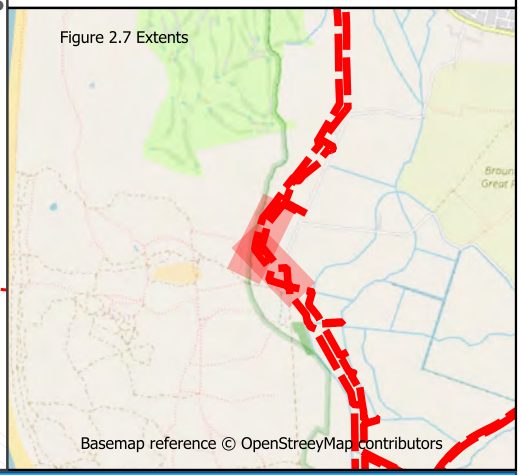
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

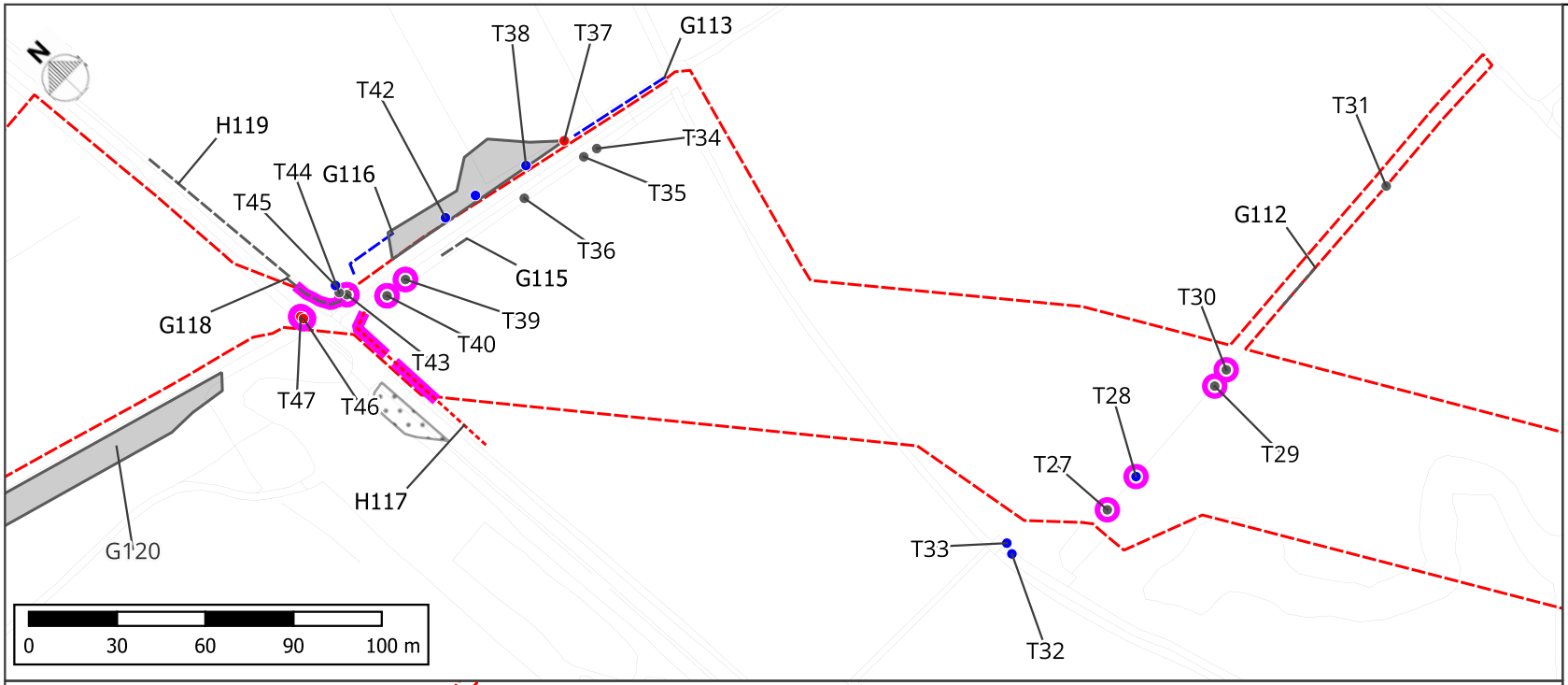
Other Item

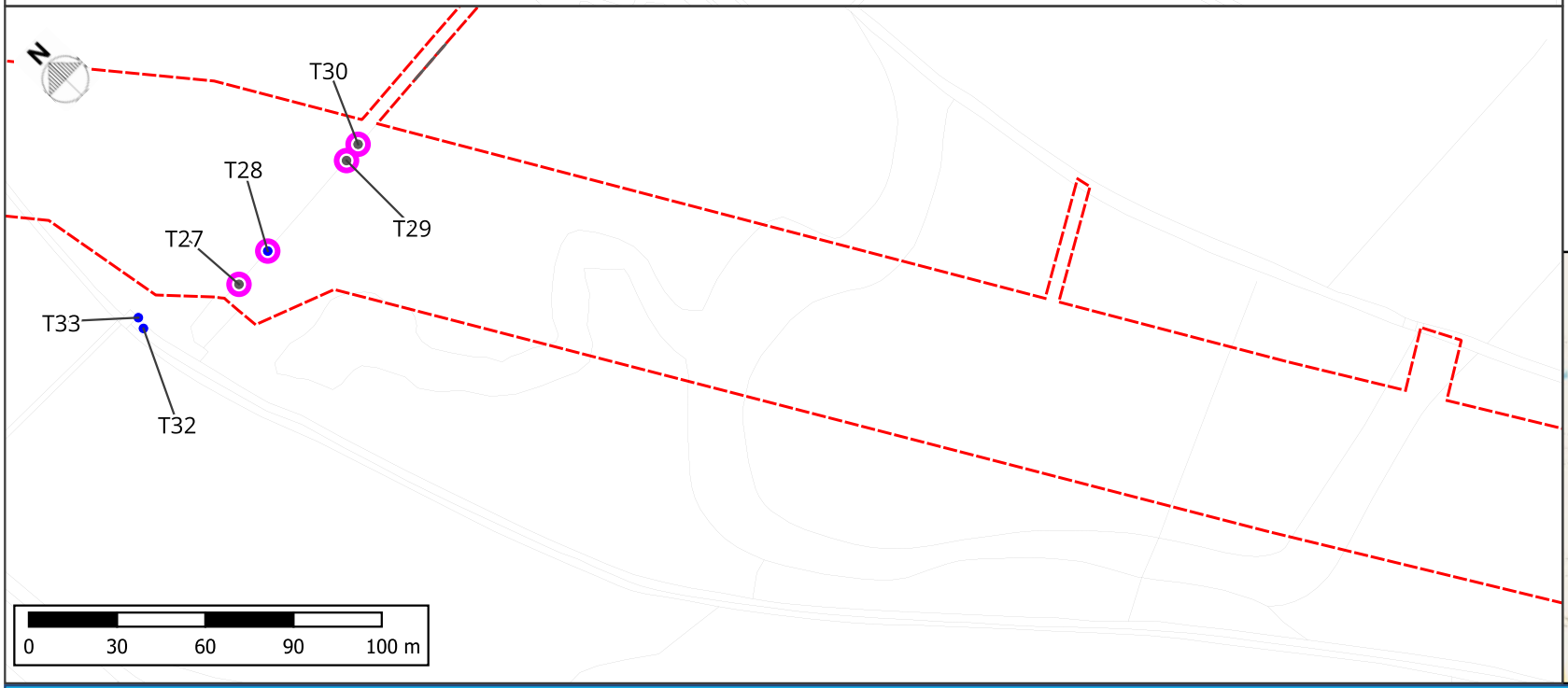
- *Srub / Shrubs*
- *Red Line Boundary*



Scale:1:2500 @A3

Tree Protection Plan Figure 2.7





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

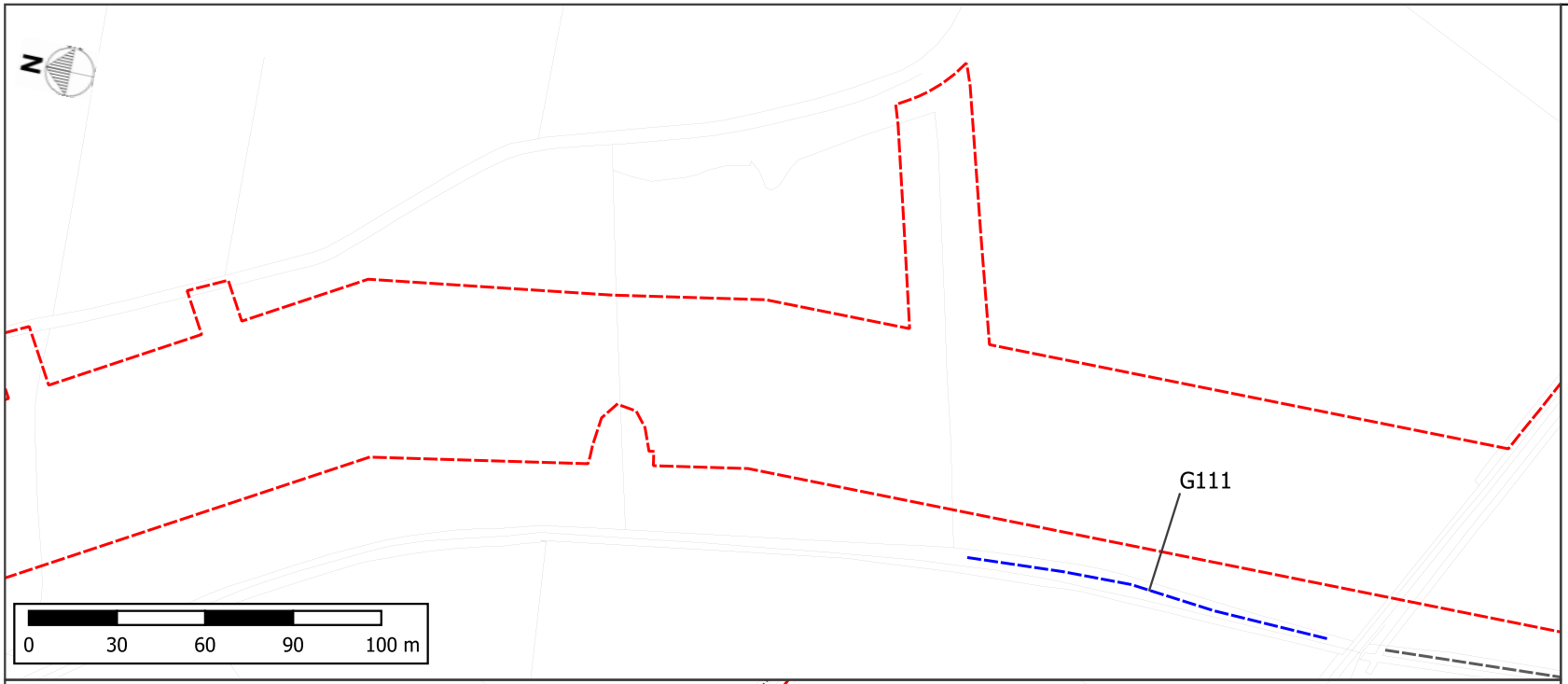
- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

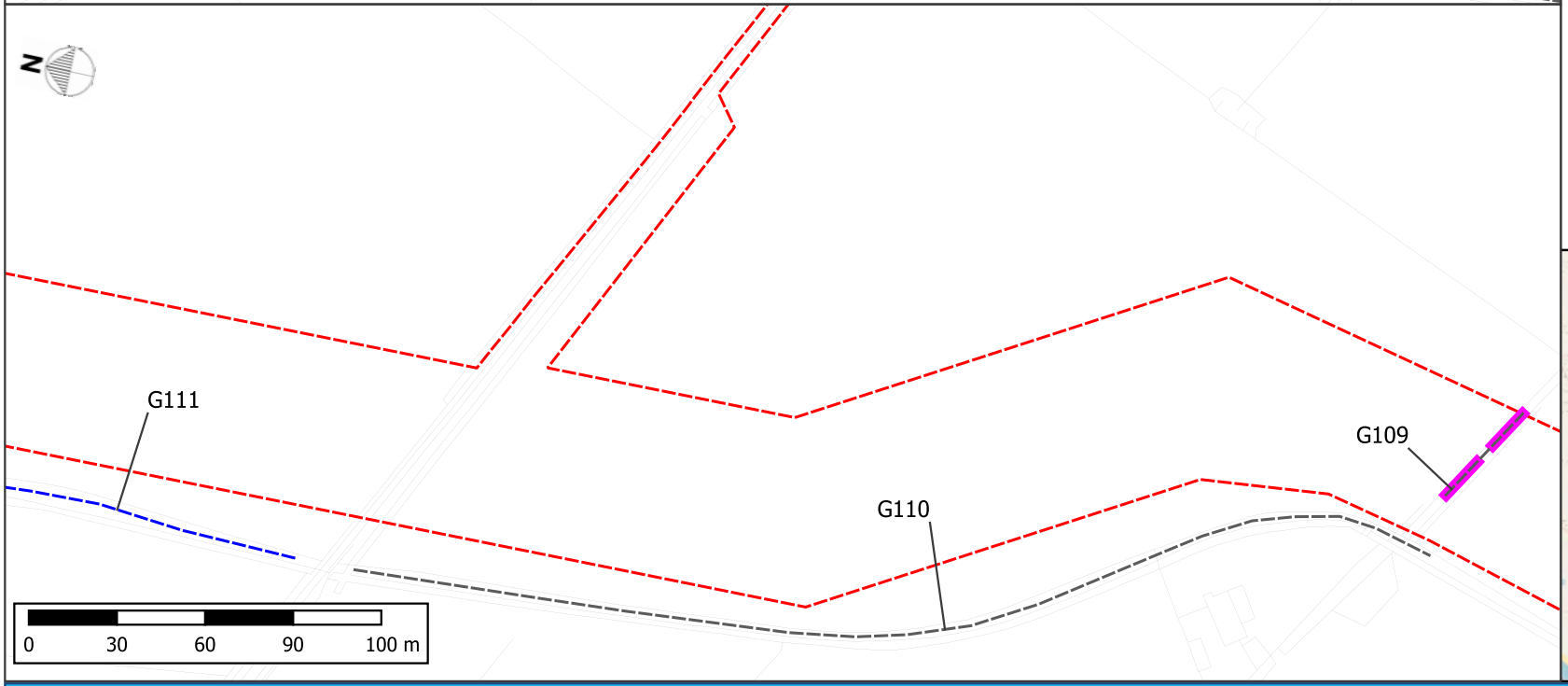
Other Item

- *Srub / Shrubs*
- *Red Line Boundary*

Scale:1:2500 @A3

Tree Protection Plan Figure 2.8





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

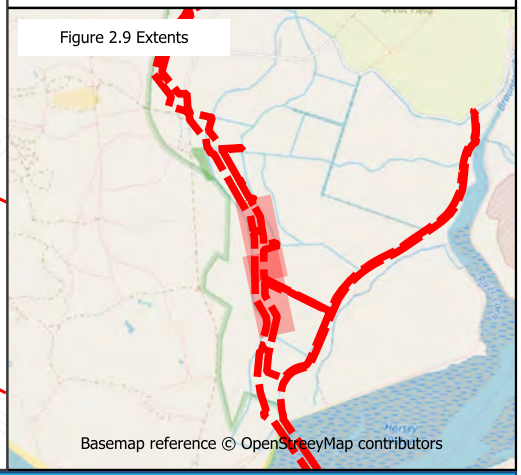
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

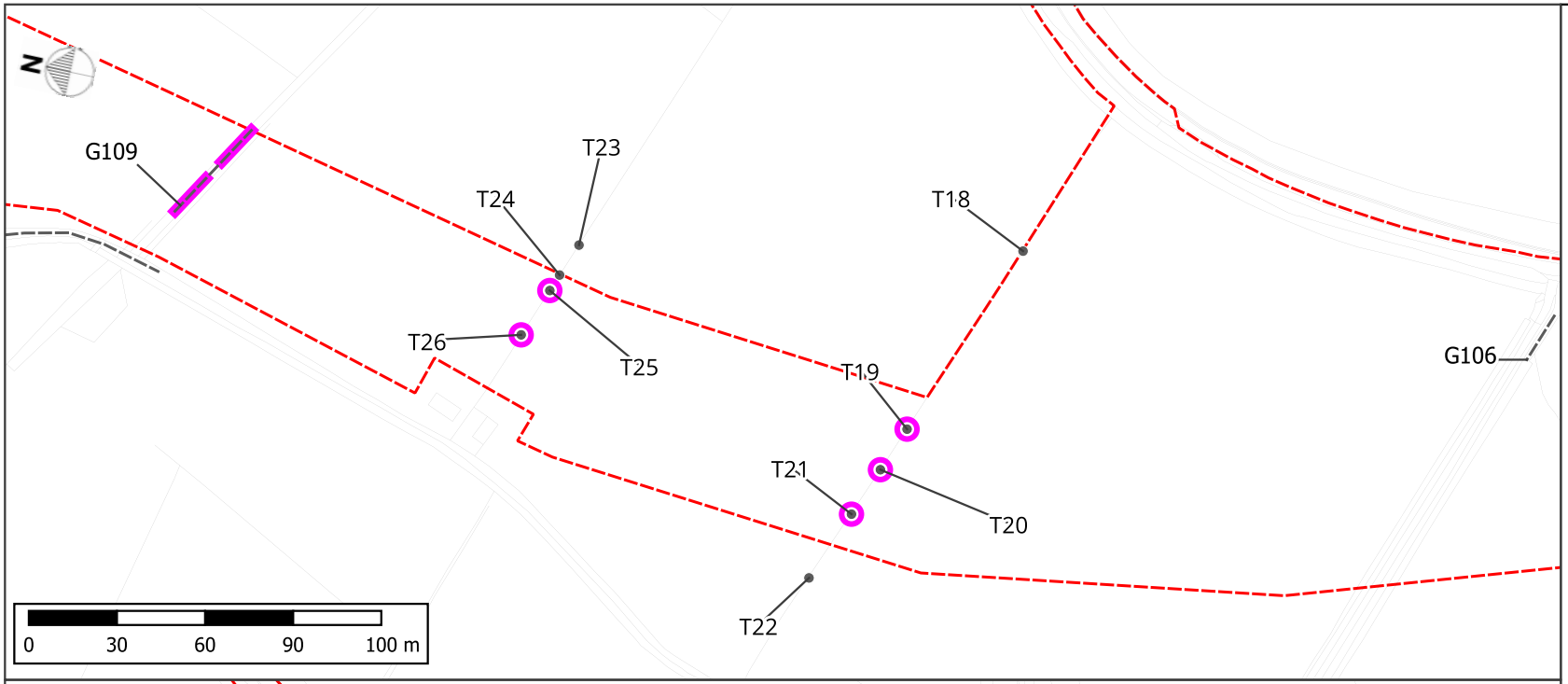
Other Item

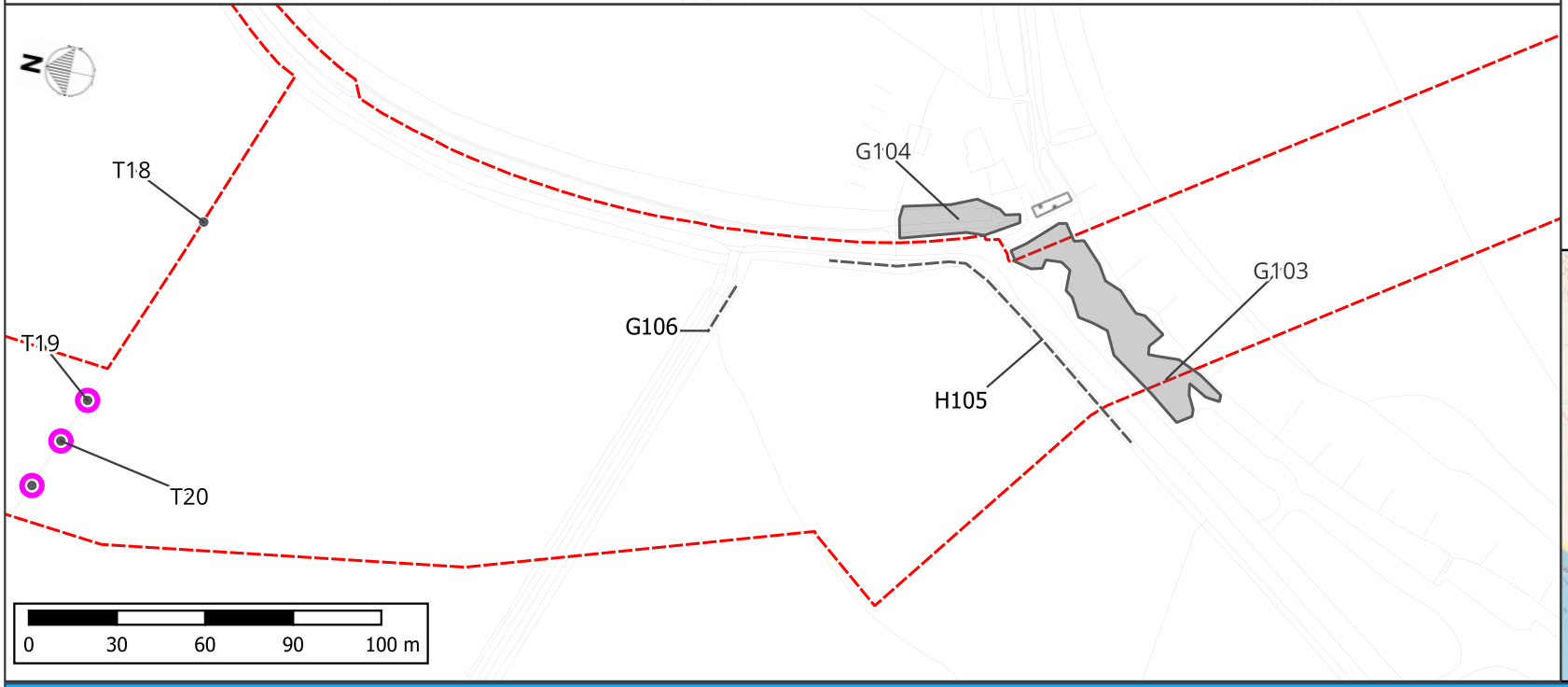
- *Srub / Shrubs*
- *Red Line Boundary*



Scale:1:2500 @A3

Tree Protection Plan Figure 2.9





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

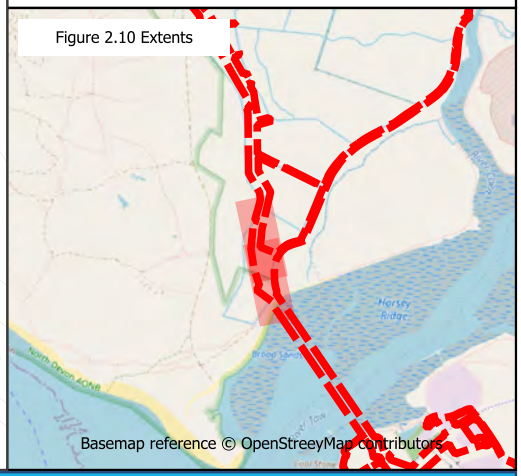
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

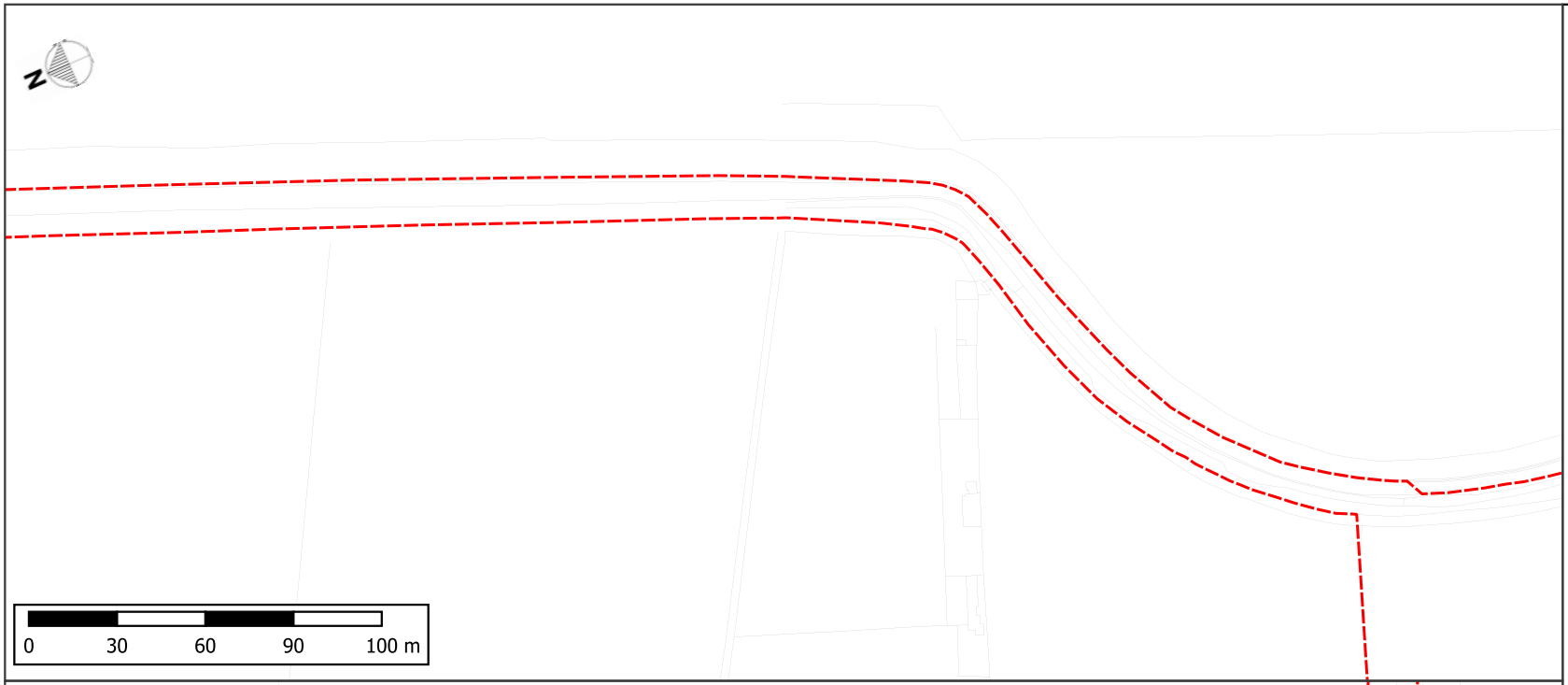
Other Item

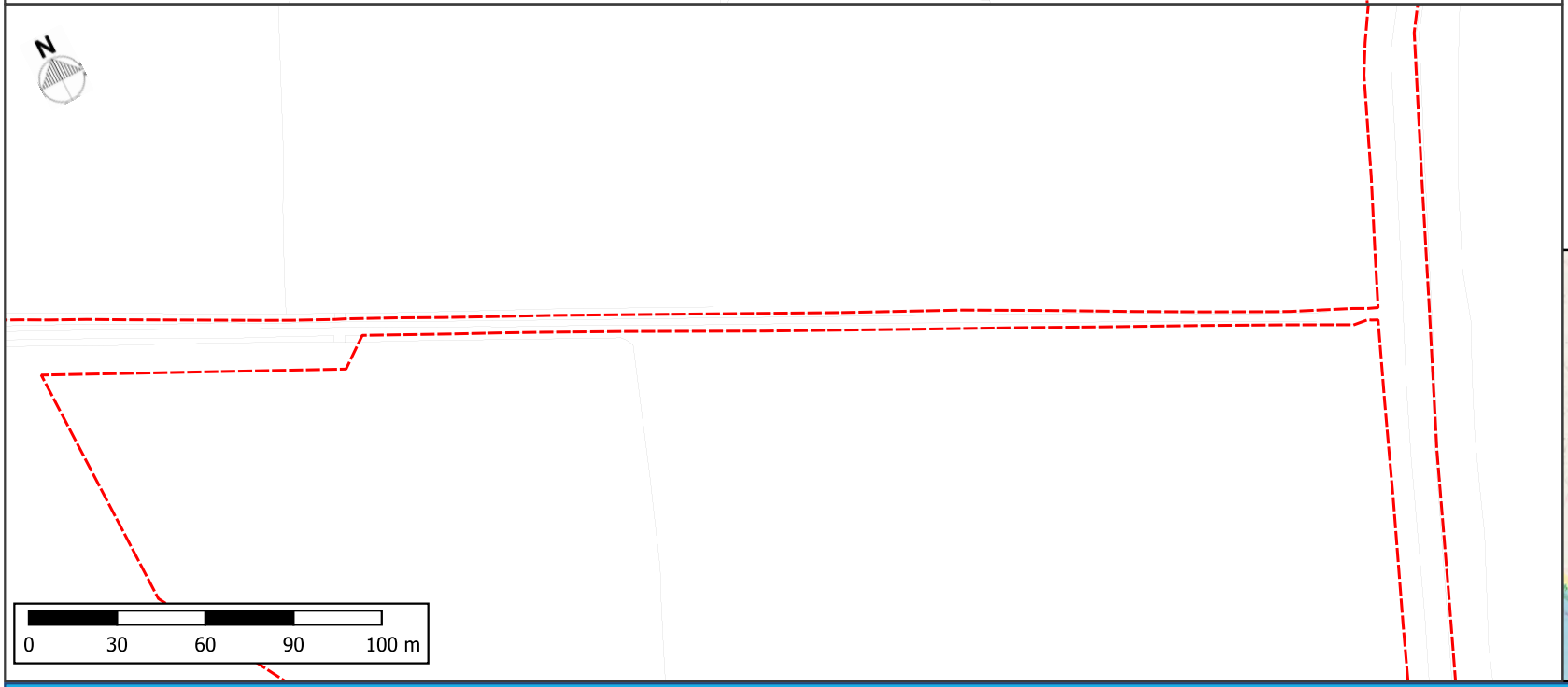
- *Srub / Shrubs*
- *Red Line Boundary*



Scale:1:2500 @A3

Tree Protection Plan Figure 2.10





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

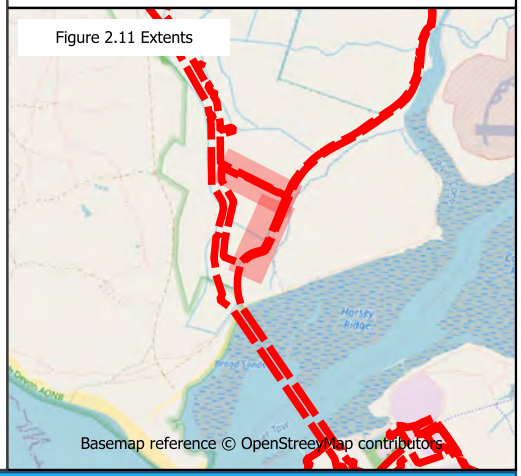
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

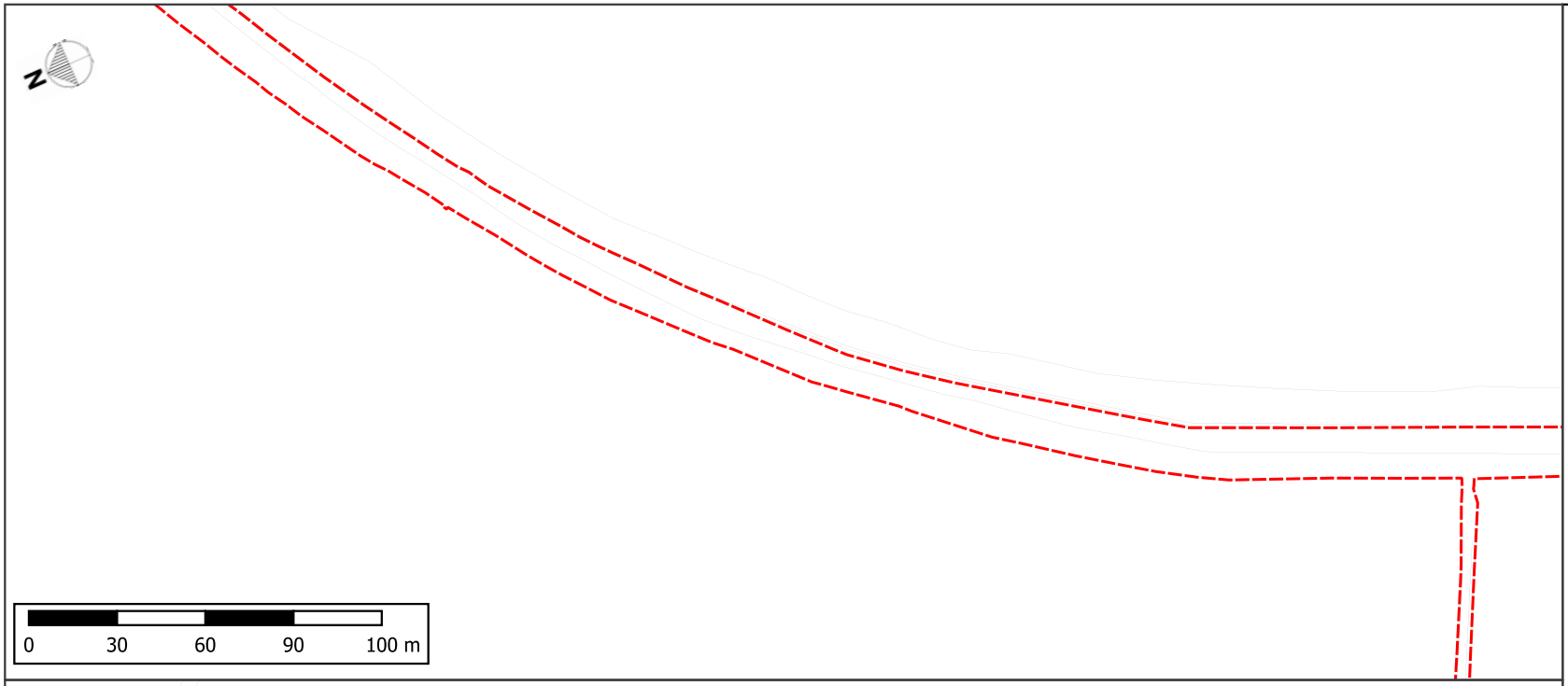
Other Item

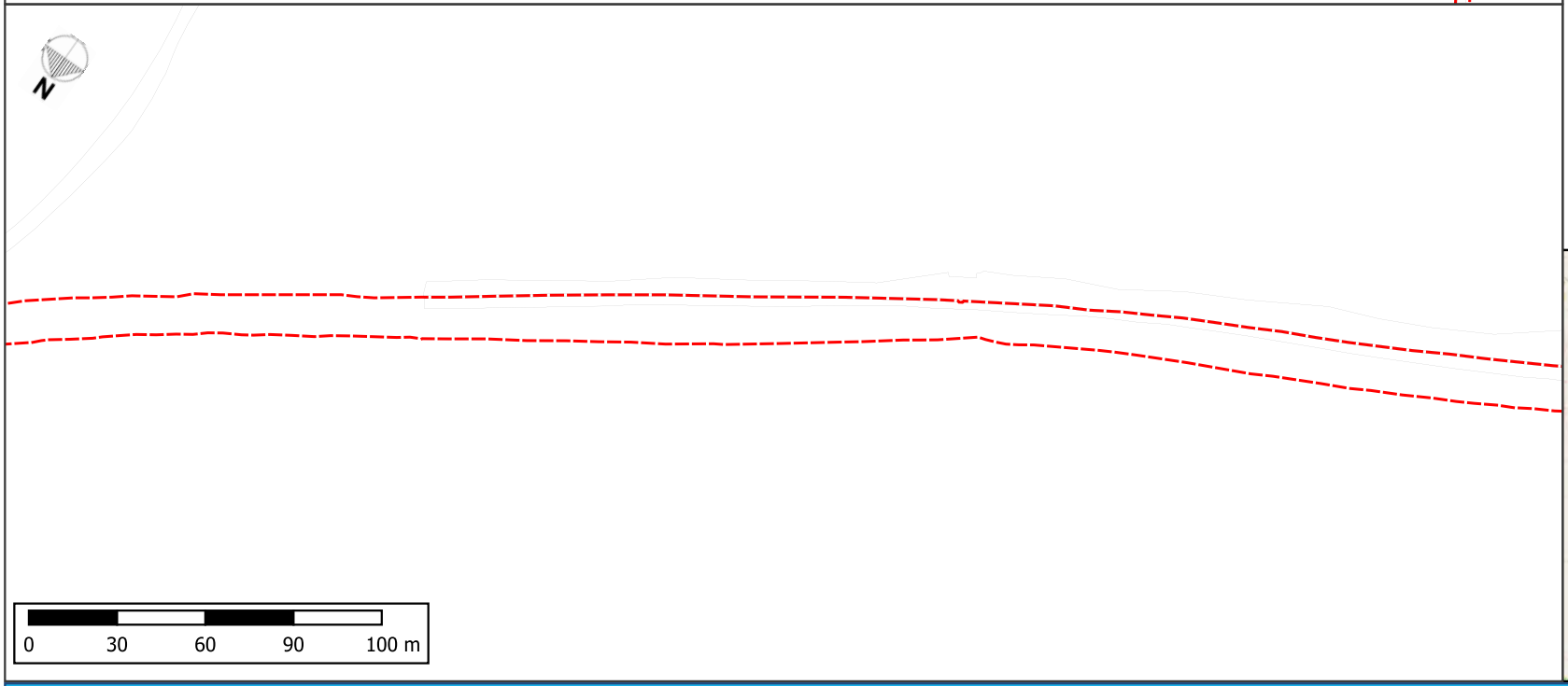
- *Srub / Shrubs*
- *Red Line Boundary*



Scale:1:2500 @A3

Tree Protection Plan Figure 2.11





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

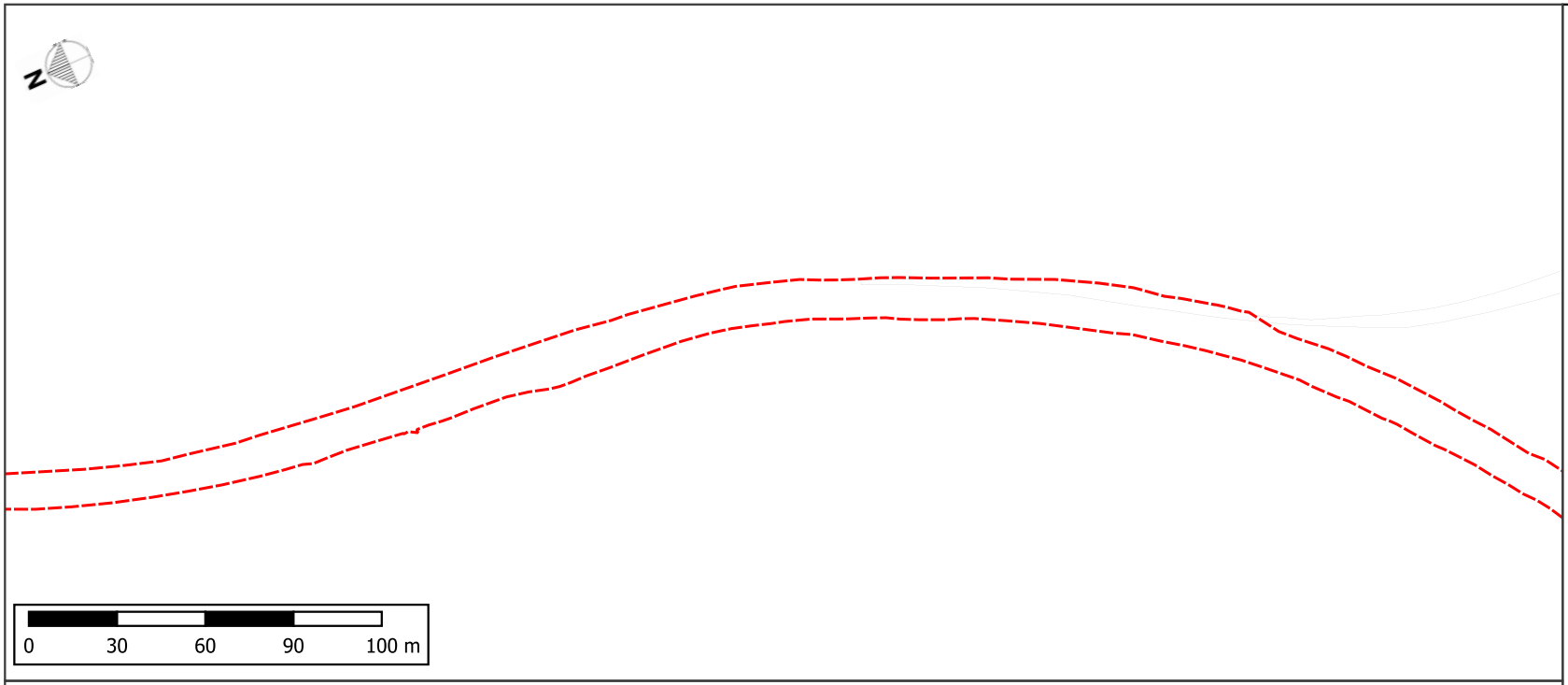
- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

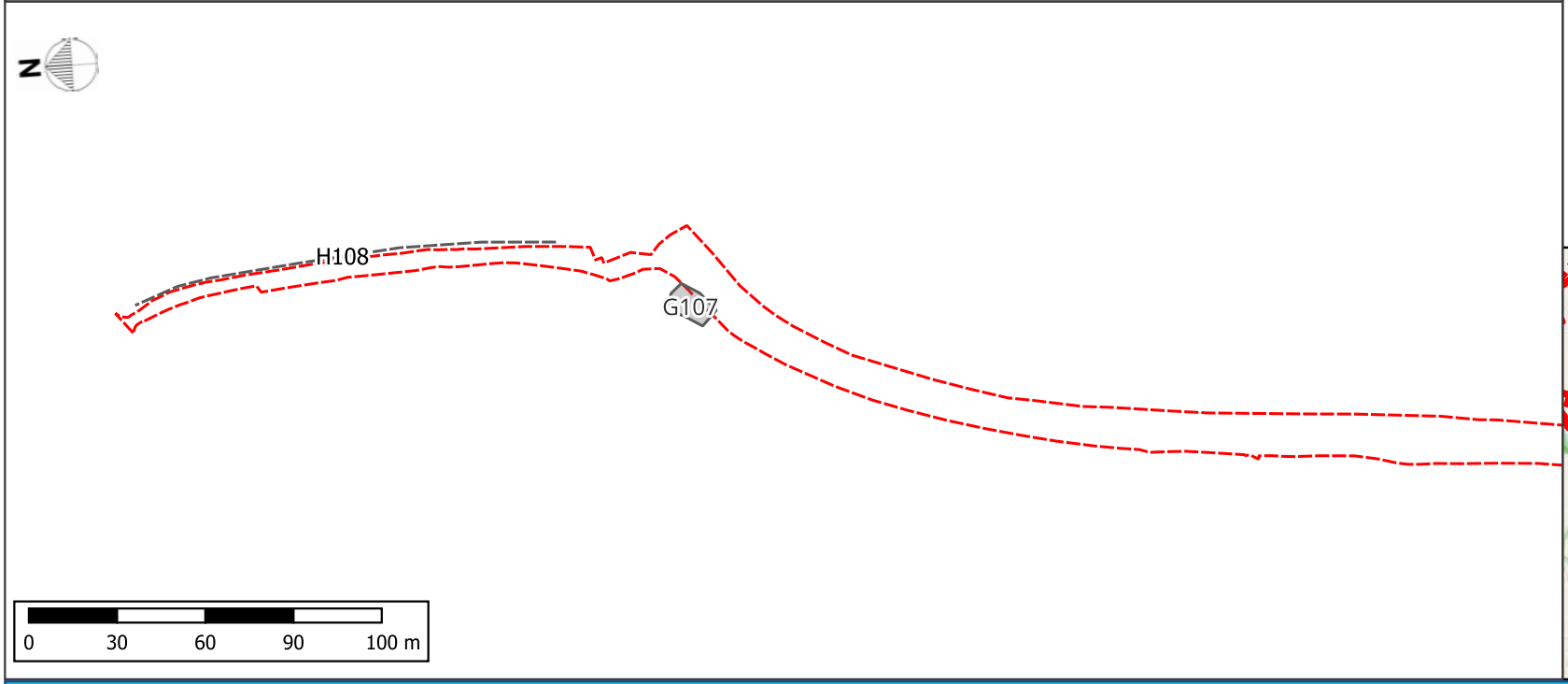
Other Item

- *Srub / Shrubs*
- *Red Line Boundary*

Scale:1:2500 @A3

Tree Protection Plan Figure 2.12





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

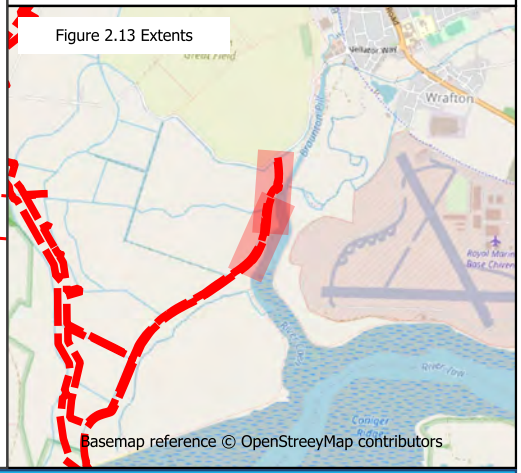
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

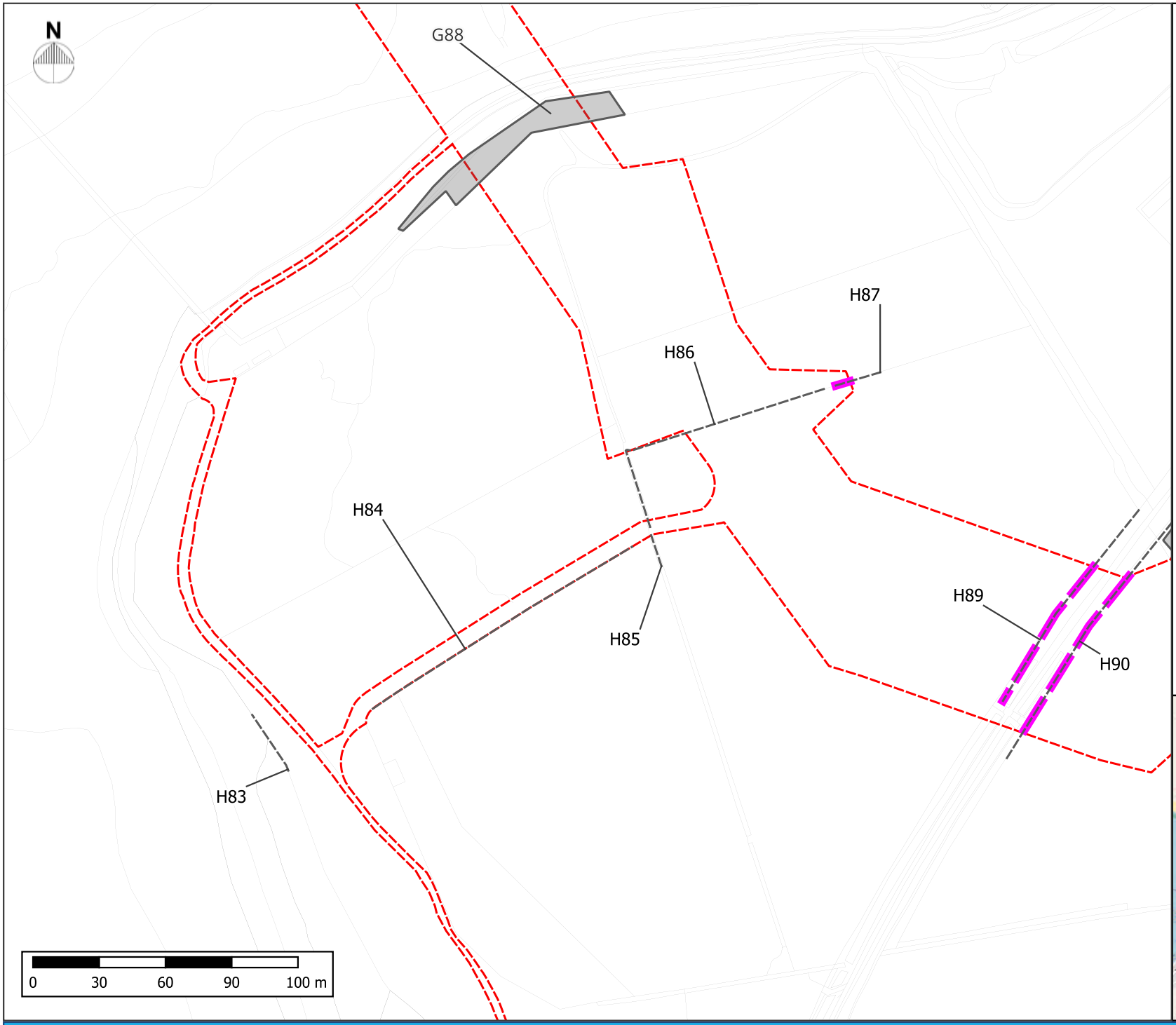
Other Item

- *Srub / Shrubs*
- *Red Line Boundary*



Scale:1:2500 @A3

Tree Protection Plan Figure 2.13



Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

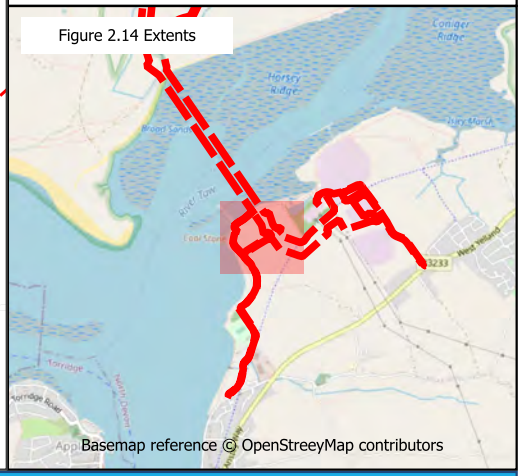
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

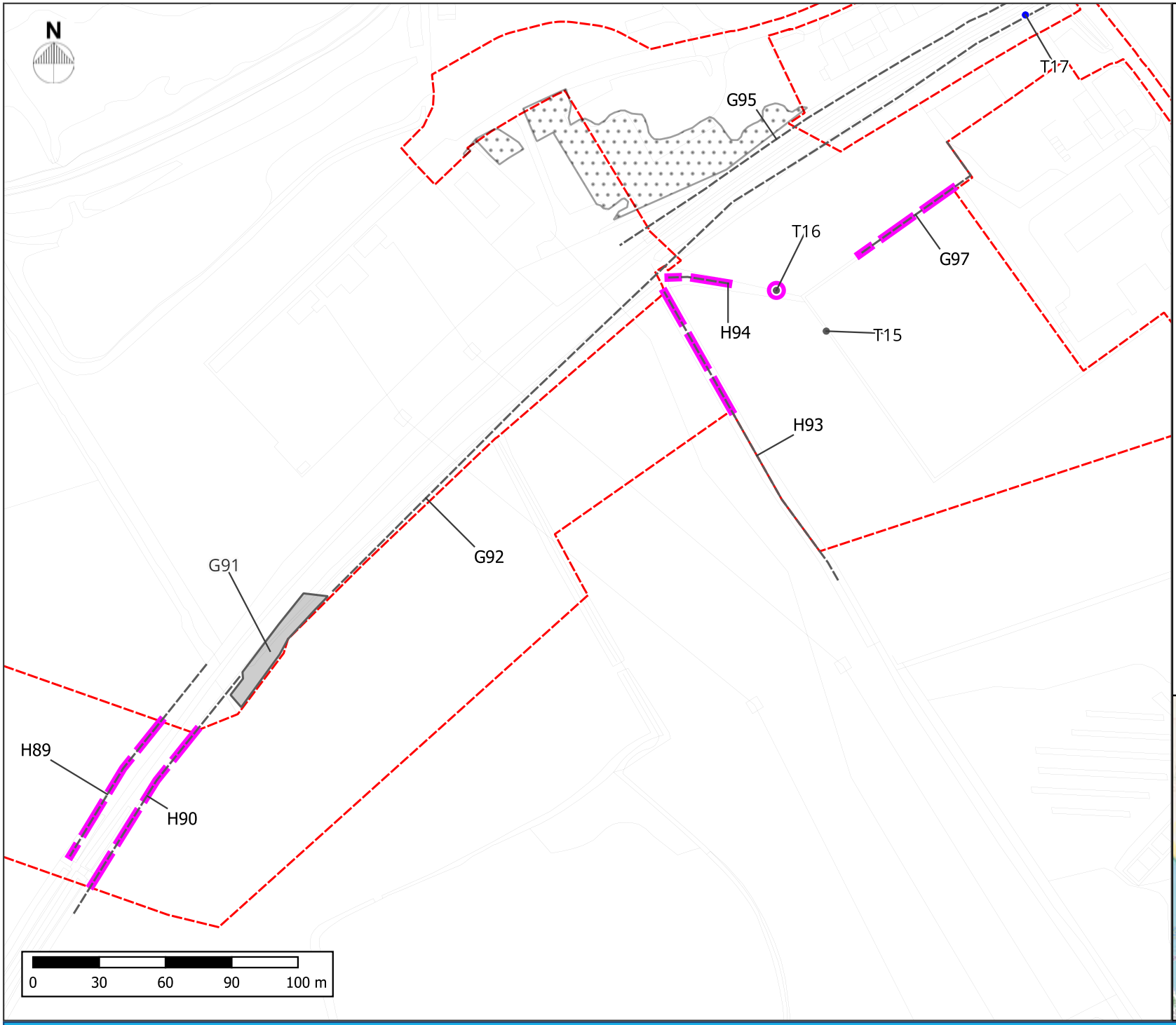
Other Item

- *Srub / Shrubs*
- *Red Line Boundary*



Scale:1:2500 @A3

Tree Protection Plan Figure 2.14



Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

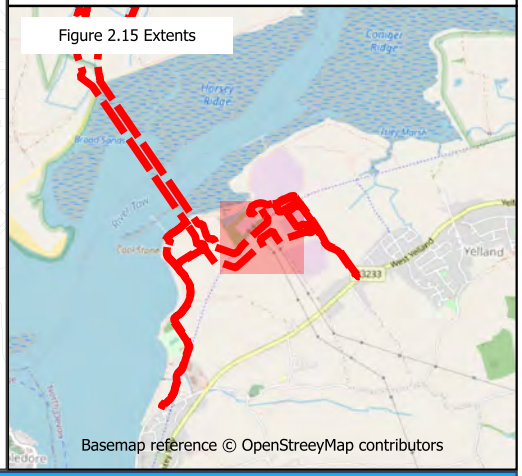
- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual)*
- *Tree Group / Hedge (Linear)*

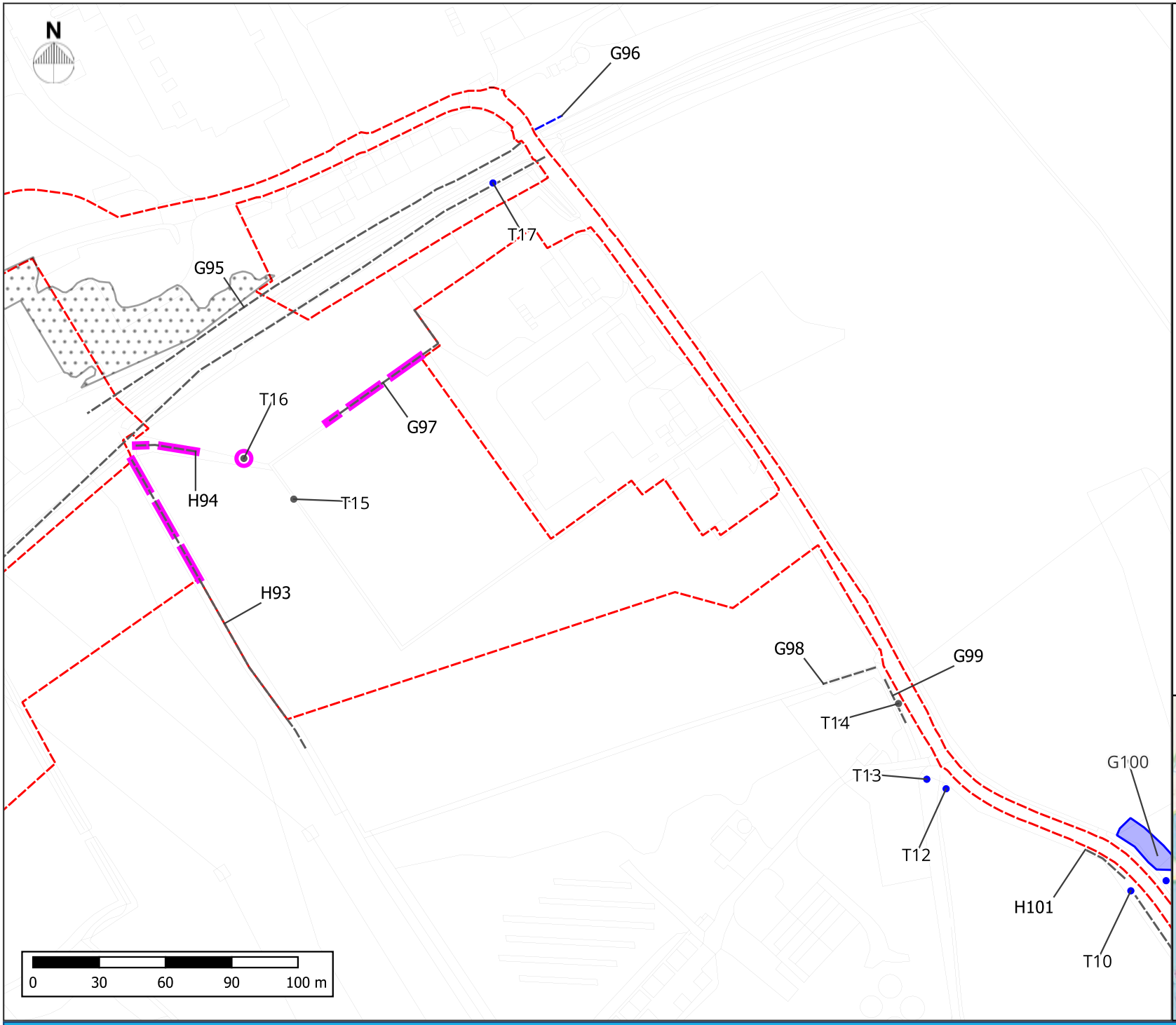
Other Item

- *Srub / Shrubs*
- *Red Line Boundary*



Scale:1:2500 @A3

Tree Protection Plan Figure 2.15



Key

Baseline Survey Data

Tree (Individual)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Tree Group (Polygon)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C

Tree Group / Hedge (Linear)

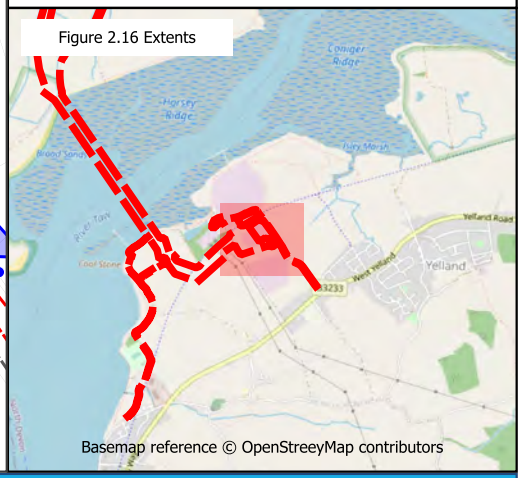
- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Arboricultural Removals

- Tree (Individual)
- Tree Group / Hedge (Linear)

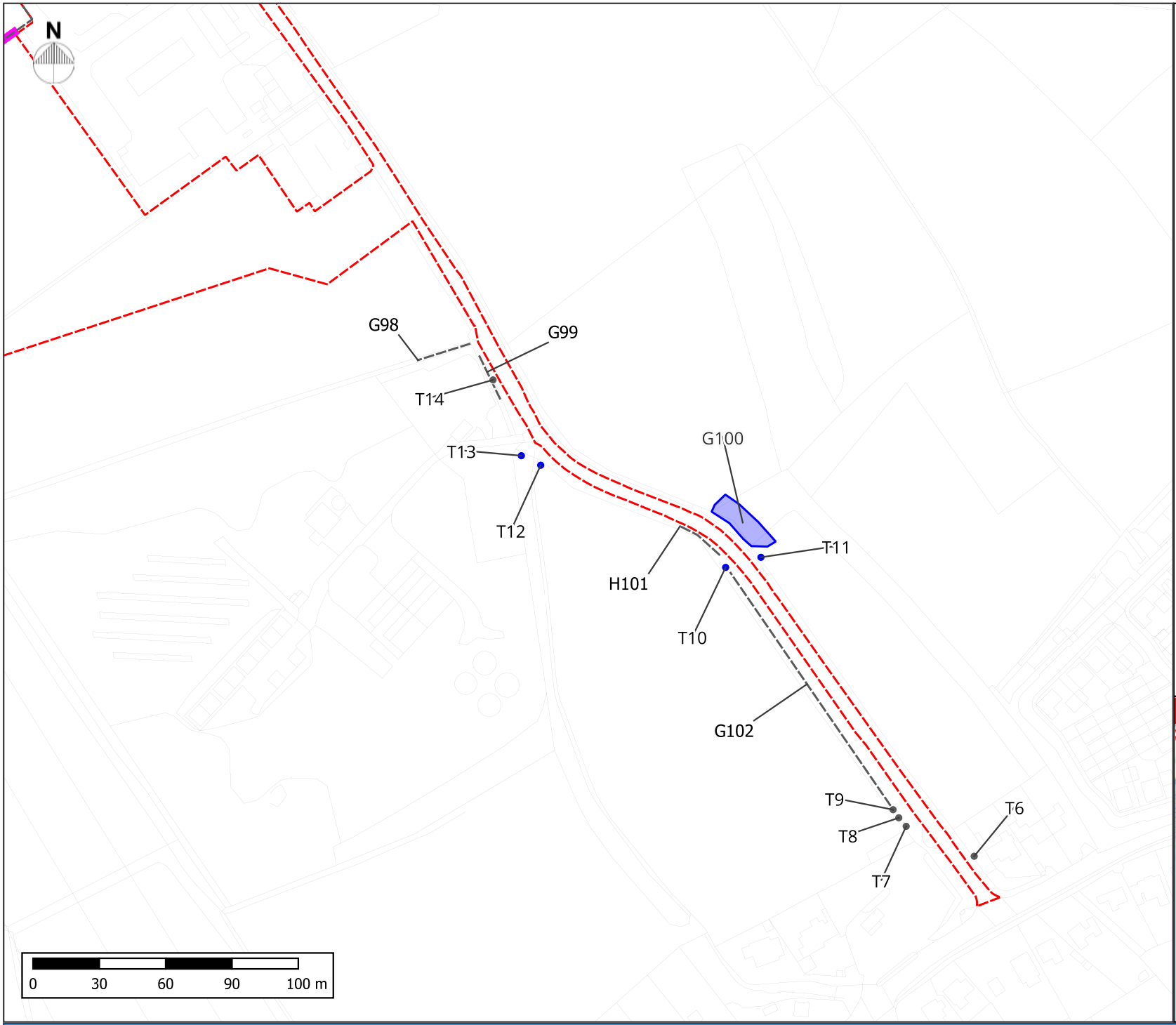
Other Item

- Srub / Shrubs
- Red Line Boundary



Scale:1:2500 @A3

Tree Protection Plan Figure 2.16



Key

Baseline Survey Data

Tree (Individual)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Tree Group (Polygon)

- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C

Tree Group / Hedge (Linear)

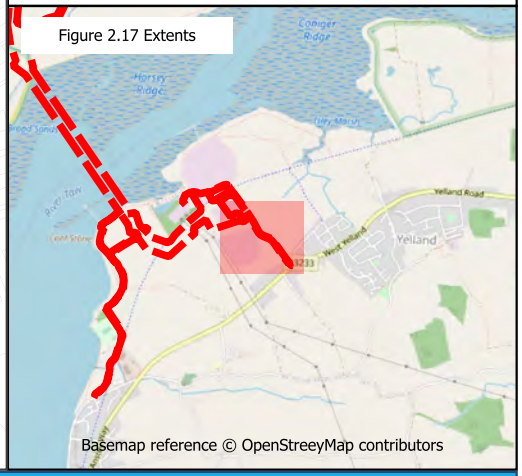
- Moderate-Quality / BS 5837 Category B
- Low-Quality / BS 5837 Category C
- Very-Low Quality / BS 5837 Category U

Arboricultural Removals

- Tree (Individual)
- Tree Group / Hedge (Linear)

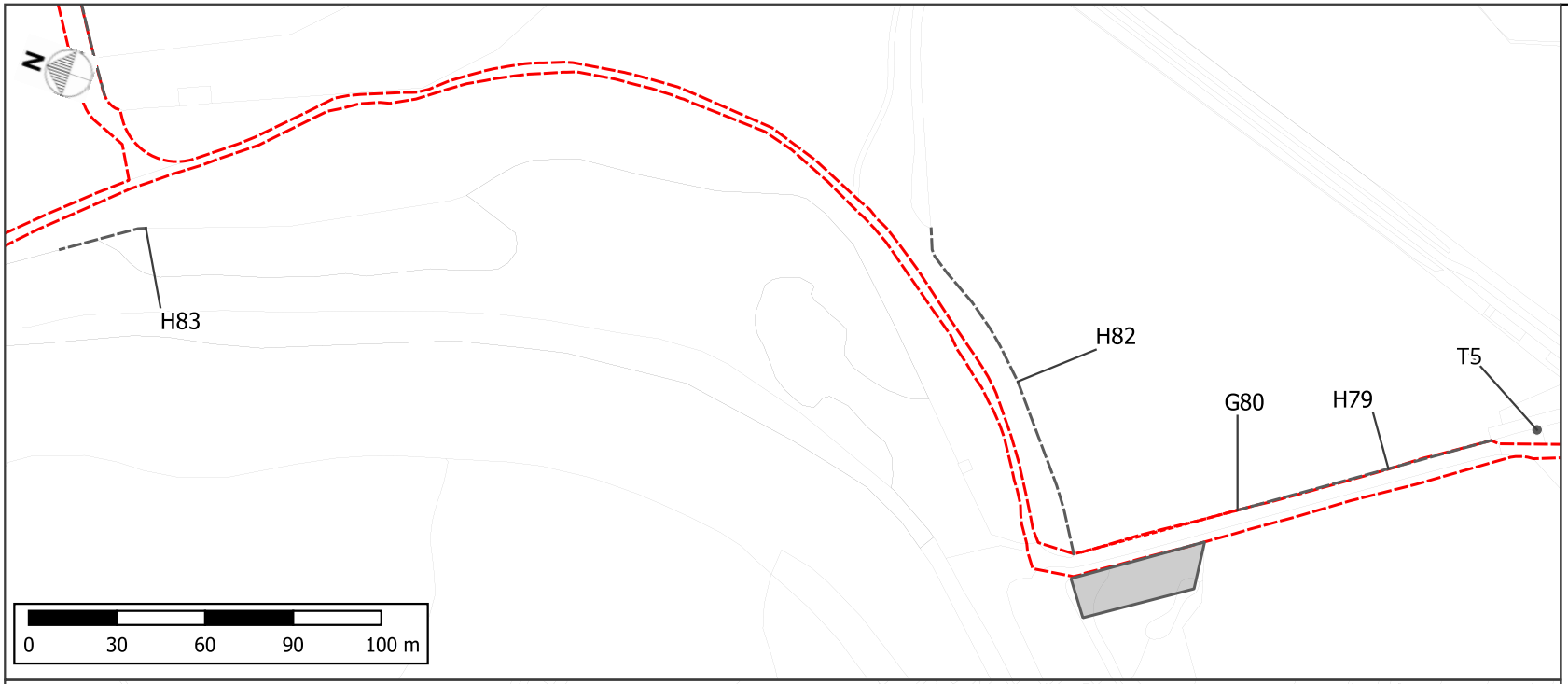
Other Item

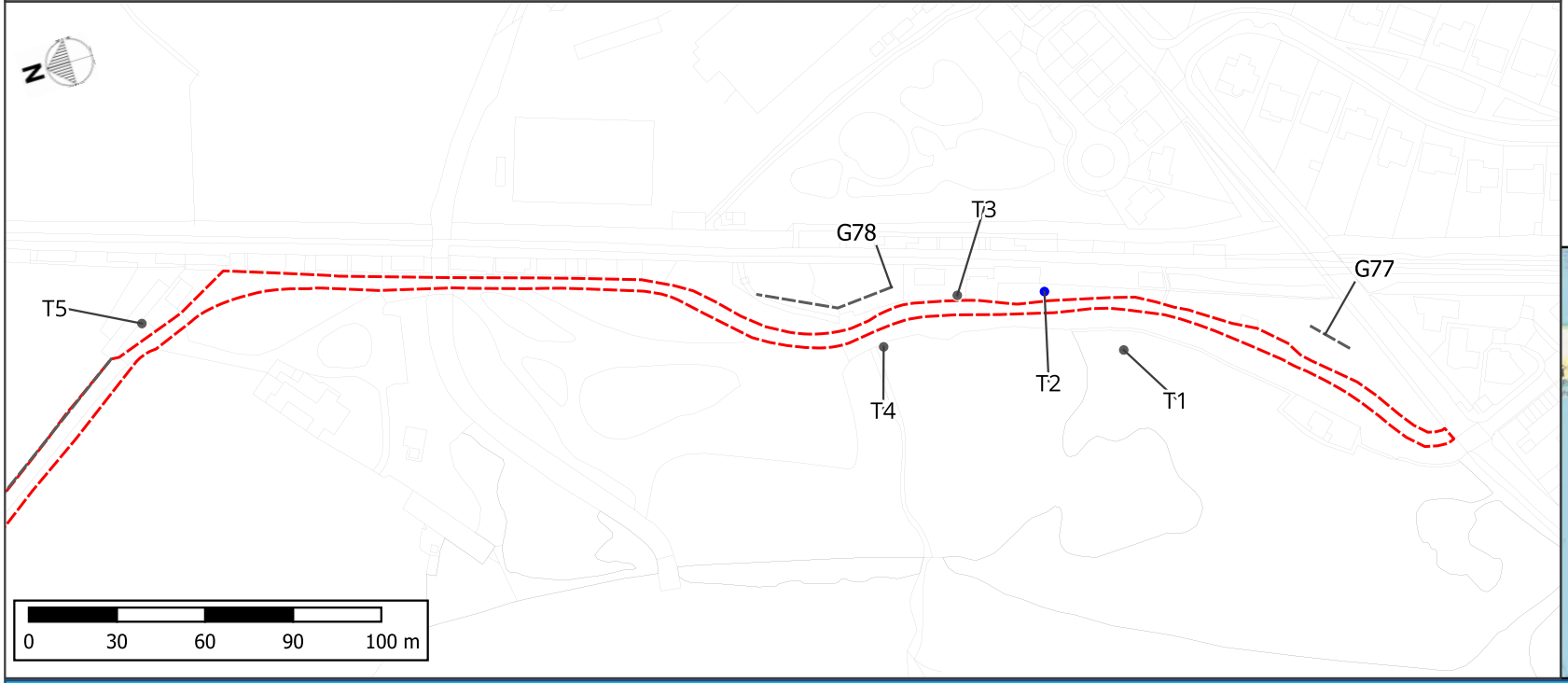
- Srub / Shrubs
- Red Line Boundary



Scale:1:2500 @A3

Tree Protection Plan Figure 2.17





Key

Baseline Survey Data

Tree (Individual)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Tree Group (Polygon)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*

Tree Group / Hedge (Linear)

- *Moderate-Quality / BS 5837 Category B*
- *Low-Quality / BS 5837 Category C*
- *Very-Low Quality / BS 5837 Category U*

Arboricultural Removals

- *Tree (Individual) [20]*
- *Tree Group / Hedge (Linear) [18]*

Other Item

- *Srub / Shrubs*
- *Red Line Boundary*

Scale:1:2500 @A3

Tree Protection Plan Figure 2.18