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White Cross Offshore Windfarm Environmental Statement

Chapter 20: Onshore Ecology and Ornithology

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Glossary of Acronyms

Acronym	Definition
AONB	Area of Outstanding Natural Beauty
BEIS	Department for Business, Energy and Industrial Strategy
CEA	Cumulative Effect Assessment
CWS	County Wildlife Site
DBRC	Devon Biodiversity Records Centre
Defra	Department for Environment, Food and Rural Affairs
DWT	Devon Wildlife Trust
EIA	Environmental Impact Assessment
EMFs	Electromagnetic Frequency
EPS	European Protect Species
ES	Environmental Statement
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
MCZ	Marine Conservation Zone
MMO	Marine Management Organisation
NE	Natural England
NNR	National Nature Reserve
NPS	National Policy Statement
OWL	Offshore Wind Ltd
PPG	Pollution Prevention Guidelines
RIAA	Report to Inform an Appropriate Assessment
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
SuDS	Sustainable Drainage Systems
UK	United Kingdom
UWS	Unconfirmed Wildlife Site
WTG	Wind Turbine Generator
ZoI	Zone of Influence

Glossary of Terminology

Defined Term	Description
Applicant	Offshore Wind Limited
Commitment	A term used interchangeably with mitigation. Commitments are Embedded Mitigation Measures. Commitments are either Primary (Design) or Tertiary (Inherent) and embedded within the assessment at the relevant point in the EIA (e.g. at Scoping). The purpose of commitments is to reduce and/or eliminate Likely Significant Effects (LSE's), in EIA terms.
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.
Department for Business, Energy and Industrial Strategy (BEIS)	Government department that is responsible for business, industrial strategy, science and innovation and energy and climate change policy and consent under Section 36 of the Electricity Act.
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.
Development Area	The area comprising the Onshore Development Area and the Offshore Development Area.
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 National Grid Onshore Substation comprising both the Offshore Export Cable Corridor and Onshore Export Cable Corridor.
Floating substructure	The floating substructure acts as a stable and buoyant foundation for the WTG. The WTG is connected to the substructure via the transition piece and the substructure is kept in position by the mooring system.
Generation Assets	The infrastructure of the Project related to the generation of electricity within the windfarm site, including wind turbine generators, substructures, mooring lines, seabed anchors and inter-array cables.
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.
Inter-array cables	Cables which link the wind turbines to each other and the Offshore Substation Platform, or at the inter-array cables junction box (if no offshore substation). Array cables will connect the wind turbines to one

Defined Term	Description
	and other and to the Offshore Substation (if utilised). The initial section for the inter-array cables will be freely suspended in the water column below the substructure (dynamic sections) while the on seabed sections of the cables will be buried where possible.
Jointing bay	Underground structures constructed at regular intervals along the Onshore Export Cable Corridor to join sections of cable and facilitate installation of the cables into the buried ducts.
Landfall	Where the offshore export cables come ashore.
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.
Mooring system	The equipment (mooring lines and seabed anchors) that keeps the floating substructure in position during operation through a fixed connection to the seabed.
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 any predicted significant impacts. Additional mitigation is therefore subsequently adopted by OWL as the EIA process progresses.
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.
Offshore Development Area	The Windfarm Site (including wind turbine generators, substructures, mooring lines, seabed anchors, inter-array cables and Offshore Substation Platform (as applicable)) and Offshore Export Cable Corridor to MHWS at the Landfall. This encompasses the part of the project that is the focus of this application and Environmental Statement and the parts of the project consented under Section 36 of the Electricity Act and the Marine and Coastal Access Act 2009.

Defined Term	Description
Offshore Export Cables	The cables which bring electricity from the Offshore Substation Platform or the inter-array cables junction box to the Landfall.
Offshore Export Cable Corridor	The proposed offshore area in which the export cables will be laid, from Offshore Substation Platform or the inter-array cable junction box to the Landfall.
Offshore Infrastructure	All of the offshore infrastructure including wind turbine generators, substructures, mooring lines, seabed anchors, Offshore Substation Platform and all cable types (export and inter-array). This encompasses the infrastructure that is the focus of this application and Environmental Statement and the parts of the project consented under Section 36 of the Electricity Act and the Marine and Coastal Access Act 2009.
Offshore Substation Platform	A fixed structure located within the Windfarm Site, containing electrical equipment to aggregate the power from the wind turbines and convert it into a more suitable form for export to shore.
Offshore Transmission Assets	The aspects of the project related to the transmission of electricity from the generation assets including the Offshore Substation Platform (as applicable)) or offshore junction box, Offshore Cable Corridor to MHWS at the Landfall.
Offshore Transmission Owner	An OFTO, appointed in UK by Ofgem (Office of Gas and Electricity Markets), has ownership and responsibility for the transmission assets of an offshore windfarm.
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 National 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 National Grid grid connection 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 National Grid grid connection at East Yelland.
Onshore Infrastructure	The combined name for all infrastructure associated with the Project from MLWS at the Landfall to the National Grid 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 project related to the transmission of electricity from MLWS at the Landfall to the National Grid grid connection at East Yelland including the Onshore Export Cable, the White Cross Onshore Substation and onward connection to the National Grid grid connection at East Yelland.
Project	The Project for the offshore Section 36 and Marine Licence application includes all components offshore of MHWS. This includes the infrastructure within the windfarm site (e.g. wind turbine generators,

Defined Term	Description
	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).
Transition joint bay	Underground structures at the Landfall that house the joints between the offshore export cables and the onshore export cables.
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 National Grid electrical requirements at the grid connection at East Yelland.
Wind Turbine Generators (WTG)	The wind turbine generators convert wind energy into electrical power. Key components include the rotor blades, nacelle (housing for electrical generator and other electrical and control equipment) and tower. The final selection of project wind turbine model will be made post-consent application.
Windfarm Site	The area within which the wind turbines, Offshore Substation Platform and inter-array cables will be present.
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.

20. Onshore Ecology and Ornithology

20.1 Introduction

1. This chapter of the Environmental Statement (ES) presents the potential impacts of the White Cross Offshore Windfarm Project (the Offshore Project) on onshore ecology and ornithology. Specifically, this chapter considers the potential impact of the Offshore Project on the onshore ecology receptors of construction, operation and maintenance, and decommissioning phases seaward of Mean High-Water Springs (MHWS). Therefore, only those impacts that would arise from activities within and below MHWS springs are assessed with the closest elements to onshore being at the Landfall and the Taw Estuary Crossing. The Onshore Project (which covers activities and infrastructure above MLWS) are assessed and submitted within the separate onshore application.

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 the Marine Management Organisation (MMO) on behalf of the Secretary of State for Business for The Department for Business, Energy and Industrial Strategy (BEIS) for Section 36 Consent and relevant Marine Licences under the Marine and Coastal Access Act 2009.

3. 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.

20.2 Policy, Legislation and Guidance

4. **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.

20.2.1 National Policy Statement

5. The specific assessment requirements for onshore ecology and ornithology are set out within the overarching National Policy Statement (NPS) for Energy (EN-1) and NPS for Renewable Energy Infrastructure (EN-3) and summarised in **Table 20.1**. Whilst the project does not fall under the category of a Nationally Significant Infrastructure Project (NSIP) the provisions are considered relevant. It is noted that the draft revised NPS have been reviewed but only material changes have been included in **Table 20.1**.

20.2.1 National Planning Policy Framework

6. 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 20.2**.

20.2.2 Other legislation, policy and guidance

7. In addition to NPS and NPPF, there are a number of pieces of legislation, policy and guidance applicable 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
- Marine and Coastal Access Act 2009
- The Commons Act 2006
- Countryside and Rights of Way (CRoW) Act 2000
- Natural Environment White Paper 2011
- Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services
- Natural England and Forestry Commission's Standing Advice on Ancient Woodland (2022)
- North Devon and Torridge Local Plan 2011-2031 (2018) and Local Development Scheme 2022.

8. Further detail is provided in **Chapter 3: Policy and Legislative Context**, and **Table 20.3** for those not covered in that chapter.

Table 20.1 Summary of NPS EN-1, EN-3and 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 Section 5.3.3**	See **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**
"The applicant should show how the project has taken advantage of opportunities to conserve and enhance biodiversity and geological conservation interests." - **EN-1 Section 5.3.4**	See mitigation measures in **Section 20.3.7.1**
"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 environment." - **EN-1 Sections 5.3.5, 5.3.7 and 5.3.8**	See **Chapter 4: Site Selection and Assessment of Alternatives**, and **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**

Summary	How and where this is considered in the ES
"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 Section 5.3.9**	There are no SPAs screened into the assessment as they are not within the zone of influence (ZoI) of the onshore works
"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 Section 5.3.11**	SSSIs are identified in **Section** Error! Reference source not found., and features and sites assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**
"Where a proposed development on land within or outside a Site of Special Scientific Interested (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 Section 5.3.11**	SSSIs are identified in **Section** Error! Reference source not found., and features and sites assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**. The outcomes of the assessment were to identify mitigation measures (both embedded or additional) to prevent any long-term impact to SSSIs
"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**	Local biodiversity sites are identified in **Section** Error! Reference source not found., and features and sites assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**. Only one local 'unconfirmed' wildlife site was identified in the potential works areas and impacts are temporary
"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. 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	No ancient woodland is present within the study area, see **Section** Error! Reference source not found.

Summary	How and where this is considered in the ES
affected by development proposals the applicant should set out proposals for their conservation or, where their loss is unavoidable, the reasons why." - **EN-1 Section 5.3.14**	
"The IPC will aim to maximise opportunities to build in beneficial biodiversity features when considering proposals as part of good design." - **EN-1 Section 5.3.15**	Without causing potential disturbance or impact to designated site features none were identified, though enhancements are being proposed for the onshore works Town and Country Planning application
"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 Sections 5.3.16 – 5.3.17**	Impacts on protected species and habitats and species of principal importance are identified in **Section** Error! Reference source not found., and features and sites assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**. The outcomes of the assessment were to identify mitigation measures (both embedded or additional) to prevent significant impacts to any of these
"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 Sections 5.3.18**	Mitigation measures that are embedded in the project or additional are summarised in **Section 20.3.7.1**

Summary	How and where this is considered in the ES
"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 Section 5.3.20**	Mitigation measures that are embedded in the project or additional are summarised in **Section 20.3.7.1**. Currently no protected species licences are identified as being required
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 Section 2.4.2**	Mitigation measures that are embedded in the project or additional are summarised in **Section 20.3.7.1**. The outcomes of the assessment in **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11** identify any potentially significant impacts and to mitigate for them
"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 Section 2.6.71**	Mitigation measures that are embedded in the project or additional are summarised in **Section 20.3.7.1** including monitoring during construction (such as ECoW)
"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 2.7.15**	No final decision has yet been made regarding the final decommissioning policy for the project infrastructure. It is also recognised that legislation and industry best practice change over time. However, it is likely that the onshore project equipment, including the cable, will be removed, reused, or recycled where possible and the transition bays and cable ducts being left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the purposes of a worst-case scenario, the impacts will be no greater than those identified for the construction phase

Summary	How and where this is considered in the ES
EN-5 NPS for Electricity Networks Infrastructure (EN-5)	
Generic biodiversity effects are covered in Section 5.3 of EN-1. However, large birds such as swans and geese may collide with overhead lines associated with power infrastructure, particularly in poor visibility. Large birds in particular may also be electrocuted when landing or taking off by completing an electric circuit between live and ground wires. Even perching birds can be killed as soon as their wings touch energised parts. "The applicant will need to consider whether the proposed line will cause such problems at any point along its length and take this into consideration in the preparation of the Environmental Impact Assessment (EIA) and ES (see Section 4.2 of EN-1). Particular consideration should be given to feeding and hunting grounds, migration corridors and breeding grounds. "The IPC should ensure that this issue has been considered in the ES and that appropriate mitigation measures will be taken where necessary.' - **EN-5 Section 2.7.2 and 2.7.3**	As the offshore works entail burial of the cables no permanent impacts on birds are expected either breeding or non-breeding Embedded mitigation is outlined in **Section 20.3.7**.

Table 20.2 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 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 no. 174**	Impacts on protected species and habitats and species of principal importance are identified in **Section** Error! Reference source not found., and features and sites assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**. The outcomes of the assessment were to identify mitigation measures (both embedded or additional) to prevent significant impacts to any of these. Without causing potential disturbance or impact to designated site features none were identified, though enhancements are being proposed for the onshore works Town and Country Planning application
“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 Framework58; 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 no. 175**	Whilst not a plan, the assessment of impacts on the hierarchy of designated sites present are identified in **Section** Error! Reference source not found., and features and sites assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**

Summary	How and where this is considered in the ES
“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 no.176**	See **Chapter 4: Site Selection and Assessment of Alternatives**, and, impacts on protected species and habitats and species of principal importance are identified in **Section** Error! Reference source not found., and features and sites assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**. The outcomes of the assessment were to identify mitigation measures (both embedded or additional) to prevent significant impacts to any of these
“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 biodiversity61; wildlife corridors and steppingstones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation62; 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 no. 179**	Biodiversity receptors are identified in **Section** Error! Reference source not found., and sites and species at all levels assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**. The outcomes of the assessment were to identify mitigation measures (both embedded or additional) to prevent significant impacts to 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	Impacts on protected species and habitats and species of principal importance are assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**. The outcomes of the assessment were to identify mitigation measures (both embedded or additional) to prevent significant impacts to any of these. Mitigation measures that are embedded in the project or additional are summarised in **Section 20.3.7.1**

Summary	How and where this is considered in the ES
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 biodiversity or enhance public access to nature where this is appropriate." **-NPPF, paragraph no. 180**	
"The following should be given the same protection as habitats sites: a) potential Special Protection Areas and possible Special Areas of Conservation; b) listed or proposed Ramsar sites64; 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 no. 181**.	During the baseline collection and assessment no sites of these types were screened into the assessment. Therefore none would be affected by the 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 no. 182**.	Impacts on internationally designated sites are assessed within **Sections 20.5**, **20.6**, **20.7**, **20.8**, **20.9**, **20.10**, and **20.11**, and in more detailed in **Appendix 6.A** (the Report to Inform the Appropriate Assessment). The outcomes of the assessment identified embedded mitigation measures (summarised in **Section 20.3.7.1**) to prevent and adverse effect on the integrity of any sites

Table 20.3 Summary of legislation and policy not covered 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.
The Commons Act 2006	The Act aims to protect areas of common land, in a sustainable manner delivering benefits for farming, public access and biodiversity (Department for Environment, Food and Rural Affairs (Defra), 2013).
Countryside and Rights of Way (CRoW) Act 2000	The Act amends the law relating to public rights of way including making provision for public access on foot to certain types of land. Amendments are made in relation to SSSIs to improve their management and protection, as well as to the Wildlife and Countryside Act 1981, to strengthen the legal protection for threatened species. Provision is also made for Areas of Outstanding Natural Beauty (AONB) to improve their management.
Natural Environment White Paper 2011	The paper was the first White Paper produced by the government in 20 years. The paper contains plans to reconnect nature, connect people and nature for better quality of life and capture and improve the value of nature.
Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services	The Strategy sets out how England will implement the 2010 Aichi Biodiversity Targets, European Commission's 2011 EU Biodiversity Strategy and the recommendations of the 2011 Natural Environment White Paper. It contains targets for improving priority habitats, no net loss of priority habitats, conservation of land and inland waters, restoring degraded ecosystems, and more engagement by people in biodiversity issues and awareness.
Natural England and Forestry Commission's Standing Advice on Ancient Woodland (2022)	Recommends the protection of ancient woodlands.

Policy / Legislation	Summary
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 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
	Policy ST14: Enhancing Environmental Assets The quality of northern Devon's natural environment will be protected and enhanced by ensuring that development contributes to: (b) protecting the hierarchy of designated sites in accordance with their status; (c) conserving European protected species and the habitats on which they depend;

20.3 Assessment Methodology

20.3.1 Study Area

9. Details of the location of the Project and the offshore components that are close to onshore receptors and the Taw Estuary (below Mean High Water Springs (MHWS)) crossing are set out within **Chapter 5: Project Description**.

10. The onshore ecology and ornithology study area is defined by the distance over which impacts on ecology and ornithology from the offshore project components (i.e. Offshore Substation, Landfall, and Offshore Export Cable Corridor) may occur and by the location of any receptors that may be affected by those potential impacts. The study area for onshore ecological receptors are presented in **Table 20.4**.

Table 20.4 Study areas used for onshore ecology receptors in this ES

Data/ survey	Study area
Protected and notable species (excluding great crested newts, birds and bats)	Within and up to 2km from the Landfall (intertidal zone being closest) and Taw Estuary Crossing (below MHWS).
Great crested newts	Within and up to 250m form the Landfall (intertidal zone being closest) and Taw Estuary Crossing (below MHWS).
Bats and birds	Within and up to 5km from the Landfall (intertidal zone being closest) and Taw Estuary Crossing (below MHWS).
Statutory and non-statutory designated sites	Within and up to 2km from the Landfall (intertidal zone being closest) and Taw Estuary Crossing (below MHWS).
UK Habitats of Principal Importance (UKHPI) and Forestry habitats	Within and up to 2km from the Landfall (intertidal zone being closest) and Taw Estuary Crossing (below MHWS).
Statutory sites and associated impact risk zones	Within and up to 2km from the Landfall (intertidal zone being closest) and Taw Estuary Crossing (below MHWS).

11. This has been established using professional judgement and professional judgement from similar projects, as well as in accordance with the accepted industry guidance (CIEEM, 2018), shown in **Figure 20.1**.

20.3.2 Approach to Assessment

12. The assessment methodology for onshore ecology and ornithology is consistent with that presented in **Chapter 6: EIA Methodology**.

Figure 20.1: Onshore ecology and ornithology study area

20.3.2.1 Approach to onshore ecology and ornithology assessment

13. The following sections describe more specifically the methodology that has been applied in relation to onshore ecology that is based on the *Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine* (CIEEM, 2018).

14. The CIEEM guidelines aim to predict the residual impacts on important ecological features affected, either directly or indirectly by a development, once all the appropriate mitigation has been implemented.

15. The approach to determining the significance of an impact follows a systematic process for all impacts. This involves identifying, qualifying and, where possible, quantifying sensitivity of all ecological receptors which have been scoped into this assessment. Then the magnitude of the various direct and indirect (and secondary) impacts is similarly quantified wherever possible (or therefore qualified). Using this information, a significance of each potential effect has been determined. Each of these steps is set out in the remainder of this section.

16. The assessment has used professional judgement to ensure assessed significance level is appropriate for each individual receptor, taking account of local values for biodiversity to avoid a subjective assessment wherever possible as per the CIEEM guidelines. As a result, the assessed significance level may not always be directly attributed to the guidance matrix detailed below.

20.3.2.2 Impact assessment criteria

17. The terms used to define sensitivity of receptors and magnitude of impacts are outlined in **Table 20.5** and **Table 20.6** respectively.

Table 20.5 Definition of terms relating to receptor sensitivity

Sensitivity	Definition
High	Habitats or species that form part of the cited interest within an internationally or nationally protected site, such as those designated under the Habitats Directive (e.g., SACs) or other international convention (e.g., Ramsar site). A feature (e.g., habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in an international/national context, such that the site is likely to be designated as a site of European importance (e.g., SAC). Habitats or species that form part of the cited interest within a nationally designated site, such as an SSSI or an NNR. A feature (e.g., habitat or population) which is either unique or sufficiently unusual to be considered as being one of the highest quality examples in a national context for which the site could potentially be designated as a SSSI.

Sensitivity	Definition
	Presence of UKBAP habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.
Medium	A feature (e.g., habitat or population), which is either unique or sufficiently unusual to be considered as being of nature conservation value from a county to regional level. Habitats or species that form part of the cited interest of an LNR, or some local-level designated sites, such as a LWS, also referred to as a non-statutory Site of Importance for Nature Conservation or the equivalent, e.g., Ancient Woodland designation. Presence of LBAP habitats or species, where the action plan states that all areas of representative habitat or individuals of the species should be protected.
Low	A feature of importance at district level. A feature (e.g., habitat or population) that is of nature conservation value in a local context only, with insufficient value to merit a formal nature conservation designation.
Negligible	A feature of importance at local level. Commonplace feature of little or no habitat/historical significance. Loss of such a feature would not be seen as detrimental to the ecology of the area.

Table 20.6 Definition of terms 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.

18. The sensitivity of a receptor is determined through its ability to accommodate change and on its ability to recover if it is negatively affected (**Table 20.5**). The sensitivity level of onshore ecology receptors to each type of impact is justified within the impact assessment and is dependent on the following factors:

- Adaptability – The degree to which a receptor can avoid or adapt to an effect
- Tolerance – The ability of a receptor to accommodate temporary or permanent change without a significant adverse effect
- Recoverability – The temporal scale over and extent to which a receptor will recover following an effect
- Value – A measure of the receptor importance and rarity (as reflected in the species conservation status and legislative importance.

19. The 'value' of the receptor forms an important component within the assessment, for instance, if the receptor is a protected species. It is important to understand that high value and high sensitivity are not necessarily linked within a particular impact. A receptor could be of high value (e.g. an Annex II species) but have a low or negligible physical/ecological sensitivity to an effect. Similarly, low value does not equate to low sensitivity and is judged on a receptor by receptor basis.

20. The magnitude of the potential impacts is based on the scale or degree of impact to the baseline conditions and is categorised into four levels of magnitude: high, medium, low, or negligible, as defined in **Table 20.6**. Where no magnitude of impact occurs this therefore would result in no effect.

21. Determining the magnitude of an impact considers several factors, including:

- Type of activity: will the effects be permanent or temporary
- Duration and frequency of the activity
- Extent of the activity
- Timing and location of the activity.

22. The thresholds for defining the magnitude of effect that could occur from a particular impact has been determined based on current scientific knowledge, professional experience and judgement.

23. The significance of the effect upon onshore ecology and ornithology is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The method employed for this assessment is presented in **Table 20.7**.

Table 20.7 Significance of an effect - 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

24. Effects can be beneficial (positive enhancement or improvement to the receptor) or adverse (where there is a reduction in scale, extent, distribution, or resilience of a receptor. Potential effects identified within the assessment as major or moderate are regarded as significant in terms of the EIA regulations. Appropriate mitigation has

been identified, where possible. The aim of mitigation measures is to avoid or reduce the overall effect in order to determine a residual effect upon a given receptor.

20.3.3 Cumulative Effect Assessment

25. **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.

26. The key consideration used in relation to linear development such as the onshore project area 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 is however potential for a cumulative effect upon the overall habitat resource at a regional or national level. Where potential regional or national level impacts are identified and considered to be relevant they are highlighted in the CEA.

27. 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 impact i.e. where developments follow on from one another before the species has recovered from displacement or other impact. In addition, whilst it is assumed that any consented development would be subject to mitigation and management measures which would reduce impacts to non-significant unless there were exceptional circumstances, it is accepted that such projects may contribute to a wider cumulative effect.

28. Finally, in cases where this project has negligible or no impact on a receptor (through for example avoidance of impact through routeing or construction methodology) it is considered that there is no pathway for a cumulative effect.

29. Further details of the methods used for the CEA for onshore ecology and ornithology are provided in **Section 22.8**.

20.3.4 Transboundary Impact Assessment

30. There are no transboundary impacts with regards to onshore ecology as the proposed onshore project area works 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.

31. Transboundary effects on ornithological receptors were scoped out as the proposed onshore (intertidal) works are not sited in proximity to any international boundaries.

Migratory birds present within the intertidal habitat 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 (excluding those considered in **Chapter 13: Offshore Ornithology** are therefore scoped out of this assessment and will not be considered further.

20.3.5 Habitats Regulations Assessment

32. A Report to Inform the Appropriate Assessment (RIAA) to support the Habitats Regulations Assessment (HRA) has been prepared for the project (see **Appendix 6.A**) and has been submitted as part of the consent application. The RIAA contains an assessment of 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.

33. This chapter draws on the information provided and assessed within the RIAA where relevant to do so, i.e. where potential impacts upon ecological receptors which are associated with European sites and their qualifying features have been identified. For more details regarding the HRA assessment, please refer to the RIAA (see **Appendix 6.A**).

20.3.6 Worst-Case Scenario

34. In accordance with the assessment approach to the Project Design Envelope, or '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**.

35. **Table 20.8** presents the realistic worst-case scenario components considered for the assessment of onshore ecology and ornithology, with the focus on those elements closest to land, notably the Landfall (intertidal) works and the Taw Estuary Crossing.

Table 20.8 Definition of realistic worst-case scenario details relevant to the assessment of impacts in relation to onshore ecology and ornithology

Impact	Parameter
Construction	
Offshore Export Cable at Landfall – trenching	Landfall trenching (temporary works) physical parameters: 2 export cables Trench width= 0.5m Trench depth = >1.2m deep Length of trenching = 270m Total area of cables = 270m2 Total volume of excavation = 324m^3
	Duration Less than 5 days
Offshore Export Cable at Landfall – trenchless technique	Landfall trenchless technique (temporary works) physical parameters: Trenchless technique length = 500m -1,500m Trenchless technique to include 12 hours / 7 days working where required.
	Duration: Trenchless technique duration approximately 32 days
Operation and Maintenance	
Export Cable at Landfall	Cable operational physical parameters: Transition joint bays at ground level (manholes) within car park No other above ground structures
Decommissioning	
No final decision has yet been made regarding the final decommissioning policy for the project infrastructure. It is also recognised that legislation and industry best practice change over time. However, it is likely that the onshore project equipment, including the cable, will be removed, reused, or recycled where possible and the transition bays and cable ducts being left in place. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and will be agreed with the regulator. It is anticipated that for the purposes of a worst-case scenario, the impacts will be no greater than those identified for the construction phase.	

20.3.7 Summary of Mitigation

20.3.7.1 Embedded Mitigation

36. This section outlines the embedded mitigation relevant to the onshore ecology and ornithology assessment, which has been incorporated into the design of the projects (**Table 20.9**). Where other mitigation measures are proposed, these are detailed in the impact assessment

Table 20.9 Embedded mitigation measures relevant to the onshore ecology and ornithology assessment

Component/Activity	Mitigation embedded into the design of the Project
Landfall and Taw Estuary Crossing trenchless technique	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. Agreement will be obtained 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 and either amend approach or recommence through an alternative line at the Landfall and under the Taw Estuary. During works continual monitoring of the trenchless technique bore above ground will be undertaken where possible (e.g. within the intertidal). If frac-out occurs and surface discharge occurs, the material will be collected and reinstatement of the surface area carried out immediately
Crossing of the Taw-Torridge Estuary SSSI	Trenchless technique underneath the Taw-Torridge Estuary SSSI
Crossing of the Taw-Torridge Estuary SSSI	No works would take place between the months of October to March inclusive, to avoid disturbance to overwintering bird populations
All construction activities and sites	A Code of Construction Practice will be implemented to avoid or minimise impacts from all construction activities. Some particular examples are identified below.
	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 subsequent compliance monitoring visits, undertaken and recorded by a suitably qualified and pre-appointed 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

Component / Activity	Mitigation embedded into the design of the Project
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. Refuelling and maintenance of all equipment will take place away from intertidal zones and estuary
Storage (Pollution)	No storage facilities will be located within the marine environment
Restricted working areas	No personal, equipment or vehicles are to operate within inundated tidal areas of the Taw Estuary.

37. In addition to the embedded mitigation measures as outlined above, the Applicant has also committed to the following additional mitigation measures summarised in **Table 20.10**.

Table 20.10 Additional mitigation measures relevant to the onshore ecology and ornithology assessment

Feature / Impact	Additional Mitigation
Invasive species	• Good site practice measures for managing the spread of invasive species • Good site practice measures for managing the spread of invasive species during works at watercourses • A requirement for an Ecological Clerk of Works (ECoW) and details of their responsibilities with respect to non-native invasive species

20.3.8 Baseline Data Sources

20.3.8.1 Desktop Study

38. A desk study was undertaken to obtain information on onshore ecology and ornithology. Data were acquired within the study area through a detailed desktop review of existing studies and datasets. Agreement was reached with all consultees that the data collected and the sources used to define the baseline characterisation for onshore ecology and ornithology are fit for the purpose of the EIA.

39. The sources of information presented in **Table 20.11** were consulted to inform the onshore ecology and ornithology assessment.

Table 20.11 Data sources used to inform the onshore ecology and ornithology assessment

Source	Data source	Date of data
European designated sites (SPA, SAC and Ramsar sites)	MAGIC website and JNCC	2022
UK designated sites (SSSI, NNR and LNR)	JNCC	2022
UK Habitats of Principle Importance (UKHPI)	Natural England	2022
Protected and notable species	JNCC	2022
Ecological data including designated sites, protected species, and habitats and species of conservation concern	Devon Biodiversity Records Centre (DBRC)	2022
Five-year summary data for Wetland Bird Survey (WeBS) core count sectors	British Trust for Ornithology (BTO)	2022
Sand lizard survey	Dynamic Dunescapes	2021
Great-crested newt survey	Dynamic Dunescapes	2021
Conservation status of birds in the UK	Birds of Conservation Concern 5	2021 (Stanbury *et al*)
Breeding and wintering status of birds in Devon	Devon Bird Report	2020 (Devon Birds; published 2022)
Wintering wildfowl high tide roost locations	Identification of Wintering Wildfowl High Tide Roosts & Recreational Disturbance Impacts on the Taw Torridge Estuary	2019 (Berridge)

40. Once the onshore Study Area was identified (as part of the route planning and site selection process and subsequent Scoping Opinion), encompassing the Landfall (below MHWS) and the Taw Estuary Crossing (below MHWS), biological records data was obtained from the Devon Biological Records Centre (DBRC). This information includes records relating to protected, notable and non-native invasive species. Other datasets obtained included sand lizard surveys and great-crested newt surveys within Braunton Burrows commissioned by Dynamic Dunescapes.

20.3.8.2 Site Specific Survey

41. To inform the EIA, site-specific surveys were undertaken, as agreed with the statutory consultees. A summary of surveys is outlined in **Table 20.12**, and the survey extents are shown on **Figure 20.2**. Some of the surveys took place outside the consent application envelope and have been used to indicate absence of particular interests in the following sections.

Table 20.12 Summary of site-specific survey data

Receptor survey	Survey year	Summary of survey
Intertidal survey	2022	Consisted of an intertidal biotope survey for the Landfall and Taw Estuary Crossing. See **Appendix 20.A** (Intertidal Survey).
Extended Phase 1 Habitat Survey	2022	Covered the Landfall Location and Taw Estuary Crossing plus a 50m buffer and will include the mapping of the habitats and identification of all UK protected species potential alongside recommendations for targeted species-specific Phase 2 surveys. See **Appendix 20.B** (Preliminary Ecological Appraisal).
Bat activity survey and bat roost survey	2022	Consisted of activity transect surveys of all suitable commuting / foraging habitats and all potential bat roosts that may be impacted by the Project. See and **Appendix 20.C** (Bat Activity Survey), **Appendix 20.D** (Bat Emergence & Activity Survey – Buildings), and **Appendix 20.E** (Inspection & Bat Emergence Survey – Trees).
Water vole *Arvicola amphibius* and otter *Lutra lutra* survey	2022	Covered all suitable aquatic habitats which may be impacted by the Project. See **Appendix 20.F** (Otter & Water Vole Survey).
Dormouse *Muscardinus avellanarius* survey	2022	Covered all suitable woodland habitats which may be impacted by the Project. See **Appendix 20.G** (Dormouse Survey).
Breeding bird survey	2022	Covered all suitable habitats (including any functionally linked habitats) that may be impacted by the Project and / or afforded protection for breeding birds. See **Appendix 20.H** (Breeding & Ground Nesting Bird Survey).

Receptor survey	Survey year	Summary of survey
Great-crested newt *Triturus cristatus* presence / absence survey	2022	Consisted of a Habitat Suitability Index (HSI) survey of all ponds within a 250m buffer of the Landfall Location and Taw Estuary Crossing, followed by an environmental DNA (eDNA) survey of all suitable ponds to determine the presence or likely absence of great crested newts. See **Appendix 20.I** (Great Crested Newt Survey: Habitat Suitability Index, eDNA & Population Class Assessment).
Reptile survey	2022	Covered all suitable habitats which may support significant populations of reptiles, and which may be impacted by the Project. See **Appendix 20.J** (Reptile Survey).
Invertebrate survey (terrestrial and aquatic)	2022	Covered all terrestrial and / or aquatic habitats which may support rare or notable invertebrates, and which may be impacted by the Project. See **Appendix 20.K** (Terrestrial Invertebrate Survey) and **Appendix 20.L** (Aquatic Macro-Invertebrate Survey).
Terrestrial flora survey	2022	Covered all terrestrial habitats which may support rare or notable flora, and which may be impacted by the Project. See **Appendix 20.M** (National Vegetation Classification)
Aquatic flora survey	2022	Covered aquatic habitats which may support rare or notable aquatic flora, and which may be impacted by the Project. See **Appendix 20.N** (Aquatic Vegetation Survey)

20.3.9 Data Limitations

42. The key data limitations with the baseline data and their ability to materially influence the outcome of the EIA are:

- The Phase I habitat survey was undertaken in late spring, which will have precluded annual vegetative species with summer and autumn growing/flowering periods.
- The Phase I habitat survey 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.
- 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). That

notwithstanding, the species specific survey will have identified key protected species presence or absence.

- Additional buildings within close proximity to the Landfall and Taw Estuary Crossing 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, and Buildings associated with Saunton Sands holiday accommodation and facilities.
- A limitation to the survey consisted of a number of the dormouse tubes being disturbed at Yelland. This area included public footpaths and it is assumed a number of the tubes were disturbed by members of the public.
- 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.
- Drainage ditches that were dry during the period of the survey were not surveyed, 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 water vole and otter visits to the south side of the Taw Estuary prevented direct access to the bank side. Surveys were conducted 3m to 4m from the tidal embankment with the aid of handheld binoculars (Bushnell 10x42).
- Access to the south bank of the large water body (pond) on the south side of the Taw Estuary for water vole and otter survey 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).
- The sweep netting used for the terrestrial invertebrate survey is only suitable in vegetation of certain height and types including ungrazed/lightly grazed grasslands with tussocky/taller swards, margins of wetland features and areas dune scrub/grassland mosaic with only light/scattered creeping willow.
- Sweep netting includes a bias 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, rabbits and deer, extensive areas of dune grassland were reduced to very short and/or desiccated swards, further limiting the extent of sweep netting.

20.3.10 Scope

43. Upon consideration of the baseline environment, the project description outlined in **Chapter 5: Project Description**, and Scoping Opinion where relevant to the Landfall and Taw Estuary Crossing, potential impacts upon onshore ecology and ornithology have been scoped in or out. These impacts are outlined in **Table 20.13** respectively.

Table 20.13 Summary of impacts scoped in relating to onshore ecology and ornithology

Potential Impact	Construction	Operation and Maintenance	Decommissioning
Impacts to designated statutory and non-statutory sites	✓	✓	✓
Permanent and temporary loss of habitats	✓	✓	✓
Temporary habitat fragmentation and isolation of species	✓	✓	✓
Impacts on protected species or on their nesting or breeding sites	✓	✓	✓
Disturbance of bird populations	✓	✓	✓
Spread of non-native invasive species	✓	✓	✓
Cumulative effects	✓	✓	✓

44. Key potential impacts relate to the construction phase and direct and indirect disturbance to species and/or habitat and loss of habitat associated with temporary disturbance associated with the works at the Landfall and the Taw Estuary Crossing.

45. Operational impacts are predicted to be limited within the Landfall and Taw Estuary Crossing as all infrastructure is buried beneath the ground / intertidal and seabed. All remaining impacts would be associated with annual monitoring and any maintenance activities (if required). Decommissioning impacts would likely be similar to those for construction; cumulative effects may arise if other projects are constructed within 1km of the Landfall and Taw Estuary Crossing. No transboundary impacts have been identified.

Figure 20.2: Onshore Ecology Survey Areas

20.3.11 Consultation

46. Consultation has been a key part of the development of the Project. Consultation regarding onshore ecology and ornithology has been conducted throughout the EIA. An overview of the project consultation process is presented within **Chapter 7: Consultation**.

47. A summary of the key issues raised during consultation specific to onshore ecology and ornithology is outlined below in **Table 20.14**, together with how these issues have been considered in the production of this ES.

20.4 Existing Environment

48. 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 20.3.5**.

20.4.1 Statutory Designated Sites

49. A total of seven statutory designated sites for nature conservation are located within the designated sites study area (**Figure 20.3**). These are:

- Braunton Burrows SAC – within the Landfall
- Saunton to Baggy Point Coast SSSI – within the Landfall
- Braunton Burrows SSSI - within the Landfall
- Taw-Torridge Estuary SSSI - within the Taw Estuary Crossing
- Northam Burrows SSSI – 1.74km from the Taw Estuary Crossing
- Bideford to Foreland Point MCZ – within the Landfall
- Caen Valley Bats SSSI – 3.6km from the Landfall and 5km from the Taw Estuary Crossing (the site is designated for bat species which have a foraging range of 5km or more and therefore the site falls within its zone of influence)

50. The export cable corridor within the intertidal zone (at the Landfall) lies within the boundary of the Braunton Burrows SAC, Saunton Baggy Point SSSI (partially overlaps), Braunton Burrows SSSI, and the Bideford to Foreland Point MCZ. It is noted that the assessment of impacts on the Bideford to Foreland Point MCZ are considered and addressed in **Chapter 10: Benthic and Intertidal Ecology**.

51. Northam Burrows SSSI and the Isley Marsh RSPB Reserve are both located outside the boundary of the proposed crossing of the Taw Estuary (greater than 1.5km and 1km respectively). The crossing would be carried out using a trenchless technique and thus no above ground or above estuary bed impacts are expected. The crossing lies within the boundary of the Taw-Torridge Estuary SSSI.

Table 20.14 Consultation responses

Consultee	Date, Document, Forum	Comment	Where addressed in the ES
Scoping Opinion Responses			
MMO	30/05/2022 Scoping opinion, 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 **Section 20.5.**
ETG Meetings			
Natural England	20/05/2022, Onshore ecology ETG	Route across Braunton Burrows likely to cause the most environmental harm. Recommend considering biodiversity net gain as early as possible. Main NE concerns for potential impacts: ▪ Landfall: 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. ▪ Consider sand movement and stability, vascular plant assemblies as well geomorphological processes.	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 assessments. To include embedded biodiversity net gain considerations. Potential impacts discussed within **Section 20.5.**

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.	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.	Route across central Braunton Burrows has now been discounted and is no longer being considered.
RSPB	09/09/2022 Ornithology ETG	Need to ensure any operations have secure biosecurity measures in respect of rats to ensure no risk to colonies on Lundy, this should be addressed in the EIA. Reconsider survey efforts for certain species, particularly species hard to detect, such as Balearic shearwater, storm petrels. Also consider surveys for nocturnal species.	Surveys carried out presented in **Section 0.**

Figure 20.3: Designated nature conservation sites

52. A summary of the qualifying features/reasons for notification of these designated sites is presented in **Table 20.15**.

Table 20.15 Designated Sites Qualifying Features / Reasons for Notification or Designation

Designated site	Designated features
Braunton Burrows SAC	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
Saunton to Baggy Point Coast SSSI	Consisting of four SSSI units, and is designated for its ragged cliffs and associated botanical features of maritime heathland, grassland and lichens. The single unit within which the Landfall is located is: • 104 – Saunton Cliffs and Foreshore (36.93 ha): Unfavourable – declining
Braunton Burrows SSSI	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 two units within which the Landfall and Taw Estuary Crossing are located are the following: • 108 - Saunton Sands (302.46 ha): Favourable • 107 - Crow Point & Broad Sands (95.50 ha): Favourable
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*

Designated site	Designated features
	anguilla), and a diversity of invertebrates. The single unit within which the Taw Estuary Crossing is located is: • 103 – River Taw (1018.58 ha): Favourable
Bideford to Foreland Point MCZ	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 & anthozoan communities on subtidal rocky habitats, Honeycomb worm (*Sabellaria alveolata*) reefs, Pink sea-fan (*Eunicella verrucosa*), and Spiny lobster (*Palinurus elephas*).
Northam Burrows SSSI	Northam Burrows is of interest for its wide range of coastal habitats (including 'yellow' dunes, wet grassland, dune slack, and extensive coastal grassland) and in particular for the rare and local plants to be found. The site also supports many overwintering and migratory birds. In addition, the cobble ridge is an important land-form feature.
Caen Valley Bats SSSI	Designated for the great horseshoe bat maternity roost, and winter hibernacula.

20.4.2 Non-Statutory Designated Sites

53. A range of non-statutory designated sites are located outside the Landfall and the Taw Estuary Crossing. Sites which are located within 500m of the Landfall and/or Taw Estuary Crossing are listed in **Table 20.16** and, where publicly available GIS data is available, shown on **Figure 20.4**.

Table 20.16 Non-statutory designated sites

Site name	Importance	Summary	Distance
Horsey Island	County Wildlife Site (CWS), Devon Wildlife Trust (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	>0.2km east of the at Taw Estuary Crossing
Saunton Down	UWS	Semi-improved neutral grassland & scrub	0.18km north of the offshore export cable corridor

Site name	Importance	Summary	Distance
Braunton Marsh	UWS	Semi-improved neutral grassland	0.07km north of the Taw Estuary Crossing
Instow Barton Marsh	UWS	Grazing marsh	Located on the south side of the Taw Estuary Crossing approximately 20m outside the estuary

20.4.3 Habitats

54. The following paragraphs present detail of the habitats present within the Landfall and immediately adjacent area to the Landfall and the Taw Estuary Crossing.

20.4.3.1 Landfall

55. Saunton Sands comprises the mobile intertidal sandflat habitat (**Figure 20.5**). Detail of the intertidal communities present are found in **Chapter 10: Benthic and Intertidal Ecology**, specifically **Section 10.4**.

56. The intertidal habitat survey (**Appendix 20.A**; *Section 3.2.2*) provides the basis of the baseline. The survey covered the entire Landfall and surrounding area. The habitat in and adjacent to the Landfall is largely dominated by fine sand (ranging from 0.002mm – 0.50mm; fine-very fine range). Patches of small rocks (approx. 5cm - 20cm) were scattered intermittently in areas of the upper littoral zone at the northern end. There was evidence of marine worms such as blow lugworm *Arenicola marina* in the sandy sediment including breathing holes, sand trails, bore holes (from predatory worms) in mollusc shells scattered through the littoral zone. One small white ragworm *Hediste diversicolor* was collected at the southern part of the corridor near the subtidal zone. There was steady human presence (both people and dogs) in the upper littoral zone. The northern-most transect in this area was formed of rocky shore. Species present in the rock pools included: shanny *Lipophrys pholis*, beadlet sea anemone *Actinia equina*, shore crab *Carcinus maenas*, periwinkle *Littorina littorea*, limpet *Patella sp.*, common rock barnacle *Semibalanus balanoides*, purple top shell *Gibbula umbilcalis* and thick topshell *Steromphala umbilicalis*. Seaweed species present in the rock pools included serrated wrack *Fucus serratus,* bladderwrack *Fucus vesiculosus*, sea lettuce *Ulva intestinalis* and coral weed *Corallina officinalis*. The north side of the Landfall overlaps with the Saunton to Baggy Point SSSI, which is designated for its ragged cliffs and associated botanical features of maritime heathland, grassland and lichens.

Figure 20.4: Non-statutory nature conservation sites

Figure 20.5: Habitats within the study area

57. The intertidal area therefore comprised Annex 1 habitat 1140 Mudflats and sandflats not covered by seawater at low tide, which is a qualifying feature of the Braunton Burrows SAC. This area falls within unit 108 of Braunton Burrows SSSI, which is identified as in favourable condition. The north end of the Landfall overlaps with unit 104 Saunton Cliffs and Foreshore of the Saunton to Baggy Point SSSI, which is in unfavourable – declining condition.

58. The intertidal zone also falls within the Bideford to Foreland Point MZC. The features of this designated site within the Landfall are Intertidal Sand & Muddy Sand, Low Energy Infralittoral Rock, High Energy Infralittoral Rock, and High Energy Intertidal Rock. Subtidal sand and patches of honeycomb worm *Sabellaria alveolata* reefs lie adjacent to or 100m outside the corridor respectively. Assessment of the effects on the MCZ is presented in **Chapter 10: Benthic and Intertidal Ecology**, and **Appendix 10.A**.

59. Landward of the sandflats are the extensive sand dune system (see *Section 3.2* in **Appendix 20.B**). Inland of the intertidal zone falls within unit 101 of Braunton Burrows SSSI, and continuation of the Braunton Burrows SAC.

60. There are no non-statutory designated sites within the Landfall.

20.4.3.2 Taw Estuary Crossing

61. The Taw Estuary Crossing lies close to the Crow Point area of Braunton Burrows SAC. 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. Areas of saltmarsh included glassworts *Salicornia* spp., sea-blite *Suaeda maritima*, sea purslane *Atriplex portulacoides*, sea lavender *Limonium binervosum*, and sea spurrey *Spergularia marina*. On the south side of the Taw Estuary it comprises a rocky shoreline, saltmarsh and tidal creeks, with extensive mud/sand flats.

62. 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, golden plover, lapwing, redshank, dunlin, oystercatcher) and rare plants (glassworts, common saltmarsh-grass, cord-grass, sea aster, annual seablite, rock sea-lavender, and great sea-stock. Other estuarine species include mullet, flat fish, bass, pollack, eel, and a diversity of invertebrates. A portion of the Taw-Torridge Estuary lies within the proposed Taw Estuary Crossing.

63. The majority of the upper littoral zone habitat within the corridor was sand, transitioning to mud leading up to a small channel with flowing water at low tide. Saltmarsh was identified at the far western extent of the corridor on the north side of the estuary, and at the far eastern extent on the south side of the estuary (see **Figure 20.5**). Beyond the channel, exposed mud flats extended to the low tide water line. Shore crab, blow lugworm, ragworm, and cockles *Cerastoderma edule* were identified. Moving from east to west, the beach transitioned from sandy to small rocks with underlying sand and mud (see **Plate 20.2**). Near the channel bank the substrate was predominately mud covering of gutweed and intermittent bladderwrack. On the western portion of the survey area, the rocky shore transitioned to a mix of mud and salt marsh. The salt marsh habitat was dominated by common cordgrass *Sporobolus anglicus*, eelgrass and glasswort. Mud snails *Hydrobia ulvae* were abundant in this habitat, as well as periwinkle and cockle (*Section 3.2.4* in **Appendix 20.B**). On the south side of the estuary, the habitats present are a rocky shoreline, saltmarsh and tidal creeks, and extensive mud/sand flats.

64. The intertidal area on the north side of the estuary therefore comprised Annex 1 habitat 1140 Mudflats and sandflats not covered by seawater at low tide, which is a qualifying feature of the Braunton Burrows SAC. Both sides of the estuary fall within unit 103 of the Taw-Torridge Estuary SSSI, which is identified as in favourable condition. The north side of the estuary falls within unit 107 Crow Point & Broad Sands part of Braunton Burrows SSSI, which is in favourable condition.

Plate 20.2 Taw-Torridge Estuary at proposed crossing looking south

65. Coastal embankment separates the north and south side of the estuary from the inland areas. The embankments comprised a mosaic of scrub and grassland (*Section 3.2.7* in **Appendix 20.B**) (see **Plate 20.3**).

Plate 20.3 Embankment and landward fields on the south side of the Taw Estuary

20.4.3.3 Priority Habitats

66. Priority habitats identified within the Landfall are maritime cliffs and slopes, and in the Taw Estuary Crossing include lowland fens, and reedbeds.

20.4.4 Species Present

67. The following sub-sections detail the flora and fauna species presence in the area of the Landfall and the Taw Estuary Crossing.

20.4.4.1 Badger

68. The information provided by DBRC within the study area indicated the presence of setts in the Braunton Burrows and East Yelland area (*Section 3.3.2*; **Appendix 20.B**). It is considered that the study area provides sett, dispersal and foraging habitat for badger, though no active setts are recorded in or adjacent to the Landfall or within the Taw Estuary, therefore this species is not considered further.

20.4.4.2 Bats

69. Both Landfall and Taw Estuary Crossing lie within the greater horseshoe bat *Rhinolophus ferrumequinum* sustenance zones associated with the Caen Valley Bats SSSI.

20.4.4.2.1 Landfall

70. DBRC data identified 28 records for bats within 1km of Braunton Burrows (*Section 3.3.3*; **Appendix 20.B**) including:

- Brown long-eared bat *Plecotus auritus* (1 record)
- Greater horseshoe bat (7 records)
- Noctule *Nyctalus noctula* (2 records)
- Common pipistrelle *Pipistrellus pipistrellus* (3 records)
- Soprano pipistrelle *Pipistrellus pygmaeus* (3 records)
- Unidentified *Myotis* (2 records)

71. Furthermore, MAGIC identified one European Protected Species Licence (EPSL) for common pipistrelle bat near to the Landfall at Saunton Sands (*Section 3.3.3*; **Appendix 20.B**).

72. As such, the intertidal habitat within the Landfall could provide some foraging habitat for bat species, though no records of greater horseshoe bats associated with Caen Valley Bats SSSI (*Section 3.3.3*; **Appendix 20.B**) occurred near the Landfall. The bat activity survey recorded the presence of foraging Serotine *Eptesicus serotinus* at the southside of the Saunton Sands car park, with foraging greater horseshoe, barbastelle *Barbastella barbastellus*, Noctule sp., and common pipistrelle recorded further east beyond the car park (*Figure 3-1*; **Appendix 20.C**) though none were recorded specifically within the intertidal zone.

73. There are no trees and buildings/structures present within the Landfall that were surveyed which evidenced any bat roosting activity (**Appendix 20.D** and **Appendix 20.E**).

20.4.4.2.2 Taw Estuary Crossing

74. The DBRC data included one unidentified bat species records within 1km of the East Yelland area. As such, Taw Estuary and adjacent areas could provide foraging and dispersal habitat for bat species, including greater horseshoe bats associated with Caen Valley Bats SSSI (**Appendix 20.D**). The bat activity survey recorded the presence of foraging greater horseshoe, Noctule sp., Soprano pipistrelle, common pipistrelle, and *Myotis* sp on the north side of the Taw Estuary (*Figure 3-1*; **Appendix 20.C**). On the south side of the River Taw, Noctule sp., Soprano

pipistrelle, and common pipistrelle were recorded around the tidal embankment and field boundaries (*Figure 3-1*; **Appendix 20.C**).

75. There are no trees and buildings/structures present within the Taw Estuary Crossing that were surveyed which evidenced any bat roosting activity (**Appendix 20.D** and **Appendix 20.E**).

20.4.4.3 Otter

76. The information provided by DBRC included seven records for otter within 1km of the survey area (see *Section 3.3.7* in **Appendix 20.B**). The estuary, ditches and rhynes may provide commuting, foraging and holt/resting site habitats for otter. Consequently, additional survey for otter was carried out for watercourses within the study area (see *Figure 1.1* and detail in **Appendix 20.F**).

77. The nearest surveyed watercourse to the Landfall was in excess of 0.9km away (see *Figure 1.1* and detail in **Appendix 20.F**), and indicated limited or negligible value of the watercourses for otter. Consequently, otter are not considered further at the Landfall.

78. The nearest surveyed watercourse to the north side of the Taw Estuary Crossing were the drains (Crow Point) within the corridor (see *Figure 1.1* and detail in **Appendix 20.F**). Evidence (spraint, run, tracks, and feeding remains) of otter was found at the north-eastern end of the field behind the car park (see *Section 3* and *Appendix 4* in **Appendix 20.F**).

79. The nearest surveyed watercourse to the south side of the Taw Estuary Crossing was the drain (Yelland) immediately behind the tidal embankment and within the corridor (see *Figure 1.1* and detail in **Appendix 20.F**). Evidence (spraint and feeding remains) of otter was found at the pond at the north-eastern end of the corridor (see *Section 3* and *Appendix 4* in **Appendix 20.F**).

20.4.4.4 Water Vole

80. The information provided by DBRC contained no records for water vole within 1km of the survey area (see *Section 3.3.9* in **Appendix 20.B**). Historically water vole were present in Braunton Marshes but are now considered absent (see *Section 3.3.9* in **Appendix 20.B**). The nearest watercourses to the Landfall (0.9km inland) that were surveyed recorded no evidence of water vole presence (see *Section 3.3* in **Appendix 20.F**).

81. Drains on the north side of the Taw Estuary within the Taw Estuary Crossing were identified as being of suitable but poor value in terms of habitat suitability for water vole. On the south side of the estuary within the Taw Estuary Crossing the drain behind the tidal embankment was identified as being of negligible value in terms of habitat suitability for water vole. However, the pond at the north-eastern end of the Taw Estuary Crossing was identified as being optimal for water vole, though no evidence was found of water vole presence (see *Section 3.3* and *Appendix 1* in **Appendix 20.F**).

82. As no water vole records occur immediately adjacent to the Landfall or Taw Estuary Crossing and no suitable habitat for them within the Landfall and Taw Estuary Crossing, water vole are not considered further.

20.4.4.5 Dormouse

83. The woodland, scrub and hedgerows within the survey area may provide nesting, foraging and hibernation habitat for dormouse. 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 and study area.

20.4.4.5.1 Landfall

84. No notable dormouse habitat was identified within the Landfall or surrounding area, and no specific surveys were carried out. Dormouse is therefore not considered further at the Landfall.

20.4.4.5.2 Taw Estuary Crossing

85. Dormouse tubes were installed, and survey carried out along the scrub and embankment on the north side of the Taw Estuary within the Taw Estuary Crossing (*Figure 1.1*; **Appendix 20.G**). Tubes were also installed along the woodland/scrub and hedgerows on the south side of the Taw Estuary within the Taw Estuary Crossing (*Figure 1.1*; **Appendix 20.G**).

86. No presence of dormouse was recorded in any surveys and locations (even across the wider area north of the River Taw) (*Section 3.3*; **Appendix 20.G**). Dormouse are therefore not considered further at the Taw Estuary Crossing.

20.4.4.6 Other Mammals

87. The information provided by DBRC included additional records for the following mammal species (*Section 3.3.11* in **Appendix 20.B**):

- Eurasian Water Shrew *Neomys fodiens* (1 record)
- Eurasian Pygmy Shrew *Sorex minutus* (1 record)

- Weasel *Mustela nivalis* (1 record)
- Stoat *Mustela erminea* (1 record)
- Roe deer *Capreolus capreolus* (1 record)
- Harvest mouse *Micromys minutus* (1 record)
- Brown hare *Lepus europaeus* (1 record)

88. European rabbits *Oryctolagus cuniculus* were observed throughout the survey areas during the survey. Roe deer were also observed within Braunton Marsh and Braunton Burrows.

89. During surveys, mink traps were observed deployed within the ditch/rhyne system of Braunton Marsh.

90. However, no records or observations of other mammals were made within the Landfall and Taw Estuary Crossing, and given the limited suitability of the habitat (intertidal) other mammals are not considered further.

20.4.4.7 Breeding Birds

91. Data provided by DBRC (see *Section 3.3.4* in **Appendix 20.B**) included a large number of bird records from within 1km of the Landfall and Taw Estuary Crossing. Based on professional judgement and understanding of species' breeding status in Devon (based on the most recent Devon Bird Report (2020); Devon Birds, 2022), previous records of notable bird species considered to potentially breed in the vicinity of the Landfall and Taw Estuary Crossing are provided in **Table 20.17**.

92. The breeding bird survey (see **Appendix 20.H**) recorded a total of 10 species within and adjacent to the Landfall (up to 50m buffer either side). A list of these species, along with their legal and conservation status, is provided in **Table 20.18**.

93. The Landfall comprised predominantly of fine sand with patches of small rocks which provides limited opportunities for nesting birds. Although the breeding bird survey identified all species listed in **Table 20.18** as breeding within the wider Saunton survey sector, no evidence of breeding for these species was recorded within the Landfall and surrounding 50m buffer. Consequently, breeding bird receptors are not considered further at the Landfall.

94. The breeding bird survey (**Appendix 20.H**) recorded a total of 47 species within and adjacent to the Taw Estuary Crossing (up to 50m buffer either side). A list of these species along with their legal / conservation and breeding status, is provided in **Table 20.19**.

Table 20.17 Notable bird species previously recorded within 1km of study area potentially breeding in the vicinity of the Landfall and Taw Estuary Crossing

Common name	Legal / conservation status[1]
Barn owl *Tyto alba*	Schedule 1[2]
Bullfinch *Pyrrhula pyrrhula*	Amber[3], Priority Species[4]
Cuckoo *Cuculus canorus*	Red[5], Priority Species
Dunnock *Prunella modularis*	Amber, Priority Species
Grasshopper warbler *Locustella naevia*	Red, Priority Species
Great black-backed gull *Larus marinus*	Amber
Greenfinch *Carduelis chloris*	Red
Grey wagtail *Motacilla cinerea*	Red
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
Mallard *Anas platyrhynchos*	Amber
Meadow pipit *Anthus pratensis*	Amber
Mistle thrush *Turdus viscivorus*	Red
Oystercatcher	Amber
Reed bunting *Emberiza schoeniculus*	Amber, Priority Species
Rook *Corvus frugilegus*	Amber
Sedge warbler *Acrocephalus schoenobaenus*	Amber
Shelduck *Anas tadorna*	Amber
Skylark *Alauda arvensis*	Red, 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

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

Table 20.18 Bird species recorded within and adjacent to Landfall during breeding bird survey

Common name	Legal / conservation status
Carrion crow *Corvus corone*	None
Dunnock	Amber, Priority Species
Goldfinch *Carduelis carduelis*	None
Herring gull	Red, Priority Species
House sparrow *Passer domesticus*	Red, Priority Species
Jackdaw *Corvus monedula*	None
Magpie *Pica pica*	None
Pied wagtail *Motacilla alba*	None
Stonechat *Saxicola rubicola*	None
Woodpigeon	Amber

Table 20.19 Bird species recorded within and adjacent to Taw Estuary Crossing during breeding bird survey

Common name	Legal / conservation status	Breeding
Blackbird ***Turdus merula***	None	✓
Blackcap *Sylvia atricapilla*	None	✓
Blue tit *Cyanistes caeruleus*	None	✓
Buzzard *Buteo buteo*	None	
Carrion crow	None	✓
Chaffinch *Fringilla coelebs*	None	✓
Chiffchaff *Phylloscopus collybita*	None	✓
Cetti's warbler *Cettia cetti*	Schedule 1	✓
Cormorant *Corvus marinus*	None	
Dunnock	Amber, Priority Species	✓
Goldfinch	None	✓
Great black-backed gull	Amber	
Great spotted woodpecker *Dendrocopos major*	None	✓
Great tit *Parus major*	None	✓
Greenfinch	Red	✓
Grey heron *Ardea cinerea*	None	
Herring gull	Red, Priority Species	
House martin	Red	✓
House sparrow	Red, Priority Species	✓
Lesser whitethroat *Curruca curruca*	None	✓
Linnet *Linaria cannabina*	Red, Priority Species	✓
Little egret *Egretta garzetta*	None	
Magpie	None	✓
Mallard	Amber	✓
Meadow pipit	Amber	✓
Oystercatcher	Amber	
Pheasant *Phasianus colchicus*	None	✓

Common name	Legal / conservation status	Breeding
Pied wagtail	None	✓
Raven *Corvus corax*	None	✓
Redshank	Amber	
Reed warbler *Acrocephalus scirpaceus*	None	✓
Robin *Erithacus rubecula*	None	✓
Rock pipit *Anthus petrosus*	None	
Rook	Amber	✓
Shelduck	Amber	
Sedge warbler	Amber	✓
Skylark	Red, Priority Species	✓
Song thrush *Turdus philomelos*	Amber, Priority Species	✓
Starling	Red, Priority Species	✓
Stonechat	None	✓
Swallow *Hirundo rustica*	None	✓
Wheatear	Amber	✓
Whitethroat	Amber	✓
Willow tit *Poecile montanus*	Red, Priority Species	✓
Willow warbler	Amber	✓
Woodpigeon	Amber	✓
Wren	Amber	✓

95. Although the breeding bird survey identified cormorant, great black-backed gull, grey heron, herring gull, little egret, oystercatcher, redshank and shelduck as breeding on the Taw-Torridge Estuary, no evidence of breeding for these species was recorded within the Taw Estuary Crossing or surrounding 50m buffer.

96. Nesting bird habitat within and adjacent to the Taw Estuary Crossing included trees, hedgerows, scrub, aquatic and marginal vegetation (e.g. reedbed), grassland, and built structures (e.g. buildings, stone walls). However, no suitable breeding bird habitat is located within the intertidal zone. No barn owl nest sites were identified in the vicinity of the Taw Estuary Crossing and proposed site compounds. Consequently, breeding bird receptors are not considered further at the Taw Estuary Crossing.

20.4.4.8 Non-Breeding (Overwintering) Birds

97. Information provided by DBRC (see *Section 3.3.4* in **Appendix 20.B**) included a large number of bird records from within 1km of the study area. Based on professional judgement, previous records of notable non-breeding species potentially present in or in the vicinity of the Landfall and Taw Estuary Crossing are provided in **Table 20.20**.

Table 20.20 Notable non-breeding bird species previously recorded within study area and potentially occurring in the vicinity of the Landfall and Taw Estuary Crossing

Common name	Legal / conservation status
Bar-tailed godwit *Limosa lapponica*	Amber
Black-headed gull *Chroicocephalus ridibundus*	Amber
Black-tailed godwit *Limosa limosa*	Schedule 1, Red, Priority Species
Brent goose *Branta bernicla*	Amber, Priority Species
Bullfinch	Amber, Priority Species
Common gull *Larus canus*	Amber
Common scoter *Melanitta nigra*	Schedule 1, Red, Priority Species
Common sandpiper *Actitis hypoleucos*	Amber
Curlew	Red, Priority Species
Eider *Somateria mollissima*	Amber
Gannet *Morus bassanus*	Gannet
Goldeneye *Bucephala clangula*	Red
Great black-backed gull	Amber
Great northern diver *Gavia immer*	Schedule 1, Amber
Greenfinch	Red
Greenshank *Tringa nebularia*	Schedule 1, Amber
Green sandpiper *Tringa ochropus*	Schedule 1,
Greylag goose *Anser anser*	Amber
Grey plover *Pluvialis squatarola*	Amber
Grey wagtail	Red
Herring gull	Red, Priority Species
Kestrel	Amber
Kingfisher	Schedule 1
Knot *Calidris canutus*	Amber
Lapwing	Red, Priority Species
Lesser black-backed gull	Amber
Linnet	Red, Priority Species
Mallard	Amber
Marsh harrier *Circus aeruginosus*	Schedule 1, Amber
Mediterranean gull *Larus melanocephalus*	Schedule 1, Amber
Meadow pipit	Amber
Mistle thrush	Red
Moorhen *Gallinula chloropus*	Amber
Oystercatcher	Amber
Razorbill *Alca torda*	Amber
Reed bunting	Amber, Priority Species
Ringed plover *Charadrius hiaticula*	Red
Rook	Amber
Sanderling *Calidris alba*	Amber
Scaup *Aythya marila*	Schedule 1, Red, Priority Species
Shelduck	Amber
Short-eared owl *Asio flammeus*	Amber
Shoveler *Anas clypeata*	Amber

Common name	Legal / conservation status
Skylark	Red, Priority Species
Snipe *Gallinago gallinago*	Snipe
Snow bunting *Plectrophenax nivalis*	Schedule 1, Amber
Spoonbill *Platalea leucorodia*	Schedule 1, Amber
Teal *Anas crecca*	Amber
Turnstone *Arenaria interpres*	Amber
Water pipit *Anthus spinoletta*	Amber
Whooper swan *Cygnus cygnus*	Schedule 1, Amber
Wigeon *Anas penelope*	Amber
Woodpigeon	Amber
Wren	Amber

98. 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 roosts, 10 occurred in Wetland Bird Survey (WeBS) count sectors lying within or adjacent to the Taw Estuary Crossing and associated site compounds. Further details are provided below and in **Table 20.21**.

Table 20.21 High tide roosts identified in WeBS sectors within and adjacent to the Taw Estuary Crossing

WeBS Sector code and name	Number of high tide roosts	Roost types
11483 Isley to Instow	3 (Isley Marsh, Yelland, The Black Ground and Cool Stone	Mixed, wader
11490 White House to Airy	3 (Crow Point saltmarsh, Crow Point beach, Crow Point groynes)	Mixed, wader
11496 Braunton Marshes	1 (Braunton Marshes)	Wader
11497 River Caen and Horsey Island	3 (Horsey Island White House, Horsey Island Pills Mouth, Horsey Island fields)	Mixed

99. The Isley to Instow sector supports three high tide roosts: Isley Marsh and Yelland, which lie to the east of the Taw Estuary Crossing, and The Black Ground and Cool Stone, which lies to the west of the Taw Estuary Crossing. 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).

100. 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).

101. The White House to Airy sector supports three high tide roosts: Crow Point saltmarsh, Crow point beach, and Crow Point groynes, all of which lie to the west of the Taw Estuary Crossing. Crow Point saltmarsh is used by a mix of species with five-year WeBS max counts >100 for oystercatcher (max count 100), curlew (160) and wigeon (100). The Crow Point beach roost supports one of the biggest oystercatcher roosts on the Taw-Torridge Estuary, with a five-year WeBS maximum count of 1300. The Crow Point groynes roost is usually dominated by gulls, with five-year WeBS maximum counts of 500 black-headed gulls and 150 herring gulls (Berridge, 2019).

102. The Braunton Marshes high tide roost occurs on agricultural grassland and is dominated by lapwing (five-year WeBS max count of 1000). Up to three fields are used, two of which occur within the Taw Estuary Crossing. The location of the roost is not consistent and varies depending on the ambient temperature, with the two fields within the Taw Estuary Crossing favoured during warmer conditions (Berridge, 2019).

103. The River Caen and Horsey Island sector supports three high tide roosts: Horsey Island White House roost, which lies on the eastern edge of the Taw Estuary Crossing, and Horsey Island Pills Mouth and Horsey Island fields, which lie to the east of the Taw Estuary Crossing. The Horsey Island White House Roost, on the western end of Horsey Island, is recently established and supports significant numbers of golden plover (five-year WeBS maximum count of 2800) and lapwing (1300). The Horsey Island Pills Mouth roost forms near the mouth of the River Caen and is used predominantly by waders, including up to 250 dunlin and 200 lapwing. The Horsey Island fields roost is dominated by golden plover (recent max 3000) and lapwing (1500) with smaller numbers of other waders including dunlin (Berridge, 2019).

104. Notable non-wetland non bird species are also likely to occur in the vicinity of the Taw Estuary Crossing. This could include widespread resident passerine species such as skylark, meadow pipit, linnet and reed bunting, for which the fields and saltmarsh

are likely to provide suitable foraging habitat. Birds of prey including kestrel, marsh harrier, barn owl and short-eared owl may also use the fields on an occasional basis for foraging, although due to their large wintering ranges and availability of alternative habitat in the vicinity, the site compound fields are unlikely to be of particular importance for these species. Trees, hedgerows and scrub are likely to support small numbers of other widespread notable passerines, such as bullfinch, dunnock and mistle thrush.

105. No overwintering wetland bird roosts have previously been identified in or adjacent to the proposed Landfall. The Saunton Sands WeBS sector, which encompasses the Landfall 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; numbers were above the threshold for national importance in nine months during 2020, when counts exceeded 100 in every month except June and with a peak of 301 in August (Devon Birds, 2022). Saunton Sands can also be important for ringed plover (Berridge, 2019). It is therefore possible that non-breeding sanderling and ringed plover could occur on beach habitats in or near to the Landfall.

106. Notable non-wetland bird species are unlikely to occur in significant numbers in the Landfall 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.

20.4.4.9 Amphibians (including great-crested newt)

107. The great-crested newt (GCN) survey carried out across a wide area covering the Landfall (*Figure 1-1*; **Appendix 20.I**) identified the nearest pond with GCN present as approximately 1.5km from the Landfall. Consequently, great-crested newt are not considered further at the Landfall.

108. The GCN survey (*Figure 1-1*; **Appendix 20.I**) identified the nearest three ponds (P1, P2, and P3) to the Taw Estuary Crossing as in excess of 0.38km and 0.5km from the north side of the Taw Estuary. No GCN presence was noted in the ponds south of the Estuary (*Figure 1-1*; **Appendix 20.I**).

109. The populations of the three ponds within 500m of the expected trenchless on the north side of the Taw Estuary were identified as small (*Table 3.1*; **Appendix 20.I**).

110. The information provided by DBRC within the study area included records for common and widespread amphibian species, including common frog, common toad, smooth newts, and palmate newt (*Section 3.3.1*; **Appendix 20.B**). Smooth/palmate

newt were reported as present in the ponds throughout Braunton Burrows. However, given the limited suitable habitat at the Landfall and within the Taw Estuary itself, and the distance from the nearest GCN identified ponds, amphibians have not been considered further.

20.4.4.10 Reptiles

111. The information provided by DBRC included 15 records for reptiles within 1km of the study area, including:

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

112. A sand lizard survey of Braunton Burrows identified extensive common lizards, sand lizards, and adder in the foredune ridge where dunes were dominated by marram grass (see *Section 3.3.8* in **Appendix 20.B**). Grass snake, common lizard and adder were also observed during the PEA field survey (see *Section 3.3.8* in **Appendix 20.B**). However, the areas of sighting and viable habitat are the dunes, dune/coastal grassland, scrub, woodland edges, semi-improved and marshy grassland fields, hedgerows, fen, ponds, ditches and rhynes within the wider habitats outside and some distance from the Landfall. The reptile survey identified common lizard, adder, and grass snake (*Table 3.8* in **Appendix 20.J**) present at Saunton Sands Foredunes inland from the Landfall. Consequently, reptiles are not considered further at the Landfall.

113. Similarly at the Taw Estuary Crossing, suitable habitats and refugia for reptiles are located inland of the estuary (on our behind the tidal embankment), with species such as slow worm *Anguis fragilis*, common lizard, grass snake, and adder recorded (*Table 3.1* in **Appendix 20.J**) in suitable habitat areas.

20.4.4.11 Invertebrates

114. The information provided by DBRC included 761 records for invertebrates within 1km of the survey area (see *Section 3.3.6* in **Appendix 20.B**). 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)

115. These records represent the following invertebrate groups:

- True flies (one record)
- Bee (one record)
- Moths (540 records)
- Butterflies (201 records)
- Crickets (eight records)
- Dragon and damsel flies (10 records)

116. Species of Principal Importance (NERC 2006; UKBAP) have been recorded within, or in proximity to the wider study area, which could be present within the Landfall and surrounding area including:

- Brown-banded carder bee
- Butterflies:
  - Dingy skipper *Erynnis tages*
  - Grayling *Hipparchia semele*
  - 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 *Malacosoma neustria*
- 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*

117. The study area is considered to provide habitat for a high number of terrestrial and aquatic invertebrate groups and species. 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

118. Within the Landfall at Saunton Sands, only intertidal habitat is present. At the Taw Estuary Crossing the habitats present are intertidal.

20.4.4.11.1 Terrestrial invertebrate survey

119. A survey for terrestrial invertebrates was carried out within the Braunton Burrows SAC and Taw-Torridge Estuary SSSI boundaries and a 50m buffer zone where they fall within the Landfall and the Taw Estuary Crossing (see **Appendix 20.K**). No species of international importance were recorded. A number of notable, UK BAP, and Red Data Book (RDB) species were recorded in areas of long vegetation, such as coastal grassland (see *Section 3* in **Appendix 20.K**). Given the lack of notable terrestrial invertebrate species within the Landfall and Taw Estuary Crossing, these are not considered further.

20.4.4.11.2 Aquatic Macro-invertebrate Survey

120. Aquatic invertebrate survey was carried outside (to) the north and south of the Taw Estuary (see **Appendix 20.L**). However, no surveys were carried out within the Landfall and Taw Estuary due to the high energy environment and tidal inundation. Aquatic invertebrates have therefore not been considered further.

20.4.4.12 Botanical Species

121. The desk study (see *Section 3.3.10* in **Appendix 20.B**) included 135 records for plant species, including:

- UK Priority Species (UK BAP)
- Devon Notable (DN1, DN2, DN3, NS)
- Devon Rarity (DR)
- Vulnerable (vuln)

122. No notable plants were identified within the Landfall given it is bare sand, and this area has therefore not been considered further.

123. Seventeen Devon Notable species and seven Devon Notable and/or Devon Rare plant species were reported on the north and south side of the Taw Estuary respectively. However, no survey was carried out within the estuary and therefore notable plants have not been considered further given they have been covered within the habitats assessed.

124. There was one record of the Schedule 9 non-native, invasive Japanese knotweed (*Fallopia japonica*) adjacent to public footpaths along the Instow flats.

20.4.5 Do Nothing Scenario

125. The Marine Works (Environmental Impact Assessment) Regulations 2007 (as amended) 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).

126. From the point of assessment, over the course of the development and operational lifetime of the Project (operational lifetime anticipated to be a minimum of 25 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.

20.4.5.1.1 Saunton Sands Landfall

127. In the previous 14 year period the beach around Saunton Sands and within the Landfall 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 Geology, Oceanography and Physical 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.

128. The area immediately landward of the beach at Saunton Sands comprises scrub and dunes to the south of the commercial properties and car park in the north. The Dynamic Dunescapes Project has been opening up dune areas and creating more bare sand areas through works and scrub removal to restore the function of the dune system and improve the condition of the site and its subsequent 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.

129. The intertidal changes will not result in significant changes to communities present. However the work of the Dynamic Dunescapes project will improve habitat quality and species presence (specifically for reptiles, bats, invertebrates, and flora). The

timescale of the works in or near to the Landfall are unknown but are expected in the next couple of years.

20.4.5.1.2 Taw Estuary Crossing

130. 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. 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 and rhynes, 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.

20.5 Potential impacts during construction

131. The potential impacts during construction of the Project elements below MHWS or that would impact on habitats within the marine and coastal environment, have been assessed for onshore ecology and ornithology. A description of the potential effect on onshore ecological and ornithological receptors caused by each identified impact is given in this section.

20.5.1 Impact 1: Physical disturbance to intertidal habitats (and Braunton Burrows SSSI and SAC) at the Landfall

132. The realistic worst-case scenario for direct disturbance within the intertidal zone is that of trenching for the cable laying. The trenching activity would use an excavator to dig a trench (see **Table 20.8**), with the sand placed either side (or on one side), following which the cable would be placed in the trench and the sand placed back into the trench to cover. The process would take less than 5 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 disturb 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.

20.5.1.1 Magnitude of impact

133. During the trenching works, approximately 270m^2 of intertidal sand would be temporarily disturbed with an assumed doubling of the disturbance to sand either side for placement of excavated material. Consequently over the works duration a maximum of 810m^2 would be 'turned' or covered during construction. Due to the sequence of working (as the trench is excavated the cable is laid and then the material is placed back in the trench) the full extent of disturbance would not occur at any one time. Given the very rapid turnover of the work and replacement of the sand, as well as the insignificant scale disturbed compared to the habitat type across Saunton Sands, the magnitude of impact is considered to be temporary and **negligible**.

20.5.1.2 Sensitivity of the receptor

134. Whilst the intertidal sand is tidally inundated and experiences diurnal movement of seabed sediment on these tidal cycles, the communities within it are also habituated to disturbance. However, as the habitat is identified as Annex 1 habitat 1140 Mudflats and sandflats not covered by seawater at low tide (and falls within the Braunton Burrows SSSI and SAC) its sensitivity is considered to be **high**.

20.5.1.3 Significance of effect

135. 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 and temporary **minor adverse effect** is expected and is not significant in the context of the EIA regulations.

20.5.1.4 Further Mitigation

136. Works would be carried out as rapidly as possible as this not only minimises the duration of disturbance but also reduces construction cost. Potentially the works could be undertaken in one working day. However, no magnitude change is identified on the basis of this given the uncertainties (such as weather concerns, public access issues, ability of sub-contractors to complete in one day) around it.

137. 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 significant 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. Therefore a short-term

and temporary **minor adverse effect** would therefore remain on intertidal habitats (and therefore the Braunton Burrows SSSI and SAC).

20.5.2 Impact 2: Indirect disturbance to intertidal habitats (and Braunton Burrows SSSI and SAC, and Saunton to Baggy Point SSSI) at the Landfall

138. During construction activity within the intertidal zone there is the 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 (likely 2 excavators and 1 vehicle containing the cable roll) these have the potential to result in accidental (leaks) as any refilling (spillages and storage) would occur within the on-site compound inland. Any accidental pollutant discharges have the potential to impact on the flora and fauna within the intertidal zone.

139. If trenchless techniques are used as an alternative to trenching, there is the potential for 'frac-out' to occur. A frac-out occurs 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 (usually bentonite) and the main impact associated with it is smothering of any surface vegetation or habitat, in this case the intertidal sandflat.

20.5.2.1 Magnitude of impact

140. The likelihood of a leak occurring is low given both the short timescale of presence of plant within the intertidal, 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 intertidal sand and subsequent rapid dispersal of liquid if discharged the scale could cover a notable area and volume. However, embedded mitigation (see **Table 20.9**) would be incorporated into the construction requirements including:

- Implementation of Outline Code of Construction Practice
- Specific checks on vehicles / plant for leaks prior to traversing and working on site (intertidal zone)
- Provision of spillage kits present with each item of plant

141. Given the minimum distance from the rocky habitats at the northern end of the Landfall (within unit 104 Saunton Cliffs and Foreshore of the Saunton to Baggy Point

SSSI) over 90m away it is expected that accidental discharges are not likely to extend that minimum distance. Therefore **no change** would occur.

142. The magnitude of potential pollutant discharges on the intertidal sand habitat (and associated communities) from works associated with the trenching for the cable laying is determined to be **negligible** given the low likelihood, monitoring and checks, and spillage kits presence.

143. With the option for a trenchless technique, whilst a frac-out is unlikely a variety of embedded mitigation measures are proposed to both prevent and respond to such an event. These are listed in **Table 20.9** 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.
- Agreement will be obtained 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 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.

144. It is considered for the trenchless technique that given the embedded mitigation and the confidence in its successful implementation, **no change** would be expected within the intertidal habitats along the Landfall route, and thus no change on the features of the Braunton Burrows SSSI and SAC.

20.5.2.2 Sensitivity of the receptor

145. As the habitat is identified as Annex 1 habitat 1140 Mudflats and sandflats not covered by seawater at low tide (and falls within the Braunton Burrows SSSI and SAC) its sensitivity is considered to be **high**.

20.5.2.3 Significance of effect

146. 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 and temporary **minor adverse effect** is expected and is not significant in the context of the EIA regulations.

147. With the trenchless option as no change is expected there would be **no effect** on intertidal habitats during construction.

20.5.2.4 Further Mitigation

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

20.5.3 Impact 3: Physical disturbance to intertidal habitats (and Taw-Torridge Estuary SSSI) at the Taw Estuary Crossing

149. The intended crossing of the Taw-Torridge Estuary would be carried out using trenchless techniques underneath the bed of the estuary. 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 techniques would be located c. 10m or more below the bed of the estuary.

20.5.3.1 Magnitude of impact

150. As no physical disturbance would occur on or above the bed of the estuary and its associated habitats (being at a depth of c. 10m or more below the bed) no impact would occur, and **no change** is expected.

20.5.3.2 Sensitivity of the receptor

151. The estuarine habitats fall within unit 103 of the Taw-Torridge Estuary SSSI and as such its sensitivity is considered to be **high**.

20.5.3.3 Significance of effect

152. Given no impact , **no effect** is expected.

20.5.3.4 Further Mitigation

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

20.5.4 Impact 4: Indirect disturbance to intertidal habitats (and Taw-Torridge Estuary SSSI, and Braunton Burrows SSSI and SAC) at the Taw Estuary Crossing

154. During construction activity inland of the intertidal zone there is the potential for indirect effects to arise from the accidental release of pollutants from the trenchless plant that are used. These have the potential to result in accidental (leaks, spillages and storage) within the compound and activity area inland. Any accidental pollutant

discharges have the potential to impact on the flora and fauna within the intertidal zone either through leaking through the tidal embankment or (more likely) being discharged to surface drains which then discharge into the estuary (and to the habitats of the Braunton Burrows SSSI and SAC 'downstream'.

155. The use of trenchless techniques under the estuary has the potential for 'frac-out' (see **paragraph 139**) 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 it is smothering of habitat, in corridor this predominantly comprises intertidal mudflat and sandflat with small outcrops of rock, and saltmarsh at the extreme sides of the corridor (see **Figure 20.5**).

20.5.4.1 Magnitude of impact

156. The potential for spillage, fuel storage failure, and leaks within the intertidal are not likely as no vehicles would be present in the estuary. Spillages on works areas inland could potentially discharge into the estuary either through percolation or via drains inland that discharge to the estuary. However, given the embedded mitigation (see **Table 20.9**) it is determined to be **negligible** given the low likelihood, monitoring and checks, and spillage kits presence.

157. Given the small scale of the site works inland and the adoption of embedded mitigation measures listed in **paragraph** Error! Reference source not found., the potential scale and magnitude of dust generation is determined to be **negligible**.

158. The site compounds and trenchless works areas inland would contain plant and machinery that would in the short-term result in additional emissions to air. Whilst embedded mitigation measures are aimed at minimising emissions (see **Table 20.9** and **paragraph** Error! Reference source not found.) a **negligible** magnitude impact is predicted in terms of deposition within the intertidal habitats. Furthermore, the regular tidal inundation would diurnally dilute and disperse any particulates.

159. Overall, the magnitude of potential pollutant discharges on the surface water and estuarine habitats (and associated communities) is determined to be **negligible** given the low likelihood, monitoring and checks, and spillage kits presence as detailed in **Table 20.9**.

160. Whilst a frac-out is unlikely a variety of embedded mitigation measures are proposed to both prevent and respond to such an event. These are listed in **Table 20.9** and **paragraph 143**. It is considered that given the embedded mitigation and the confidence in its successful implementation, **no change** would be expected within the estuary habitats (predominantly intertidal mudflat and sandflat). The

presence of saltmarsh at the north-western corner and south-eastern corner of the crossing ‘corridor’ are unlikely to be along the specific cable route as they are distant from the expected line of the specific cable route. The likely specific cable route is also located outside the Braunton Burrows SSSI and SAC though the extreme ends of the corridor fall within these sites.

20.5.4.2 Sensitivity of the receptor

161. As the habitat within the estuary and downstream are designated as SSSI (Taw-Torridge Estuary SSSI and Braunton Burrows SSSI) and SAC (Braunton Burrows SAC; it is noted that Annex I habitats 2130 "Fixed coastal dunes with herbaceous vegetation ("grey dunes")", 2170 Dunes with *Salix repens* ssp. *argentea Salicion arenariae*, and 2190 Humid dune slacks are located approximately 100m or more away, whilst 1140 Mudflats and sandflats not covered by seawater at low tide are located approximately 3.5km away by watercourse) the sensitivity is considered to be **high**.

20.5.4.3 Significance of effect

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

163. No change is expected with the trenchless approach and there would be **no effect** on inland grassland habitats during construction.

20.5.4.4 Further Mitigation

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

20.5.5 Impact 5: Disturbance to bats at the Landfall

165. Serotine bats were recorded at the southside of the Saunton Sands car park whilst greater horseshoe, barbastelle, Noctule sp., and common pipistrelle recorded further east beyond the car park. Whilst dunes and dune grassland (and scrub) are present within the corridor, the majority of the works would result in temporary disturbance to intertidal habitats.

166. There are no trees or structures of potential roosting value within or adjacent to the Landfall.

20.5.5.1 Magnitude of impact

167. No roosts are present therefore **no change** to bat roosting habitat would arise.

168. The disturbance within the intertidal would occur during daytime hours and no expected reduction in quality of the foraging habitat would occur given it would only disturb low mobility species and buried species. Overall, **no change** is expected.

20.5.5.2 Sensitivity of the receptor

169. Whilst not recorded near the Landfall, greater horseshoe is recorded present in the area eastwards of the Landfall. This species is the designated feature of the Caen Valley Bats SSSI. Consequently, a **high** sensitivity is determined.

20.5.5.3 Significance of effect

170. Given no change is predicted in the magnitude of impacts, **no effect** would therefore occur.

20.5.5.4 Further Mitigation

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

20.5.6 Impact 6: Disturbance to bats at the Taw Estuary Crossing

172. Foraging Greater horseshoe, Noctule sp., Soprano pipistrelle, common pipistrelle, and *Myotis* sp inland on the north side of the Taw Estuary, with barbastelle and long-eared sp. recorded around the edge of the corridor. Whilst no direct habitat disturbance would occur within the estuary.

173. On the south side of the River Taw, Noctule sp., Soprano pipistrelle, and common pipistrelle were recorded around the tidal embankment and field boundaries.

174. There are no trees or structures of potential roosting value within or adjacent to the Taw Estuary Crossing.

20.5.6.1 Magnitude of impact

175. No roosts are present in or near to the Taw Estuary Crossing therefore **no change** to bat roosting habitat would arise.

176. Given that the works would entail trenchless crossing underneath the estuary there would be no alteration or loss of foraging habitat or disturbance, therefore **no change** to foraging bat habitat would arise.

20.5.6.2 Sensitivity of the receptor

177. Whilst not recorded within the fields, greater horseshoe is recorded present inland and could potentially forage along the estuary edge. This species is the designated feature of the Caen Valley Bats SSSI. Consequently, a **high** sensitivity is determined.

20.5.6.3 Significance of effect

178. Given no change is predicted in the magnitude of impacts, **no effect** would therefore occur as a result of the Taw Estuary Crossing.

20.5.6.4 Further Mitigation

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

20.5.7 Impact 7: Disturbance to otter at the Taw Estuary Crossing

180. Otter presence was recorded in the drains and pond to the north and south of the Taw Estuary (see **Section 20.4.4.3**). Otter could potentially be present in the Taw Estuary. There would be no disturbance (habitat loss or human / machinery presence) within the estuary habitats. The temporary works areas inland would not impinge on the drains or ponds to the north or south of the Taw Estuary. Direct habitat loss or alteration would therefore not be expected. However, noise and, if present, lighting could potentially result in disturbance to otters if they are resting up nearby. Furthermore, during construction activity inland in the temporary works and areas and site compounds there is the potential for indirect effects to arise from the accidental release of pollutants from the trenchless plant that are used into the surrounding drains. Any accidental pollutant discharges have the potential to impact on the flora and fauna within the drains where otter have been recorded as present.

20.5.7.1 Magnitude of impact

181. There would be no loss of or alteration to otter habitat either directly (within the estuary) or secondarily (within the temporary works and site compounds) during construction and **no change** is expected. The potential indirect impacts due to disturbance could arise during the 3-6 month duration of the works. As otter territories are very large (up to 30km) and these impacts will be short-term and extremely localised, and not near any confirmed otter holt or resting sites, (and with embedded mitigation such as site fencing, see **Table 20.9**) this is likely to produce an effect of **negligible** magnitude. The potential for spillage, fuel storage failure, and leaks within the site compounds and temporary works area would be low.

However, given the embedded mitigation (see **Table 20.9**) it is determined to be **negligible** given the low likelihood, monitoring and checks, and spillage kits presence.

20.5.7.2 Sensitivity of the receptor

182. Given the national and protected status of otter, the sensitivity is **high**.

20.5.7.3 Significance of effect

183. Given the negligible impact predicted and high sensitivity, a short-term and temporary **minor adverse effect** in relation to pollution, noise and other disturbance would occur on otter during the construction phase for the Taw Estuary Crossing.

20.5.7.4 Further Mitigation

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

20.5.8 Impact 8: Habitat loss to non-breeding birds at the Landfall

20.5.8.1 Magnitude of impact

185. The parameters for the predicted worst-case scenario during construction are outlined above and in **Table 20.8**. If the trenching method is progressed, there would be a temporary loss of approximately 135m^2 of beach habitat (predominantly fine sand) on Saunton Sands. This would lead to a reduction in suitable foraging habitat for sanderling and ringed plover, and potentially also for low numbers of passerines such as skylark and snow bunting. However, the temporary loss of this habitat is not considered to be significant for these species; the loss of 135m^2 of beach represents approximately 0.005% of the total area of Saunton Sands, and the habitat would be reinstated in less than five days.

186. If a trenchless technique is progressed, there would be no temporary loss of beach habitat on Saunton Sands, and accordingly no loss of foraging habitat for sanderling, ringed plover and passerines is predicted.

187. No loss of roosting bird habitat is predicted, irrespective of which method is progressed, as no roosts have been identified in the vicinity of the Landfall.

188. With the limited temporal and spatial scale of construction activities in the Landfall described above, the overall magnitude of habitat loss to non-breeding birds is considered to be **negligible**.

20.5.8.2 Sensitivity of the receptor

189. Saunton Sands is considered to be the most important site in Devon for sanderling, an Amber-listed Bird of Conservation Concern (Stanbury et al, 2021); numbers were above the threshold for national importance in nine months during 2020, when counts exceeded 100 in every month except June and with a peak of 301 in August (Devon Birds, 2022). The sensitivity of this species is therefore **high**. The sensitivity of other non-breeding species is considered to be **low**.

20.5.8.3 Significance of effect

190. The impact magnitude is negligible and the receptor sensitivity is high (sanderling) or low (other species), therefore the unmitigated effect of habitat loss on non-breeding birds is classified as **minor adverse** and is not significant in the context of the EIA regulations.

20.5.8.4 Further mitigation

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

20.5.9 Impact 9: Disturbance to non-breeding birds at the Landfall

20.5.9.1 Magnitude of impact

192. No disturbance to roosting birds is predicted, as no roosts have been identified in the vicinity of the Landfall. Construction activities could nevertheless disturb foraging species (including sanderling) from the Landfall and surrounding habitats, either through noise or visual disturbance. However, as set out previously, the Landfall and surrounding areas are already subject to a high degree of anthropogenic disturbance; 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). It is considered that any short-term noise or visual disturbance arising from construction activities would not lead to any discernible increase in disturbance to non-breeding bird populations in the vicinity. The magnitude of any impact would therefore be **negligible**.

20.5.9.2 Sensitivity of the receptor

193. As described previously, the sensitivity of sanderling is considered to be **high,** and for all other ornithological receptors is considered to be **low**.

20.5.9.3 Significance of effect

194. The impact magnitude is negligible and the receptor sensitivity is high (sanderling) or low (other species), therefore the unmitigated effect of disturbance to non-breeding birds is classified as **minor adverse** and is not significant in the context of the EIA regulations.

20.5.9.4 Further mitigation

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

20.5.10 Impact 10: Habitat loss to non-breeding birds at the Taw Estuary Crossing

20.5.10.1 Magnitude of impact

196. The parameters for the predicted worst-case scenario during construction are outlined in **Table 20.8**. The Taw Estuary Crossing cable would be installed by a trenchless technique, with temporary site compounds located in fields on the north and south sides of the estuary. The parameters for the site compounds have yet to be determined, however these would be minimised as far as possible and enclosed by protective fencing.

197. The site compound on the north side of the Taw Estuary Crossing would be situated in the Braunton Marshes WeBS sector, in one of three fields which have been identified as supporting a high tide roost for lapwing. The five-year maximum WeBS count for this roost is 1,000, although 200-400 birds is more typical, and the roost has undergone a substantial recent decline (Berridge, 2019). The presence of the site compound could therefore result in a temporary reduction in roosting habitat for lapwing (and potentially other wintering species). However as set out in **Table 20.9**, no works would take place between the months of October to March inclusive, thereby avoiding the key overwintering / roosting period, and the habitat would be reinstated on completion of works. This would ensure no net loss of roosting habitat for lapwing (or other species).

198. The site compound on the south side of the Taw Estuary Crossing would not be situated in any areas identified as supporting high tide roosts for waders or waterfowl. Individual or small numbers of overwintering species such as curlew, lapwing and oystercatcher may occasionally use the field for roosting or foraging (particularly given the field's proximity to the Yelland and Black Ground/Cool Stone roosts) however, as for the compound on the north side of the crossing corridor, no works would take place between the months of October to March inclusive when

overwintering / roosting species are present. Habitats would be reinstated upon completion of the works, ensuring no net loss of foraging or roosting habitat.

199. Taking into account the avoidance of the overwintering period for construction, the impact magnitude of habitat loss associated with the Taw Estuary Crossing is considered to be **negligible** for lapwing and other non-breeding birds.

20.5.10.2 Sensitivity of the receptor

200. The Braunton Marsh high tide roost is considered to support >5% of the Taw-Torridge Estuary lapwing population (Berridge, 2019) but does not approach the site threshold for national importance (6,200; Frost *et al* (2020) in Devon Birds (2022)). Lapwing is a Priority Species and Red-listed Bird of Conservation Concern (Stanbury et al 2021). The sensitivity of this receptor is therefore **medium**. The sensitivity of other non-breeding birds to habitat loss is **low**.

20.5.10.3 Significance of effect

201. The impact magnitude is negligible, and the receptor sensitivity is low to medium, therefore the unmitigated effect of habitat loss on non-breeding birds is classified as **minor adverse** and not significant in the context of the EIA regulations.

20.5.10.4 Further mitigation

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

20.5.11 Impact 11: Disturbance to non-breeding birds at the Taw Estuary Crossing

20.5.11.1 Magnitude of impact

203. Construction activities could disturb non-breeding bird species, including lapwing, from the site compounds and surrounding habitats, either through noise or visual disturbance. However, as set out previously, no works would take place between the months of October to March inclusive (see **Table 20.9**) within 250m of the roost sites. This would negate the risk of any disturbance to overwintering roosts that have been identified in the vicinity, including Braunton Marshes, Horsey Island White House and Yelland.

204. Taking into account the avoidance of the overwintering period for construction, the impact magnitude of disturbance associated with the Taw Estuary Crossing is considered to be **negligible** for lapwing and other non-breeding birds.

20.5.11.2 Sensitivity of the receptor

205. The Braunton Marsh high tide roost is considered to support >5% of the Taw-Torridge Estuary lapwing population (Berridge, 2019) but does not approach the site threshold for national importance (6,200; Frost *et al* (2020) in Devon Birds (2022)). Lapwing is a Priority Species and Red-listed Bird of Conservation Concern (Stanbury et al 2021). The sensitivity of this receptor is therefore **medium**. The sensitivity of other non-breeding birds to disturbance is **low**.

20.5.11.3 Significance of effect

206. The impact magnitude is negligible, and the receptor sensitivity is medium, therefore the unmitigated effect of disturbance on non-breeding birds is classified as **minor adverse** and not significant in the context of the EIA regulations.

20.5.11.4 Further mitigation

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

20.5.12 Impact 12: Disturbance to reptiles at the Taw Estuary Crossing

208. Slow worm and common lizard were recorded on the north side of the Taw Estuary, whilst slow worm, common lizard, grass snake, and adder were recorded on the south side of the Taw Estuary (see **Section 20.4.4.10**). The embankment and to a lesser extent the intertidal zone could support foraging reptiles, though these are considered to provide lesser value habitat than areas inland. The disturbance to the intertidal area and embankment would not be physical ground disturbance as the cable would be trenchless underneath the ground and estuary bed, however, some monitoring of the exposed estuary and habitats within it would occur during the trenchless works to monitor for 'frac-out'.

20.5.12.1 Magnitude of impact

209. As habitat loss and habitat fragmentation would not occur given that works would not take place above ground, **no change** is predicted.

210. The potential for disturbance to slow worm, common lizard, grass snake, or adder from monitoring (movement of personnel over the intertidal zone and in the circumstance of 'frac-out' would comprise manual removal of waste discharged onto the surface) is **negligible** in magnitude given the limited scale of presence and activity over the duration of the works (3-6 months).

20.5.12.2 Sensitivity of the receptor

211. Given the status of the reptiles present (slow worm, common lizard, grass snake, and adder) the sensitivity of these receptors is **medium**.

20.5.12.3 Significance of effect

212. Given the negligible magnitude impact and medium sensitivity of the receptor species, a potential short-term and temporary **minor adverse effect** is predicted on the reptile species present as a result of the disturbance from construction activities associated with the Taw Estuary Crossing, and not significant in the context of the EIA regulations.

20.5.12.4 Further Mitigation

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

20.5.13 Impact 13: Disturbance to or introduction of non-native invasive species at the Landfall

214. No invasive non-native species are recorded within the Landfall and surrounding area. As the construction will involve bringing in plant and equipment to the habitats and species study area, including plant which may have been used at other locations where presence of invasive species could occur, there is a risk of releasing non-native species into the Landfall area during the construction phase.

20.5.13.1 Magnitude of impact

215. The risk of introducing non-native species over the long term is anticipated to have a **low** magnitude risk.

20.5.13.2 Sensitivity of the receptor

216. Given the international value of the Braunton Burrows SSSI and SAC which bounds and partially falls within the temporary works area, the sensitivity is **high**.

20.5.13.3 Significance of effect

217. Given the low magnitude impact but high sensitivity, a potential **moderate adverse effect** is predicted as a result of the spread of non-native invasive species during construction associated with the Landfall, which is significant in the context of the EIA regulations.

20.5.13.4 Further Mitigation

218. The following mitigation will be undertaken:

- Good site practice measures for managing the spread of invasive species
- Good site practice measures for managing the spread of invasive species during works at watercourses
- A requirement for an Ecological Clerk of Works (ECoW) and details of their responsibilities with respect to non-native invasive species

219. Following implementation of these mitigation measures, the risk of spreading invasive species, is reduced to a no change, and therefore **no residual effect** is predicted.

20.5.14 Impact 14: Disturbance to or introduction of non-native invasive species at the Taw Estuary Crossing

220. No invasive non-native species recorded within or adjacent to the Taw Estuary Crossing, though Japanese knotweed was recorded adjacent to the footpath along the Instow Flats though this is outside the crossing corridor (see **Section 20.4.4.12**). However, as the construction will involve bringing in plant and equipment to the habitats and species study area, including plant which may have been used at other locations where presence of invasive species could occur, there is a risk of releasing non-native species into the Landfall area during the construction phase.

20.5.14.1 Magnitude of impact

221. The risk of introducing non-native species over the long term is anticipated to have a **low** magnitude risk.

20.5.14.2 Sensitivity of the receptor

222. Given the international and national value of the Braunton Burrows SSSI and SAC, and Taw-Torridge Estuary SSSI, respectively, near to the temporary works areas and site compounds, the sensitivity is **high**.

20.5.14.3 Significance of effect

223. Given the low magnitude impact but high sensitivity, a potential **moderate adverse effect** is predicted as a result of the spread of non-native invasive species during construction associated with the Taw Estuary Crossing, which is significant in the context of the EIA regulations.

20.5.14.4 Further Mitigation

224. The mitigation measures identified in **paragraph 218** will be undertaken.

225. Following implementation of these mitigation measures, the risk of spreading invasive species, is reduced to a no change, and therefore **no residual effect** is predicted.

20.6 Potential impacts during operation and maintenance

226. The potential impacts of the operation and maintenance of the Project elements below MHWS or that would impact on habitats within the marine and coastal environment have been assessed on onshore ecological and ornithological. A description of the potential effect on onshore ecological and ornithological caused by each identified impact is given in this section.

20.6.1 Impact 1: Habitat alteration or disturbance to intertidal habitats (and Braunton Burrows SSSI and SAC) at the Landfall

227. In the operational phase the export cable would be buried at depth in the intertidal zone, at least at a depth of 1.2m but potentially deeper (see **Table 20.8**). Consequently there would be no alteration to the surface habitat and communities.

228. Whilst over time the beach does change, in general over the last 14 years this has averaged less than a 0.25m decrease in the area of the Landfall (see **paragraph 127**). Consequently, it is expected that the cable would not become exposed over time if that rate is extrapolated over the next 25 years (therefore less than 0.5m drop in level as a conservative interpolation), and certainly well beyond the operational lifetime of the project. As such there would be alteration to the geomorphological processes within the intertidal zone.

229. Maintenance visits would be undertaken annually (see **Table 20.8**). These would entail a walkover of the route of the cable. As this would be undertaken on foot across the intertidal zone, no disturbance or alteration to the habitat would occur.

230. Whilst the potential for emergency repairs exists, it is extremely rare for cables to fail and require replacement. Failure points would most likely occur at the joins either at the transition bay inland or at the connection with the offshore export cable in the subtidal zone. Given the extremely low probability of such an event, no disturbance or habitat alteration would be reasonably expected throughout the lifetime of the project.

20.6.1.1 Magnitude of impact

231. No rocky habitats or their communities at the northern end of the Landfall (within unit 104 Saunton Cliffs and Foreshore of the Saunton to Baggy Point SSSI) would be disturbed or experience any form of alteration to the habitats or the geomorphological and physical processes as a result of the buried cable, therefore **no change** would occur.

232. The intertidal sandflats (Annex 1 habitat 1140 Mudflats and sandflats not covered by seawater at low tide of the Braunton Burrows SAC and SSSI) and their communities would not be disturbed or experience any form of alteration to the habitat or the geomorphological and physical processes as a result of the buried cable, therefore **no change** would occur.

233. The maintenance visits would not result in any disturbance or alteration to rocky habitats or intertidal sandflats and their communities, or any changes to the geomorphological and physical processes, therefore **no change** would occur.

234. As emergency repairs are highly unlikely, there would be no disturbance or alteration to rocky habitats or intertidal sandflats and their communities, or any changes to the geomorphological and physical processes, therefore **no change** would occur.

20.6.1.2 Sensitivity of the receptor

235. The rocky habitat and intertidal habitat are considered to be **high** sensitivity, as detailed in **paragraph 145**.

20.6.1.3 Significance of effect

236. Given that no changes are expected on or within the intertidal habitats during operation and maintenance, **no effect** is expected on them and the designated features during the operational phase at the Landfall.

20.6.1.4 Further Mitigation

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

20.6.2 Impact 2: Habitat alteration or disturbance to intertidal habitats (and Taw-Torridge Estuary SSSI) at the Taw Estuary Crossing

238. In the operational phase the export cable would be buried at depth under the estuary, approximately 10m or more below the estuary bed. Consequently there would be no alteration or disturbance to the estuary habitats and communities.

239. Given the hard substrate and geology of the estuary bed erosion would not at any time in the future be expected to expose the cable. As such there would be alteration to the geomorphological processes within the estuary as a result of exposure of the cable.

240. Maintenance visits would be undertaken annually (see **Table 20.8**). These would entail a walkover of the route of the cable above MLWS. As this would be undertaken on foot across the intertidal zone, no disturbance or alteration to the habitat would occur.

241. Whilst the potential for emergency repairs exists, it is extremely rare for cables to fail and require replacement. Failure points would most likely occur at the joins / transition bays either end of the cable where it transitions from the trenchless design to trenched. Given the extremely low probability of such an event, no disturbance or habitat alteration would be reasonably expected throughout the lifetime of the project within the estuary.

20.6.2.1 Magnitude of impact

242. No estuarine habitats or their communities would be disturbed or experience any form of alteration to the habitats or the geomorphological and physical processes as a result of the buried cable across the estuary, therefore **no change** would occur.

243. The maintenance visits would not result in any disturbance or alteration to estuarine habitats and their communities, or any changes to the geomorphological and physical processes, therefore **no change** would occur.

244. As no expected emergency repairs are likely, there would be no disturbance or alteration to estuarine habitats and their communities, or any changes to the geomorphological and physical processes, therefore **no change** would occur.

20.6.2.2 Sensitivity of the receptor

245. The estuarine habitats fall within unit 103 of the Taw-Torridge Estuary SSSI and as such its sensitivity is considered to be **high**.

20.6.2.3 Significance of effect

246. Given no impacts are identified , **no effect** is expected on the estuary habitats and features in the operational phase at the Taw Estuary Crossing.

20.6.2.4 Further Mitigation

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

20.6.3 Impact 3: Secondary indirect disturbance to intertidal habitats (and Taw-Torridge Estuary SSSI, and Braunton Burrows SSSI and SAC) at the Taw Estuary Crossing

248. During emergency repairs at the transition bays inland there is the potential for indirect effects to arise from the accidental release of pollutants from the vehicles and equipment that may be present. These have the potential to result in accidental (leaks and spillages) within the area of the transition bay. Any accidental pollutant discharges have the potential to impact on the flora and fauna within the intertidal zone either through leaking through the tidal embankment or (more likely) being discharged to surface drains which then discharge into the estuary (and to the habitats of the Braunton Burrows SSSI and SAC 'downstream'.

249. Given the works would take place within the confines of the transition bays under the manhole covers, dust emissions are not expected.

20.6.3.1 Magnitude of impact

250. The potential for spillage and leaks within the temporary works area would be very low. However, given the embedded mitigation (see **Table 20.9**) it is determined to be **negligible** given the low likelihood, monitoring and checks, and spillage kits presence.

251. Given the very minor scale of the works within the immediate area of the transition bay **no change** in magnitude of impact is expected.

252. Given the limited increase in vehicle movements compared to the baseline with movements being inland, and given the majority of movements will take placed during the daylight, the potential magnitude of traffic collisions with faunal species (particularly badgers, otters, etc) is determined to be **negligible**.

253. Other than vehicles to access the site and bring any necessary equipment and material to site, very minor and temporary emissions from vehicles would be expected, such that a **negligible** magnitude impact is predicted.

254. Overall, the magnitude of potential pollutant discharges on the surface water and estuarine habitats (and associated communities) is determined to be **negligible** given the low likelihood, monitoring and checks, and spillage kits presence as detailed in **Table 20.9**.

20.6.3.2 Sensitivity of the receptor

255. The sensitivity of receptors is considered to be **high**, as detailed in **paragraph 161**.

20.6.3.3 Significance of effect

256. Given the negligible magnitude of the impacts but the high sensitivity (and value) of the site within which the habitat disturbed is located, a short-term and temporary **minor adverse effect** is expected and not significant in the context of the EIA regulations.

20.6.3.4 Further Mitigation

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

20.6.4 Impact 4: Disturbance to bats at the Landfall

258. Serotine bats were recorded at the southside of the Saunton Sands car park whilst greater horseshoe, barbastelle, Noctule sp., and common pipistrelle recorded further east beyond the car park. Only intertidal sandflat is present at the Landfall.

259. There are no trees or structures of potential roosting value within or adjacent to the Landfall. In the operational phase the export cable would be buried at depth in the intertidal zone and inland, to a depth of 1.2m at least but potentially deeper (see **Table 20.8**). Consequently there would be no loss of or alteration to bat roosting or foraging habitat.

260. Maintenance visits would be undertaken annually (see **Table 20.8**). These would entail a walkover of the Landfall during daylight hours. As this would be undertaken on foot across the intertidal zone, no disturbance to bats would occur.

261. Whilst the potential for emergency repairs exists, it is extremely rare for cables to fail and require replacement. Failure points would most likely occur at the joins either at the transition bay inland or at the connection with the offshore export cable in the subtidal zone. Given the extremely low probability of such an event, no disturbance to bats or alteration of habitat for bats would be expected throughout the lifetime of the project. If emergency repairs took place, they would be carried out via the access to the transition bay in an area that is car park and heavily trafficked by vehicles and

people. Furthermore, such activity would be small scale and localised and is unlikely to occur at night due to health and safety and visibility requirements. Therefore, no disturbance to bats would occur.

20.6.4.1 Magnitude of impact

262. No disturbance to bats or their habitat would occur during the operational phase either through habitat alteration, or maintenance or emergency repairs, therefore **no change** is expected.

20.6.4.2 Sensitivity of the receptor

263. Whilst not recorded near the scrub area, greater horseshoe is recorded present in the area eastwards of the Landfall and scrub area. This species is the designated feature of the Caen Valley Bats SSSI. Consequently, a **high** sensitivity is determined.

20.6.4.3 Significance of effect

264. As no change would occur, **no effect** is expected on bats during the operational phase at the Landfall.

20.6.4.4 Further Mitigation

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

20.6.5 Impact 5: Disturbance to bats at the Taw Estuary Crossing

266. Foraging greater horseshoe, Noctule sp., soprano pipistrelle, common pipistrelle, and *Myotis* sp around the field boundaries on the north side of the Taw Estuary, with barbastelle and long-eared sp. recorded further inland. No direct habitat disturbance would occur within the estuary.

267. On the south side of the River Taw, Noctule sp., Soprano pipistrelle, and common pipistrelle were recorded around the tidal embankment and field boundaries. However, there would be no habitat loss within the Taw Estuary Crossing as the cable would be tunnelled underneath the estuary bed.

268. There are no trees or structures of potential roosting value within or adjacent to the Taw Estuary Crossing.

269. Maintenance visits would be undertaken annually (see **Table 20.8**). These would entail a walkover of the Taw Estuary Crossing within the estuary during daylight

hours. As this would be undertaken on foot across the intertidal zone, no disturbance to bats would occur.

270. Whilst the potential for emergency repairs exists, it is extremely rare for cables to fail and require replacement. Failure points would most likely occur at the joins either at the transition bay inland or at the connection with the offshore export cable in the subtidal zone. Given the extremely low probability of such an event, no disturbance to bats or alteration of habitat for bats would be expected throughout the lifetime of the project. If emergency repairs took place, they would be carried out from the cable access points inland and not within the estuary. Therefore, no disturbance to bats would occur within the estuary.

20.6.5.1 Magnitude of impact

271. No loss of bat foraging or roosting habitat would occur during the operational phase at the Taw Estuary Crossing during operation phase as all infrastructure would be buried under the estuary bed, therefore **no change** is expected.

272. No disturbance to bats or their habitat would occur during the operational phase to the north or south of the Taw Estuary or along the crossing during maintenance visits, therefore **no change** is expected.

273. During emergency repairs there would be no activity within the estuary. Therefore, no disturbance to bats is anticipated and as such **no change** is predicted.

20.6.5.2 Sensitivity of the receptor

274. Greater horseshoe, Noctule sp., Soprano pipistrelle, common pipistrelle, *Myotis* sp, barbastelle, and long-eared sp. bats were recorded in the surrounding area. Greater horseshoe is recorded present in the area and this species is the designated feature of the Caen Valley Bats SSSI. Consequently, a **high** sensitivity is determined.

20.6.5.3 Significance of effect

275. The permanent loss of a negligible magnitude of potential sub-optimal foraging habitat for the high sensitivity species would result in a potential secondary **minor adverse effect** on bat foraging habitat and not significant in the context of the EIA regulations. It is considered that habitat reinstatement is likely to result in some improvement and this may offset (by increased biodiversity) the very small loss that would occur.

276. As no change would occur as a result of temporary disturbance, **no effect** is expected on bats during the operational phase at the Taw Estuary Crossing from any activities that may occur.

20.6.5.4 Further Mitigation

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

20.6.6 Impact 6: Disturbance to otter at the Taw Estuary Crossing

278. . Otter presence was recorded to the north and south of the Taw Estuary (see **Section 20.4.4.3**) though no records or sightings of otter activity were found in the estuary. However, otter could potentially be present in the Taw Estuary.

279. Direct habitat loss or alteration would therefore not occur as the cable would be buried beneath the estuary bed.

280. There would be no disturbance other than an annual visual maintenance check within the estuary habitats during daylight hours.

281. There is also a very low risk of accidental release of pollutants from emergency repair works due to the small scale and likely nature of the works inland. Any accidental pollutant discharges have the potential to impact on the flora and fauna within the drains where otter have been recorded as present, and these could discharge into the estuary.

20.6.6.1 Magnitude of impact

282. There would be no loss of or alteration to otter habitat within the estuary in the operational phase and **no change** is expected.

283. The maintenance visits would occur in daylight hours annually and would be imperceptible in scale and extremely short in duration and would not represent a noticeable change from the current human presence in this area, therefore **no change** is expected.

284. The potential for spillage, fuel storage failure, and leaks associated with any emergency repairs would be very low and inland which could discharge into the estuary and impact on otter foraging resources. However, given the embedded mitigation (see **Table 20.9**) it is determined to be **negligible** given the low likelihood, monitoring and checks, and spillage kits presence.

20.6.6.2 Sensitivity of the receptor

285. Given the national and protected status of otter, the sensitivity is **high**.

20.6.6.3 Significance of effect

286. Given the negligible impacts predicted and high sensitivity, a potential temporary **minor adverse effect** in relation to pollution, noise and other disturbance would occur on otter during the operational phase for the Taw Estuary Crossing.

20.6.6.4 Further Mitigation

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

20.6.7 Impact 7: Habitat loss to birds associated with the Landfall

20.6.7.1 Magnitude of impact

288. The predicted worst-case scenario during operation and maintenance is outlined in **Table 20.8**. There would be no habitat loss for breeding or non-breeding birds as the cable would remain buried under the sand, **no change** is therefore expected.

20.6.7.2 Sensitivity of the receptor

289. No specially protected bird species, or species of conservation importance, were recorded breeding within or adjacent to the car park. The sensitivity of breeding birds to habitat loss during operation and maintenance is therefore considered to be **negligible**.

20.6.7.3 Significance of effect

290. As no change would occur, **no effect** is expected on breeding or non-breeding birds during the operational phase at the Landfall.

20.6.7.4 Further Mitigation

291. No further mitigation is required.

20.6.8 Impact 8: Disturbance to birds associated with the Landfall

20.6.8.1 Magnitude of impact

292. As set out above and in **Table 20.7**, there would be no infrastructure above the sandy beach. Maintenance visits are expected to be infrequent and short-term in duration and emergency repairs are unlikely and would not be undertaken within the estuary (as cable is buried and within ducting), although these could occur at any time throughout the year. Sanderling and ringed plover may use beach habitats adjacent to the car park for foraging, and low numbers of passerine species such as

skylark and snow bunting could also occur, however these species would be subject to existing anthropogenic disturbance from the car park and beach users. Taken in the context of the location, within a car park subject to existing high levels of traffic movement and human presence, maintenance/repair visits would only briefly affect any birds present in the immediate vicinity. The magnitude of impact is therefore considered to be **negligible**.

20.6.8.2 Sensitivity of the receptor

293. As described previously, the sensitivity of sanderling is considered to be **high,** and for all other ornithological receptors is considered to be **low**.

20.6.8.3 Significance of effect

294. The impact magnitude is negligible, and the receptor sensitivity is high (sanderling) or low (other species), therefore the unmitigated impact of disturbance to non-breeding birds is classified as **minor adverse** and not significant in the context of the EIA regulations.

20.6.8.4 Further mitigation

295. No further mitigation is required.

20.6.9 Impact 9: Habitat loss to birds associated with the Taw Estuary Crossing

20.6.9.1 Magnitude of impact

296. The predicted worst-case scenario during operation and maintenance is outlined in **Table 20.8**. There would be no habitat loss for breeding or non-breeding birds as the cable would remain buried under the estuary bed, **no change** is therefore expected**.**

20.6.9.2 Sensitivity of the receptor

297. For reasons set out previously, depending on species the sensitivity of birds to habitat loss is either **medium** (lapwing), **low** (skylark, other non-breeding birds) or **negligible** (other breeding birds).

20.6.9.3 Significance of effect

298. As no change would occur, **no effect** is expected on breeding or non-breeding birds during the operational phase at the Taw Estuary Crossing.

20.6.9.4 Further mitigation

299. No further mitigation is required.

20.6.10 Impact 10: Disturbance to birds associated with the Taw Estuary Crossing

20.6.10.1 Magnitude of impact

300. Maintenance visits or emergency repairs to the crossing cable could occur at any time. This could lead to disturbance to breeding and non-breeding birds in the vicinity of the Landfall where maintenance visits would entail and visual monitoring survey. However, as set out previously, routine maintenance is not anticipated; any works are likely to be infrequent and short-term in duration. This would only briefly disturb bird populations in the immediate surroundings, although this could include breeding skylark and non-breeding/roosting lapwing (north of the estuary). Alternative habitat is available in the vicinity; as previously described, the Braunton Marshes lapwing roost uses three separate fields regularly (Berridge 2019). Disturbance to Schedule 1 breeding species, including Cetti's warbler and barn owl, is considered very unlikely. Any emergency repairs would not take place within the estuary as the cable and ducting is buried and any repairs would take place inland. The magnitude of the impact is therefore considered to be **low.**

20.6.10.2 Sensitivity of the receptor

301. For reasons set out previously, depending on species the sensitivity of birds to disturbance is either **medium** (lapwing), **low** (skylark, other non-breeding birds) or **negligible** (other breeding birds).

20.6.10.3 Significance of effect

302. The impact magnitude is low, and the receptor sensitivity is medium to negligible, therefore the unmitigated impact of disturbance is classified as **minor adverse** and not significant in the context of the EIA regulations.

20.6.10.4 Further mitigation

303. No further mitigation is required.

20.6.11 Impact 11: Disturbance to or introduction of non-native invasive species at the Landfall

304. No invasive non-native species recorded within the Landfall. During the operational phase, maintenance visits and emergency repairs will involve bringing in plant and equipment to the habitats and species within the Landfall, including plant which may have been used at other locations where presence of invasive species could occur, as such there is a risk of releasing non-native species into the Landfall area during the operational phase.

20.6.11.1 Magnitude of impact

305. The risk of introducing non-native species is anticipated to have a **low** magnitude risk.

20.6.11.2 Sensitivity of the receptor

306. Given the international value of the Braunton Burrows SAC which bounds and partially falls within the temporary works area, the sensitivity is **high**.

20.6.11.3 Significance of effect

307. Given the low magnitude impact but high sensitivity, a potential **moderate adverse effect** is predicted as a result of the spread of non-native invasive species during the operational phase at the Landfall, which is significant in the context of the EIA regulations.

20.6.11.4 Further Mitigation

308. The mitigation measures identified in **paragraph 218** will be undertaken.

309. Following implementation of these mitigation measures, the risk of spreading invasive species, is reduced to a no change, and therefore **no residual effect** is predicted.

20.6.12 Impact 12: Disturbance to or introduction of non-native invasive species at the Taw Estuary Crossing

310. No invasive non-native species recorded within or adjacent to the Taw Estuary Crossing corridor, though Japanese knotweed was recorded adjacent to the footpath along the Instow Flats though this is outside the corridor (see **Section 20.4.4.12**). During the operational phase, maintenance visits and emergency repairs will involve bringing in plant and equipment to the habitats and species within the cable crossing corridor, including plant which may have been used at other locations where presence of invasive species could occur, as such there is a risk of releasing non-native species into the Landfall area during the operational phase.

20.6.12.1 Magnitude of impact

311. The risk of introducing non-native species is anticipated to have a **low** magnitude risk.

20.6.12.2 Sensitivity of the receptor

312. Given the international and national value of the Braunton Burrows SSSI and SAC, and Taw-Torridge Estuary SSSI, respectively, near to the temporary works areas and site compounds, the sensitivity is **high**.

20.6.12.3 Significance of effect

313. Given the low magnitude impact but high sensitivity, a potential **moderate adverse effect** is predicted as a result of the spread of non-native invasive species during the operational phase at the Taw Estuary Crossing, which is significant in the context of the EIA regulations.

20.6.12.4 Further Mitigation

314. The mitigation measures identified in **paragraph 218** will be undertaken.

315. Following implementation of these mitigation measures, the risk of spreading invasive species, is reduced to a no change, and therefore **no residual effect** is predicted.

20.7 Potential impacts during decommissioning

316. No decision has been made regarding the final decommissioning policy for the Offshore Project as it is recognised that industry best practice, rules and legislation change over time. The decommissioning methodology would be finalised nearer to the end of the lifetime of the Offshore Project to be in line with current guidance, policy and legalisation at that point. Any such methodology would be agreed with the relevant authorities and statutory consultees. The decommissioning works are likely to be subject to a separate licencing and consenting approach.

317. The anticipated decommissioning activities are outlined in **Section 5.10** of **Chapter 5: Project Description**. The potential impacts of the decommissioning of the Offshore 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 would be comparable to those identified for the construction phase:

- Impact 1: Physical disturbance to intertidal habitats at the Landfall
- Impact 2: Indirect disturbance to intertidal habitats at the Landfall
- Impact 3: Physical disturbance to intertidal habitats at the Taw Estuary Crossing
- Impact 4: Indirect disturbance to intertidal habitats at the Taw Estuary Crossing
- Impact 5: Disturbance to bats at the Landfall
- Impact 6: Disturbance to bats at the Taw Estuary Crossing

- Impact 7: Disturbance to otter at the Taw Estuary Crossing
- Impact 8: Habitat loss to non-breeding birds at the Landfall
- Impact 9: Disturbance to non-breeding birds at the Landfall
- Impact 10: Habitat loss to non-breeding birds at the Taw Estuary Crossing
- Impact 11: Disturbance to non-breeding birds at the Taw Estuary crossing
- Impact 12: Disturbance to reptiles at the Taw Estuary Crossing
- Impact 13: Disturbance to or introduction of non-native invasive species at the Landfall
- Impact 14: Disturbance to or introduction of non-native invasive species at the Taw Estuary Crossing.

318. The magnitude of impacts would be comparable to or less than those identified for the construction phase. Accordingly, given the construction phase assessments concluded “no effect” or “short-term and temporary minor adverse effect” for onshore ecology and ornithology receptors, it is anticipated that the same would be valid for the decommissioning phase regardless of the final decommissioning methodologies

20.8 Potential cumulative effects

319. 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 OWL 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.

320. The Cumulative Effect Assessment for onshore ecology and ornithology was undertaken in two stages. The first stage was to consider the potential for the impacts assessed as part of the project to lead to cumulative effects in conjunction with other projects. The first stage of the assessment is detailed in **Table 20.22**. Only potential impacts assessed in **Section 20.5 and Section 20.6** as negligible or above are included in the CEA (i.e. those assessed as ‘no impact’ are not taken forward as there is no potential for them to contribute to a cumulative impact).

Table 20.22 Potential cumulative effects considered for onshore ecology and ornithology

Impact	Potential for cumulative effect	Rationale
Construction		
Impact 1: Physical disturbance to intertidal habitats (and Braunton Burrows SSSI and SAC) at the Landfall	Yes	Cumulative physical disturbance to habitats may occur where project boundaries overlap and have potential to affect the habitat.
Impact 2: Indirect disturbance to intertidal habitats (and Braunton Burrows SSSI and SAC, and Saunton to Baggy Point SSSI) at the Landfall	Yes	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 3: Physical disturbance to intertidal habitats at the Taw Estuary Crossing	No	No physical disturbance would occur within the estuary intertidal habitats during construction, with the exception of indirect disturbance from 'frac-out'.
Impact 4: Indirect disturbance to intertidal habitats at the Taw Estuary Crossing	Yes	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 5: Disturbance to bats at the Landfall	Yes	Cumulative disturbance effects to bats may occur with other projects in the vicinity that could disturb foraging bats and their foraging habitat.
Impact 6: Disturbance to bats at the Taw Estuary Crossing	Yes	
Impact 7: Disturbance to otter at the Taw Estuary Crossing	Yes	Cumulative disturbance effects to otter may occur with other projects in the vicinity that could disturb otter and their habitat.

Impact	Potential for cumulative effect	Rationale
Impact 8: Habitat loss to non-breeding birds at the Landfall	Yes	Cumulative habitat loss for non-breeding birds may occur where project boundaries overlap and have potential to affect roosting / foraging habitat.
Impact 10: Habitat loss to non-breeding birds at the Taw Estuary Crossing	Yes	
Impact 9: Disturbance to non-breeding birds at the Landfall	Yes	Cumulative disturbance effects to non-breeding birds may occur with other projects in the vicinity that could disturb roosting / foraging birds.
Impact 11: Disturbance to non-breeding birds at the Taw Estuary crossing	Yes	
Impact 12: Disturbance to reptiles at the Taw Estuary Crossing	Yes	Cumulative disturbance effects to reptiles may occur with other projects in the vicinity that could disturb reptiles and their habitat.
Impact 13: Disturbance to or introduction of non-native invasive species at the Landfall	No	The provision of embedded / additional mitigation regarding management and prevention of invasive species introduction results in no effect for the project alone. Therefore, unlikely to lead to cumulative effects with other projects.
Impact 14: Disturbance to or introduction of non-native invasive species at the Taw Estuary Crossing	No	

Impact	Potential for cumulative effect	Rationale
Operation and maintenance		
Impact 1: Habitat alteration or disturbance to habitats at the Landfall	No	No disturbance or effects on habitat within the intertidal or Taw Estuary, therefore unlikely to lead to cumulative effects with other projects.
Impact 2: Habitat alteration or disturbance to intertidal habitats at the Taw Estuary Crossing	No	
Impact 3: Secondary indirect disturbance to intertidal habitats at the Taw Estuary Crossing	Yes	Cumulative disturbance to habitats may occur where project boundaries overlap or where disturbance influences (emissions) extend beyond project boundaries and have potential to affect the habitat.
Impact 4: Disturbance to bats at the Landfall	No – Landfall	No disturbance effect on bats or their habitat was identified at the Landfall, therefore unlikely to lead to cumulative effects with other projects.
Impact 5: Disturbance to bats at the Taw Estuary Crossing	Yes (Taw Estuary)	Cumulative disturbance effects to bats may occur with other projects in the vicinity that could disturb foraging bats and their foraging habitat.
Impact 6: Disturbance to otter at the Taw Estuary Crossing	Yes	Cumulative disturbance effects to otter may occur with other projects in the vicinity that could disturb foraging otter and their habitat.
Impact 7: Habitat loss to birds at the Landfall	No	No habitat loss within intertidal or within Taw Estuary, therefore very unlikely to lead to cumulative effects with other projects.
Impact 9: Habitat loss to birds associated with Taw Estuary Crossing	No	

Impact	Potential for cumulative effect	Rationale
Impact 8: Disturbance to birds at the Landfall	Yes	Cumulative disturbance effects to non-breeding birds may occur with other projects in the vicinity that could disturb roosting / foraging birds.
Impact 10: Disturbance to birds associated with Taw Estuary Crossing	Yes	
Impact 11: Disturbance to or introduction of non-native invasive species at the Landfall	No	The provision of embedded / additional mitigation regarding management and prevention of invasive species introduction results in no effect for the project alone. Therefore, unlikely to lead to cumulative effects with other projects.
Impact 12: Disturbance to or introduction of non-native invasive species at the Taw Estuary Crossing	No	
Decommissioning		
The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative effects during the decommissioning stage are assumed to be the same as those identified during the construction stage.		

321. 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 Section 6.6.11**) and their anticipated potential for cumulative effects are summarised in **Table 20.23**. A rationale for inclusion in the CIA for onshore ecology and ornithology has been provided and is predominately based on distance or the tiering approach described in **Chapter 6: EIA Methodology**

Table 20.23 Projects considered in the cumulative effect assessment on onshore ecology and ornithology

Project	Status	Distance from windfarm site (km)	Included in the CEA?	Rationale
White Cross Offshore Wind Farm – Onshore Components	Pre-application	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	Approved	0.4km east of Taw Estuary Crossing; 6.1km south-east of Landfall	Yes	Nearby project may lead to cumulative disturbance impacts on protected fauna and bird populations.
Sandy Lane, Braunton – erection of one dwelling	Approved	2.6km south-east of Landfall; 2.7km north of Taw Estuary Crossing	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Lower Park Road, Braunton – erection of three dwellings	Approved	5.4km east of Landfall; 4.5km north-east of Taw Estuary Crossing	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Sandy Lane Farm Lane, Braunton – erection of shed building	Approved	2.2km south-east of Landfall; 3.6km north of Taw Estuary Crossing	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Lower Yelland Farm, Yelland – Solar array of 32 panels	Approved	1.5km east of Taw Estuary Crossing; 7.1km south-east of Landfall	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
West Yelland – erection of three dwellings	Pending	1.1km south-east of Taw Estuary Crossing; 7.1km south-east of Landfall	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.

Project	Status	Distance from windfarm site (km)	Included in the CEA?	Rationale
South Hole Farm, Forda – erection of bat sheds	Approved	1.6km north-east of Landfall; 7km north of Taw Estuary Crossing	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.
Blackmore House, Croyde – demolition of existing structures and erection of three dwellings	Approved	1.9km north-west of Landfall; 7km north of Taw Estuary Crossing	No	No cumulative effects predicted due to distance from the Project and small-scale nature of the development.

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

20.8.1 Potential cumulative effects during construction

20.8.1.1 Impact 1: Physical disturbance to intertidal habitats (and Braunton Burrows SSSI and SAC) at the Landfall

323. No other project would result in disturbance within the intertidal habitats near Saunton Sands or within the Braunton Burrows SSSI and SAC during the construction phase for the project. The Taw Estuary Crossing element of the project would not result in any effect on the intertidal habitats as the crossing would be trenchless underneath the estuary bed. Consequently, no cumulative change in magnitude of the effect from the Project alone is expected.

20.8.1.1.1 Significance of effect

324. As there would be no additional impacts on intertidal habitats associated with other projects, **no cumulative effect** is expected.

20.8.1.1.2 Further Mitigation

325. No further mitigation is required.

20.8.1.2 Impact 2: Indirect disturbance to intertidal habitats (Braunton Burrows SSSI and SAC, and the Taw-Torridge Estuary SSSI)

326. The indirect disturbance to intertidal habitats assessed for the project alone relate to the accidental or incidental discharges of polluting substances during the construction phase activities, dust emissions, and other emissions to air. These disturbance effects would occur both at the Landfall and the Taw Estuary Crossing during construction, and may occur in parallel or sequentially. The combined risks associated with these impacts are considered to remain as **negligible** in magnitude because of the distance between the two working areas (over 4.4km away), and the short-term and temporary nature of the activities (as well as the embedded mitigation measures). For discharges the impact would be additive as they would not affect the same area (and therefore become synergistic). Dust emissions if they occur would be highly localised and therefore additive only in terms of extent. Other emissions to air would occur at either works area and thus be localised and additive with rapid dispersal.

327. The onshore works related to project would also have the potential to result in indirect disturbance to intertidal habitats arising from pollutant discharges, dust emissions, and other emissions to air. However, the pollutant discharges would not occur directly within the estuary habitats and would need to traverse through local drains before discharging to the estuary. Given this any embedded mitigation measures about prevention of mobilisation once a spill occurs would be expected to prevent any discharges reaching the estuary, therefore **no cumulative effect** would occur. Dust emissions would similarly occur a significant distance from any intertidal habitats and thus no cumulative effect would occur. Emissions to air would occur further away from the intertidal habitats and thus would be very low due to distance from the intertidal habitats and rapidly dispersed.

328. The Yelland Quay development would occur on the south bank of the Taw Estuary close (just over 300m) to the Taw Estuary Crossing. For pollutant discharges the risk and impact would be additive, whilst they could not affect the same intertidal area (within the Taw Estuary) there is separation and mitigation that would be implemented during the construction at Yelland Quay. Dust emissions, if they occur, would be localised and therefore additive only in terms of extent. Other emissions to air would occur at either works area and thus be localised and additive with rapid dispersal. The combined impacts are considered to remain as **negligible** in magnitude because of the distance between the two working areas, and the short-term and temporary nature of the activities (as well as the embedded mitigation measures).

20.8.1.2.1 Significance of effect

329. Given the **high** sensitivity of the receptors (specifically the Braunton Burrows SSSI and SAC, and the Taw-Torridge Estuary SSSI) and the negligible magnitude, a short-term and temporary **minor adverse cumulative effect** is predicted.

20.8.1.2.2 Further Mitigation

330. No further mitigation is required.

20.8.1.3 Impact 3: Indirect disturbance to landward habitats

331. The indirect disturbance to terrestrial habitats assessed for the project alone relate to the accidental or incidental discharges of polluting substances during the construction phase activities, dust emissions, other emissions to air, and increased traffic. These disturbance effects would occur both at the Landfall and the Taw Estuary Crossing during construction, and may occur in parallel or sequentially. The combined risks associated with these impacts are considered to remain as **negligible** in magnitude because of the distance between the two working areas (over 4.4km away), and the short-term and temporary nature of the activities (as well as the embedded mitigation measures). For discharges the impact would be additive as they would not affect the same area (and therefore become synergistic). Dust emissions if they occur would be highly localised and therefore additive only in terms of extent. Other emissions to air would occur at either works area and thus be localised and additive with rapid dispersal. The increases in traffic would be localised to the works areas and would only increase synergistically a notable distance away and in areas of existing urban development and high levels of traffic.

332. The onshore works related to project would also have the potential to result in indirect disturbance to terrestrial habitats arising from pollutant discharges, dust emissions, other emissions to air, and traffic. The pollutant discharges could occur within or close to the watercourses near the secondary works (at the landward trenchless compounds and temporary works areas). However, embedded mitigation measures about prevention of mobilisation once a spill occurs would be expected to prevent any discharges travelling far beyond the works areas, therefore a **negligible cumulative** magnitude would occur. Dust emissions could occur in close proximity to landward habitats and however given the low risk a **negligible cumulative** magnitude would occur. Emissions to air would occur in close proximity and could also overlap landward habitats but due to the short-term and limited scale this is predicted to be a **negligible cumulative** magnitude impact. The increases in traffic would be localised to the works areas and would only increase synergistically some distance away and in greater in existing urban development and high levels of traffic, however, a **negligible cumulative** magnitude impact is predicted on local roads.

333. The Yelland Quay development would occur on the south bank of the Taw Estuary close (just over 300m) to the Taw Estuary Crossing. For pollutant discharges, this cumulative risk has been assessed in **Section 20.8.1.2**. Dust emissions similarly would not be expected to overlap with the project, and its onshore components synergistically but could additively in terms of local habitats affected therefore a **negligible cumulative** magnitude impact is predicted. Other emissions to air would occur some distance from the various project and onshore component work areas and be localised and additive with rapid dispersal, and thus **negligible cumulative** magnitude. The increases in traffic at Yelland Quay and the secondary project traffic increases and increases associated with the onshore project works would again be additive as they would only become synergistic on the major A road, consequently, a **negligible cumulative** magnitude is predicted. The combined impacts are considered to remain as negligible in magnitude because of the distance between the working areas, the short-term and temporary nature of the activities (as well as the embedded mitigation measures), as well as the localised nature of the overlapping impacts.

20.8.1.3.1 Significance of effect

334. The sensitivity of the grassland and local habitats cumulatively affected is **negligible** given their local value, as designated sites (except unconfirmed local wildlife sites) are not predicted to be affected. The very minor extents of the project along with the additive extent of the onshore works and any overlap with Yelland Quay is predicted to result in a short-term and temporary **negligible adverse cumulative effect** on landward habitats as a result of the indirect disturbances of accidental pollutant discharges, dust, other emissions to air, and traffic.

20.8.1.3.2 Further Mitigation

335. No further mitigation is required.

20.8.1.4 Impact 4: Disturbance to bats and their habitats

336. Given the potential effect on landward habitat at the Landfall the mitigation of trenchless techniques from the car park into the intertidal would prevent any effect on potential bat foraging habitat. Consequently the project alone disturbance to bats and their habitats would derive only from the secondary disturbance to grassland (poor semi-improved and unimproved) habitats to the north and south of the Taw Estuary.

337. The Project's onshore works would result in disturbance to grassland habitat along its route (though trenchless under the Braunton Burrows Golf Course) with limited loss of hedgerows (generally avoided through the use of minor trenchless crossings),

as such a **negligible cumulative** magnitude habitat loss for greater horseshoe bats is predicted.

338. The Yelland Quay development indicated a minor adverse effect on the Caen Valley Bats SSSI greater horseshoe bat population from their works. Consequently, it is assumed that a **negligible cumulative** magnitude is associated within the Yelland Quay development given their distance from the SSSI.

20.8.1.4.1 Significance of effect

339. The Caen Valley Bats SSSI is the most sensitive receptor (as all other bat species presence forage and roost across the wider area and are not linked to a designated site) being **high**. The cumulative magnitude of all projects is negligible because of the dispersed nature of the habitat disturbance and the fact that the project disturbance is mostly linked within fields (grassland) rather than boundaries (hedgerows and trees) and the extent of suitable habitat in the wider area (and thus within any bat species foraging range). Consequently, a short-term and temporary **minor adverse cumulative** effect is predicted.

20.8.1.4.2 Further Mitigation

340. No further mitigation is required.

20.8.1.5 Impact 5: Disturbance to otter and their habitats at the Taw Estuary Crossing

341. The Project's onshore works would result in disturbance to drains and thus otter foraging habitat along its route (though potentially trenchless under the larger drains that provide more valuable otter foraging habitat). As such a **negligible cumulative** magnitude disturbance is predicted given works would take place in daylight hours and at one drain at a time associated with works within the Taw Estuary.

342. Given the inland (behind the tidal embankment) location of the Yelland Quay development minor adverse impact was assessed for disturbance to otter in the estuary. Given the transient nature of the potential presence and limited scale of disturbance due to the intervening tidal embankment a **negligible cumulative** magnitude disturbance is predicted.

20.8.1.5.1 Significance of effect

343. Given the national and protected status of otter, the sensitivity is **high**. Overall, a negligible magnitude cumulative effect is identified and thus a short-term and temporary **minor adverse cumulative** effect is predicted on otter populations that forage in the area.

20.8.1.5.2 Further Mitigation

344. No further mitigation is required.

20.8.1.6 Impact 6: Habitat loss to non-breeding birds at the Landfall

20.8.1.6.1 Magnitude of impact

345. Construction of the onshore components of White Cross OWF could lead to habitat loss for non-breeding birds. However, being inland of MHWS the onshore export cable corridor would affect different habitats to the Landfall, and therefore a different assemblage of non-breeding birds. No cumulative loss of habitat for sanderling and ringed plover is predicted, although there is the potential for cumulative loss of non-breeding habitat for skylark and snow bunting, for which the impact magnitude is considered to be **low**.

20.8.1.6.2 Sensitivity of the impact

346. The sensitivity of all non-breeding birds associated with the Landfall (except sanderling) is considered to be **low**.

20.8.1.6.3 Significance of effect

347. The cumulative effect of habitat loss for non-breeding birds associated with the Landfall is classified as **minor adverse** and is not significant in the context of the EIA regulations. There would be no cumulative habitat loss effects with the development at Yelland Quay due to its distance from Landfall (6.1km).

20.8.1.6.4 Further mitigation

348. No further mitigation is required.

20.8.1.7 Impact 7: Disturbance to non-breeding birds at the Landfall

20.8.1.7.1 Magnitude of impact

349. Construction of the onshore components of White Cross OWF could also lead to disturbance for non-breeding birds. However, being inland of MHWS this would not result in cumulative disturbance impacts to sanderling, which is largely restricted to sandy coastal areas in the UK. Due to existing anthropogenic disturbance within the Landfall, any cumulative disturbance to other non-breeding species would be of **low** impact magnitude.

20.8.1.7.2 Sensitivity of the receptor

350. The sensitivity of all non-breeding birds associated with the Landfall (except sanderling) is considered to be **low**.

20.8.1.7.3 Significance of effect

351. The cumulative effect of disturbance to non-breeding birds associated with the Landfall is classified as **minor adverse** and is not significant in the context of the

EIA regulations. There would be no cumulative disturbance impacts with the development at Yelland Quay due to its distance from Landfall (6.1km).

20.8.1.7.4 Further Mitigation

352. No further mitigation is required.

20.8.1.8 Impact 8: Habitat loss to non-breeding birds at the Taw Estuary Crossing

20.8.1.8.1 Magnitude of impact

353. Construction of the onshore components of White Cross OWF could lead to cumulative habitat loss to lapwing and potentially other non-breeding species on both sides of the Taw Estuary Crossing. However, works associated with the crossing cable installation would not take place between the months of October to March inclusive, thereby avoiding the key overwintering / roosting period, and the habitat would be reinstated on completion of works. The cumulative effect magnitude would therefore be **negligible** for non-breeding birds.

20.8.1.8.2 Sensitivity of the receptor

354. As described previously, the sensitivity of lapwing is **medium,** and the sensitivity of other non-breeding birds is **low**.

20.8.1.8.3 Significance of effect

355. The cumulative effect of habitat loss to lapwing and other non-breeding birds associated with the Taw Estuary Crossing is classified as **minor adverse** and is not significant in the context of the EIA regulations. There would be no cumulative habitat loss impacts with the development at Yelland Quay due to its distance from the crossing corridor (0.4km).

20.8.1.8.4 Further Mitigation

356. No further mitigation is required.

20.8.1.9 Impact 9: Disturbance to non-breeding birds at the Taw Estuary Crossing

20.8.1.9.1 Magnitude of impact

357. Construction of the onshore components of White Cross OWF and the proposed development at Yelland Quay could lead to cumulative disturbance impacts on lapwing and other non-breeding bird on both sides of the Taw Estuary Crossing. However, works associated with the crossing cable installation would not take place between the months of October to March inclusive, thereby avoiding the key overwintering / roosting period. The magnitude of any cumulative effect would therefore be **negligible** for non-breeding birds.

20.8.1.9.2 Sensitivity of the receptor

358. As described previously, the sensitivity of lapwing is **medium,** and the sensitivity of other non-breeding birds is **low**.

20.8.1.9.3 Significance of effect

359. The cumulative effect of disturbance to lapwing and other non-breeding birds associated with the Taw Estuary Crossing is classified as **minor adverse** and is of the same significance as previously described for construction impacts.

20.8.1.9.4 Further mitigation

360. No further mitigation is required.

20.8.1.10 Impact 10: Disturbance to reptiles and their habitats at the Taw Estuary Crossing

361. Given the potential effect on landward habitat at the landfall the mitigation of trenchless techniques from the car park into the intertidal would prevent any effect on potential reptile habitat. Consequently the project alone disturbance to reptiles and their habitats would derive only from the secondary disturbance to grassland (poor semi-improved and unimproved) habitats to the north and south of the Taw Estuary.

362. The Project's onshore works would result in disturbance to grassland habitat along its route (though trenchless under the Braunton Burrows Golf Course) with limited loss of hedgerows (generally avoided through the use of minor trenchless crossings), as such a **negligible cumulative** magnitude habitat loss for reptiles is predicted.

363. The Yelland Quay development concluded a moderate adverse effect on reptile habitats and populations from their site clearance works. Consequently, it is assumed that a **medium cumulative** magnitude is associated within the Yelland Quay development given their impact on in particular the slow worm population.

20.8.1.10.1 Significance of effect

364. The reptile species present in the surrounding area is considered to be **medium** sensitivity. Whilst there is separation between the onshore works and Taw Estuary crossing on the north side of the estuary from Yelland Quay, the Taw Estuary crossing secondary effects on reptile habitat, combined with the Project's onshore works and that of Yelland Quay are identified as having a **medium cumulative** magnitude impact. There is no increase above the Yelland Quay impact due to the quality of the grassland habitat that would be affected by the Project's works with limited if any disturbance to hedgerows and field boundaries. Consequently, a short-term and temporary **moderate adverse cumulative** effect is predicted.

20.8.1.10.2 Further Mitigation

365. Prior to site clearance work for the Project's onshore works, a walkover survey and removal of reptiles should be undertaken to prevent injury or death to reptiles present. Whilst there is the potential during temporary works for reptiles to return, site checks should be undertaken prior to vehicles and plant being moved in the morning and also on removal of all site structures and equipment prior to reinstatement. The extent of habitat being temporary lost during the construction phase for the Project's onshore components is negligible. Consequently, provided these measures are implemented, a short-term and temporary negligible disturbance for the Project's onshore components. Whilst this will not reduce the overall magnitude of the effect this is due to the scale of potential disturbance from the Yelland Quay development, but minimises the Project's contribution.

20.8.2 Potential cumulative effects during operation and maintenance

20.8.2.1 Impact 1: Indirect disturbance to intertidal habitats

366. The indirect disturbance to intertidal habitats assessed for the project alone relate to the accidental or incidental discharges of polluting substances during any (very low probability) emergency repairs. These disturbance effects could occur at the two transition joint bays inland of the Taw Estuary Crossing. For discharges these would need to traverse through local drains before discharging to the estuary and impacting on habitats. Given this any embedded mitigation measures about prevention of mobilisation once a spill occurs would be expected to prevent any discharges reaching the estuary, in addition the scale of the potential discharges would be minimal given the unlikely nature and small scale of any works, therefore **no cumulative effect** would occur.

367. The onshore works related to project would also have the potential to result in indirect disturbance to intertidal habitats arising from pollutant discharges. Here also the pollutant discharges would not occur directly within the estuary habitats and would need to traverse through local drains before discharging to the estuary. Given this any embedded mitigation measures about prevention of mobilisation once a spill occurs would be expected to prevent any discharges reaching the estuary, therefore **no cumulative effect** would occur.

368. The Yelland Quay development would occur on the south bank of the Taw Estuary close (just over 300m) to the Taw Estuary Crossing. For pollutant discharges the risk and impact would be additive, whilst they could not affect the same intertidal area (within the Taw Estuary) there is separation and mitigation that would be

implemented during the construction at Yelland Quay. The combined impacts are considered to remain as **no cumulative effect** in magnitude, due the short-term and temporary nature of any emergency repair activities (as well as the embedded mitigation measures) for the Project. In addition, the operation phase at Yelland Quay would incorporate pollution-control measures within the road network, and use of SuDS features to both reduce pollution risk and attenuate storm-water flows.

20.8.2.1.1 Significance of effect

369. The receptors (specifically the Braunton Burrows SSSI and SAC, and the Taw-Torridge Estuary SSSI) are **high** sensitivity. However, as no cumulative effects are predicted, **no cumulative effect** is expected.

20.8.2.1.2 Further Mitigation

370. No further mitigation is required.

20.8.2.2 Impact 2: Disturbance to bats and their habitats

371. No disturbance to bats or their habitat would occur during the operational phase either through habitat alteration, or maintenance or emergency repairs at the Landfall. If emergency repairs were to take place either side of the Taw Estuary Crossing, such activity would be localised and unlikely to result in disturbance to bat foraging habitat other than through the presence of vehicles as repairs would be undertaken within the transition pits (accessed via a manhole). Given this negligible and very low probability event, no cumulative magnitude is predicted.

20.8.2.2.1 Significance of effect

372. Whilst bats are considered to be a **high** sensitivity receptor, given the lack of Project related disturbance to bats in the operational phase, **no cumulative effect** is expected on foraging bats and their foraging habitat.

20.8.2.2.2 Further Mitigation

373. No further mitigation is required.

20.8.2.3 Impact 3: Disturbance to otter and their habitats at the Taw Estuary Crossing

374. If emergency repairs were to take place either side of the Taw Estuary Crossing, such activity would be localised and unlikely to result in disturbance to otter foraging habitat other than through the presence of vehicles nearby as repairs would be undertaken within the transition pits (accessed via a manhole). The risk of discharges is very low due to the small scale of any potential emergency repairs, and given the embedded mitigation measures no overall effect is predicted. Given this negligible and very low probability event, no cumulative magnitude is predicted.

20.8.2.3.1 Significance of effect

375. Whilst otter are considered to be a **high** sensitivity receptor, given the lack of Project related disturbance to otter in the operational phase, **no cumulative effect** is expected on otter and their habitat.

20.8.2.3.2 Further Mitigation

376. No further mitigation is required.

20.8.2.4 Impact 4: Disturbance to birds at the Landfall

20.8.2.4.1 Magnitude of impact

377. Maintenance visits and emergency repairs to the Landfall during operation and maintenance are expected to be infrequent and short-term in duration and would only briefly affect any birds in the immediate vicinity. Onshore components of White Cross OWF are expected to have similar maintenance requirements. Furthermore, as previously described, the Landfall is subject to existing anthropogenic disturbance from the car park and beach users. The cumulative effect magnitude is predicted to be **negligible**.

20.8.2.4.2 Sensitivity of the receptor

378. As described previously, the sensitivity of sanderling is considered to be **high**, and for all other ornithological receptors is considered to be **low**.

20.8.2.4.3 Significance of effect

379. The cumulative effect of disturbance to birds associated with the Landfall is classified as **minor adverse** and is of the same significance as previously described for construction impacts.

20.8.2.4.4 Further mitigation

380. No further mitigation is required.

20.8.2.5 Impact 5: Habitat loss to birds at the Taw Estuary Crossing

20.8.2.5.1 Magnitude of impact

381. Maintenance visits and emergency repairs to the Taw Estuary Crossing cable during operation are expected to be infrequent and short-term in duration and would only briefly affect the habitat of any birds in the immediate vicinity of the access points on the north and south sides of the Taw (there would be no operations within the estuary itself). Onshore components of White Cross OWF are expected to have similar maintenance requirements. Any cumulative habitat impacts are not predicted to be of greater magnitude that previously identified (**low**).

20.8.2.5.2 Sensitivity of the receptor

382. The sensitivity of birds to habitat loss is either **medium** (lapwing), **low** (skylark, other non-breeding birds) or **negligible** (other breeding birds).

20.8.2.5.3 Significance of effect

383. The cumulative effect of habitat loss to birds associated with the Taw Estuary Crossing corridor is classified as minor adverse and is of the same significance as previously described for operation and maintenance impacts. There would be **no cumulative habitat loss effect** with the development at Yelland Quay due to its distance from the crossing corridor (0.4km).

20.8.2.5.4 Further mitigation

384. No further mitigation is required.

20.8.2.6 Impact 6: Disturbance to birds at the Taw Estuary Crossing

20.8.2.6.1 Magnitude of impact

385. As previously described, maintenance visits and emergency repairs to the Taw Estuary Crossing cable during operation and maintenance are expected to be infrequent and short-term in duration and would only briefly affect any birds in the immediate vicinity of the access points on the north and south sides of the Taw (there would be no operations within the estuary itself). Onshore components of White Cross OWF are expected to have similar maintenance requirements. Cumulative effects could occur with Yelland Quay if birds are simultaneously disturbed from this location and the cable crossing corridor, however these would be temporary only and there is alternative habitat available in the vicinity. Cumulative effects are therefore not predicted to be of greater magnitude that previously identified (**low**).

20.8.2.6.2 Sensitivity of the receptor

386. The sensitivity of birds to habitat loss is either **medium** (lapwing), **low** (skylark, other non-breeding birds) or **negligible** (other breeding birds).

20.8.2.6.3 Significance of effect

387. The cumulative effect of disturbance to birds associated with the Taw Estuary Crossing corridor is classified as **minor adverse** and is of the same significance as previously described for operation and maintenance impacts.

20.8.2.6.4 Further mitigation

388. No further mitigation is required.

20.8.3 Cumulative effects during decommissioning

389. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance that the time of decommissioning and agreed with the regulator. A decommissioning plan will be provided. As such, cumulative effects during the decommissioning state are assumed to be the same as those identified during the construction stage.

20.9 Potential transboundary impacts

390. The Scoping Report identified that there was no potential for significant transboundary effects regarding onshore ecology and ornithology from the Project upon the interests of other EEA States and this is not discussed further.

20.10 Inter-relationships

391. Inter-relationship impacts are covered as part of the assessment and consider impacts from the construction, operation and maintenance 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 maintenance, 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

392. **Table 20.24** serves as a sign-posting for inter-relationships.

Table 20.24 Onshore ecology and ornithology Inter-relationships

Topic and description	Related chapter	Where addressed in this Chapter	Rationale
Potential impacts to geomorphology of the beach at Braunton Burrows SSSI and SAC and how this will affect the species they support	**Chapter 8: Marine Geology, Oceanography and Physical Processes**	**Section 20.5.1** and **20.6.1**	The disturbance to beach topography and movement of sediment along and up / down the beach could impact on the flora and fauna communities that are supported
Potential impacts to watercourses and how this will affect the species they support	**Chapter 9: Marine Water and Sediment Quality**	**Section 20.5.3**, **20.5.4**, **20.5.7**, and **20.6.6**	Works at watercourses may influence ecological species and habitats
Habitats which support onshore ornithology	**Chapter 20 Onshore Ecology and Ornithology**	**Section 20.5.1**, **20.5.3**, **20.5.8**, **20.5.10**, **20.6.1**, **20.6.2**, **20.6.3**, **20.6.7**, and **20.6.9**	Onshore ornithology may share habitats of importance with onshore ecology
Noise disturbance on protected species	**Chapter 21: Noise and vibration**	**Section 20.5.4**, **20.5.7**, **20.5.9**, **20.5.11**, **20.6.1**, **20.6.2**, **20.6.3**, **20.6.6**, **20.6.8**, and **20.6.10**	Noisy activities associated with construction may disturb protected species
Dust impacts to habitats and species		**Section 20.5.4**, **20.6.1**, **20.6.2**, and **20.6.3**	Changes in dust levels in the air may affect ecological habitats and species
Lighting impacts to protected species	**Chapter 19: Offshore Seascape, Landscape, and Visual Amenity**	**Section 20.5.5**, **20.5.6**, **20.6.4**, and **20.6.5**	Construction and maintenance lighting (covered in **Chapter 19**) may cause disturbance to protected species

20.11 Interactions

393. 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 are presented in **Table 20.25** and **Table 20.26**, 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.

Table 20.25 Interaction between impacts during construction

Potential impact					
Construction	Intertidal habitats (including designated site features)	Bats	Otter	Non-breeding birds	Invasive species
Intertidal habitats (including designated site features)		No	Yes	Yes	Yes
Bats			No	No	No
Otter				No	No
Non-breeding birds					No
Invasive species					

Table 20.26 Interaction between impacts during operation and maintenance

Potential impact			
Operation and maintenance	**Bats**	**Otter**	**Non-breeding birds**
Bats		No	No
Otter			No
Non-breeding birds			

394. **Table 20.27** 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. If minor impact and minor impact were added this would effectively double count the sensitivity.

Table 20.27 Potential interactions between impacts on onshore ecology and ornithology

Receptor	Construction	Operation and Maintenance	Decommissioning	Phase Assessment	Lifetime Assessment
Intertidal habitats and otter	Minor adverse	Minor adverse	Minor adverse	No greater than individually assessed impact.	No greater than individually assessed impact.
Intertidal habitats and non-breeding birds	Minor adverse	Minor adverse	Minor adverse	No greater than individually assessed impact.	No greater than individually assessed impact.
Invertebrates and invasive species	No effect	No effect	No effect	No greater than individually assessed impact.	No greater than individually assessed impact.
Protected botanical species and invasive species	No effect	No effect	No effect	No greater than individually assessed impact.	No greater than individually assessed impact.

20.12 Summary

395. This chapter has investigated the potential effects on onshore ecology and ornithology receptors arising from the Project. The range of potential impacts and associated effects considered has been informed by the Scoping Opinion, consultation, and reference to existing policy and guidance. The impacts considered include those brought about directly as well as indirectly.

396. The key valued habitats and species present include the designated features (intertidal sandflats) of the Braunton Burrows SSSI and SAC as well as the designated features (intertidal mudflats and sandflats, estuary, and supported species) of the Taw-Torridge Estuary SSSI. Protected species recorded included bats (extensive use of the habitats within the study area), otter (around the Taw Estuary Crossing), and non-breeding birds (a range of Schedule 1, and Amber and Red List recorded). No water vole, dormouse, amphibians (and great-crested newts), reptiles, and invertebrates of international or national importance (though UK BAP and Red Data Book species were present in high quality supporting habitat within the wider area), or botanical species (terrestrial or aquatic) of international or national importance (though UK BAP, Devon Notable, and Devon Rarity species were present in high quality supporting habitat within the wider area), or sand lizard were recorded in surveys within the corridors or potential works areas. No invasive species were recorded in the corridors or potential works areas.

397. **Table 20.28** presents a summary of the impacts assessed within this ES chapter, any commitments made, and mitigation required and the residual effects. The key potential identified impact was:

- During the construction, and the operational and maintenance phases a potential moderate adverse effect was predicted as a result of the introduction of invasive species on plant and machinery. However, mitigation measures such as strict adherence to relevant good practice and monitoring is expected to prevent this impact occurring. No effect would therefore arise

398. The assessment of cumulative effects from the Project and other developments and activities concluded that all of the would not be significantly increased in magnitude and remain as not significant.

399. The screening of transboundary impacts identified that no species or effects on species and habitats have the potential for impacts outside England.

Table 20.28 Summary of potential impacts for onshore ecology and ornithology during construction, operation, maintenance and decommissioning of the Project

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Construction						
Impact 1: Physical disturbance to intertidal habitats at the Landfall	Intertidal habitats (and Braunton Burrows SSSI and SAC)	High	Negligible	Short-term and temporary minor adverse	Use of trenchless technique	Short-term and temporary minor adverse
Impact 2: Indirect disturbance to intertidal habitats at the Landfall	Intertidal habitats (and Braunton Burrows SSSI and SAC)	High	Negligible	Short-term and temporary minor adverse	No mitigation required	Short-term and temporary minor adverse
Impact 3: Physical disturbance to intertidal habitats at the Taw Estuary Crossing	Intertidal habitats (and Taw-Torridge Estuary SSSI)	High	No change	No effect	No mitigation required	No effect
Impact 4: Indirect disturbance to intertidal habitats at the Taw Estuary Crossing	Estuary, dunes, and mudflats and sandflats (and Taw-Torridge Estuary SSSI, and Braunton Burrows SSSI and SAC)	High	Negligible	Short-term and temporary minor adverse	No mitigation required	Short-term and temporary minor adverse

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Impact 5: Disturbance to bats at the Landfall	Bats and their foraging habitat (and Caen Valley Bats SSSI)	High	No change	No effect	No mitigation required	No effect
Impact 6: Disturbance to bats at the Taw Estuary Crossing	Bats and their foraging habitat (and Caen Valley Bats SSSI)	High	No change	No effect	No mitigation required	No effect
Impact 7: Disturbance to otter at the Taw Estuary Crossing	Otter and their foraging habitat	High	Negligible	Short-term and temporary minor adverse	No mitigation required	Short-term and temporary minor adverse
Impact 8: Habitat loss to non-breeding birds at the Landfall	Non-breeding birds	High (sanderling) Low (other species)	Negligible	Minor adverse	No mitigation required	Minor adverse
Impact 9: Disturbance to non-breeding birds at the Landfall	Non-breeding birds	High (sanderling) Low (other species)	Negligible	Minor adverse	No mitigation required	Minor adverse
Impact 10: Habitat loss to non-breeding birds at the Taw Estuary Crossing	Non-breeding birds	Medium (lapwing) Low (other species)	Negligible (assuming avoidance of overwinteri ng period)	Minor adverse	No mitigation required	Minor adverse

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Impact 11: Disturbance to non-breeding birds at the Taw Estuary crossing	Non-breeding birds	Medium (lapwing) Low (other species)	Negligible (assuming avoidance of overwintering period)	Minor adverse	No mitigation required	Minor adverse
Impact 12: Disturbance to reptiles at the Taw Estuary Crossing	Reptiles and their habitat	Medium	Negligible	Short-term and temporary minor adverse	No mitigation required	Short-term and temporary minor adverse
Impact 13: Disturbance to or introduction of non-native invasive species at the Landfall	Flora and fauna communities within Braunton Burrows SSSI and SAC	High	Low	Moderate adverse	Good site practice measures for managing the spread of invasive species and monitoring (ECoW)	No effect
Impact 14: Disturbance to or introduction of non-native invasive species at the Taw Estuary Crossing	Flora and fauna communities within Braunton Burrows SSSI and SAC, and Taw-Torridge Estuary SSSI	High	Low	Moderate adverse	Good site practice measures for managing the spread of invasive species and monitoring (ECoW)	No effect

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Operation and maintenance						
Impact 1: Habitat alteration or disturbance to intertidal habitats at the Landfall	Intertidal habitats (and Braunton Burrows SSSI and SAC)	High	No change	No effect	No mitigation required	No effect
Impact 2: Habitat alteration or disturbance to intertidal habitats at the Taw Estuary Crossing	Intertidal habitats (and Taw-Torridge Estuary SSSI)	High	No change	No effect	No mitigation required	No effect
Impact 3: Secondary indirect disturbance to intertidal habitats at the Taw Estuary Crossing	Estuary, dunes, and mudflats and sandflats (and Taw-Torridge Estuary SSSI, and Braunton Burrows SSSI and SAC)	High	Negligible	Short-term and temporary minor adverse	No mitigation required	Short-term and temporary minor adverse
Impact 4: Disturbance to bats at the Landfall	Bats and their habitat (and Caen Valley SSSI)	High	No change	No effect	No mitigation required	No effect

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Impact 5: Disturbance to bats at the Taw Estuary Crossing	Bats and their habitat (and Caen Valley SSSI)	High	No change	No effect	No mitigation required	No effect
Impact 6: Disturbance to otter at the Taw Estuary Crossing	Otter and their habitat	High	Negligible	Temporary minor adverse	No mitigation required	Temporary minor adverse
Impact 7: Habitat loss to birds at the Landfall	Birds (breeding and non-breeding)	Negligible	No change	No effect	No mitigation required	No effect
Impact 8: Disturbance to birds at the Landfall	Birds (breeding and non-breeding)	High (sanderling) Low (other species)	Negligible	Minor adverse	No mitigation required	Minor adverse
Impact 9: Habitat loss to birds associated with Taw Estuary Crossing	Birds (breeding and non-breeding)	Medium (lapwing) Low (skylark, other non-breeding birds) Negligible (other breeding birds)	No change	No effect	No mitigation required	No effect

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Impact 10: Disturbance to birds associated with Taw Estuary Crossing	Birds (breeding and non-breeding)	Medium (lapwing) Low (skylark, other non-breeding birds) Negligible (other breeding birds)	Low	Minor adverse	No mitigation required	Minor adverse
Impact 11: Disturbance to or introduction of non-native invasive species at the Landfall	Braunton Burrows SSSI and SAC	High	Low	Moderate adverse	Good site practice measures for managing the spread of invasive species	No effect
Impact 12: Disturbance to or introduction of non-native invasive species at the Taw Estuary Crossing	Braunton Burrows SSSI and SAC and Taw-Torridge Estuary SSSI	High	Low	Moderate adverse	Good site practice measures for managing the spread of invasive species	No effect
Decommissioning						
No decision has been made regarding the final decommissioning policy for the onshore infrastructure as it is recognised that industry best practice, rules and legislation change over time. An Onshore Decommissioning Plan will be provided. It is anticipated that the onshore cable would be decommissioned (de-energised) and either the cables and jointing bays left in situ or removed depending on the requirements of the Onshore Decommissioning Plan approved by the Local Planning Authority. The detail and scope of the decommissioning works will be determined by the relevant legislation and guidance at the time of decommissioning and agreed with the regulator. As such, for the purposes of a worst-case scenario, impacts no greater than those identified for the construction phase are expected for the decommissioning phase.						

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Cumulative – Construction phase						
Impact 1: Physical disturbance to intertidal habitats	Intertidal habitats (and Braunton Burrows SSSI and SAC, and Taw-Torridge Estuary SSSI)	High	No cumulative change	No cumulative effect	No mitigation required	No cumulative effect
Impact 2: Indirect disturbance to intertidal habitats	Intertidal habitats (and Braunton Burrows SSSI and SAC, and Taw-Torridge Estuary SSSI)	High	Negligible	Short-term and temporary minor adverse	No mitigation required	Short-term and temporary minor adverse
Impact 3: Indirect disturbance to landward habitats	Grassland and tidal embankments	Negligible	Negligible	Short-term and temporary negligible adverse	No mitigation required	Short-term and temporary negligible adverse
Impact 4: Disturbance to bats and their habitats	Bats and their foraging habitat	High	Negligible	Short-term and temporary minor adverse	No mitigation required	Short-term and temporary minor adverse
Impact 5: Disturbance to otter and their habitats	Otter and their foraging habitat	High	Negligible	Short-term and temporary minor adverse	No mitigation required	Short-term and temporary minor adverse

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Impact 6: Habitat loss to non-breeding birds at the Landfall	Non-breeding birds	Low	Low	Minor adverse	No mitigation required	Minor adverse
Impact 7: Disturbance to non-breeding birds at the Landfall	Non-breeding birds	Low	Low	Minor adverse	No mitigation required	Minor adverse
Impact 8: Habitat loss to non-breeding birds at the Taw Estuary Crossing	Non-breeding birds	Medium (lapwing) Low (other species)	Negligible	Minor adverse	No mitigation required	Minor adverse
Impact 9: Disturbance to non-breeding birds at the Taw Estuary Crossing	Non-breeding birds	Low	Negligible	Minor adverse	No mitigation required	Minor adverse
Impact 10: Disturbance to reptiles and their habitats at the Taw Estuary Crossing	Reptiles and their foraging habitat	Medium	Medium	Short-term and temporary moderate adverse	No mitigation required for the project, but mitigation proposed as part of the Yelland Quay development which contributes the vast majority of the impact magnitude	Short-term and temporary moderate adverse

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Cumulative – Operation and maintenance phase						
Impact 1: Indirect disturbance to intertidal habitats	Intertidal habitats (and Braunton Burrows SSSI and SAC, and Taw-Torridge Estuary SSSI)	High	No cumulative change	No cumulative effect	No mitigation required	No cumulative effect
Impact 2: Disturbance to bats and their habitats	Bats and their foraging habitat	High	No cumulative change	No cumulative effect	No mitigation required	No cumulative effect
Impact 3: Disturbance to otter and their habitats	Otter and their foraging habitat	High	No cumulative change	No cumulative effect	No mitigation required	No cumulative effect
Impact 4: Disturbance to birds at the Landfall	Birds (breeding and non-breeding)	High (sanderling) Low (other species)	Negligible	Minor adverse	No mitigation required	Minor adverse
Impact 5: Habitat loss to birds at the Taw Estuary Crossing	Birds (breeding and non-breeding)	Medium (lapwing) Low (skylark, other non-breeding birds) Negligible (other breeding birds)	Low	Minor adverse	No mitigation required	Minor adverse

Potential impact	Receptor	Sensitivity	Magnitude	Significance of effect	Potential mitigation measure	Residual effect
Impact 6: Disturbance to birds at the Taw Estuary Crossing	Birds (breeding and non-breeding)	Medium (lapwing) Low (skylark, other non-breeding birds) Negligible (other breeding birds)	Low	Minor adverse	No mitigation required	Minor adverse

20.13 References

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White Cross Offshore Windfarm Environmental Statement

Appendix 20.A: Intertidal Survey

Appendix 20.A Intertidal Survey 2022

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

Report Reference:	220316 IS rev02
Client/s:	Offshore Wind Ltd. (OWL)
Architect/Agent:	Royal HaskoningDHV
Survey Dates:	7th, 12th, and 14th May 2022
Report Date:	November 2022
Report Author:	Erin Reardon, BSc, PhD, MCIEEM
Approved By:	Andrew Charles BSc (Hons), MSc, MCIEEM
Surveyors	Erin Reardon, Jane Usher & Andrew Charles

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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

1.1 Site Background & Survey Purpose

Royal HaskoningDHV commissioned EcoLogic Consultant Ecologists LLP to undertake an Intertidal Survey at the coastal and estuarine extents of 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, beneath the Taw-Torridge Estuary to Crow Point using horizontal directional drilling (HDD), 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).

Saunton Sands forms part of the Bideford to Foreland Point Marine Conservation Zone (MCZ). Braunton Burrows is a Special Area of Conservation (SAC) with marine components encompassing Saunton Sands and the intertidal area extending from Crow Point. Each of these areas lie within Oslo and Paris Conventions (OSPAR) Region III: Celtic Seas. The entire Taw-Torridge Estuary is designated a Marine Annex 1 Habitat – SAC Complex Features for estuaries.

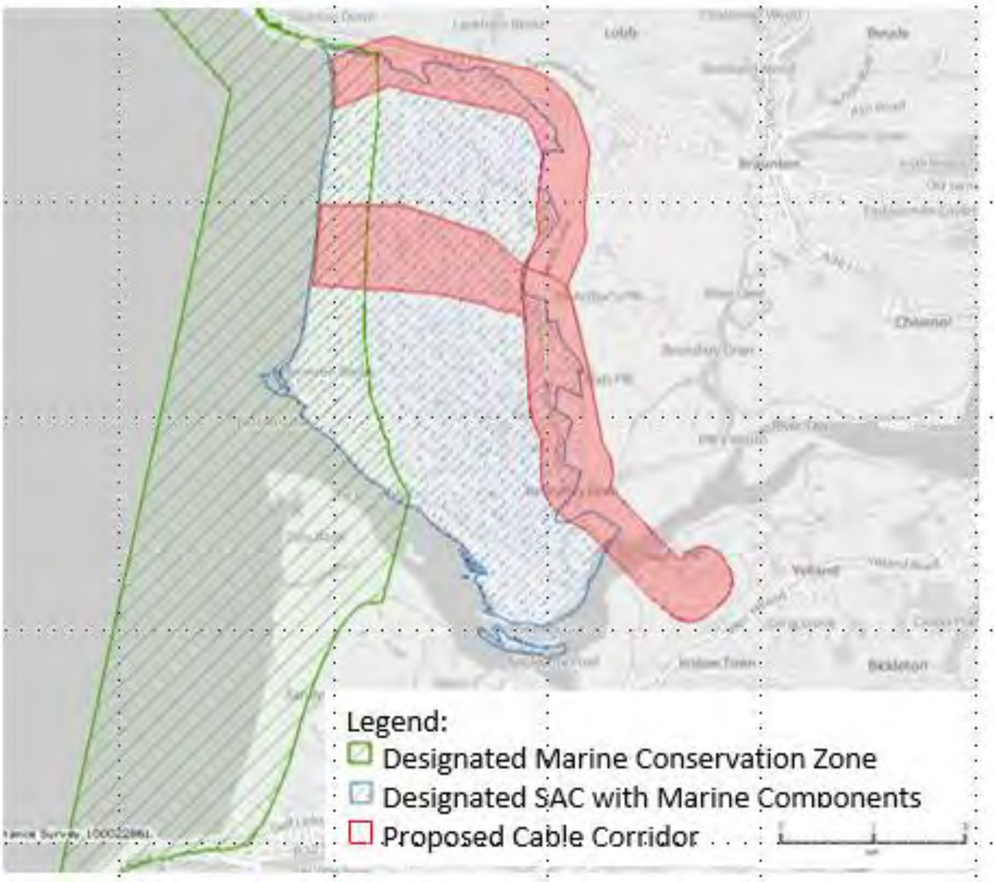

Figure 1.1. Marine-designated areas within the proposed Onshore Export Cable Corridor routes (red) including the portions of the Bideford to Foreland Point Marine Conservation Zone and the Braunton Burrows SAC with Marine Components (adapted from the JNCC MPA Mapper, May 2022).

2. Survey Methods

2.1 Scope of the Assessment

The zone of influence covers the intertidal habitats within the proposed Onshore Export Cable Corridor routes at Saunton Sands and the Taw-Torridge Estuary. The assessment considers designated sites, habitats, species of importance for biodiversity conservation and legally protected species.

2.2 Desk Study

A desk-based review was undertaken to identify protected species and habitats and/or species and habitats of conservation concern, with emphasis on coastal and marine zones associated with the estuary.

The desk-based review included review of the following resources:

- MAGIC (https://magic.defra.gov.uk/ – May 2022); and,
- JNCC mapper (https://jncc.gov.uk/mpa-mapper/ – May 2022).

2.3 Intertidal Biotope Survey

The intertidal biotope survey comprised of a walkover assessment of the intertidal extents of the proposed Onshore Export Cable Corridor routes and a 50m buffer area, using the marine intertidal Phase 1 biotope mapping survey (Wyn et al. 2000; JNCC, 2010), a standard technique for classifying and mapping British intertidal biotopes.

The intertidal biotope survey was carried out by Erin Reardon BSc. PhD MCIEEM, Jane Usher PhD and Andrew Charles BSc. (Hons) MSc. MCIEEM on the 7th, 12th and 14th May 2022 within two hours of low tide.

Five transects, running from the lower littoral to the high intertidal zone were followed within each intertidal survey area. This included a 'central' transect positioned along the tidal extents of the proposed onshore export cable corridor routes. With two further transects, one either side of the central transect, and two further transects again, each within the 250m outer buffer zone. The transect routes and substrate sampling points are presented on Figure 2.

Along each transect, the zones were identified based on visual features and assessed for indicators of ecological value, including the presence of, or field signs for any protected or rare habitats and species.

At a point within each zone along each transect route, a substrate sample was collected from approximately 20cm depth. Collected infauna specimens were separated from the substrate by 1mm sieve. The collected infauna were retained for identification prior to being released.

In addition, 4-5 representative substrate samples per survey area were collected from 15cm and stored in clean, plastic, labelled containers for laboratory particle size analysis.

2.4 Sediment Particle Size Analysis

A total of 19 sediment samples were collected in the field. In the laboratory at the University of Exeter, all samples were dried for 36 hours in a 56°C drying oven. To ensure no loss of sample, lid openings were wrapped in parafilm, and 3 puncture holes made with a 26-gauge needle. An EVOS M5000 (Invitrogen) was used to scan and quantify particle size.

Predetermined size particles were used for calibration (acid-washed glass beads, Sigma), size boundaries were determined using three diameter measurements from each glass bead size selection used. This is to allow for the irregular shape of sand/sediment and clay particles.

Each of the sediment sample was subsampled in triplicate for a total of 57 samples analysed. For each sample, 500mg of dry weight material was weighed.

Runs were performed in triplicate and plates randomised to minimise error.

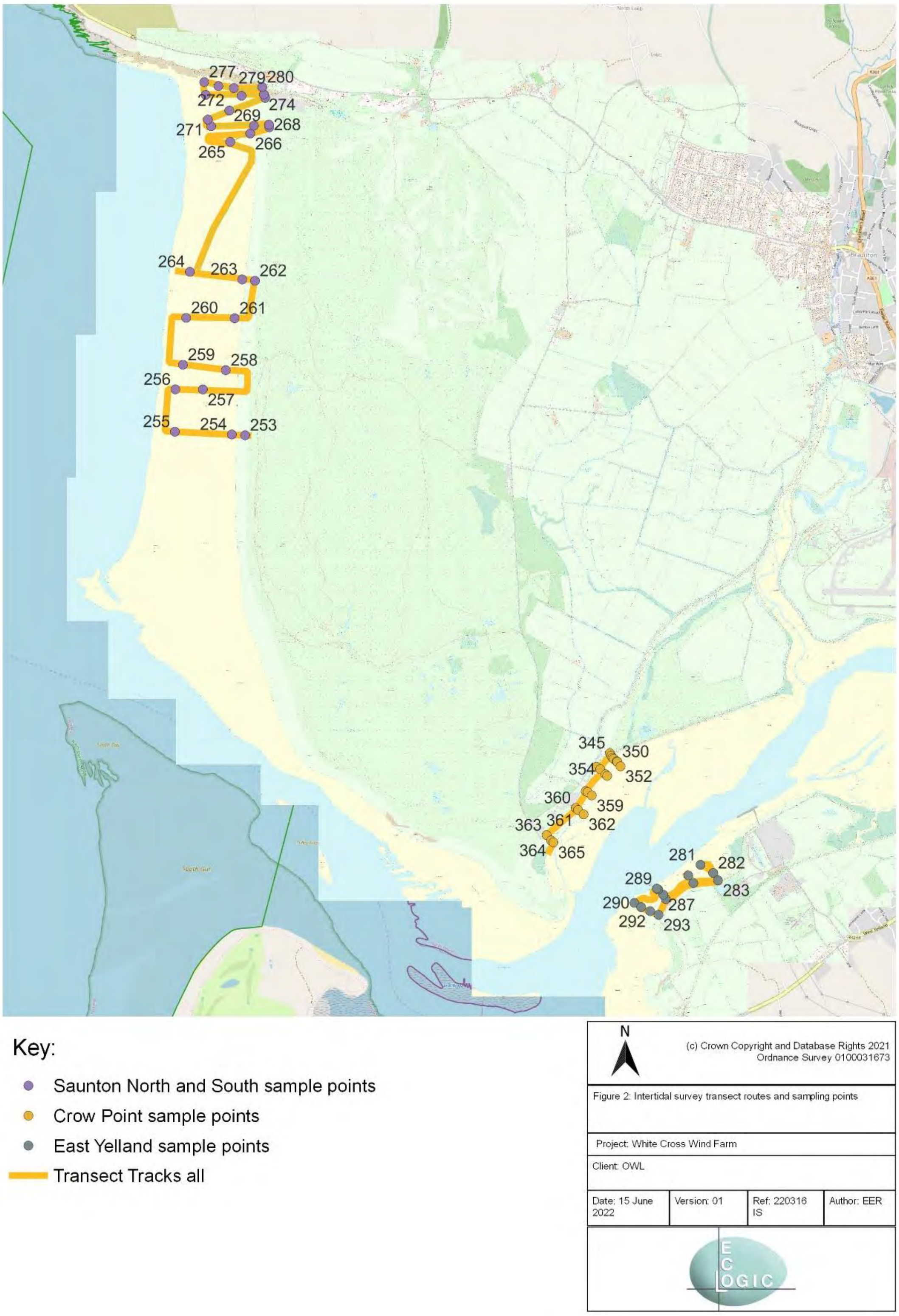

Figure 2-1. Intertidal survey transect routes and sampling points

3. Results

3.1 Desk Study

<u>Bideford to Foreland Point MCZ</u>

The Bideford to Foreland Point MCZ (UKMCZ0029; area 104 km^2) is located along the north coast of Devon. It was designated in 2016 based on the presence of 20 designated features of conservation importance (DEFRA, 2016).

The Saunton Sands portion of the study site sits within the central area of this MCZ. Within the proposed Onshore Export Cable Corridor, there were six designated features (EUNIS habitat classification 2012, amended 2019, Bern Convention):

- Intertidal Sand & Muddy Sand (A2.2): Shores comprising of clean sands (coarse, medium or fine-grained) and muddy sands with up to 25% silt and clay fraction. Shells and stones may occasionally be present on the surface. The sand may be duned or rippled as a result of wave action or tidal currents. Littoral sands exhibit varying degrees of drying at low tide depending on the steepness of the shore, the sediment grade and the height on the shore.
- Subtidal Sand (A5.2): lean medium to fine sands or non-cohesive slightly muddy sands on open coasts, offshore or in estuaries and marine inlets. Such habitats are often subject to a degree of wave action or tidal currents which restrict the silt and clay content to less than 15%. This habitat is characterised by a range of taxa including polychaetes, bivalve molluscs and amphipod crustacea.
- Low energy infralittoral rock (A3.3): Infralittoral rock in wave and tide-sheltered conditions, supporting silty communities with *Laminaria hyperborea* and/or *Laminaria saccharina* (A3.31). Associated seaweeds are typically silt-tolerant and include a high proportion of delicate filamentous types.
- High energy infralittoral rock (A3.1): Rocky habitats in the infralittoral zone subject to exposed to extremely exposed wave action or strong tidal streams. Typically, the rock supports a community of kelp *Laminaria hyperborean* with foliose seaweeds and animals, the latter tending to become more prominent in areas of strongest water movement.
- High energy intertidal rock (A1.1): Extremely exposed to moderately exposed or tide-swept bedrock and boulder shores. Extremely exposed shores dominated by mussels and barnacles, occasionally with robust fucoids or turfs of red

seaweed. Tide-swept shores support communities of fucoids, sponges and ascidians on the mid to lower shore.

- Patches of honeycomb worm *Sabellaria alveolata* (A2.7, HOCI_8) reefs: Many wave-exposed boulder scar grounds in the eastern basin of the Irish Sea (and as far south as Cornwall), are characterized by reefs of *S. alveolata* which build tubes from the mobile sand surrounding the boulders and cobbles. The tubes formed by *S. alveolata* form large reef-like hummocks, which serve to further stabilize the boulders. Small patches of honeycomb worm are present along the rocky shore along the northern boundary to Saunton Sands (Figure 3.1).

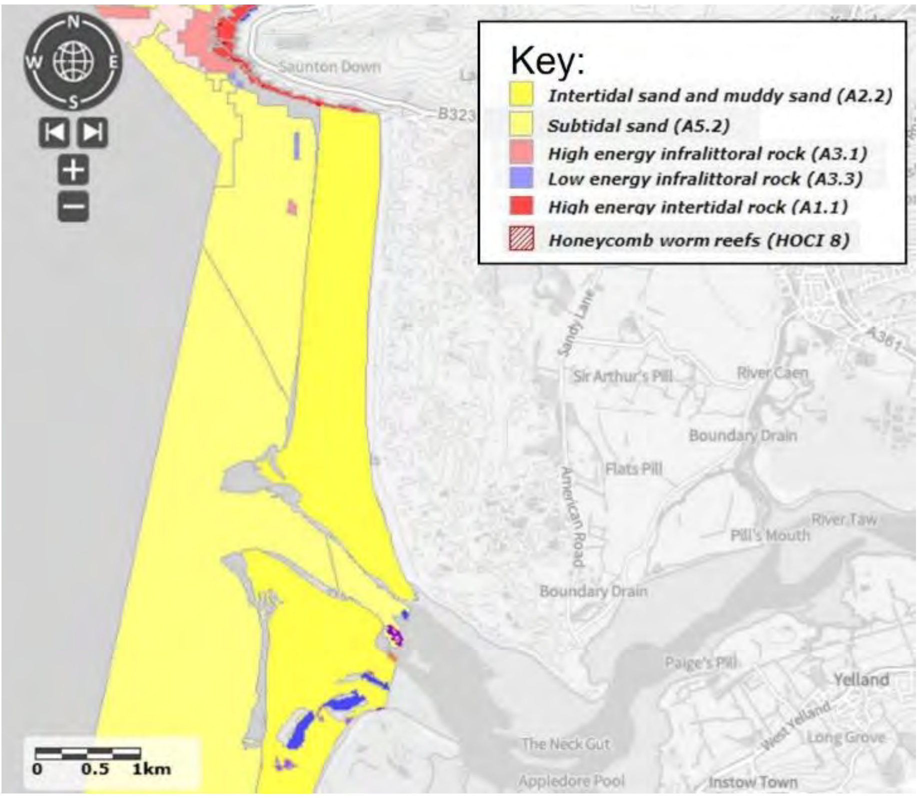

Figure 3-1. MCZ designated features identifying broad scale habitats, priority habitats and species of conservation importance at Saunton Sands (adapted from MAGIC, 2022).

Marine Components of the 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. This site is also designated as a SSSI and forms the centre of the UNESCO North Devon Biosphere Reserve and North Devon 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. The terrestrial features of this SAC have been previously described in the Preliminary Ecology Appraisal for the Project (Ecologic, 2022). This site's marine features include intertidal sand & muddy sand (A2.2, described above) and Marine Annex 1 Habitat - SAC Complex Features of: large shallow inlets and bays (H1160) along Saunton Sands and estuaries (H1130) around Crow Point (Figure 3-2).

Taw-Torridge Estuary Marine Annex 1 Habitat

The Taw-Torridge Estuary is comprised of large areas of mudflats, sandbanks and areas of saltmarsh and beaches which supports a variety of overwintering and migratory wading birds, estuarine fish species, and a diversity of invertebrates (described in Ecologic, 2022). This estuary has one marine designation for Marine Annex 1 Habitat – SAC Complex Features for estuaries (H1130; Figure 3-2).

OSPAR Region III: Celtic Seas

All survey areas lie within the OSPAR Region III: Celtic Seas region.

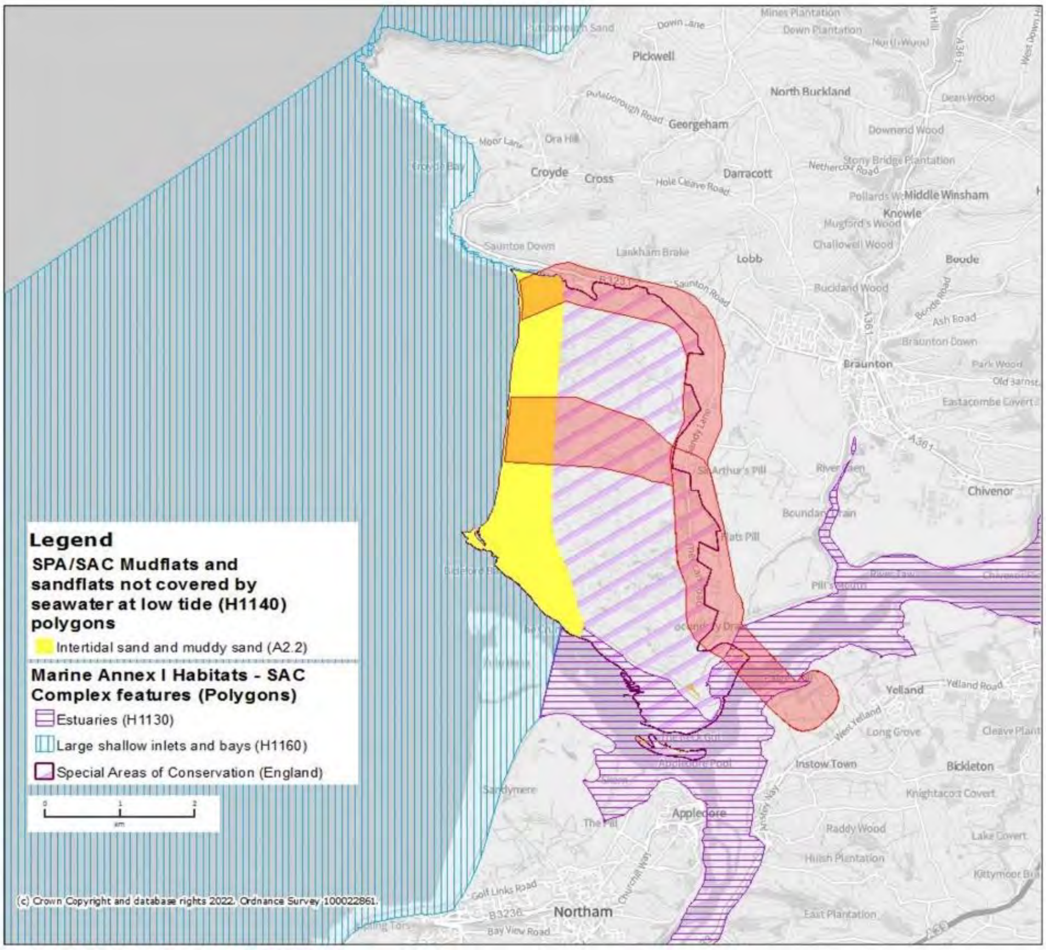

Figure 3-2. SAC features associated with the marine components of the Braunton Burrows SAC and Taw-Torridge Estuary Marine Annex 1 Habitat – SAC Complex Features for estuaries with the proposed cable route outlined in red.

3.2 Intertidal Biotope Survey

Weather conditions and timings of the May 2022 intertidal survey are presented in Table 3.1.

Table 3.1. Weather conditions and timings of the May 2022 intertidal survey.

Date	Area	Low tide time	Survey timing	Temp (C)	Cloud cover %	Wind	Precip-itation
7th May 2022	Saunton Sands (southern area)	4:56 pm	3-5pm	20	Transitioned from full sun to low visibility sea mist during survey	2-3	0
7th May 2022	Saunton Sands (northern area)	4:56 pm	5-6:30pm	19	100%	2	0
12th May 2022	East Yelland Quay	11:45 am	10 – 11:30am	15	30%	2-3	0
14th May 2022	Crow Point	11:39 am	11:45 – 13:00	17	20%	1	0

3.2.1 Saunton Sands – South

Across the Saunton Sands intertidal survey area, the habitat was sandy (ranging from 0.5-0.50mm), with finer sand/silt/mud at the low tide boundary and small rocks (less than 5cm) scattered near the high tide line (Figure 3-3; Plates 1-4). Although the beach was wide, the habitat was the same across the transects. There was evidence of marine worms such as blow lugworm *Arenicola marina* in the sandy sediment including breathing holes, sand trails, bore holes in mollusc shells scattered through the littoral zone (Plate 5). Across sediment dig points, only one specimen was collected. It was a small white catworm *Nephtys hombergii*, collected near the low tide line of the southernmost transect near point 255 (Plate 6). In addition, scattered sand brittle stars *Ophiura ophiura*, both alive and dead (Plate 7), sea potato *Echinocardium cordatum* exoskeletons, moon snail *Euspira heros* egg cases, cuttlefish *Sepia officinalis* cases and several ray egg cases were scattered across the littoral zone. A sanderling *Calidris alba* (~30 individuals) flock was feeding at water line near point 264 (Plate 8).

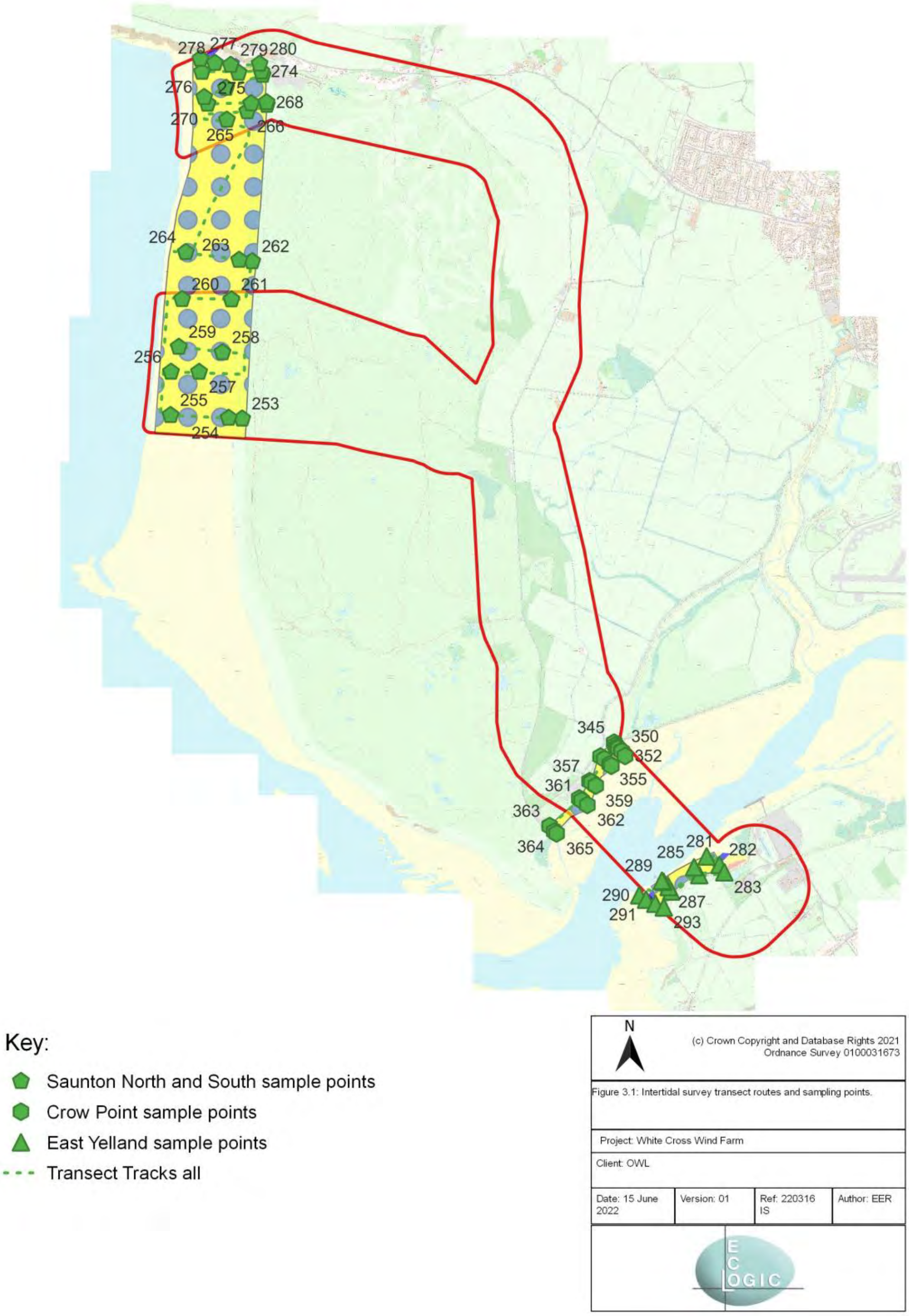

Figure 3-3. Intertidal survey transect routes and sample point identification numbers

Plate 1. Saunton Sands south from the southernmost transect with a view north.

Plate 2. Saunton Sands south with a view south.

Plate 3. Saunton Sands south looking east.

Plate 4. Area of sand habitat with scattered small rocks (point 261).

Plate 5. An example blow worm hole.

Plate 6. Cat worm collected from sediment sampling at point 255.

Plate 7. An example brittle star.

Plate 8. Group of Sanderling near point 264.

3.2.2 Saunton Sands – North

Similar to the southern survey area, the habitat in the northern area of Saunton Sands was largely dominated by fine sand (Figure 3-3, Plates 10-13; ranging from 0.002 – 0.50mm; fine-very fine range). Patches of small rocks (approx. 5 - 20cm) were scattered intermittently in areas of the upper littoral zone. There was evidence of marine worms such as blow lugworm in the sandy sediment including breathing holes, sand trails, bore holes in mollusc shells scattered through the littoral zone. One small white ragworm was collected at point 270. There was steady human presence (both people and dogs) in the upper littoral zone in the northern half of the survey area. The northern-most transect in this area was formed of rocky shore. Species present in the rock pools included: shanny *Lipophrys pholis*, Beadlet sea anemone *Actinia equina*, shore crab *Carcinus maenas* (Plate 14), periwinkle *Littorina littorea* (Plate 15), limpet *Patella sp.*, common rock barnacle *Semibalanus balanoides*, purple top shell *Gibbula umbilcalis* and thick topshell *Steromphala umbilicalis*. Seaweed species present in the rock pools included serrated wrack *Fucus serratus,* bladderwrack *Fucus vesiculosus*, sea lettuce *Ulva intestinalis* and coral weed *Corallina officinalis* (Plates 16-17).

Plate 10. The north survey area at Saunton Sands from the littoral rock habitat looking south across the sand.

Plate 11. The north Saunton survey area from the low water line looking east.

Plate 12. The high energy littoral rock habitat at the northern extent of the north Saunton survey area.

Plate 13. The southern portion of the upper littoral area of the north Saunton survey area.

Plate 14. The northern portion of the upper littoral area of the north Saunton survey area.

Plate 12. The northern portion of the upper littoral area of the north Saunton survey area.

Plate 13. The southern portion of the lower littoral area of the north Saunton survey area.

Plate 14. The shore crab observed near point 275.

Plate 15. Beadlet sea anemone, periwinkles and barnacles in the intertidal rock pools associated with the high energy littoral rock along the northern extent of the survey area.

Plate 16. Example flora and fauna of rock pool habitat assocaited with the high energy littoral rock along the northern extent of the survey area.

Plate 17. Example flora and fauna of rock pool habitat assocaited with the high energy littoral rock along the northern extent of the survey area.

3.2.3 East Yelland

The littoral habitat at East Yelland transitioned from intertidal mud and sand in the eastern extent of the survey area to sand in the central area to rocky shore with underlying mud along the western extent of the survey area (Figure 3-3; Plates 18-22). Throughout all habitats signs of blow lugworm and ragworm (feeding holes, sand castings; Plate 19). Dead shore crabs were found intermittently in the upper littoral zone (close to high tide line).

Along the eastern transect (points 281-283), the littoral habitat was intertidal mud (dominated by silt and very fine sand; sediment size ranging from 0.002-0.10mm). Several cockles were collected at point 281. West of point 282, there were intermittent patches of common cord grass *Spartina anglica* with gut weed on the sandy mud (Plate 22). There were also occasional seaweeds present such as egg wrack. One common ragworm *Hediste diversicolor* was collected at point 285.

The upper littoral habitat was shingle overlying sand and mud with patches of salt tolerant vegetation (area surveyed along points 284, 284 and 286; Plate 24) including sea purslane *Halimione portulacoides*, sea beet *Beta vulgaris maritima*, couch grass *Elymus repens*, and sea plantain *Plantago maritima*.

The intertidal habitat in the central portion of the survey area (between points 285 and 288) was in sand and mud (Plate 25; sediment sizes ranging from 0.002 – 0.10 mm in diameter). Two sand hoppers *Talitrus saltator* were collected at point 287. There was a patch of shale rock substrate along the sublittoral zone extending east from the jetty (Plate 26). There was a thick covering of egg wrack *Ascophyllum nodosum* on this rocky substrate brown with intermittent areas of gutweed. Species present in attached to the rocks in this area included barnacle, periwinkle, limpet, mussel, cockle and purple topshell. A cockle was collected from the sediment at point 289 (Plate 27).

The habitat along the western portion of this survey area (west of the jetty) transitioned from sand and mud with small, scattered rocks to rocky shore with underlying sand and mud (Plates 28-29). Two common ragworm were collected at points 290 and 291. There was a group of 18 oystercatchers *Haematopus ostralegus* foraging at an outcrop into the river (west of point 291).

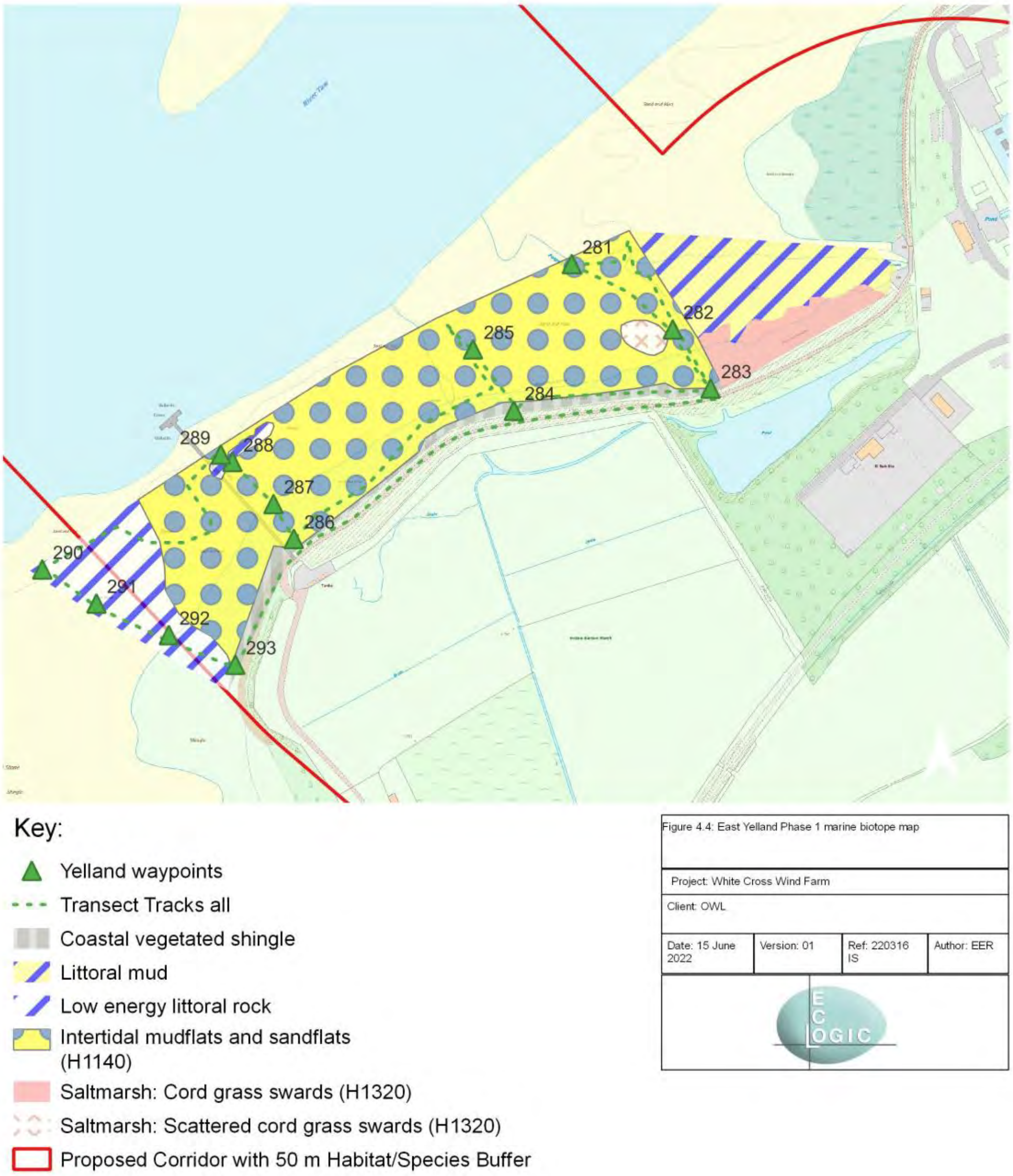

Figure 3-4. East Yelland Phase 1 marine biotope map

Plate 18. The eastern portion of the East Yelland survey area.

Plate 19. The muddy sand central East Yelland survey area of sand with scattered blow worm casings.

Plate 20. Intertidal mud habitat near point 281 with the outflow from the East Yelland pond further bound by salt marsh to the east.

Plate 21. Intertidal mud habitat near point 281 with the outflow from the East Yelland pond with patches of bladderwrack and empty cockle shells.

Plate 22. Sand with small patches of cord grass in the eastern portion of the survey area.

Plate 23. Example of sand with underlying mud.

Plate 24. Upper littoral zone in the central survey area.

Plate 25. The western portion of the central survey area.

Plate 26. Rock substrate with a thick covering of egg wrack

Plate 27. An example cockle collected at point 289.

Plate 28. The transition from sand to rock habitat west of the jetty.

Plate 29. Rocky habitat with egg wrack in the western portion of the survey area.

3.2.4 Crow Point

The majority of the upper littoral zone habitat was sand, transitioning to mud leading up to a small channel with flowing water at low tide (Figure 3-5; Plates 30-32, and 39). Beyond the channel, exposed mud flats extended to the low tide water line (Plate 30). A shore crab was observed on the bank near the channel (point 352).

Across this survey area, the lower littoral zone had signs of blow lugworm throughout. Three cockles were collected a point 350.

Moving from east to west, the beach transitioned from sandy to small rocks with underlying sand and mud. Near the channel bank (point 362) the substrate was predominately mud covering of gutweed and intermittent bladderwrack. At waypoint

362, two juvenile shore crabs (Plate 35) observed and two specimens of common ragworm (Plate 34) were collected.

On the western portion of the survey area, the rocky shore transitioned to a mix of mud and salt marsh. The salt marsh habitat was dominated by common cord, eelgrass and glass wort (Plates 37-38). Mud snails *Hydrobia ulvae* were abundant in this habitat, as well as periwinkle and cockle. Sounds of cockles filter feeding were clearly audible close to the water line (near point 365).

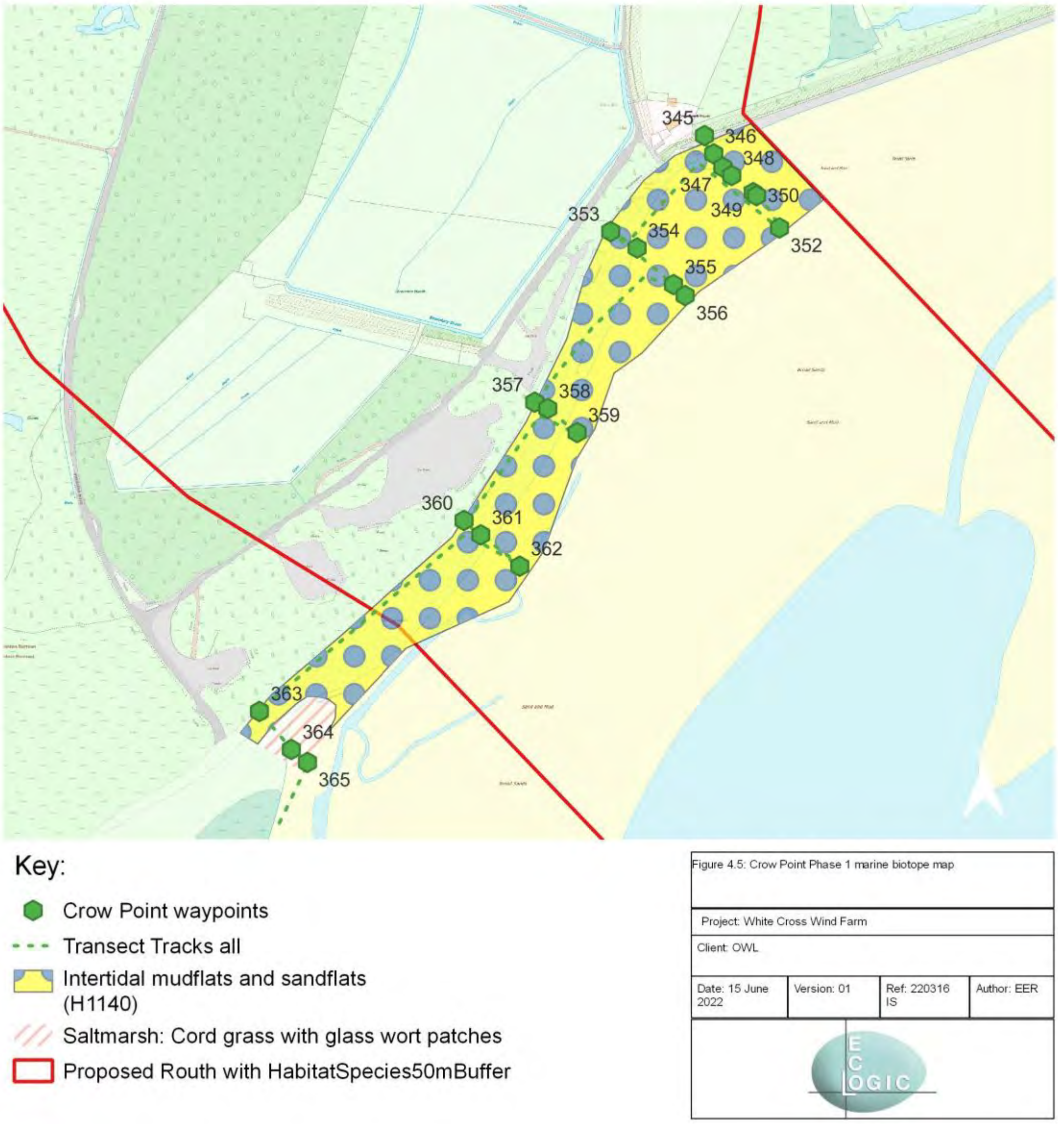

Figure 3-5. Crow Point Phase 1 marine biotope map

Plate 30. The eastern portion of the Crow Point survey area.

Plate 31. Sandy mud habitat with lugworm along the east of the Crow Point survey area.

Plate 32. The central survey area at Crow Point.

Plate 33. The muddy bank near the channel at point 362.

Plate 34. A ragworm collected at point 362.

Plate 35. A juvenile shore crab at point 362.

Plate 36. The western portion of the Crow Point survey area.

Plate 37. Cord grass swards in the western portion of the Crow Point survey area.

Plate 38. Glass wort and gut weed in the western extent of the Crow Point survey area.

Plate 39. The central portion of the Crow Point survey area.

3.3 Sediment Particle Size Analysis

See Table 3.2 for the composition of sediment size classes for each sample point.

Table 3.2. The composition of sediment size classes as percent of sample dry weight. Sample points correspond with waypoints presented on Figure 2.

Survey area	Sample point	Clay (less than 0.002 mm)	Silt (0.002-0.05 mm diam)	Very fine Sand (0.05-0.10 mm)	Fine Sand (0.10-0.25 mm)	Medium Sand (0.25 -0.50 mm)	Coarse Sand (0.50-1.00 mm)	Very Coarse Sand (1.00-2.00 mm)
Saunton South	254	0	3	36	38	23	0	0
	257	0	0	25	41	32	2	0
	258	0	6	25	42	24	3	0
	260	0	0	4	47	35	12	2
	263	0	0	17	26	55	2	0
Saunton North	265	0	11	38	39	4	6	2
	270	0	3	27	46	22	1	1
	272	0	8	39	26	24	2	1
	276	0	9	62	22	7	0	0
	278	0	26	46	24	4	0	0
East Yelland	281	0	51	36	7	6	0	0
	285	13	37	37	11	1	1	0
	287	0	43	39	18	0	0	0
	291	36	28	29	7	0	0	0
Crow Point	347	53	33	11	3	0	0	0
	354	0	3	26	37	34	0	0
	359	26	31	36	5	2	0	0
	361	0	2	21	46	28	3	0
	365	0	45	25	28	2	0	0

4. Discussion

4.1 Proposed Works

Potential damaging activities associated with the Project, include:

- Short term local disturbance to the downstream intertidal habitats during proposed works;
- Risk of short-term reduction in water quality to occur as a result of a fuel/oil/chemical spill or simply due to an increase in turbidity; and,
- Risk of introduction of non-native invasive species from equipment and supplies.

4.2 Designated Habitats & Species

The proposed Onshore Export Cable Corridor lies within the boundary of the designated Bideford to Foreland Point MCZ, Braunton Burrows SAC with marine components, and Marine Annex I Habitat with SAC Complex Features for estuaries (Figure 1-1).

The installation phase of the Project may cause short term disturbance and/or damage to an extent of intertidal habitats at Saunton Sands. It is understood that the onshore export cable corridor route will pass beneath the Taw-Torridge Estuary and thus will not be impacted by the Project.

<u>Intertidal Sand & Muddy Sand (A2.2)</u>

The four intertidal survey areas predominately comprised of intertidal sand & muddy sand (A2.2) habitat.

This habitat is afforded legal protection under the Resolution 4 (1996) of the Bern Convention on endangered natural habitats types using the EUNIS habitat classification (year of revision 2014).

The Project has potential to impact intertidal coarse sediment habitat due to:

- Any works taking place in or close to water have the potential to result in a reduction in water quality to occur as a result of a fuel/oil/chemical spill or simply due to an increase in turbidity during the installation phase of the Project.

Within Saunton Sands, it is considered unlikely that the Project will have any impact beyond insignificant on intertidal coarse sediment habitat due to the narrow working corridor and temporary time scale of disturbance. However, precautionary recommendations are provided to ensure the proposed construction works minimize impacts on this habitat.

There are no perceived long-term impacts of the Project after works are completed.

There will be no impact on the areas surveyed within the Taw Estuary because the proposed Onshore Export Cable Corridor runs beneath this habitat.

Subtidal sand (A5.2)

The habitat adjacent to the intertidal zone at Saunton Sands will be subtidal sand (Figure 3). There is no intertidal subtidal sand habitat located within or directly adjacent to the Taw River Estuary survey areas.

This habitat is afforded legal protection under the Annex I of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora – consolidated version 01/01/2007.

The Project has potential to impact subtidal sand due to:

- Any works taking place in or close to water have the potential to result in a reduction in water quality to occur as a result of a fuel/oil/chemical spill or simply due to an increase in turbidity during the installation phase of the Project; and/or,
- Physical damage and/or disturbance during the installation phase due to alter tidal flow regimes and wave exposure, or resulting in sediment deposition influence the structure of the sedimentary habitat.

It is considered unlikely that the Project will have any impact beyond insignificant on subtidal sand sediment habitat due to due to the narrow working corridor and temporary time scale of disturbance. However, precautionary recommendations are provided to ensure the Project minimizes impacts on this habitat.

There are no perceived long-term impacts of the Project after works are completed.

Low energy infralittoral rock (A3.3)

There were small patches of low energy infralittoral rock west of the north Saunton Sands survey area. There were no other instances of this habitat within or directly adjacent to the other survey areas.

This habitat is afforded legal protection under the Annex I of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora – consolidated version 01/01/2007.

The Project has potential to impact low energy infralittoral rock habitat due to:

- Construction works in or close to water create the potential to result in a reduction in water quality to occur as a result of a fuel/oil/chemical spill or simply due to an increase in turbidity during the installation phase of the Project.

It is considered unlikely that the Project will have any impact beyond insignificant on the low energy infralittoral rock. However, precautionary recommendations are provided to ensure the Project minimizes impacts on this habitat.

There are no perceived long-term impacts of the Project after works are completed.

High energy infralittoral rock (A1.1)

There was a small area of high energy infralittoral rock along the northern boundary of the north Saunton Sands survey area. There were no other instances of this habitat within or directly adjacent to the other three survey areas.

This habitat is afforded legal protection under the Annex I of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora – consolidated version 01/01/2007.

The Project has potential to impact high energy infralittoral rock due to:

- Construction works in or close to water create the potential to result in a reduction in water quality to occur as a result of a fuel/oil/chemical spill or simply due to an increase in turbidity during the installation phase of the Project.

It is considered unlikely that the Project will have any impact beyond insignificant on the high energy infralittoral rock. However, precautionary recommendations are provided to ensure the Project minimizes impact on this habitat.

There are no perceived long-term impacts of the Project after works are completed.

Honeycomb worm (A2.7)

There was no honeycomb worm identified within any of the survey areas. However, there were several patches of honeycomb located along the rocky shore west of the north Saunton survey area with the closest instance 100 m to the west. There was no honeycomb worm identified within or directly adjacent to the sites at Taw-Torridge Estuary.

This habitat is afforded legal protection under the Annex I of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora – consolidated version 01/01/2007.

The Project has potential to impact honeycomb worm due to:

- Changes in sedimentation impacting filtration through gills due to contamination from construction phase, and post-construction due to altered sediment dynamics due to the changes to the sediment's profile;
- Construction works in or close to water create the potential to result in a reduction in water quality to occur as a result of a fuel/oil/chemical spill or simply due to an increase in turbidity during the proposed works; and/or,
- Habitat damage and/or disturbance during the construction phase.

It is considered unlikely that the Project will have any impact beyond insignificant on honeycomb worm due to the distance and scale of the Project. However, precautionary recommendations are provided to ensure the Project minimizes impacts on this habitat.

There are no perceived long-term impacts of the Project after works are completed.

4.3 Recommendations

Compliance Monitoring

Ecological supervision during the works to confirm adherence to constraints and implementation of control measures**.**

Timing of Works

All proposed works must avoid high tide. This is to avoid direct or indirect incidents or disturbance reducing water quality**.**

Pollution Prevention Measures

The works must be undertaken in compliance with Statutory Pollution Prevention Guidelines.

A site compound is to be established upon hardstanding and enclosed by protective fencing. While not in use all construction materials, equipment, machinery, facilities etc. must be sited within a designated compound.

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. Refuelling and maintenance of all equipment will take place within the site compound only.

Storage facilities must be installed to contain and prevent the release of fuel, oils, and chemicals associated with plant, refuelling and construction equipment, into the terrestrial or marine environment. Secondary containment must be used with a capacity of no less than 110% of the container's storage capacity.

No personal, equipment or vehicles are to operate within inundated tidal areas – i.e. works effecting the riverbank and/or newly created tidal areas, must avoid high tide. The Project is to include a pre-commencement site meeting and subsequent compliance monitoring visits, undertaken and recorded by a suitably qualified and pre-appointed ecologist. Such visits would be required to confirm adherence to recommendations/constraints and implementation of ecological mitigation and compensation recommendations.

4.4 Conclusion

Taking mitigation measures into account, the proposed development will likely have no significant negative impacts on the Bideford to Foreland Point MCZ, Marine Components of the Braunton Burrows SAC and the Taw-Torridge Estuary Marine Annex 1 Habitat. With implementation of the recommended mitigation and compensation measures, the proposal is considered to represent a neutral impact on the Bideford to Foreland Point MCZ, Marine Components of the Braunton Burrows SAC and the Taw-Torridge Estuary Marine Annex 1 Habitat.

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White Cross Offshore Windfarm Environmental Statement

Appendix 20.B: Preliminary Ecological Appraisal

Preliminary Ecological Appraisal

White Cross Windfarm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

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<tr><td>Report Author / s:</td><td colspan="3">Erin Reardon BSc PhD MCIEEM
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<tr><td>GIS Mapping:</td><td colspan="3">Erin Reardon BSc PhD MCIEEM</td></tr>
<tr><td>Approved By:</td><td colspan="3">Andrew Charles BSc (Hons) MSc MCIEEM</td></tr>
<tr><td rowspan="2">Surveyor / s & Licence N°:</td><td>Andrew Charles</td><td colspan="2">Bats: 2015-13738-CLS-CLS (Level 2)
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GCN: 2016-20368-CLS-CLS
Barn owl: CL29/00098</td></tr>
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Dormouse: 2015-18348-CLS-CLS
Badger: CL35/0067
FISC: Level 5</td></tr>
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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.

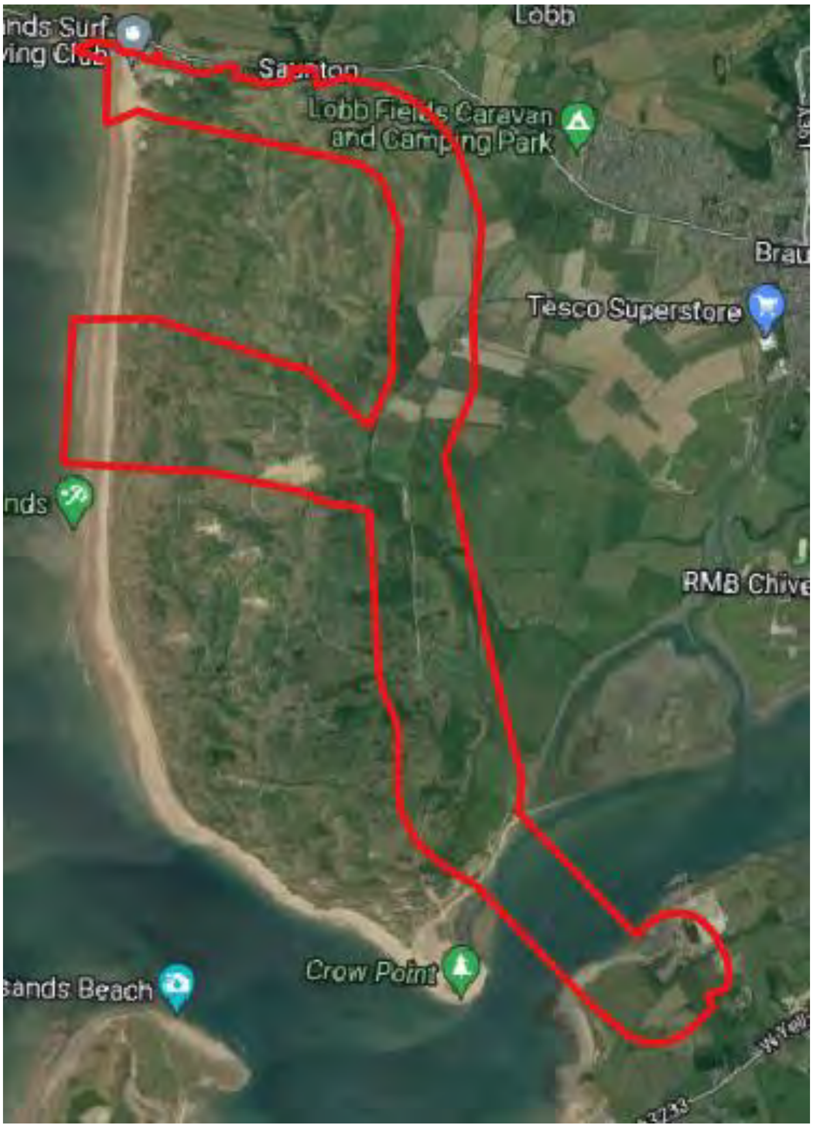


Figure 1-1. The proposed Onshore Export Cable Corridor PEA survey area

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.

<u>Braunton Burrows SAC</u>

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

<u>Braunton Burrows SSSI</u>

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=

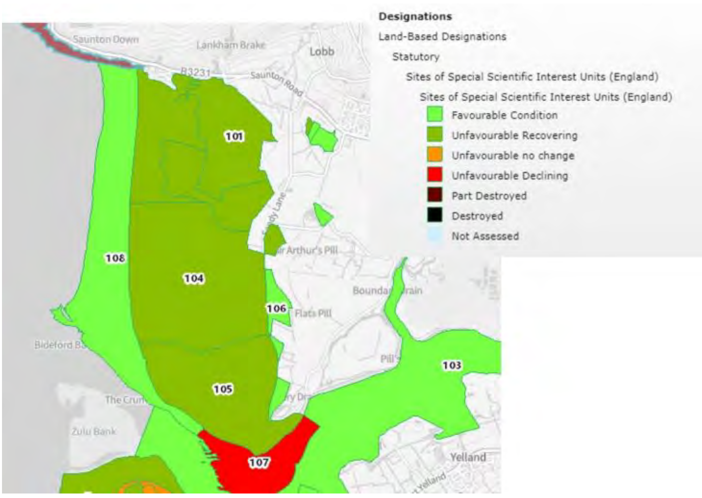


Figure 3-1. Braunton Burrows, Saunton to Baggy Point, Taw/Torridge Estuary, Greenaways and Freshmarsh and Braunton Swanpool SSSI units within the proposed cable route of the site (MAGIC website 06/05/22)

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.

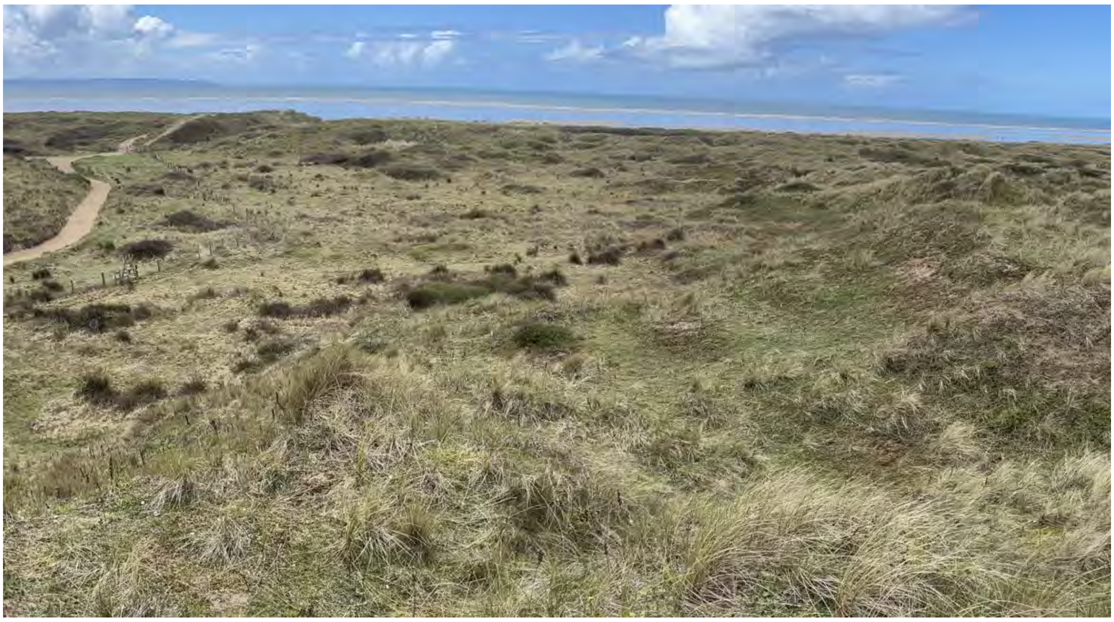
The inner dune/grey dunes/fixed dune grassland included creeping willow, silverweed, sharp rush, St. John's-wort, meadowsweet, common knapweed, tufted vetch, common fleabane, yellow iris, bugle, yellow barista, oxeye daisy, yellow rattle, goat's beard, common agrimony and mullein.

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

Bats – Feeding & Dispersal

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 20.C: Bat Activity Survey

Appendix 20.C 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).

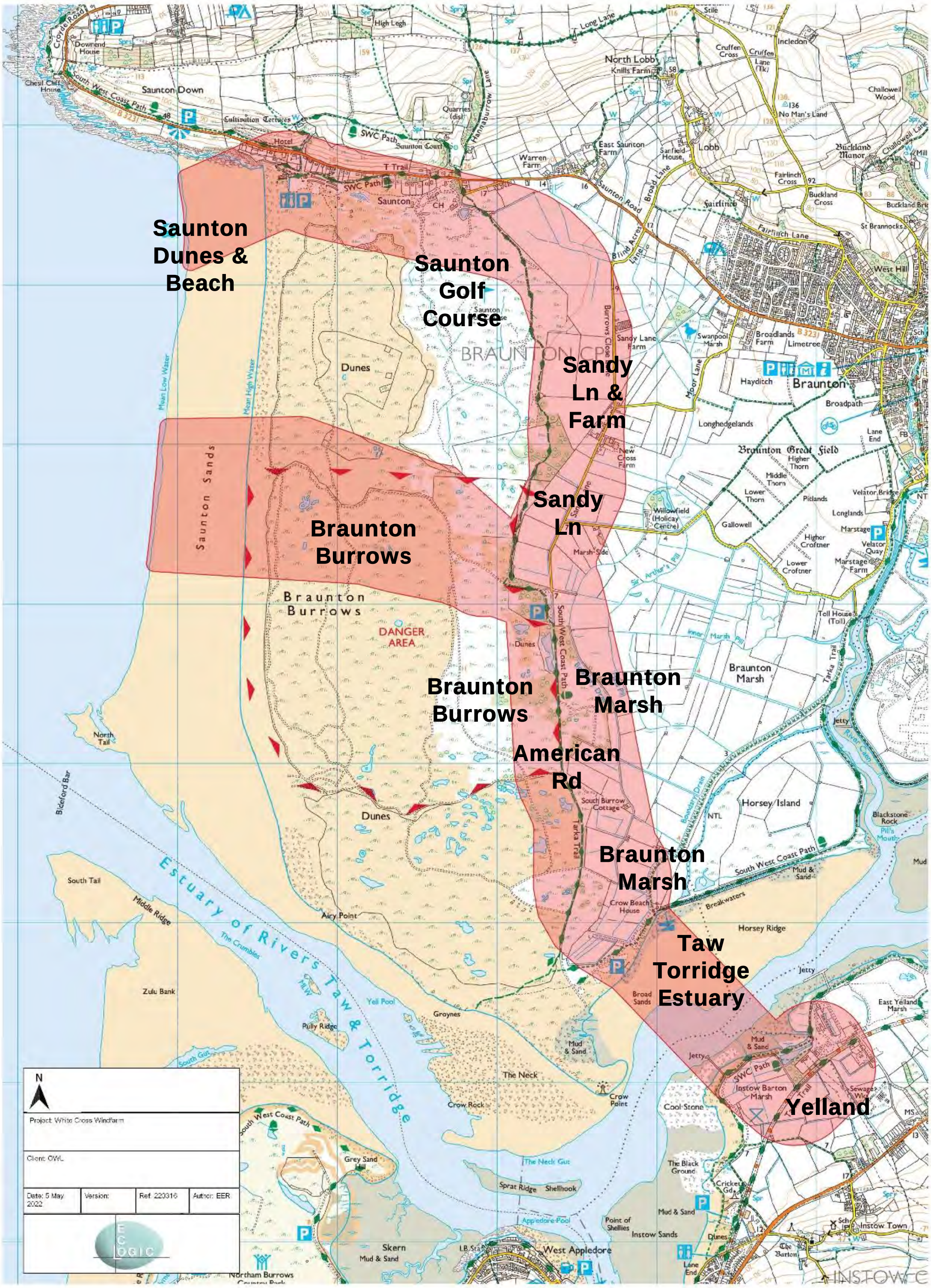

Figure 1-1 The proposed cable corridors and bat activity survey area

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.

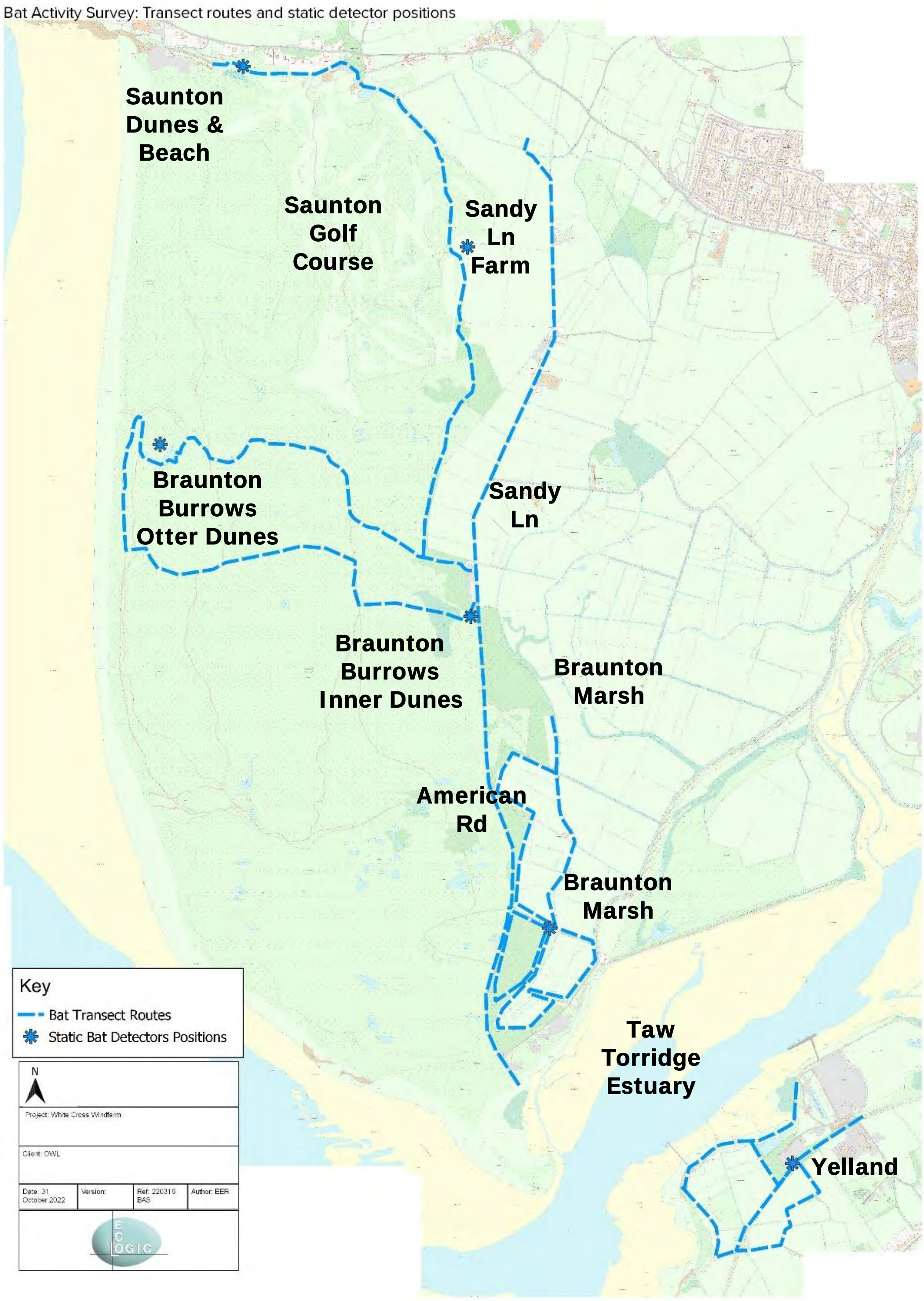

Figure 2-1 The transect routes and static bat detector positions

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 1st to 6th June 2022						Braunton – Outer Dunes 1st to 6th June 2022						Braunton – Inner Dunes 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 1st to 6th June 2022						Saunton Dunes 1st to 6th June 2022						Yelland 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 25th to 30th July 2022						Braunton – Outer Dunes 25th to 30th July 2022						Braunton – Inner Dunes 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 25th to 30th July 2022						Saunton Dunes 25th to 30th July 2022						Yelland 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 1st to 6th August 2022						Braunton – Outer Dunes 1st to 6th August 2022						Braunton – Inner Dunes 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 1st to 6th August 2022						Saunton Dunes 1st to 6th August 2022						Yelland 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**	**Jun e**	**July**	**Aug**	**Sep**	**Oc t**	**Sub total**	**Apr**	**May**	**Jun e**	**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**	**3,42 3**	**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 (°C)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %
23rd April 2022 Sunset: 20:25 Start Time: 20:10 End Time: 22:45	Start of Survey	14	3	40	None	56
	End of Survey	12	3	20	None	66
27th April 2022 Sunset: 20:32 Start Time: 20:17 End Time: 23:17	Start of Survey	10	2	15	None	61
	End of Survey	9	2	<5	None	67
28th April 2022 Sunset: 20:33 Start Time: 20:18 End Time: 23:09	Start of Survey	11	1	40	None	67
	End of Survey	9	0	0	None	79
13th May 2022 Sunset: 20:57 Start Time: 20:42 End Time: 00:46	Start of Survey	13	2	15	None	81
	End of Survey	11	1	25	None	90
14th May 2022 Sunset: 20:58 Start Time: 20:43 End Time: 00:30	Start of Survey	14	1	100	Light rain	90
	End of Survey	12	2	85	None	99
29th May 2022 Sunset: 21:18 Start Time: 21:03 End Time: 23:18	Start of Survey	11	1	10	None	81
	End of Survey	10	0	<5	Mist	99
30th May 2022 Sunset: 21:20 Start Time: 21:05 End Time: 23:30	Start of Survey	11	1	50	None	69
	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 (°C)	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 (°C)	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									
	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Species Total	Activity Identified
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									
	Visit 1	Visit 2	Visit 3	Visit 4	Visit 5	Visit 6	Visit 7	Visit 8	Species Total	Activity Identified
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

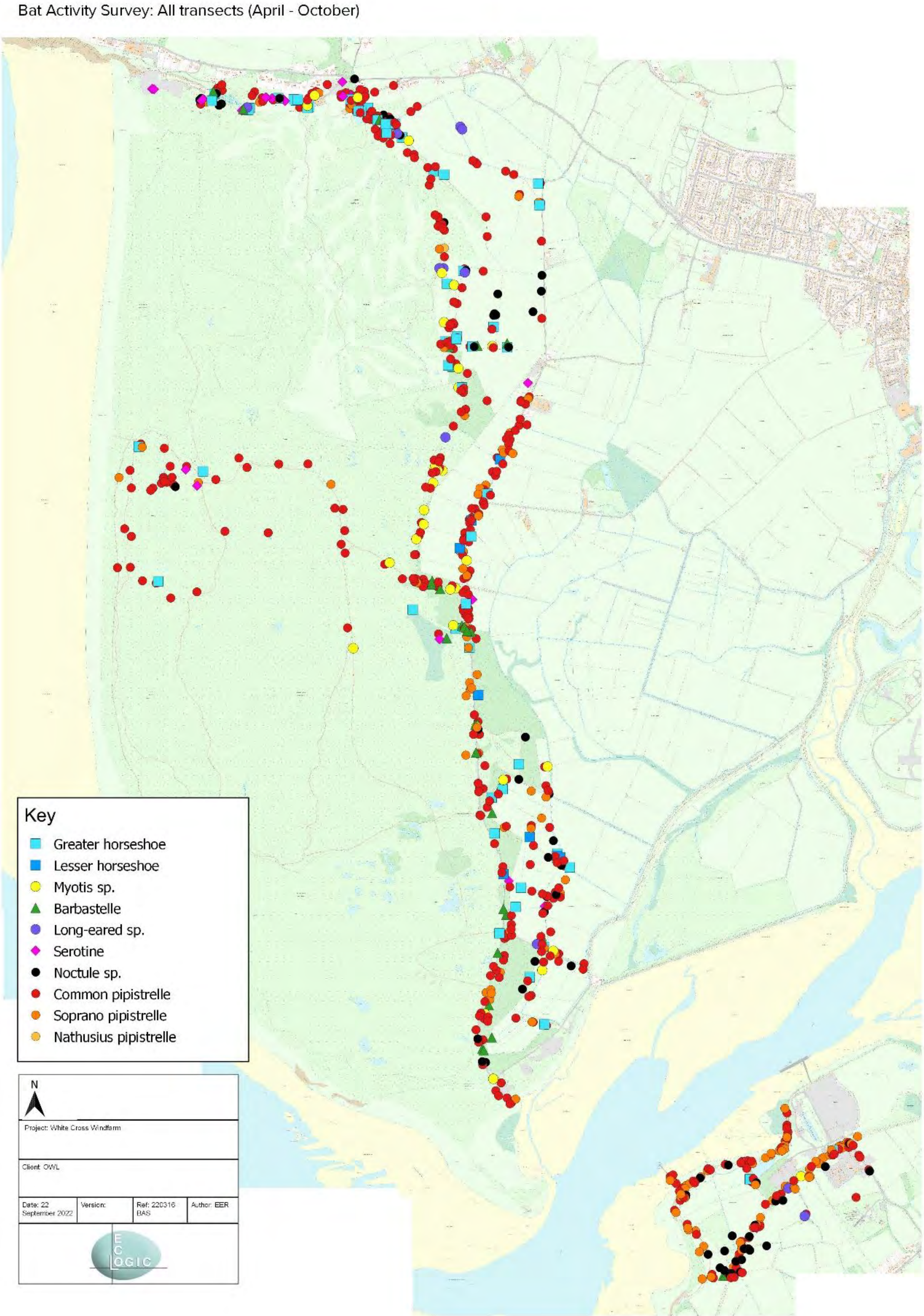

Figure 3-1 Cumulative manual dusk & dawn bat activity survey results for April-October 2022

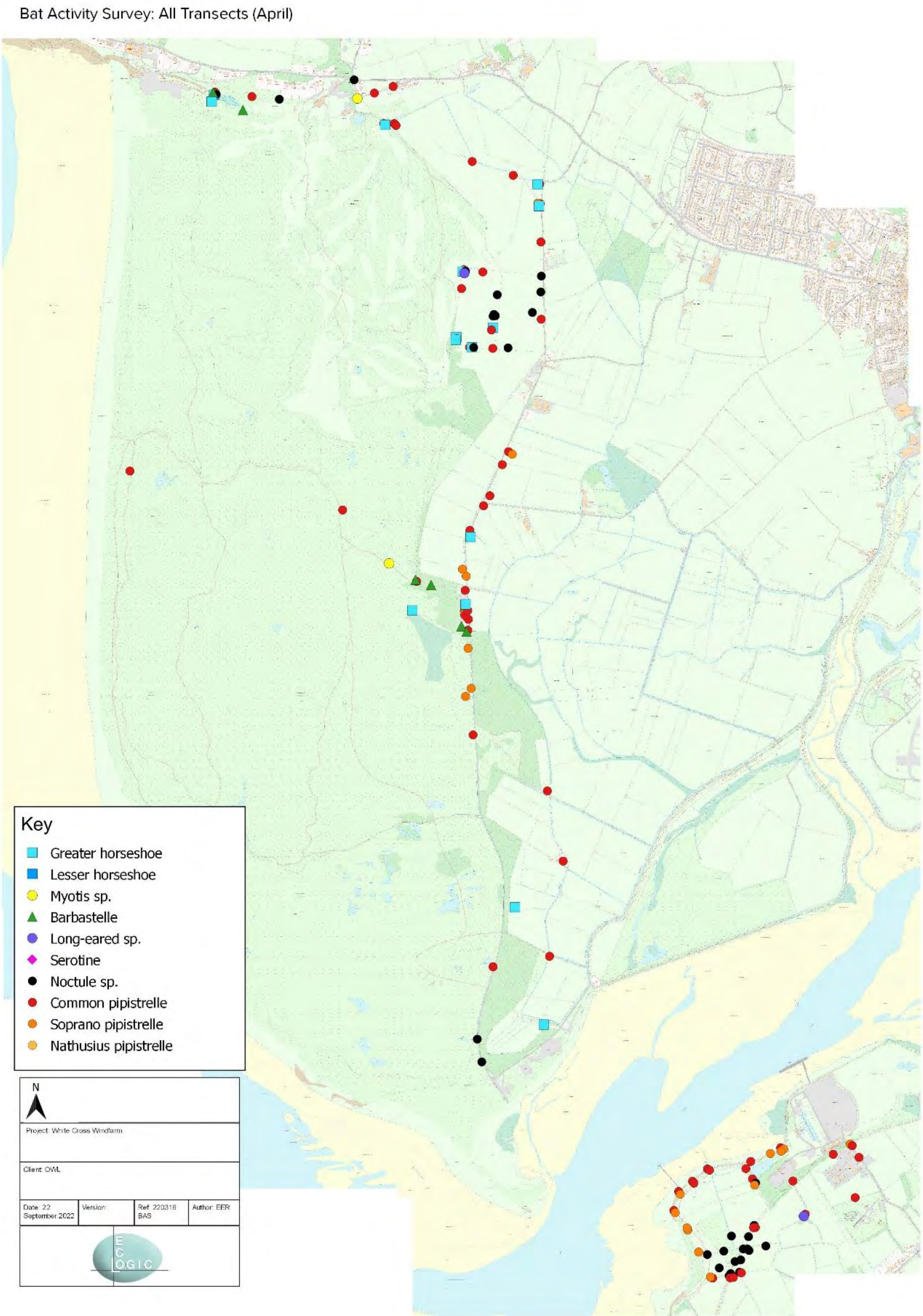

Figure 3-2 Manual dusk bat activity survey results for April 2022

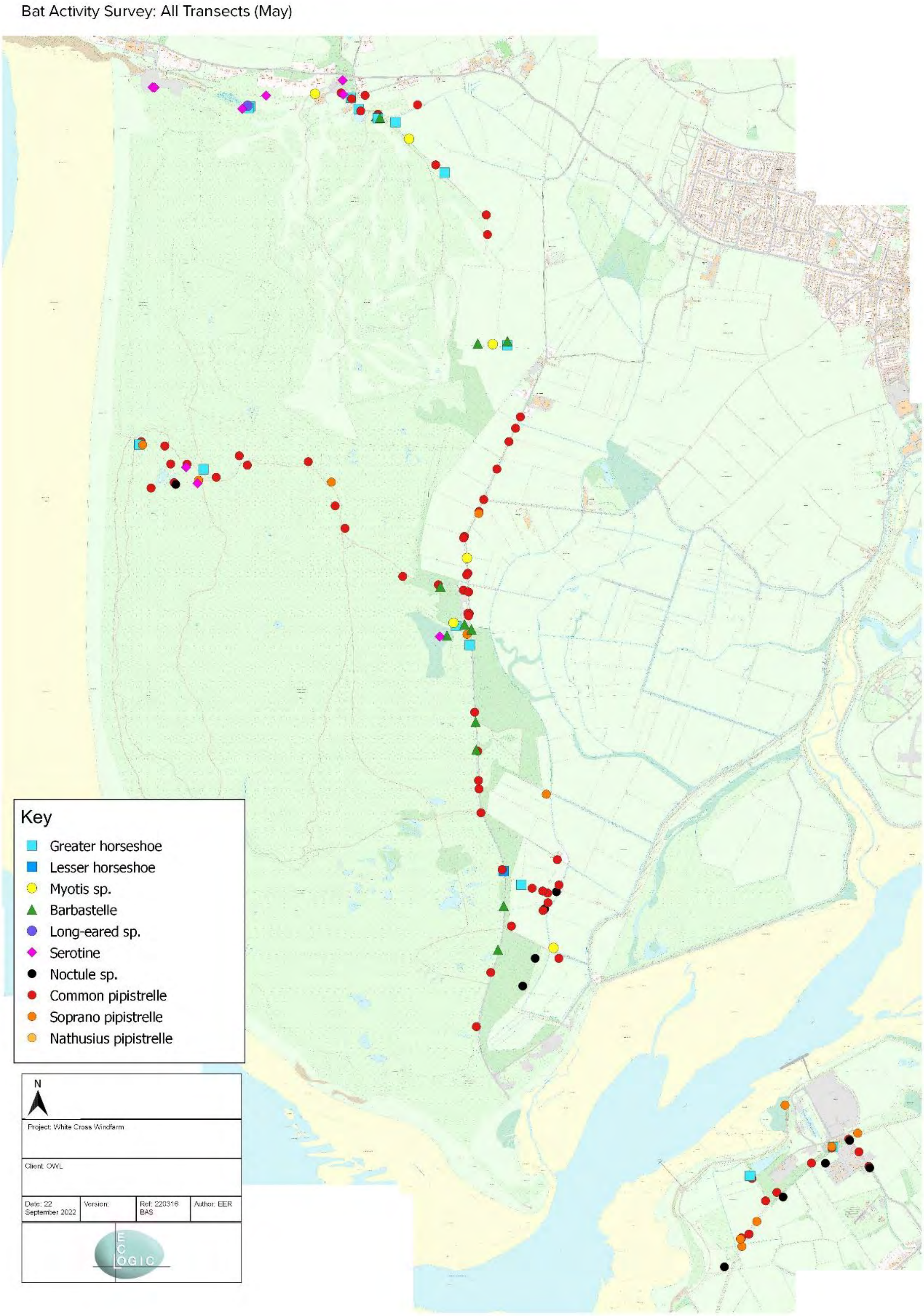

Figure 3-3 Manual dusk bat activity survey results for May 2022

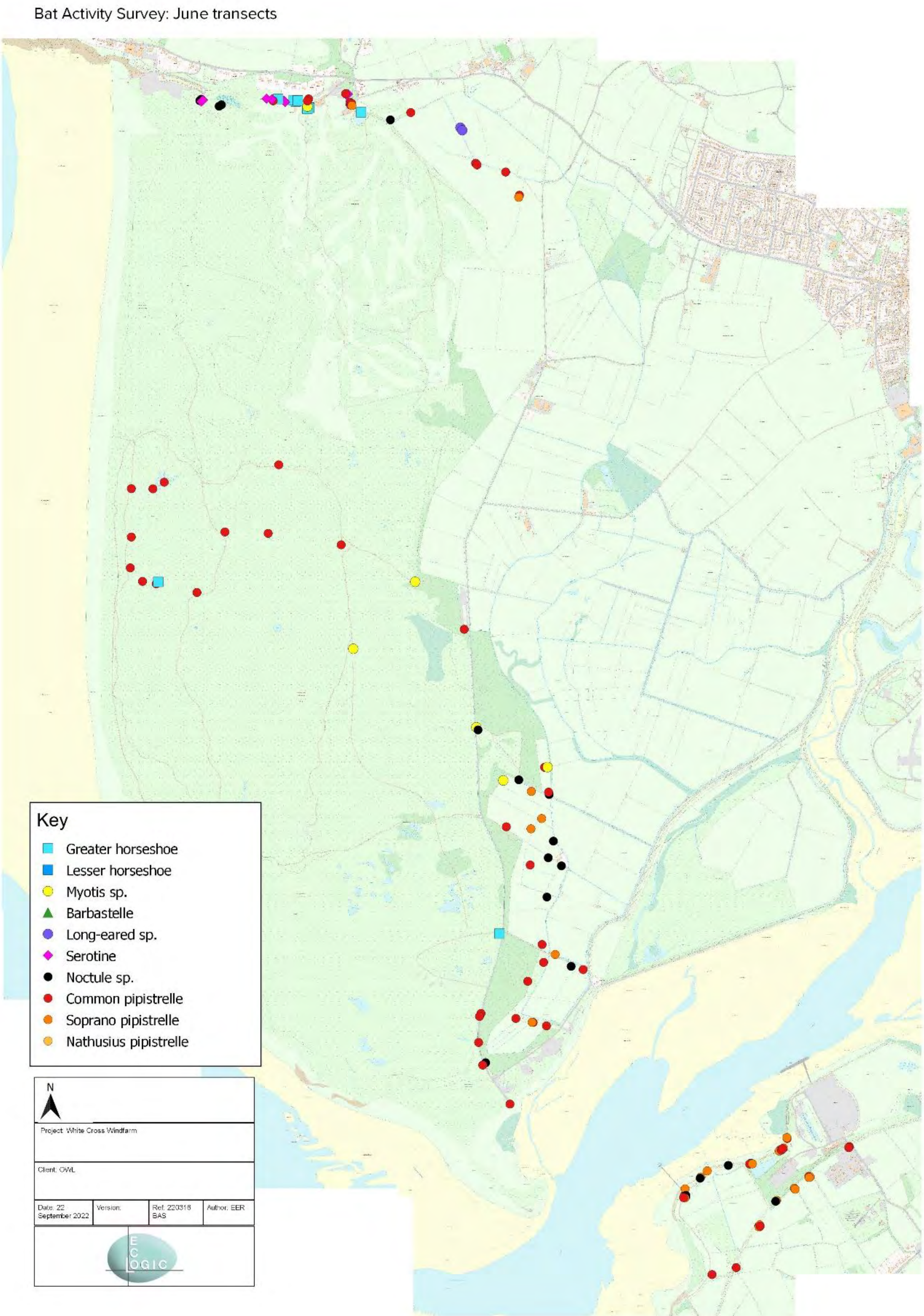

Figure 3-4 Manual dusk bat activity survey results for June 2022

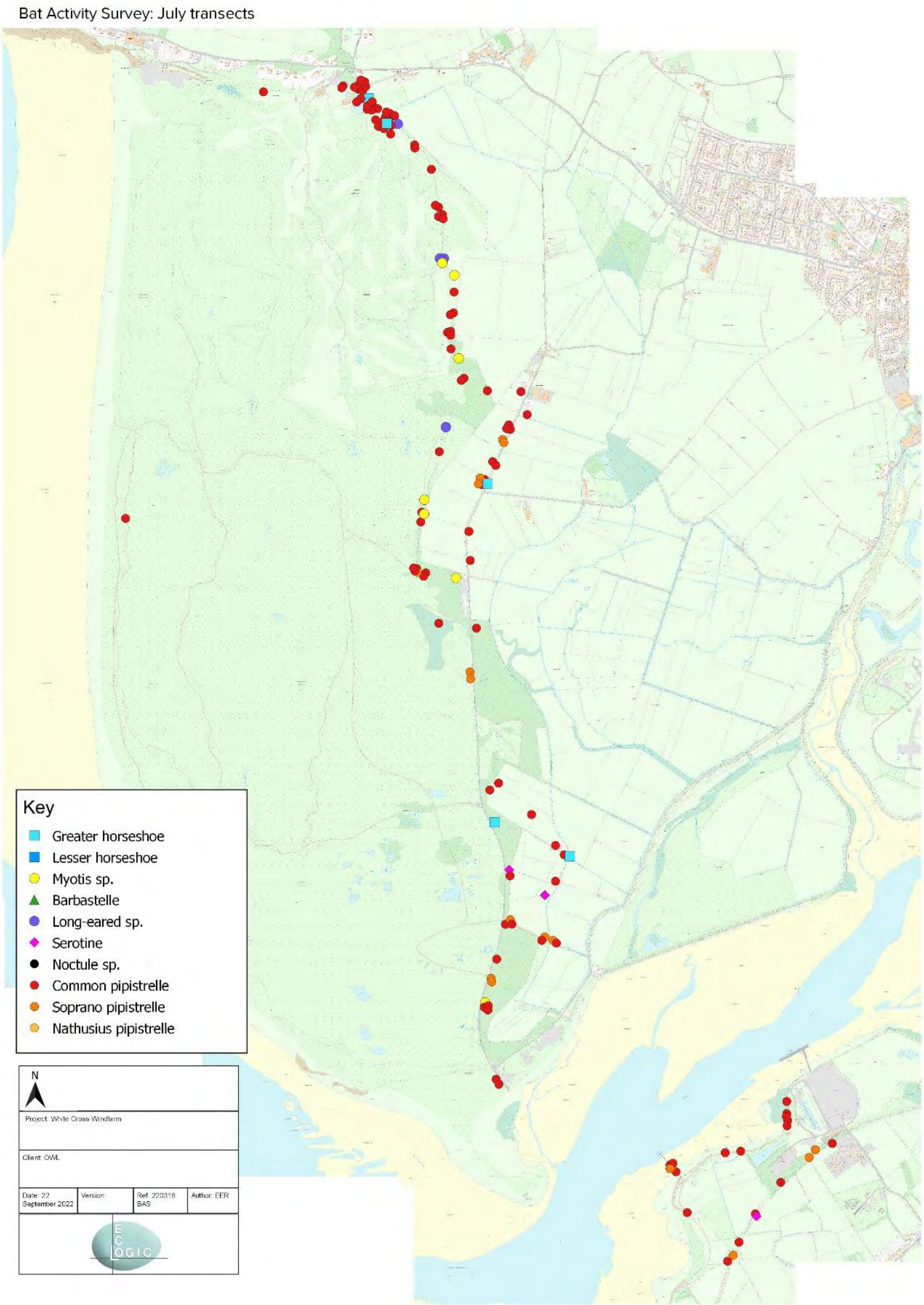

Figure 3-5 Manual dusk bat activity survey results for July 2022

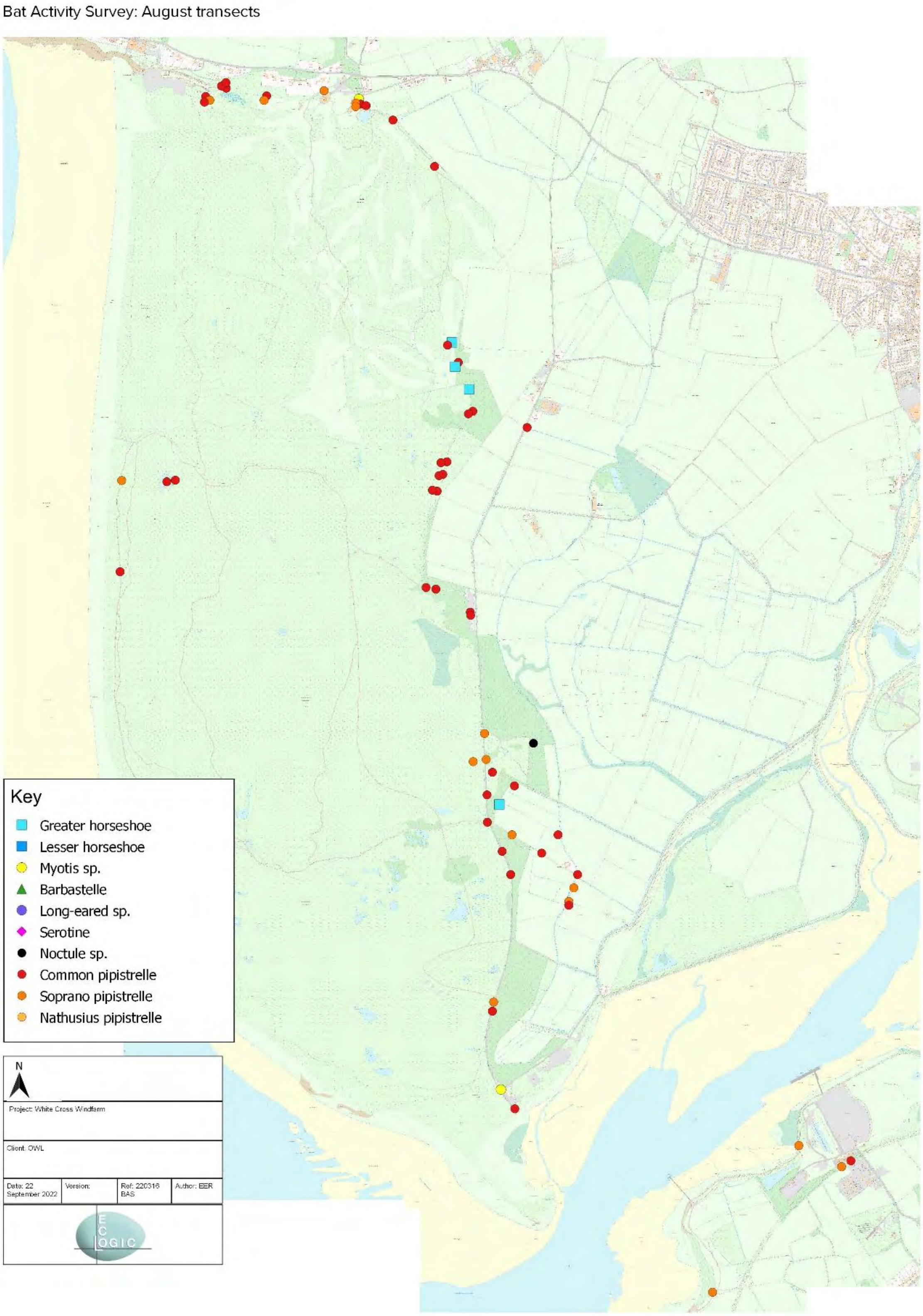

Figure 3-6 Manual dusk bat activity survey results for August 2022

Bat Activity Survey: September transects (dusk)

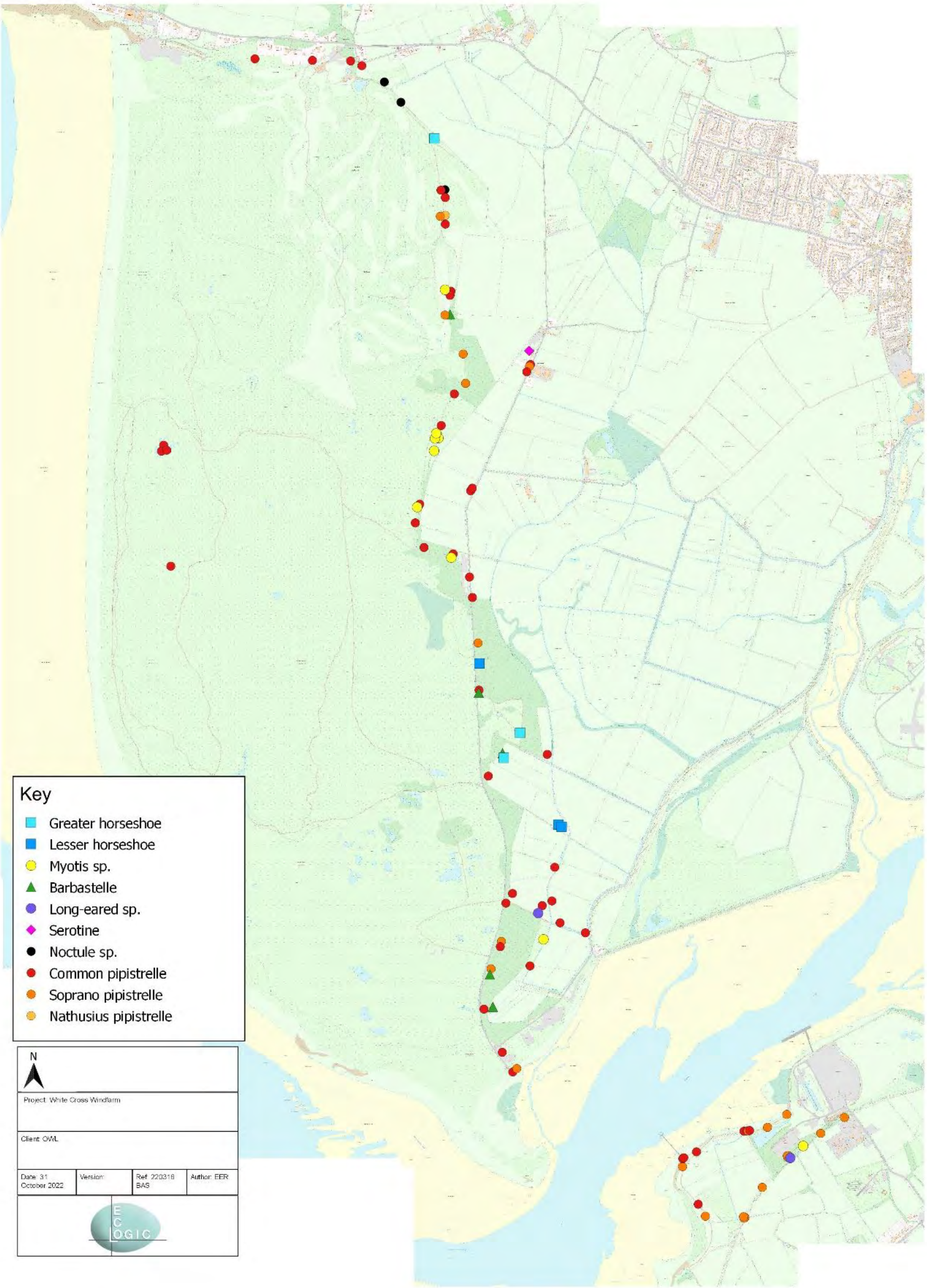

Figure 3-7 Manual dusk bat activity survey results for September 2022

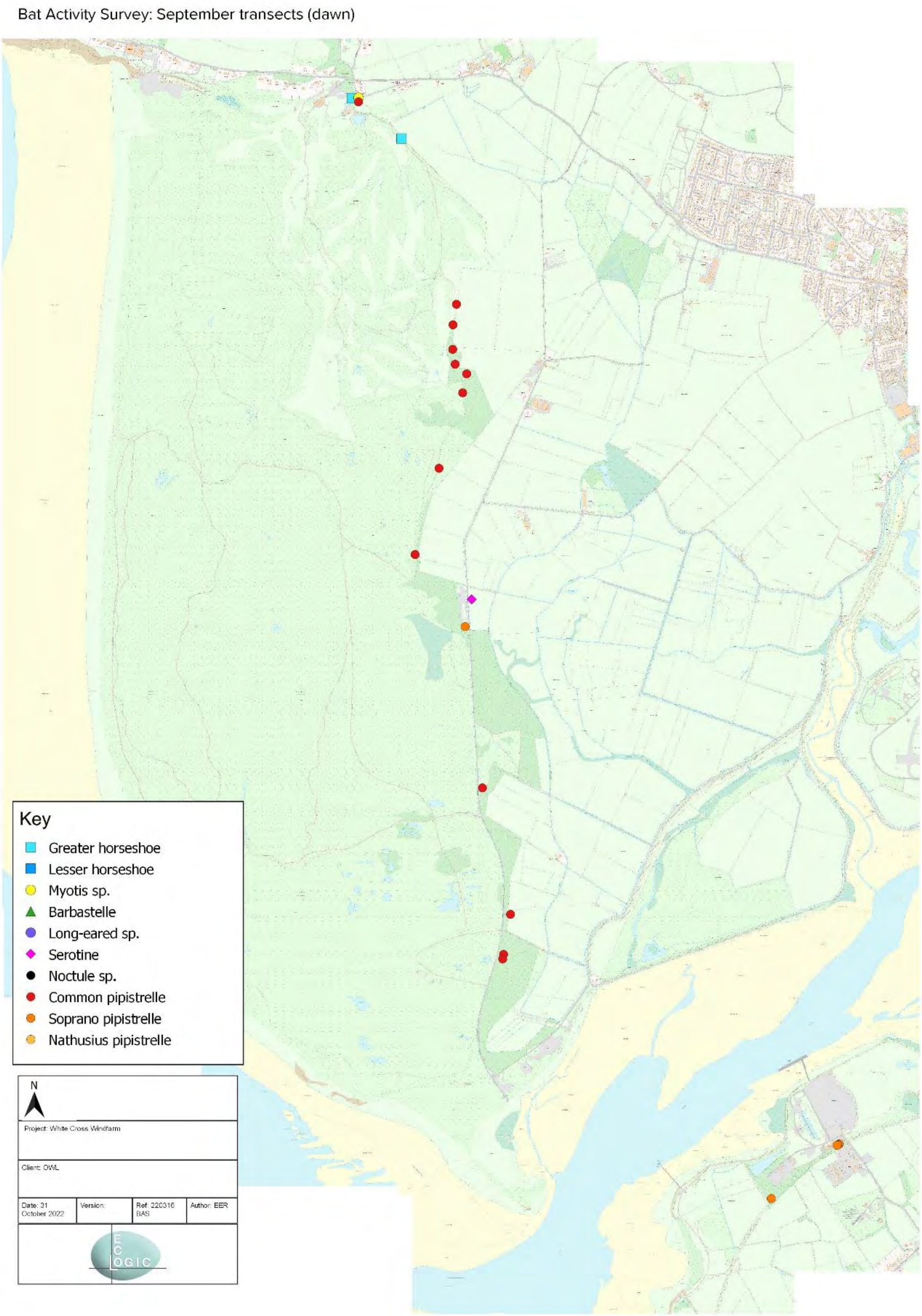

Figure 3-8 Manual dawn bat activity survey results for September 2022

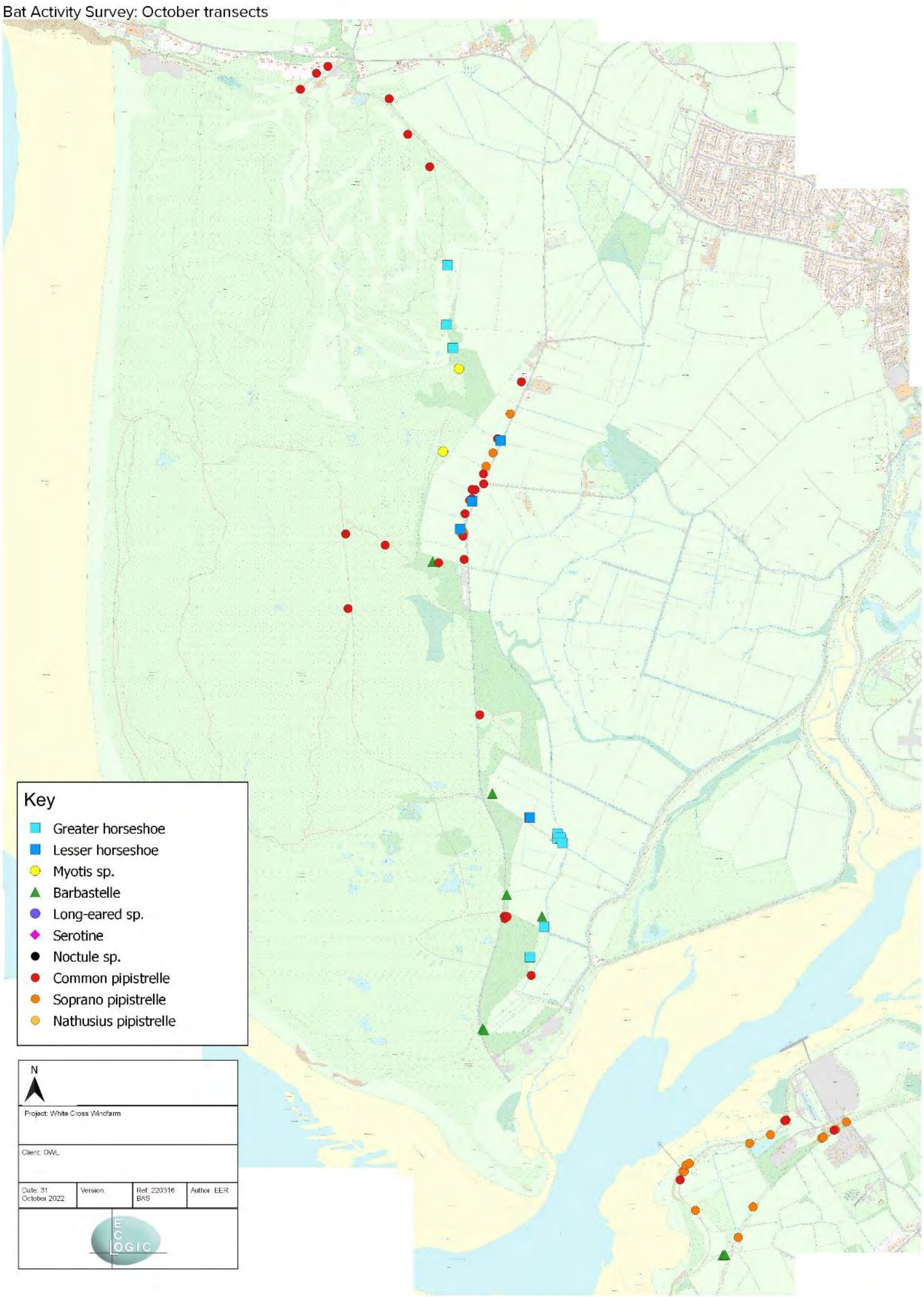

Figure 3-9 Manual dusk bat activity survey results for October 2022

References

Collins, J. 2016 *Bat Surveys for Professional Ecologists Good Practice Guidelines 3rd edition* The Bat Conservation Trust, London.

White Cross Offshore Windfarm Environmental Statement

Appendix 20.D: Bat Emergence & Activity Survey – Buildings

Appendix 20.D 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

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 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.

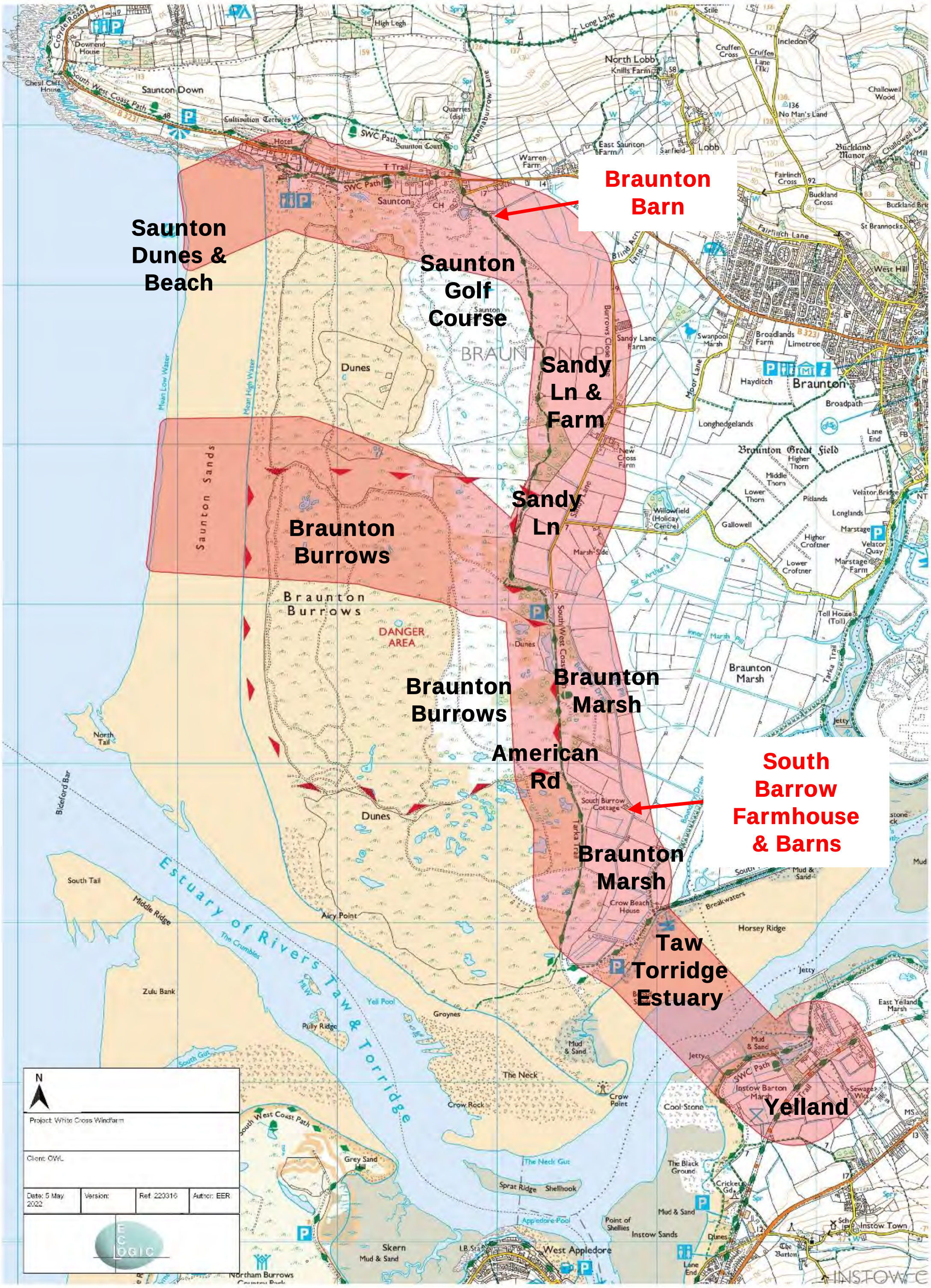

Figure 1-1 The proposed cable corridor routes and the buildings subject to bat emergence survey

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 (°C)	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 20.E: Inspection & Bat Emergence Survey – Trees

Appendix 20.E Inspection & Bat Emergence Survey – Trees

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

<table>
<tr><td>Report Reference:</td><td colspan="2">220316 BEST rev01</td></tr>
<tr><td>Client:</td><td colspan="2">Offshore Wind Ltd. (OWL)</td></tr>
<tr><td>Architect / Agent:</td><td colspan="2">Royal HaskoningDHV</td></tr>
<tr><td>Survey Date / s:</td><td colspan="2">September 2022</td></tr>
<tr><td>Report Date:</td><td colspan="2">November 2022</td></tr>
<tr><td>Report Author:</td><td colspan="2">Aby Sampson BSc, ACIEEM</td></tr>
<tr><td>Approved By:</td><td colspan="2">Andrew Charles BSc (Hons), MSc, MCIEEM</td></tr>
<tr><td rowspan="4">Surveyor / s & Licence N°:</td><td>Andrew Charles</td><td>Bats: 2015-13738-CLS-CLS (WML-A34 Level 2)</td></tr>
<tr><td>Aby Sampson</td><td>Bats: 2019-40487-CLS (WML-A34 Level 2)</td></tr>
<tr><td>William Corbett</td><td>Bats: 2022-10213-CL18-BAT (WML-A34 Level 2)</td></tr>
<tr><td>John Polley</td><td>Bats: 2015-11916-CLS-CLS (WML-A34 Level 2)</td></tr>
</table>

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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 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).

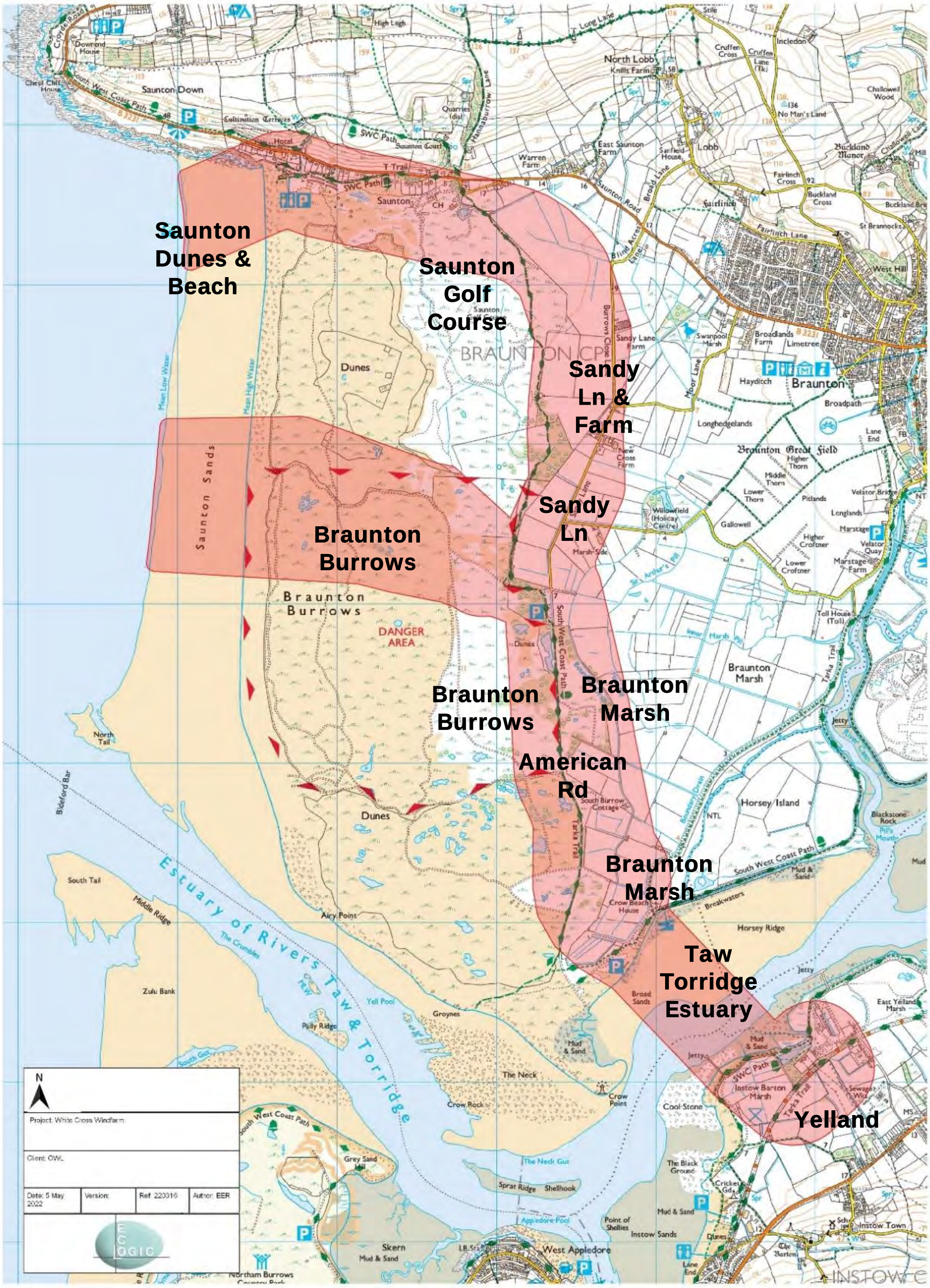


Figure 1-1 The proposed cable corridors with a 50m buffer.

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 (°C)	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

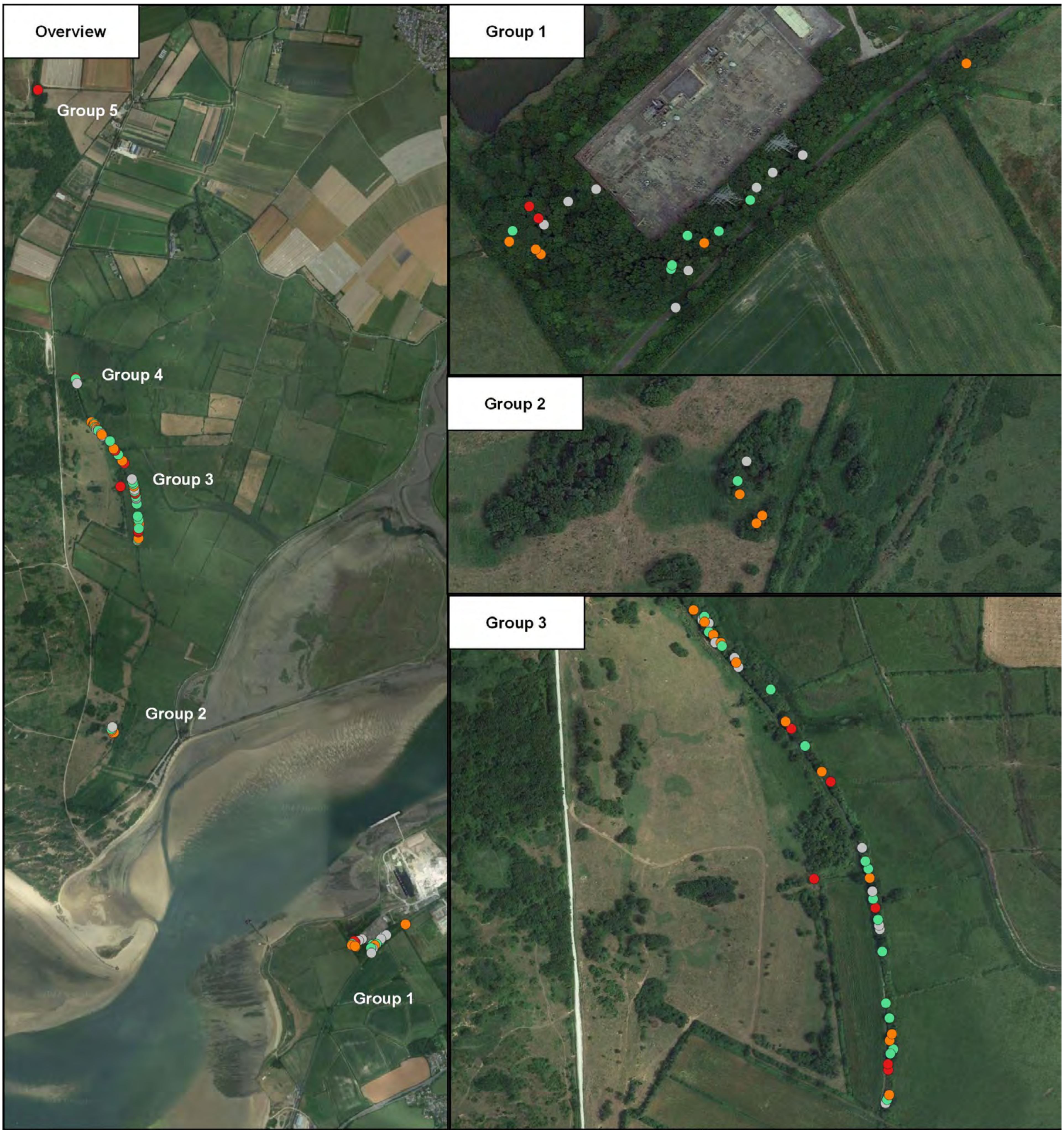
Collins, J. (2016). *Bat Surveys for Professional Ecologist: Good Practice Guidelines* (3rd ed.) The Bat Conservation Trust, London.

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: 07/11/2022	Version: 01	Ref: 220316	Author: 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 20.F: Otter & Water Vole Survey

Appendix 20.F 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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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.

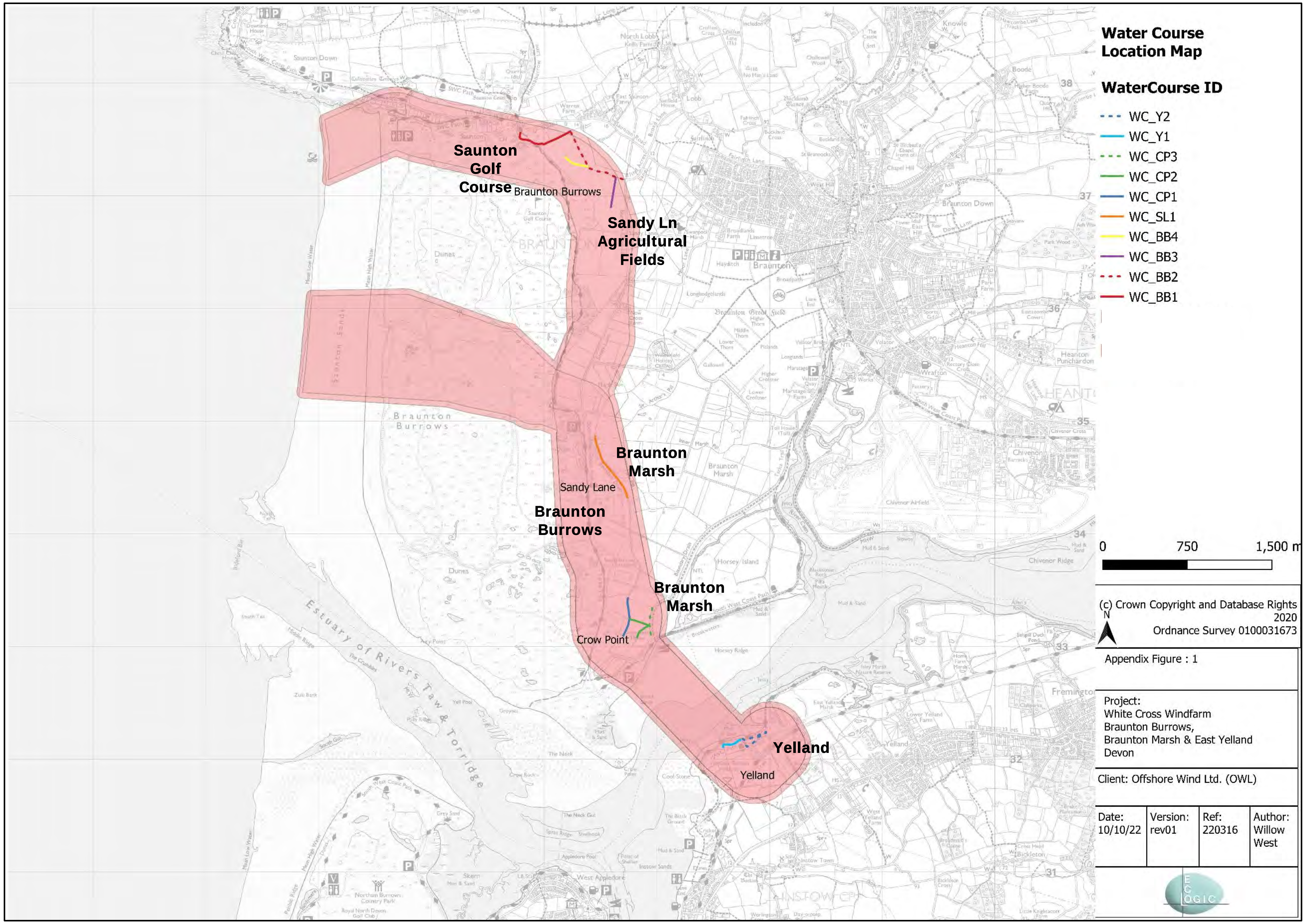

Figure 1-1. Full site map with water course locations

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 (°C)	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 (°C)	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.

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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

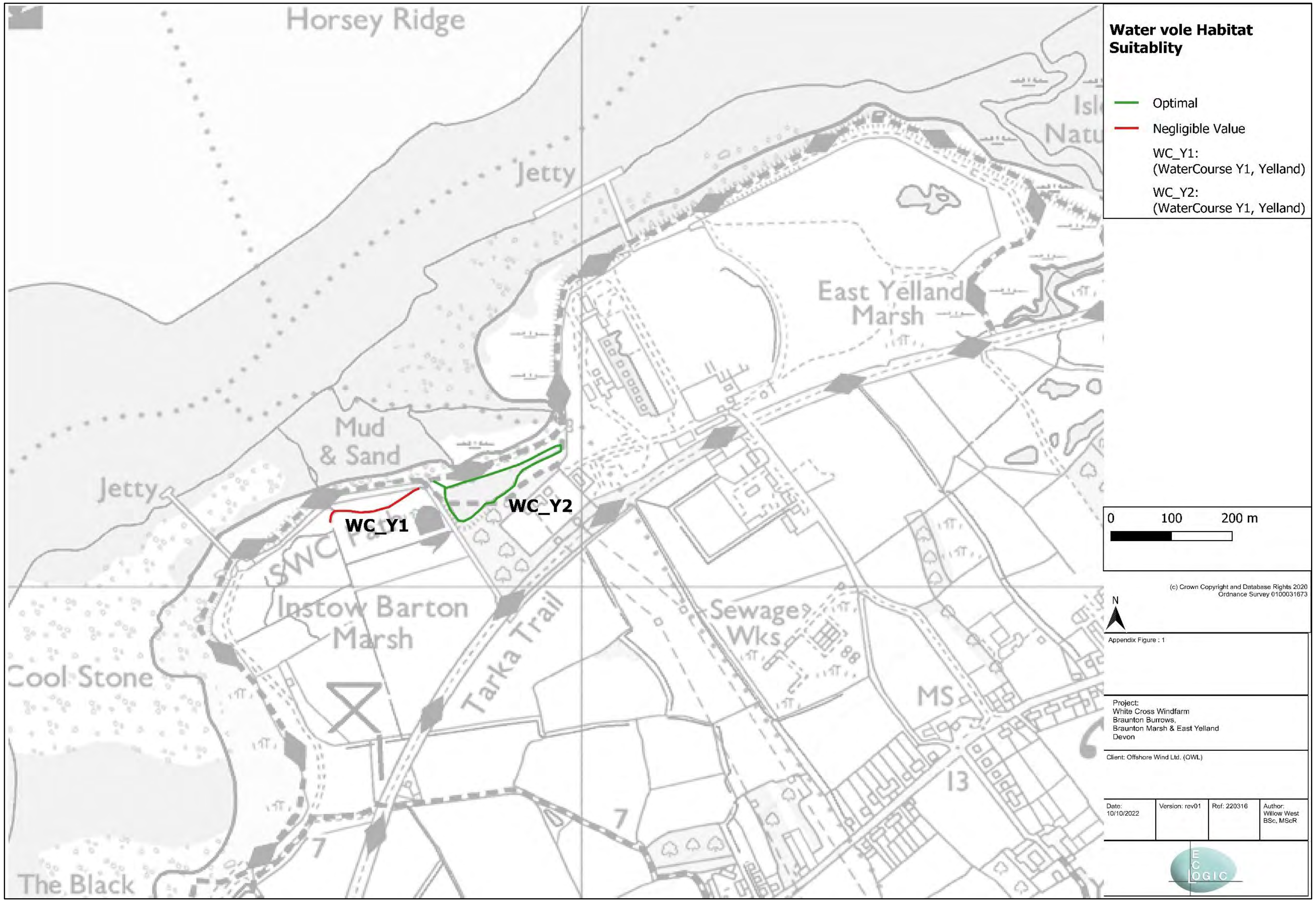

Figure A1-1: A map depicting the habitat suitability assessment for use by water voles at East Yelland – water courses: WC_Y1 & WC_Y2.

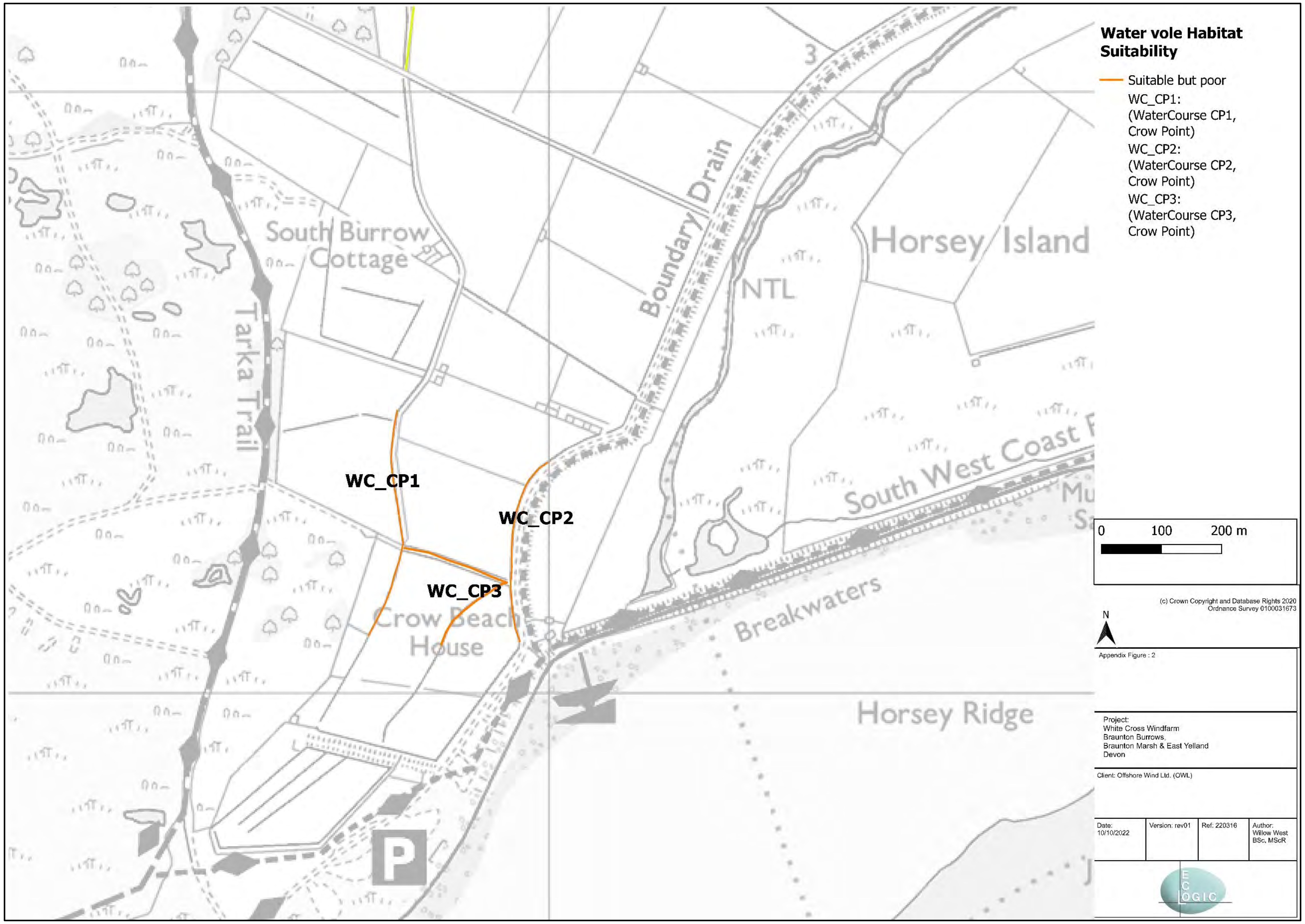

Figure A1-2: A map depicting the habitat suitability assessment for use by water voles at Braunton Marsh – water courses: WC_CP1, WC_CP2 & WC_CP3.

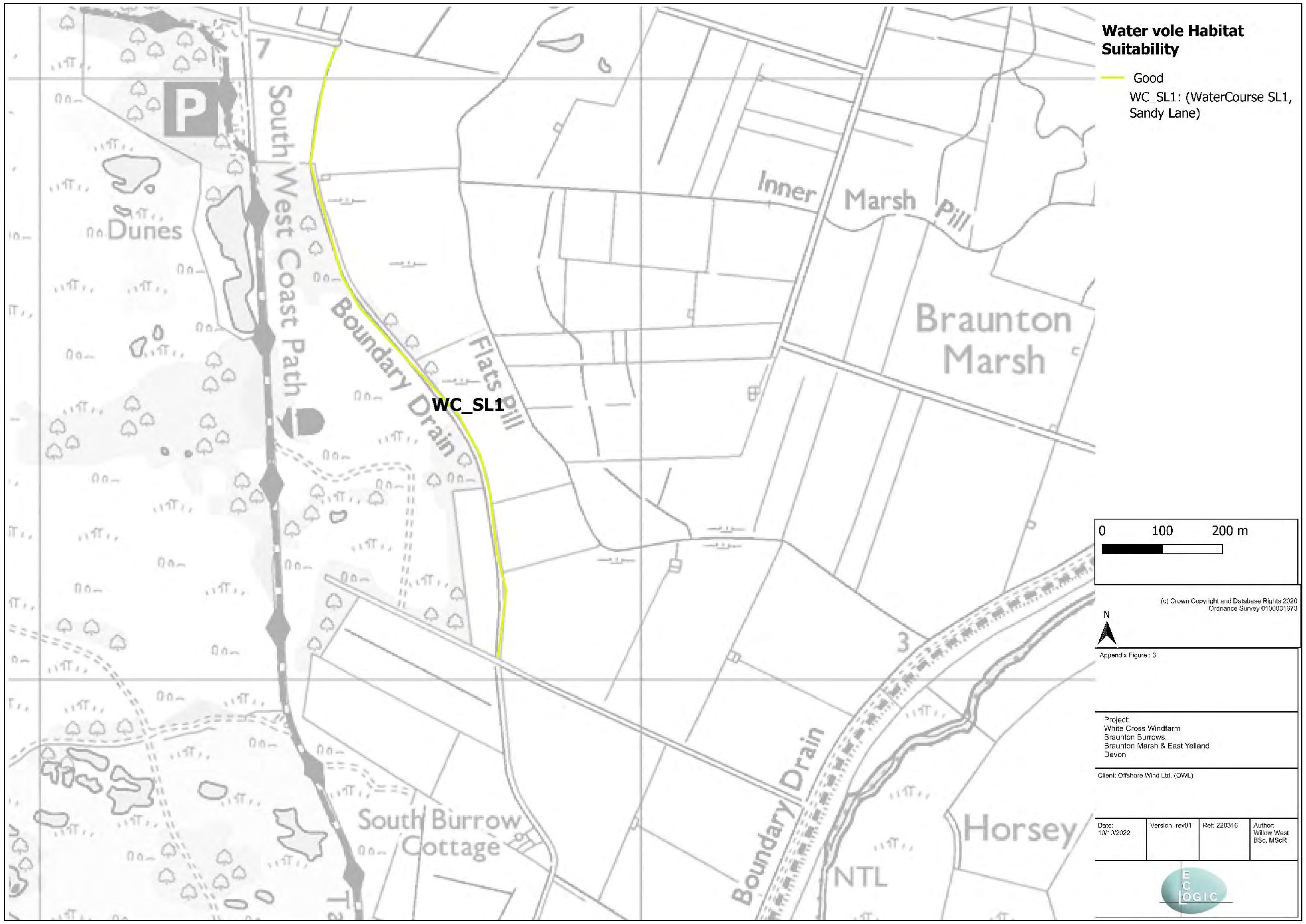

Figure A1-3: A map depicting the habitat suitability assessment for use by water voles at Braunton Burrows and Braunton Marsh – water course: WC_SL1.

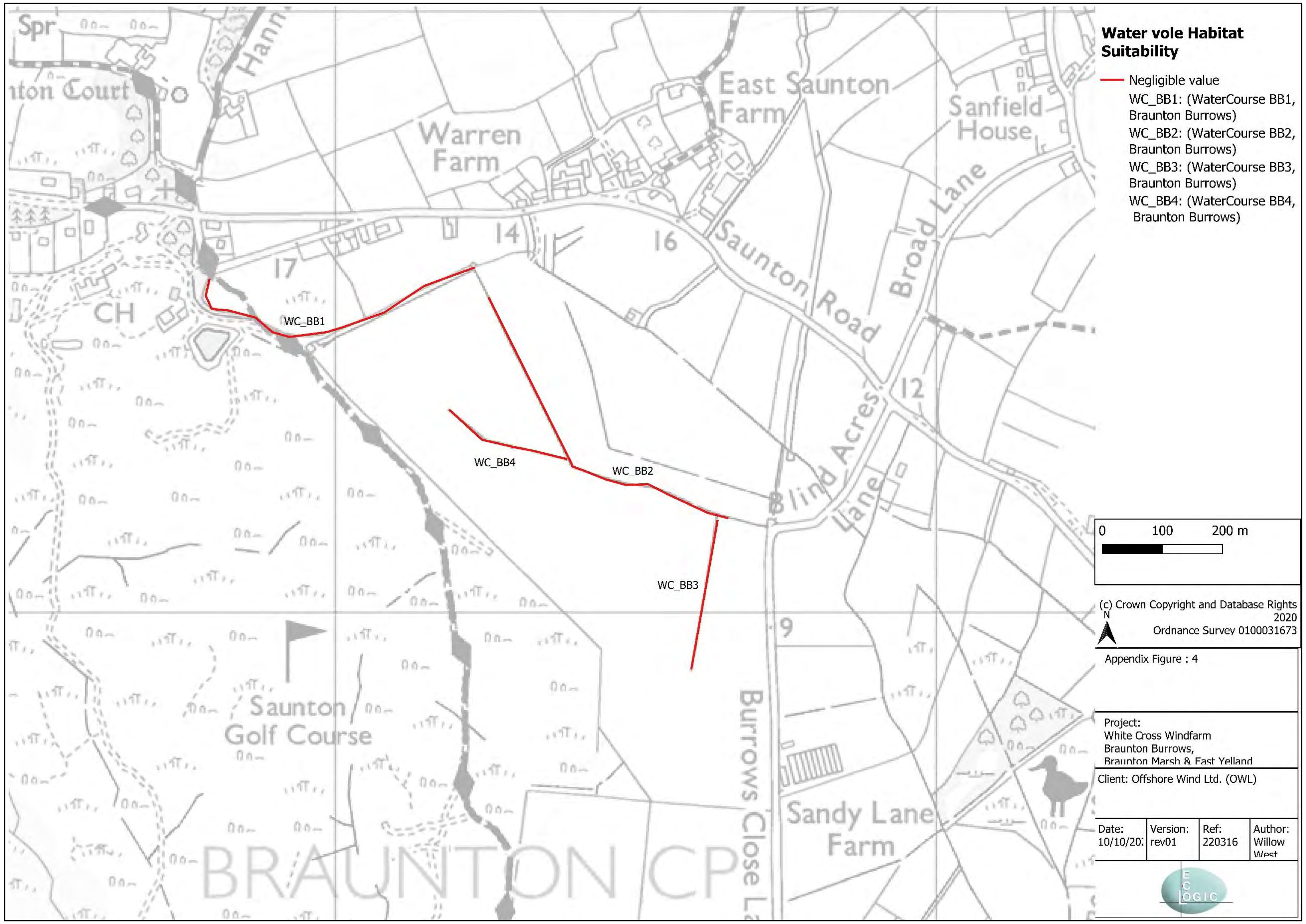

Figure A1-4: A map depicting the habitat suitability assessment for use by water voles within Sandy Lane Agricultural Fields and Saunton Golf Course – water courses: WC_BB1, WC-BB2, WC_BB3 & WC_BB4.

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

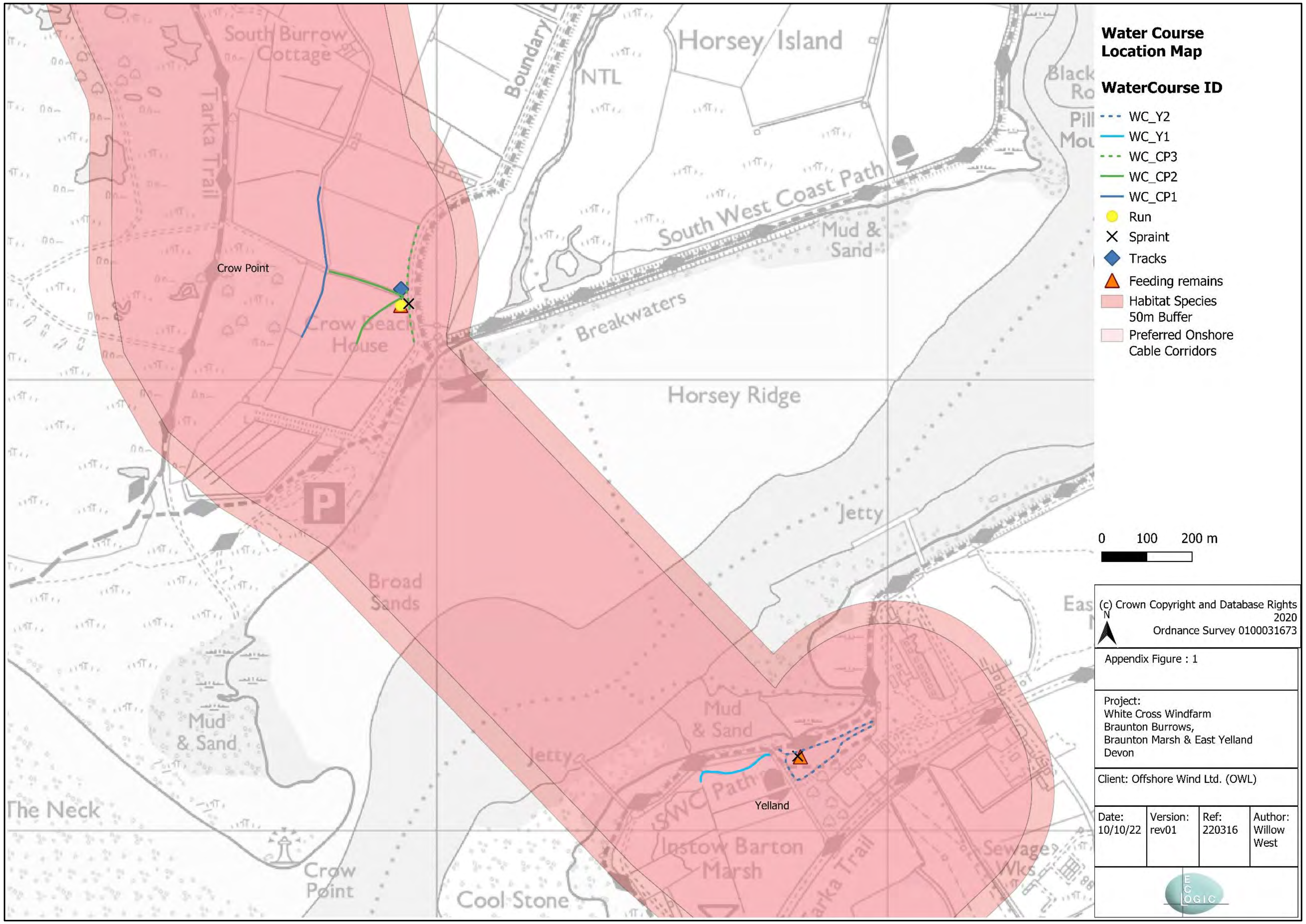

Figure A4-1. Map showing the type of evidence and location when evidence was found, relating to otter, within survey sites – Yelland and Braunton Marsh.

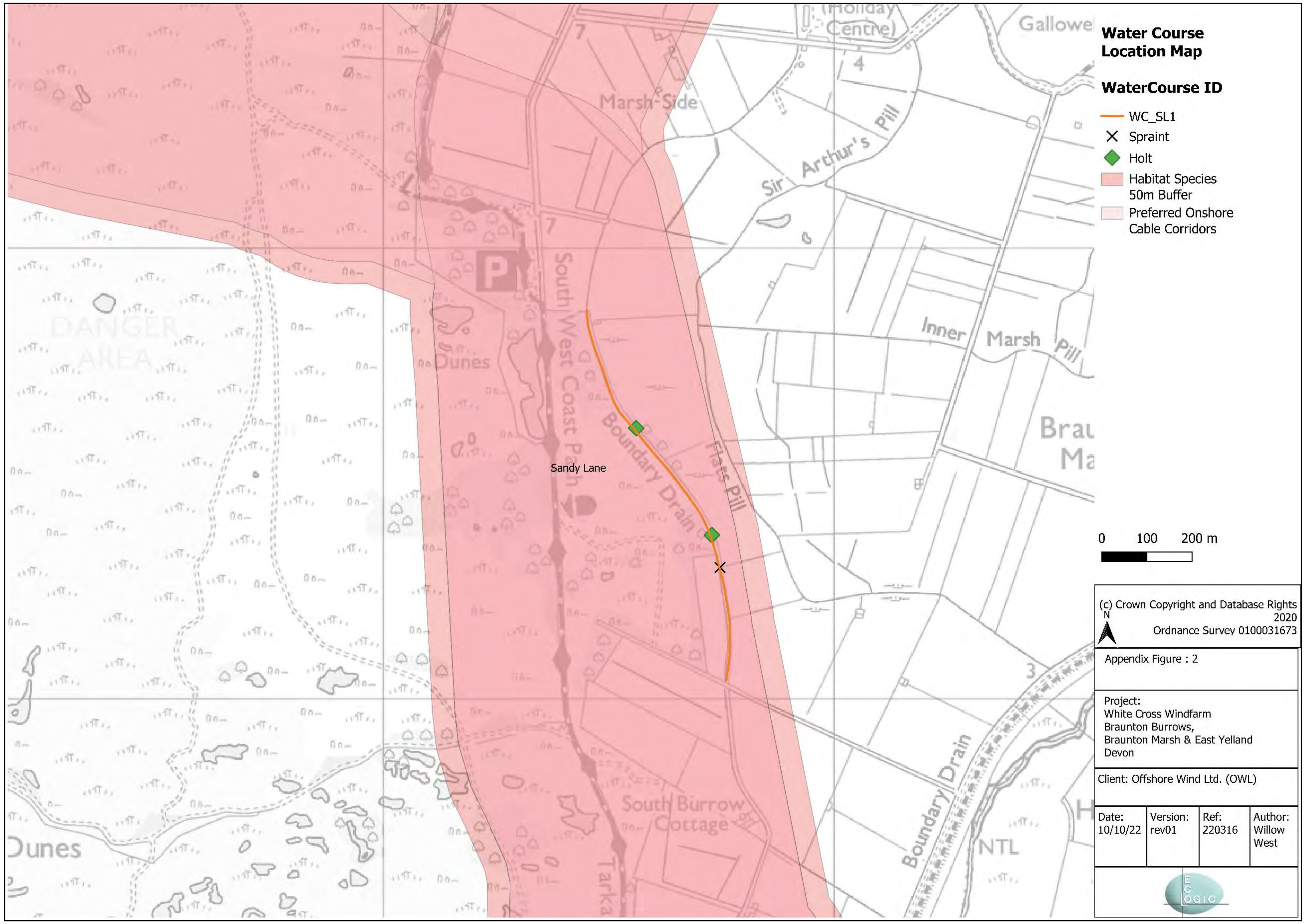

Figure A4-2**:** Map showing the type of evidence and location when evidence was found, relating to otter, within survey sites – Braunton Marsh & Braunton Burrows.

WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 20.G: Dormouse Survey

Appendix 20.G 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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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).

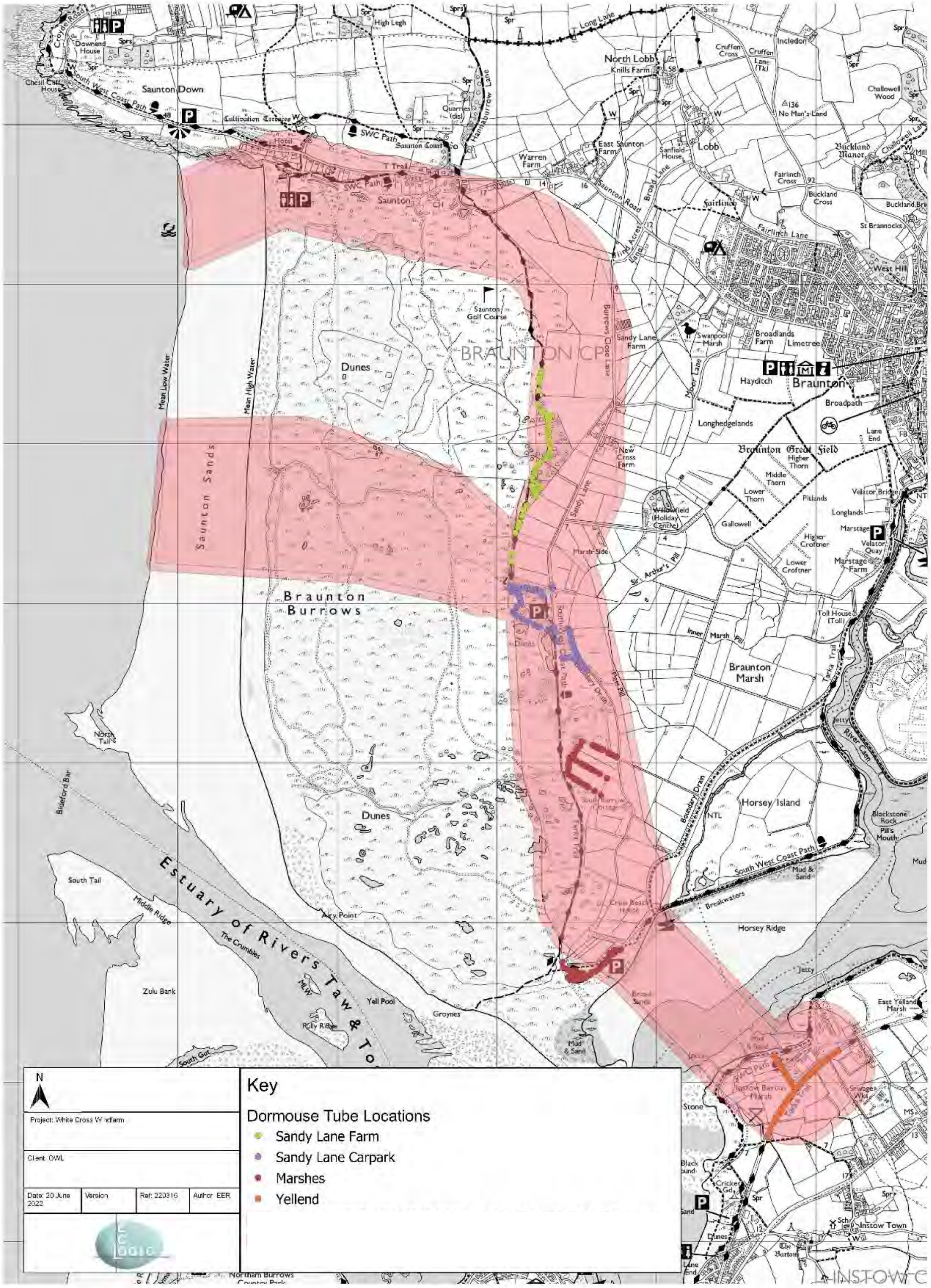

Figure 1.1. The dormouse tube survey locations within the proposed Onshore Cable Corridor routes for The Project.

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					
	31st 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.

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Wildlife & Countryside Act 1981, as amended. HMSO

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White Cross Offshore Windfarm Environmental Statement

Appendix 20.H: Breeding Bird Survey

Appendix 20.H 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
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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).

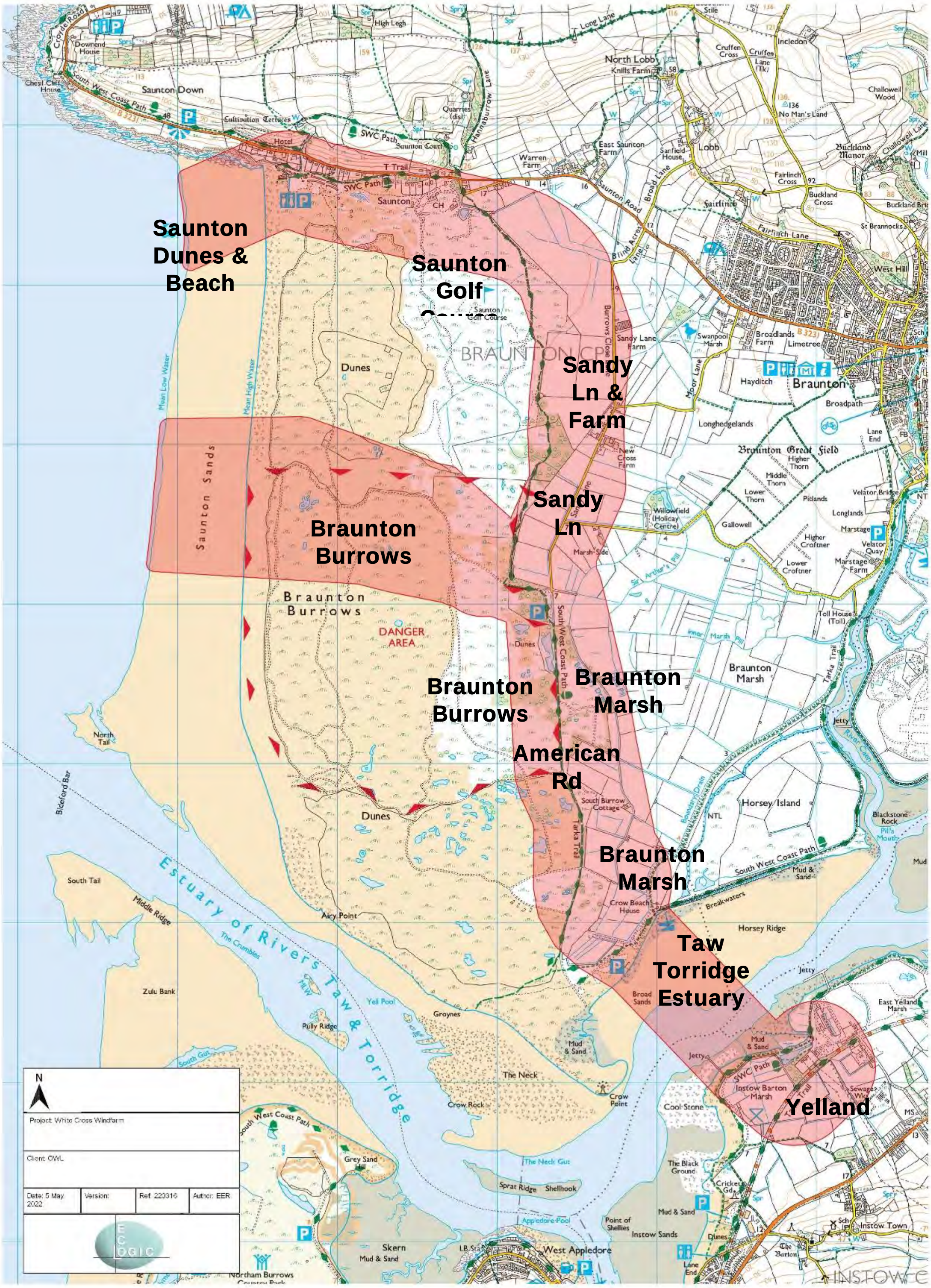

Figure 1-1 The proposed cable corridors and the breeding and ground nesting bird survey area

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 (°C)	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 (°C)	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 (°C)	Wind Speed (Beaufort Scale)	Cloud Cover %	Precipitation	Humidity %
15th April 2022 Sunrise: 06:23	High 05:57	Start of Survey	14	3	100	None	92
Start Time: 07:30 End Time: 11:00	Low 12:03	End of Survey	14	3	100	None	82
28th April 2022 Sunrise: 05:56	High 05:18	Start of Survey	9	3	10	None	74
Start Time: 07:00 End Time: 11:00	Low 11:25	End of Survey	11	32	<5	None	56
2nd May 2022 Sunrise: 05:49	High 07:47	Start of Survey	9	1	90	None	94
Start Time: 06:45 End Time: 11:00	Low 13:40	End of Survey	11	1	90	None	68
28th May 2022 Sunrise: 05:12	High 05:29	Start of Survey	11	1	<5	None	91
Start Time: 06:15 End Time: 11:00	Low 11:29	End of Survey	14	1	<5	None	54
15th June 2022 Sunrise: 05:02	High 07:14	Start of Survey	14	1	10	None	79
Start Time: 06:00 End Time: 11:00	Low 13:18	End of Survey	17	2	20	None	60
30th June 2022 Sunrise: 05:06	High 07:38	Start of Survey	13	3	80	None	83
Start Time: 06:00 End Time: 11:00	Low 13:29	End of Survey	14	2	80	None	65
8th July 2022 Sunrise: 05:12	Low 06:47	Start of Survey	16	1	<10	None	88
Start Time: 06:15 End Time: 10:45	High 13:18	End of Survey	19	1	<10	None	82
19th July 2022 Sunrise: 05:24	Low 04:44	Start of Survey	22	1	<5	None	72
Start Time: 06:30 End Time: 11:00	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 (°C)**	**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 Low 12:03	Start of Survey End of Survey	14 14	3 3	100 100	None None	92 82
30th April 2022 Sunrise: 05:53 Start Time: 07:00 End Time: 11:00	High 06:38 Low 12:38	Start of Survey End of Survey	7 10	2 1	10 10	None None	82 55
13th May 2022 Sunrise: 05:30 Start Time: 06:40 End Time: 11:00	High 04:30 Low 10:39	Start of Survey End of Survey	11 13	3 3	30 50	None None	83 70
28th May 2022 Sunrise: 05:12 Start Time: 06:15 End Time: 11:00	High 05:29 Low 11:29	Start of Survey End of Survey	11 14	1 1	<5 <5	None None	91 54
14th June 2022 Sunrise: 05:02 Start Time: 06:00 End Time: 11:00	High 06:23 Low 12:28	Start of Survey End of Survey	10 17	1 1	<5 <5	None None	84 56
23th June 2022 Sunrise: 05:03 Start Time: 06:00 End Time: 11:00	High 02:03 Low 08:14	Start of Survey End of Survey	15 17	1 1	50 75	None None	85 70
3th July 2022 Sunrise: 05:08 Start Time: 06:00 End Time: 11:00	Low 03:00 High 09:23	Start of Survey End of Survey	13 16	3 3	80 50	None None	92 68
28th July 2022 Sunrise: 05:36 Start Time: 06:30 End Time: 11:00	High 06:47 Low 12:39	Start of Survey End of Survey	15 20	2 2	80 50	None None	91 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.

4.3.2 Temporary 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.

4.3.3 Disturbance 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

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Gilbert, G., Gibbons, D.W. & Evans, J. 1998. *Bird Monitoring Methods.* RSPB, Sandy.

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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%).

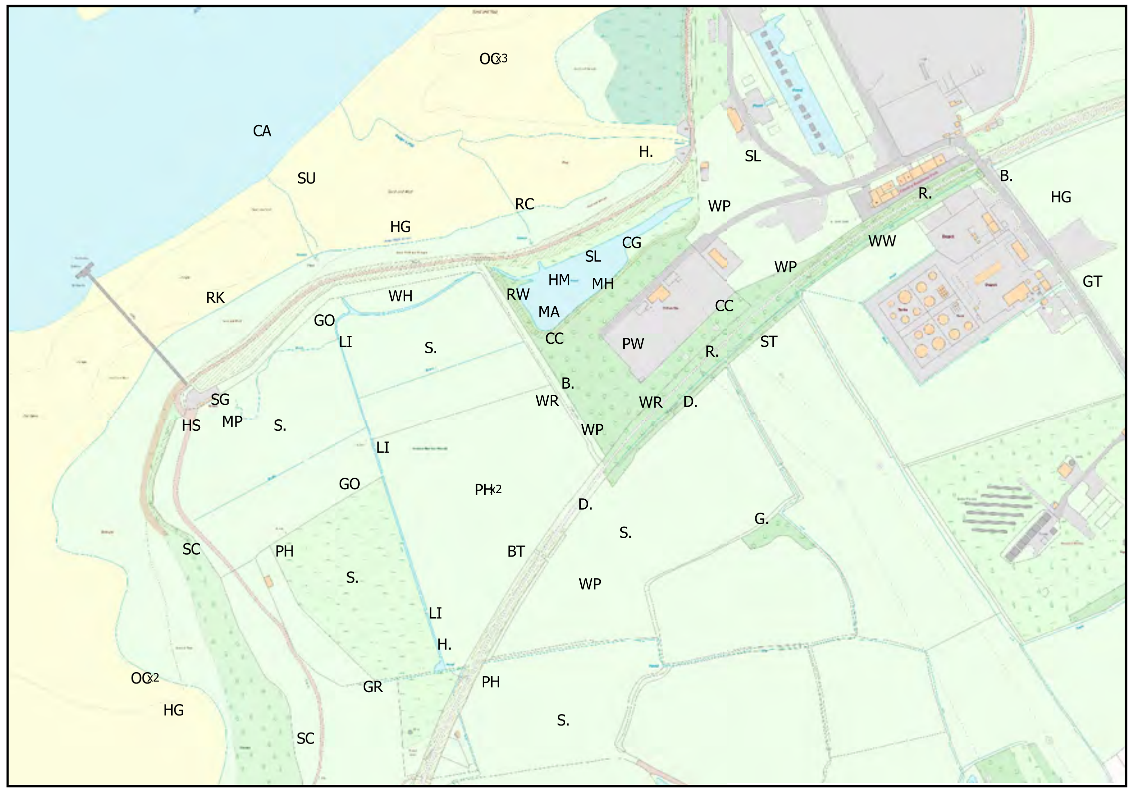
BR and **WR** Rarity. UK breeding population of less than 300 pairs (BR), or non-breeding population of less than900 individuals (WR).

BL and **WL** Localisation. At least 50% of the UK breeding (BL) or non-breeding (WL) population found in 10 or fewer sites.

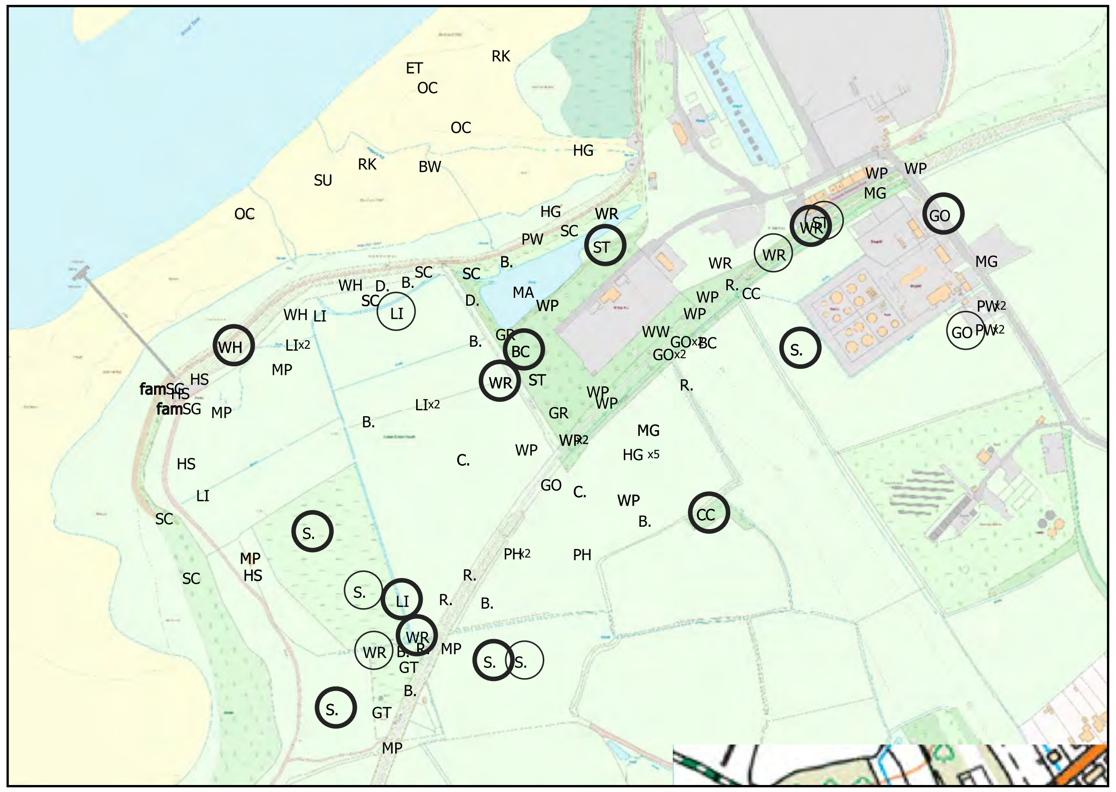
BI and **WI** International Importance. At least 20% of the European breeding (BI) or non-breeding (WI) population found in the UK.

Appendix 2: Breeding Bird Survey Maps

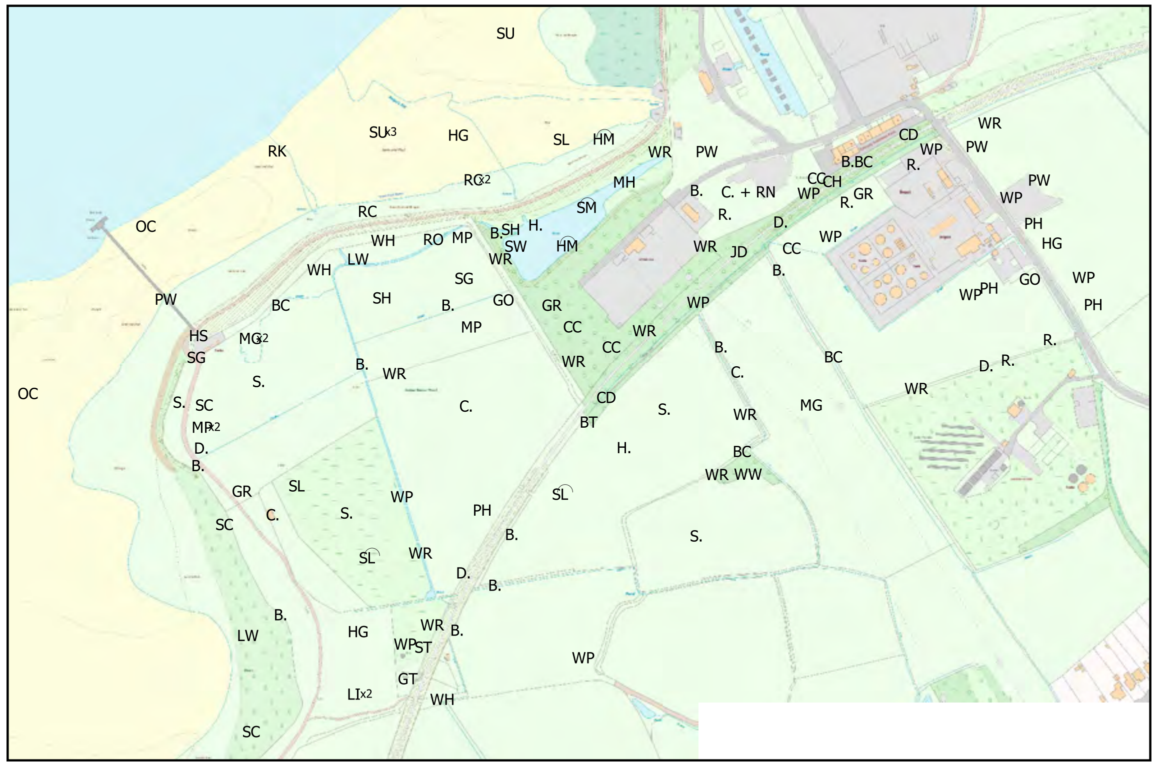
Yelland - 15 April 2022



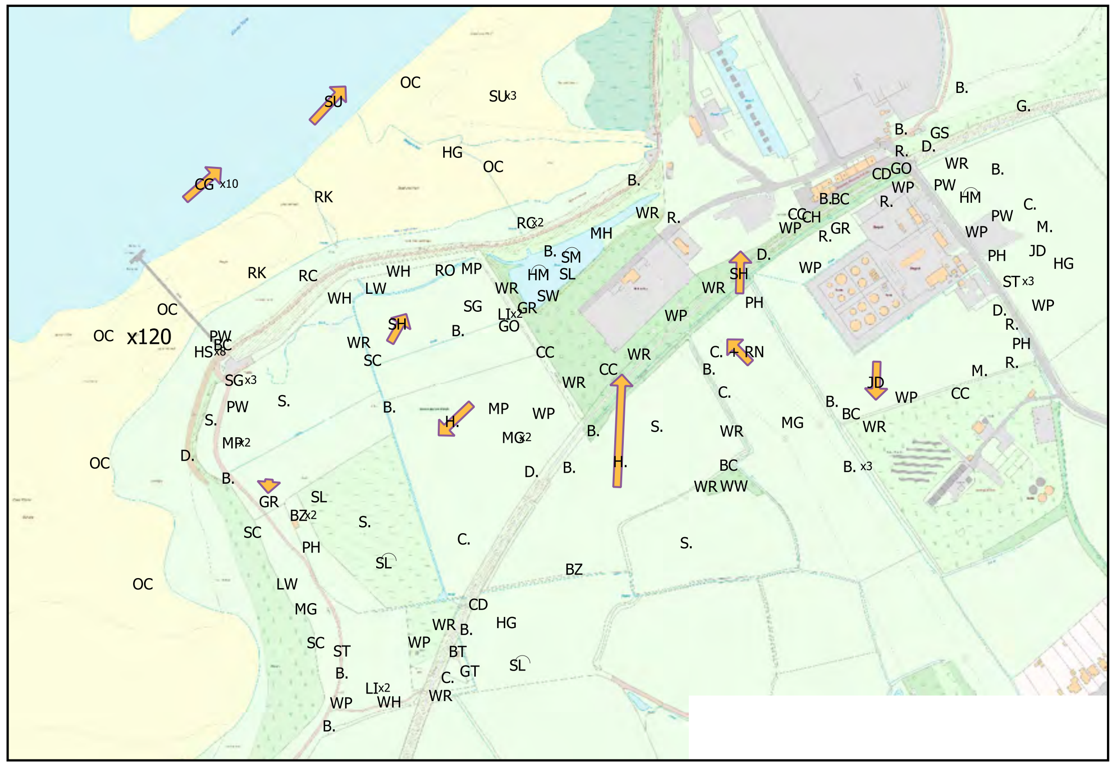
Yelland - 28 April 2022



Yelland - 2 May 2022



Yelland - 30 May 2022



Legend

- flight direction
- singing
- circling
- ♂ Male
- ♀ Female
- ♀♂ Female & male
- fam Family
- juv Juvenile
- x # of birds

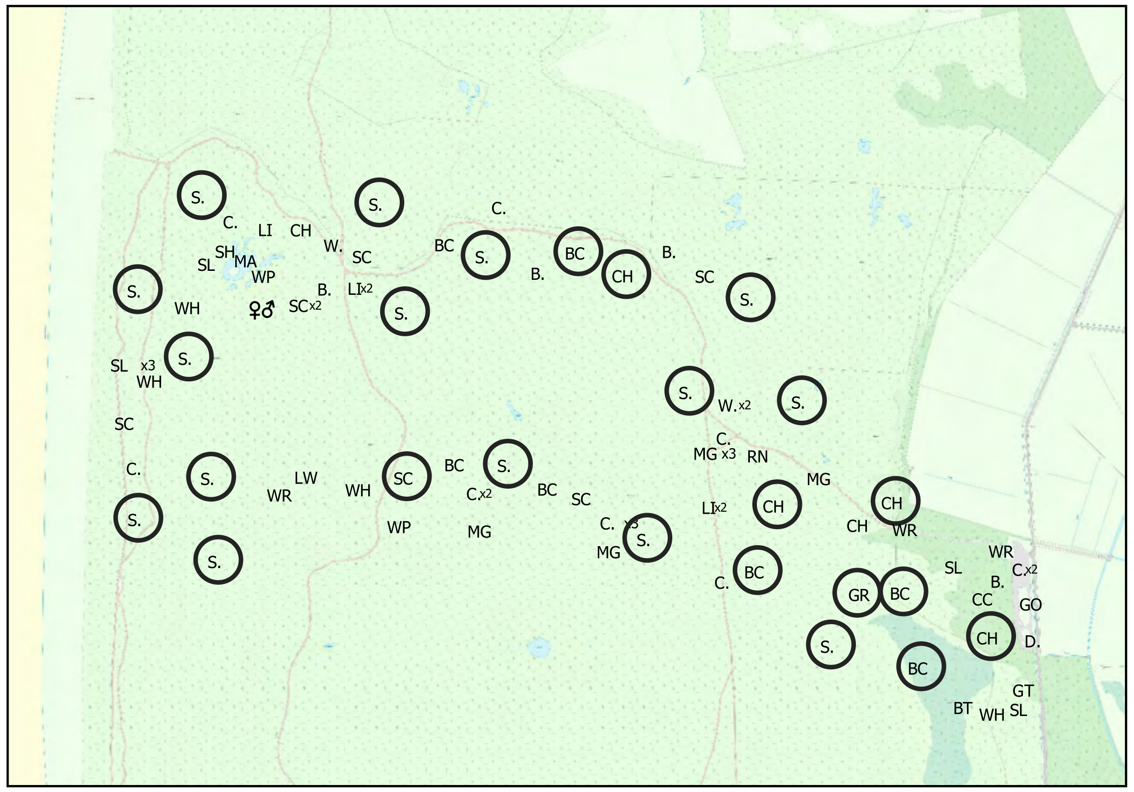
East Yelland BTO Bird Codes

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

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



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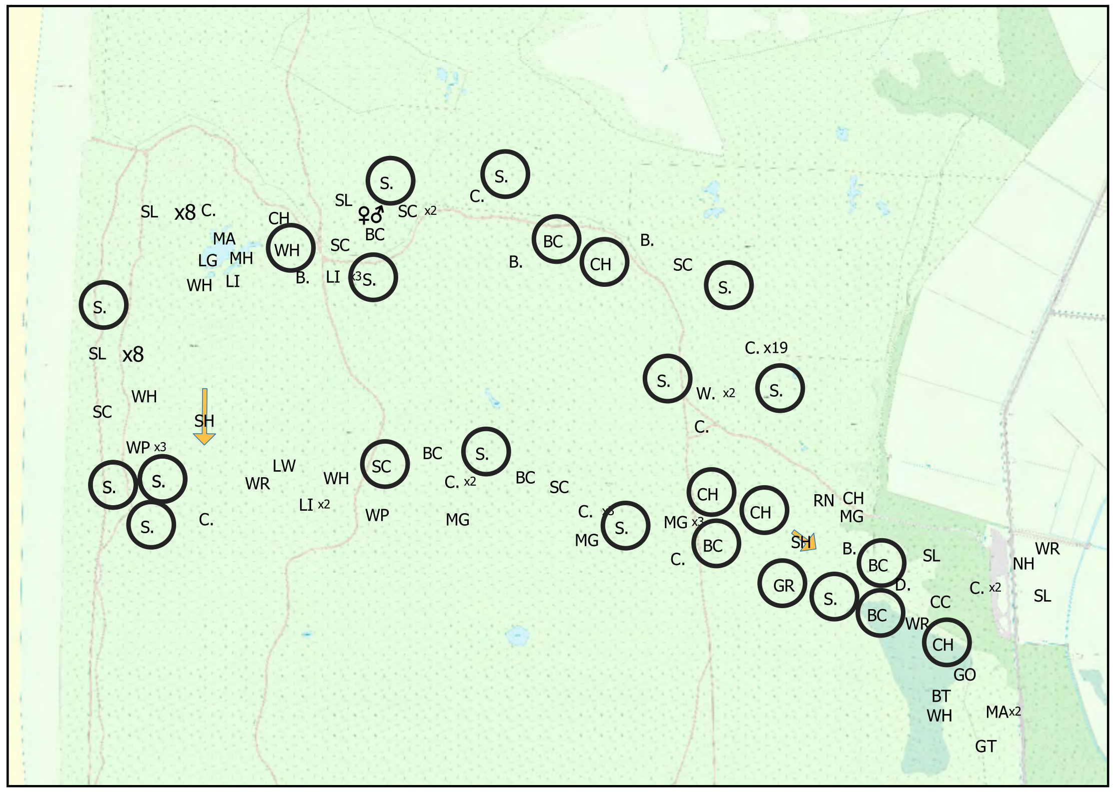

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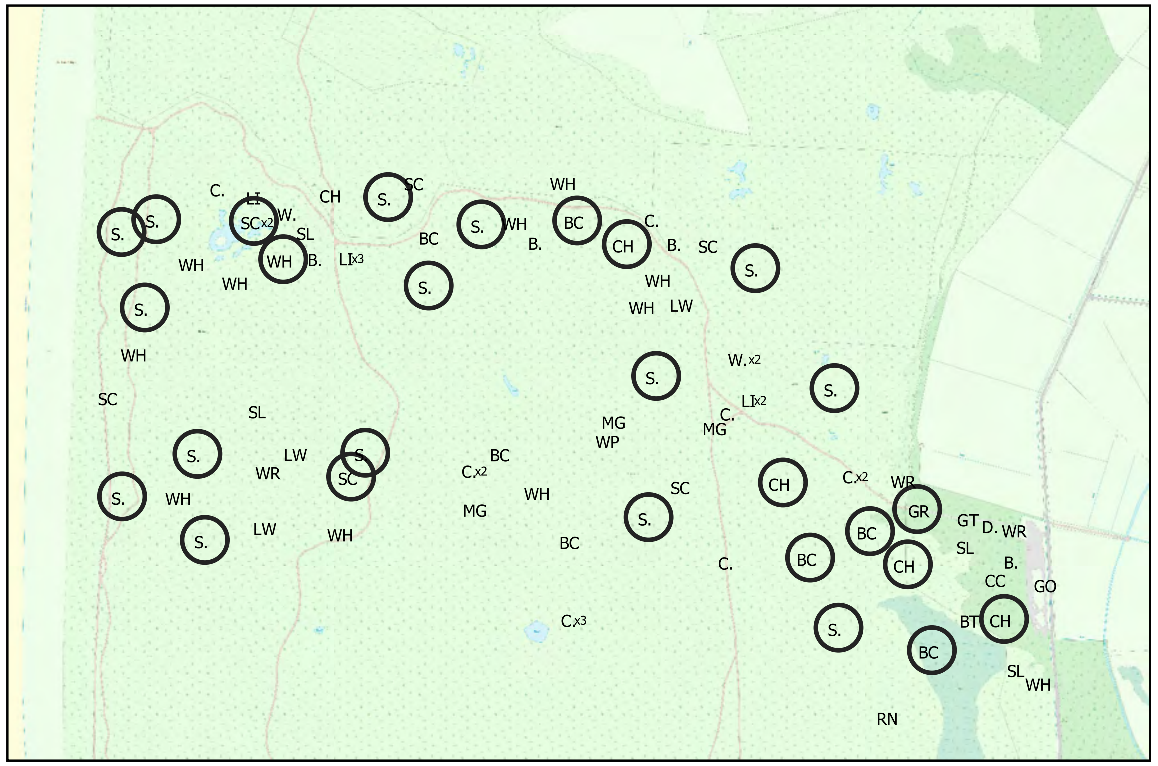

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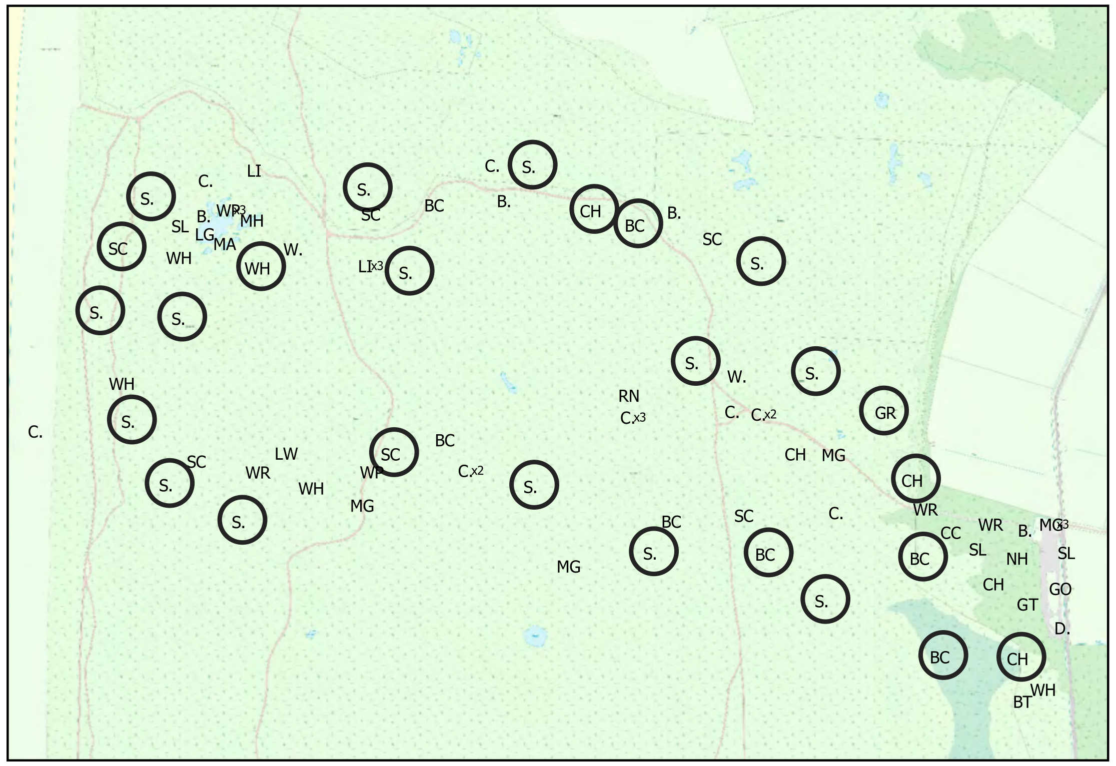


Legend

- 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

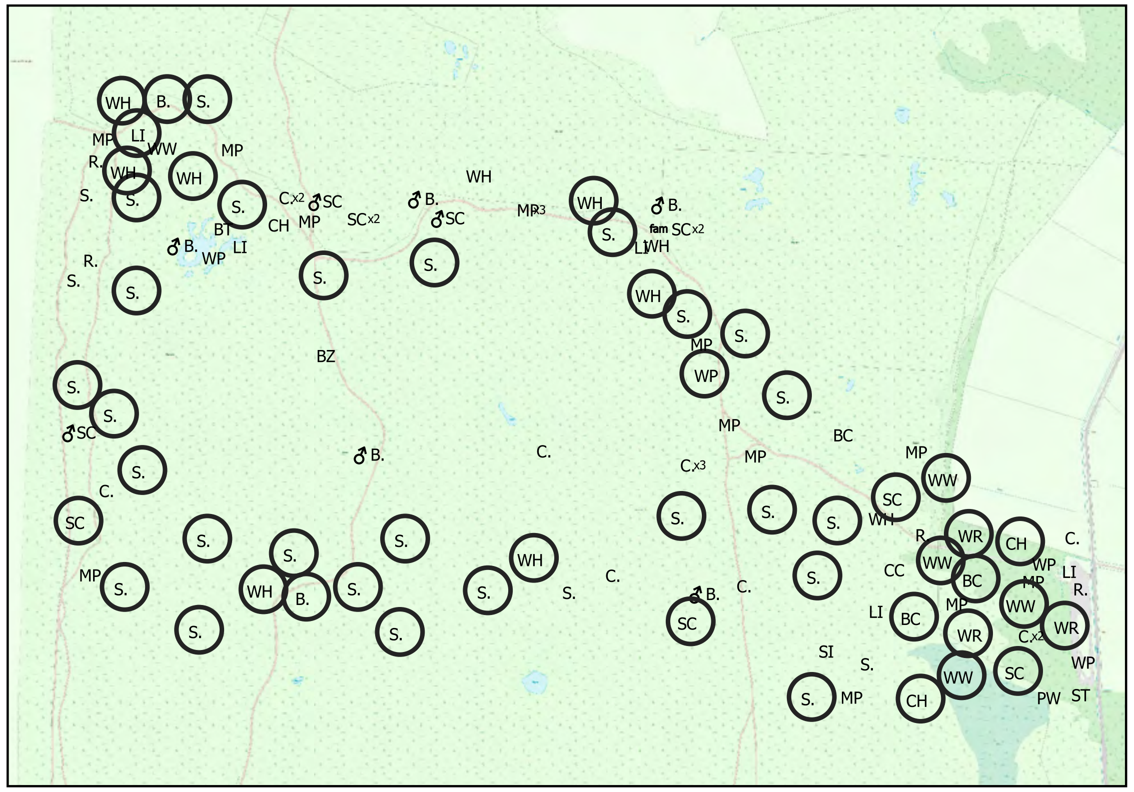
N

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



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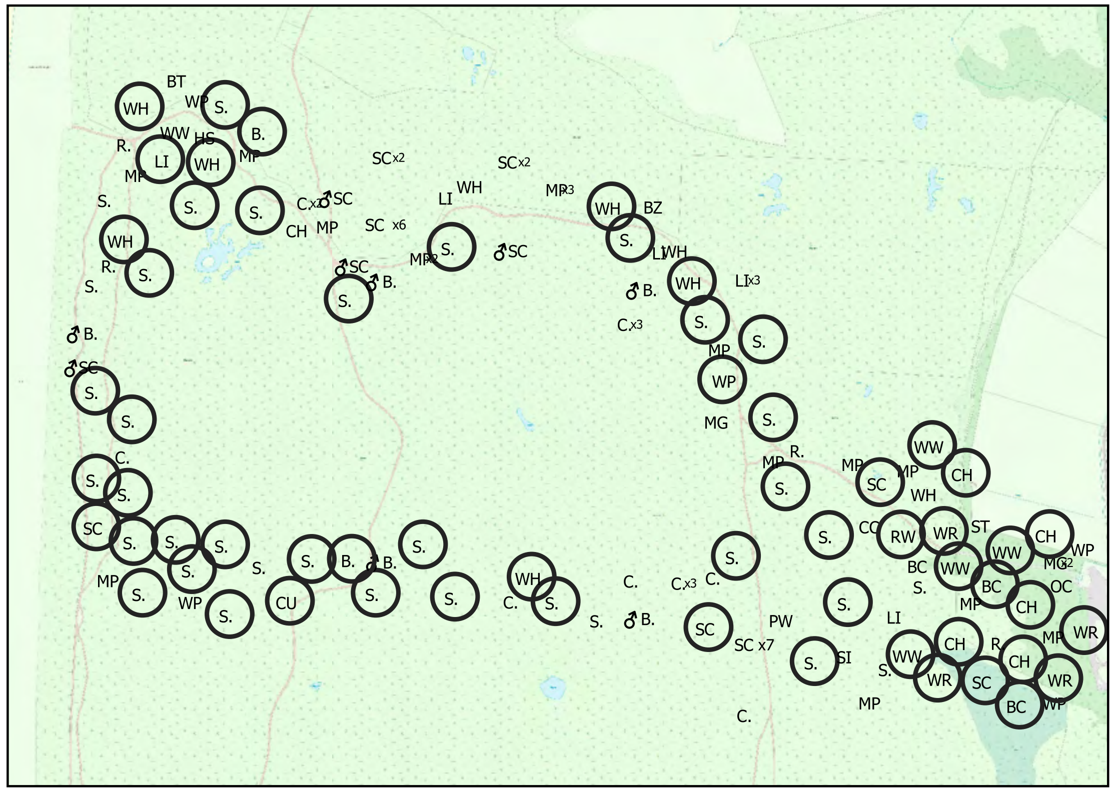
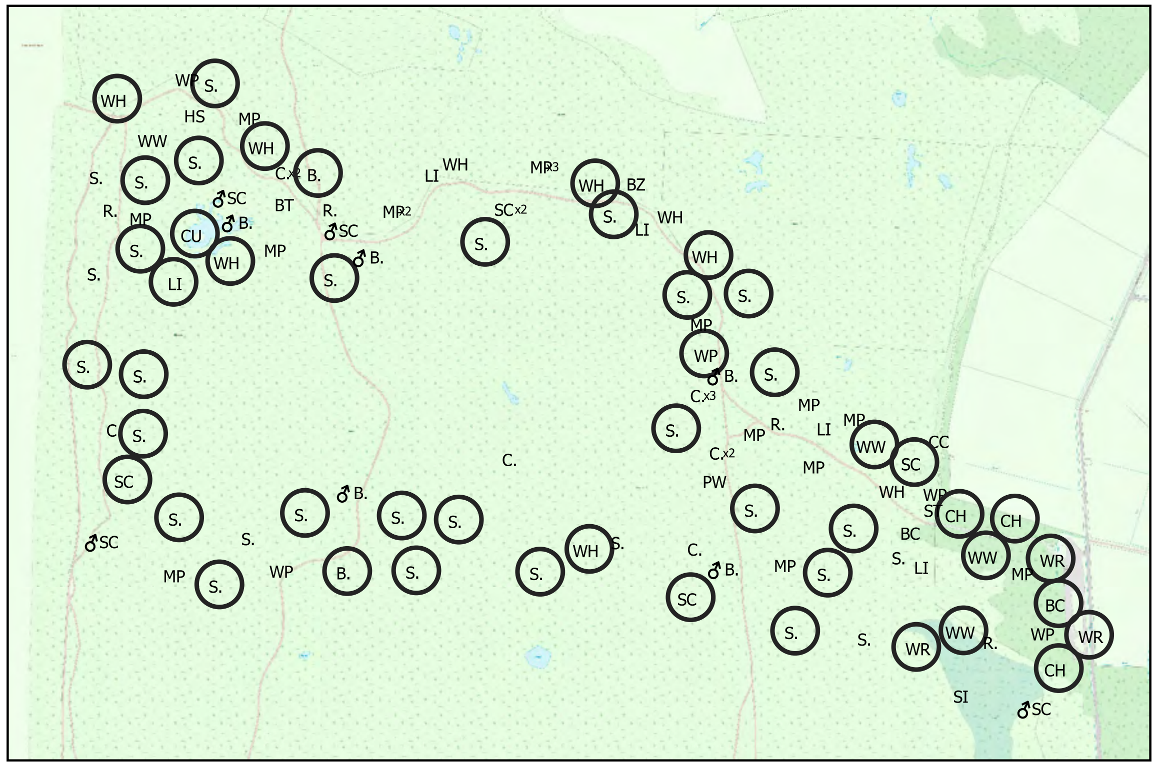
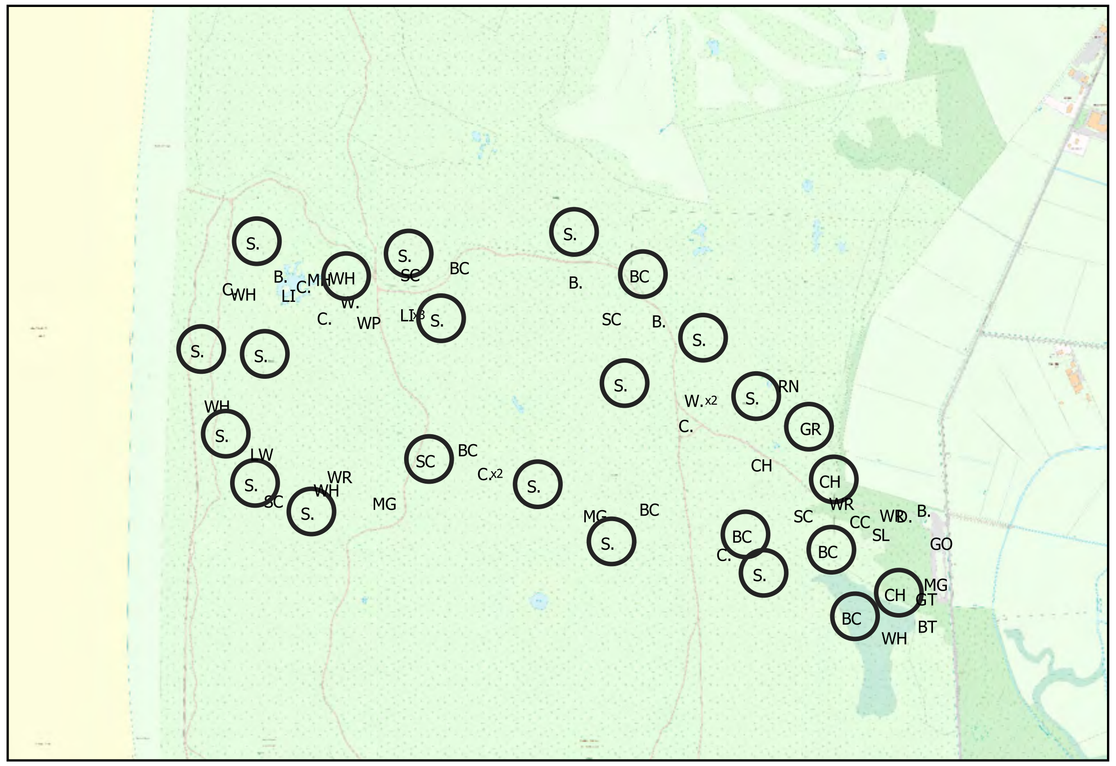


Partridge Slack - 8 July 2022



Yelland - 19 July 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

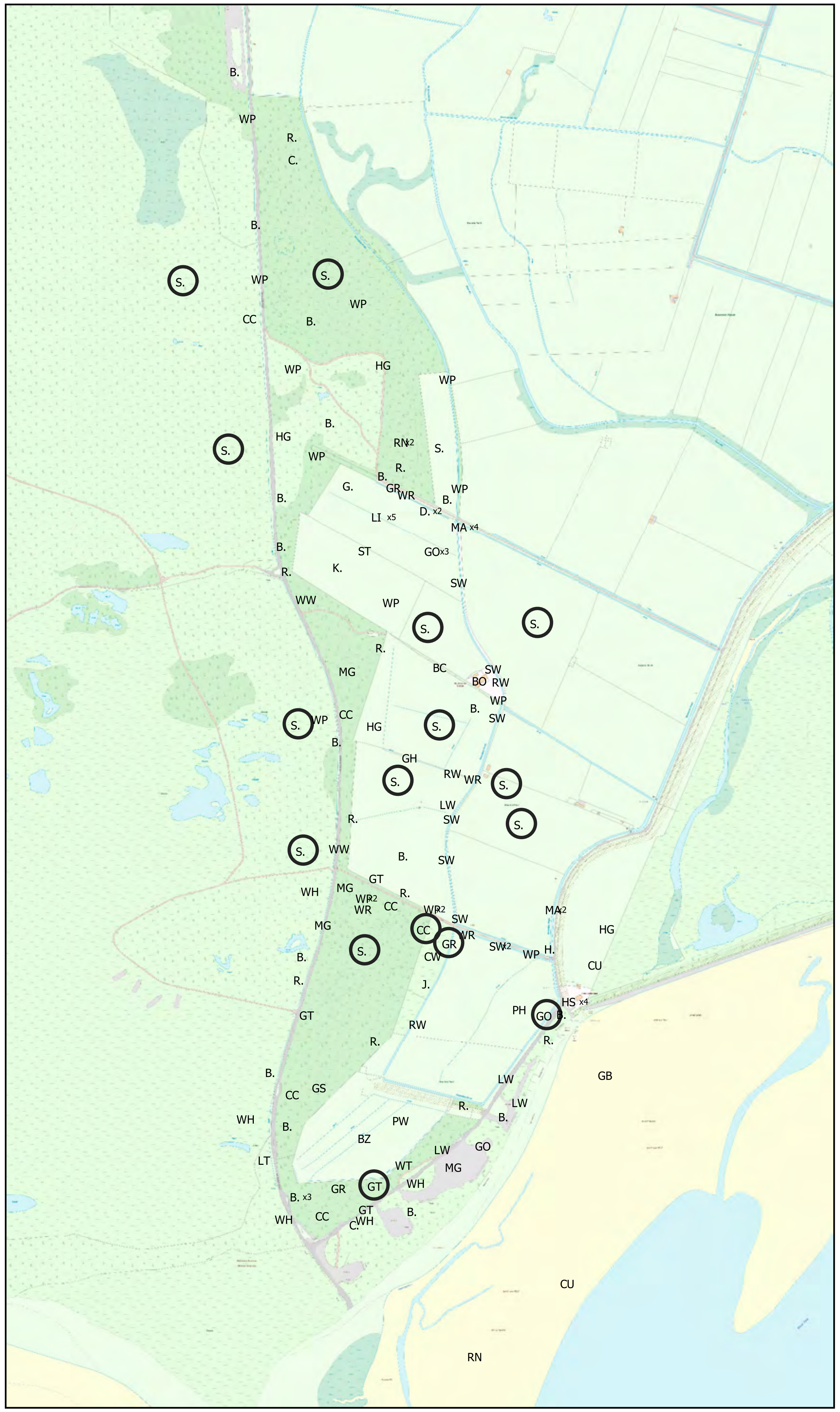
N

Appendix 1: The Partridge Slack bird transect maps.

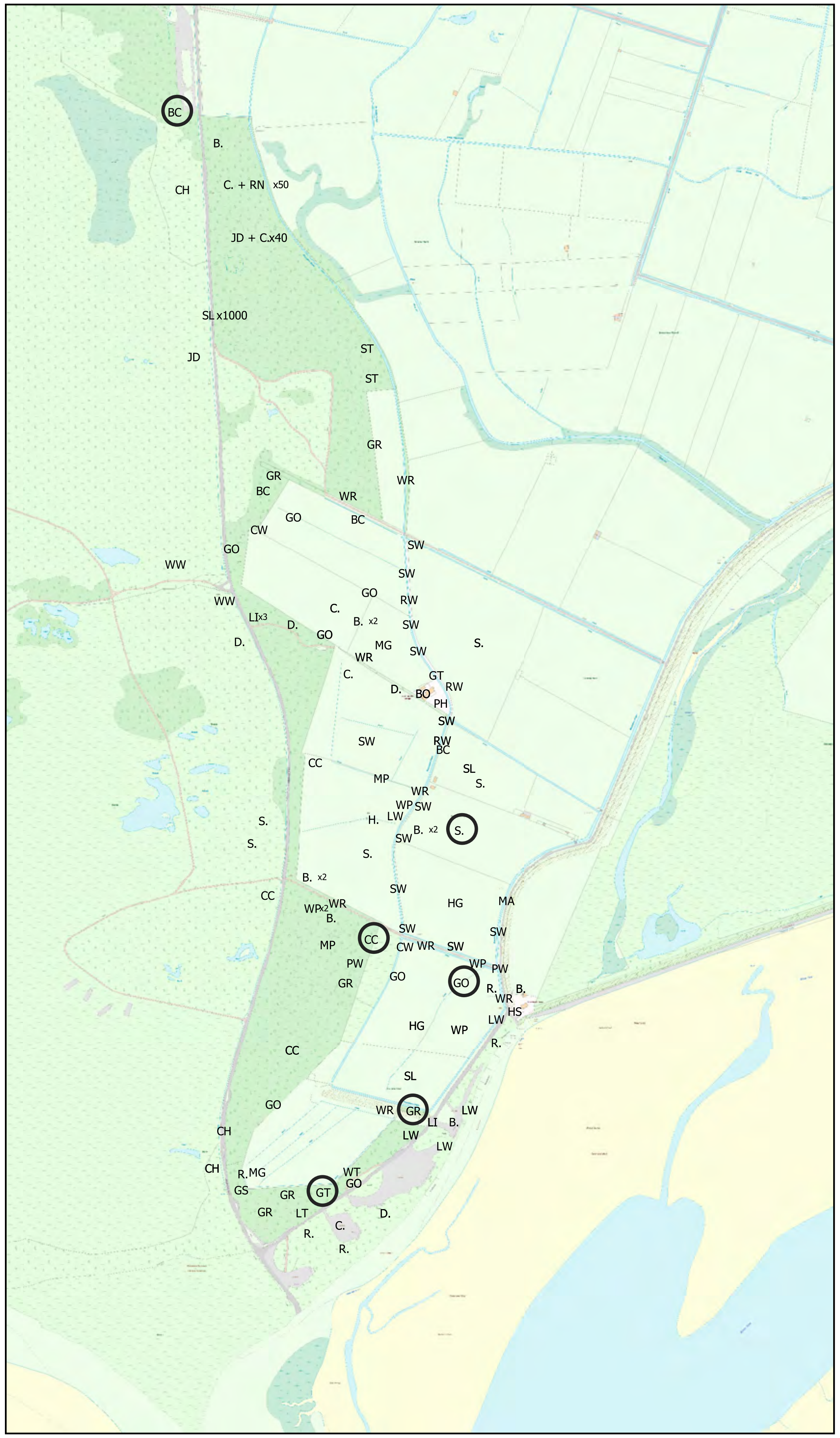
Project: White Cross Offshore Windfarm

Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

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

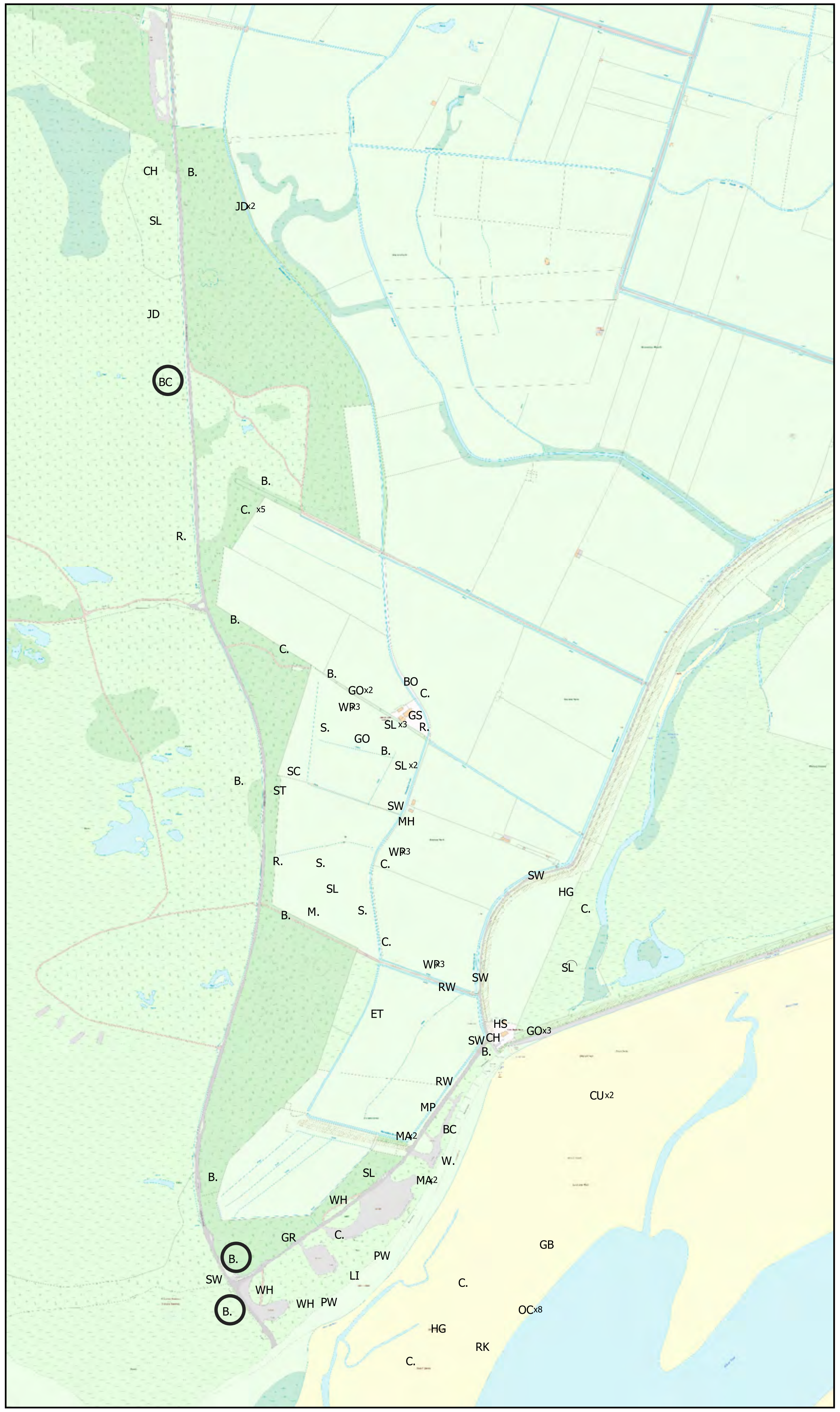
N

Appendix 1: The Braunton Marshes bird transect resuts maps.

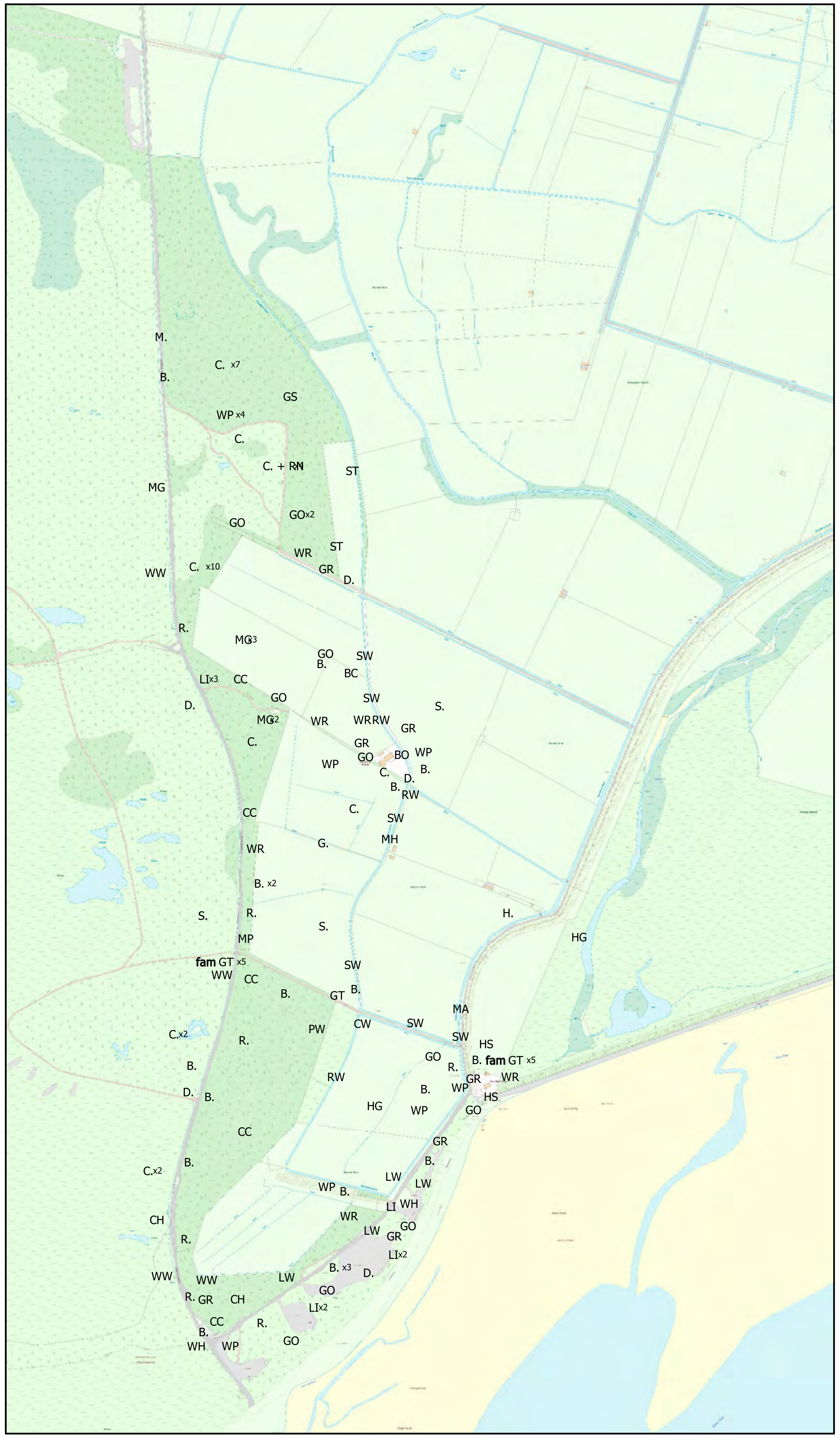
Project: White Cross Offshore Windfarm

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

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B.	Blackbird
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BZ	Buzzard
C.	Carrion crow
C.	Cettis warbler
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CF	Chiffchaff
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J.	Jay
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M.	Mistle thrush
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SC	Stonechat
SL	Swallow
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W.	Wheatear
WH	Whitethroat
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WW	Willow warbler
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WR	Wren

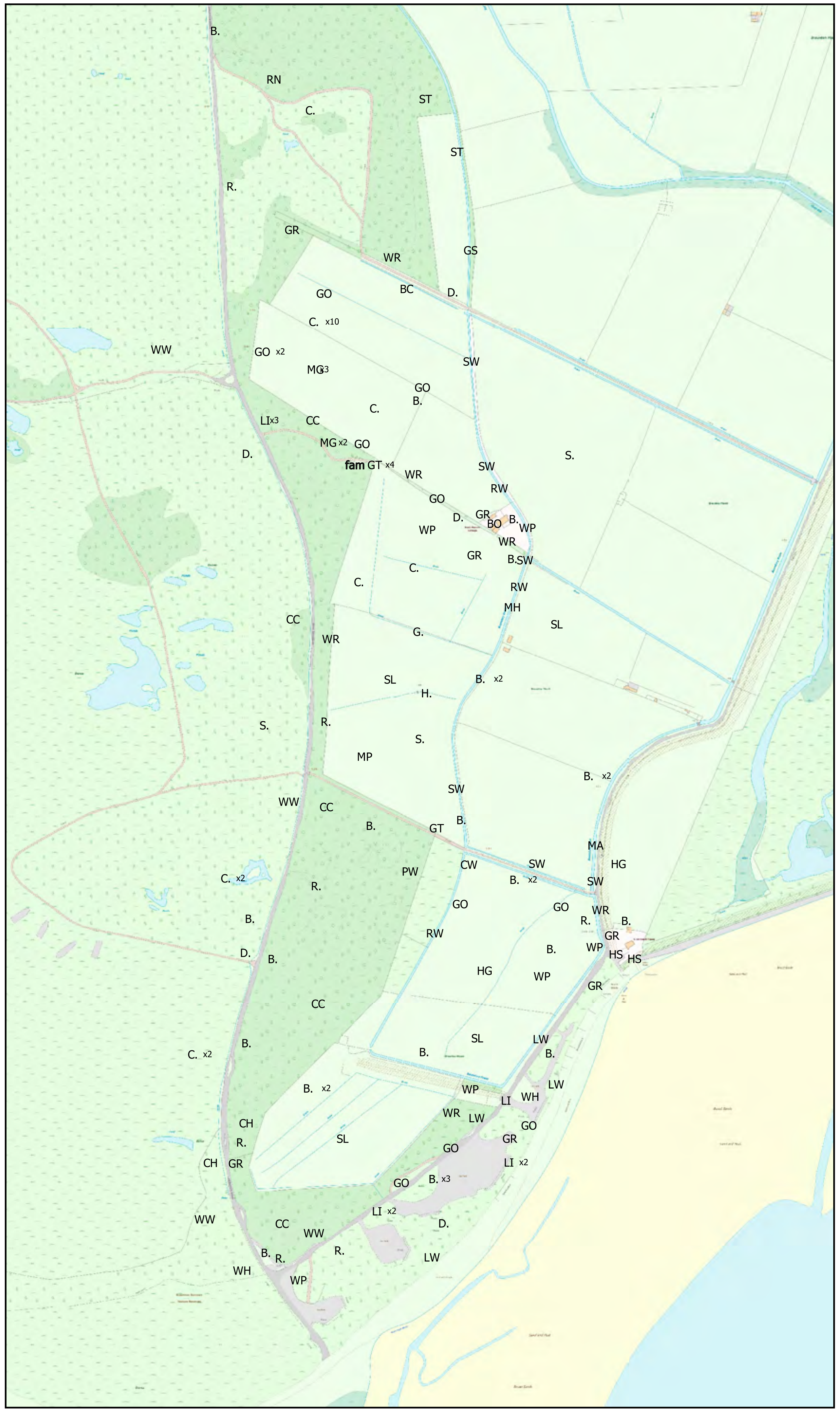
N

Appendix 1: The Braunton Marshes bird transect resuts maps.

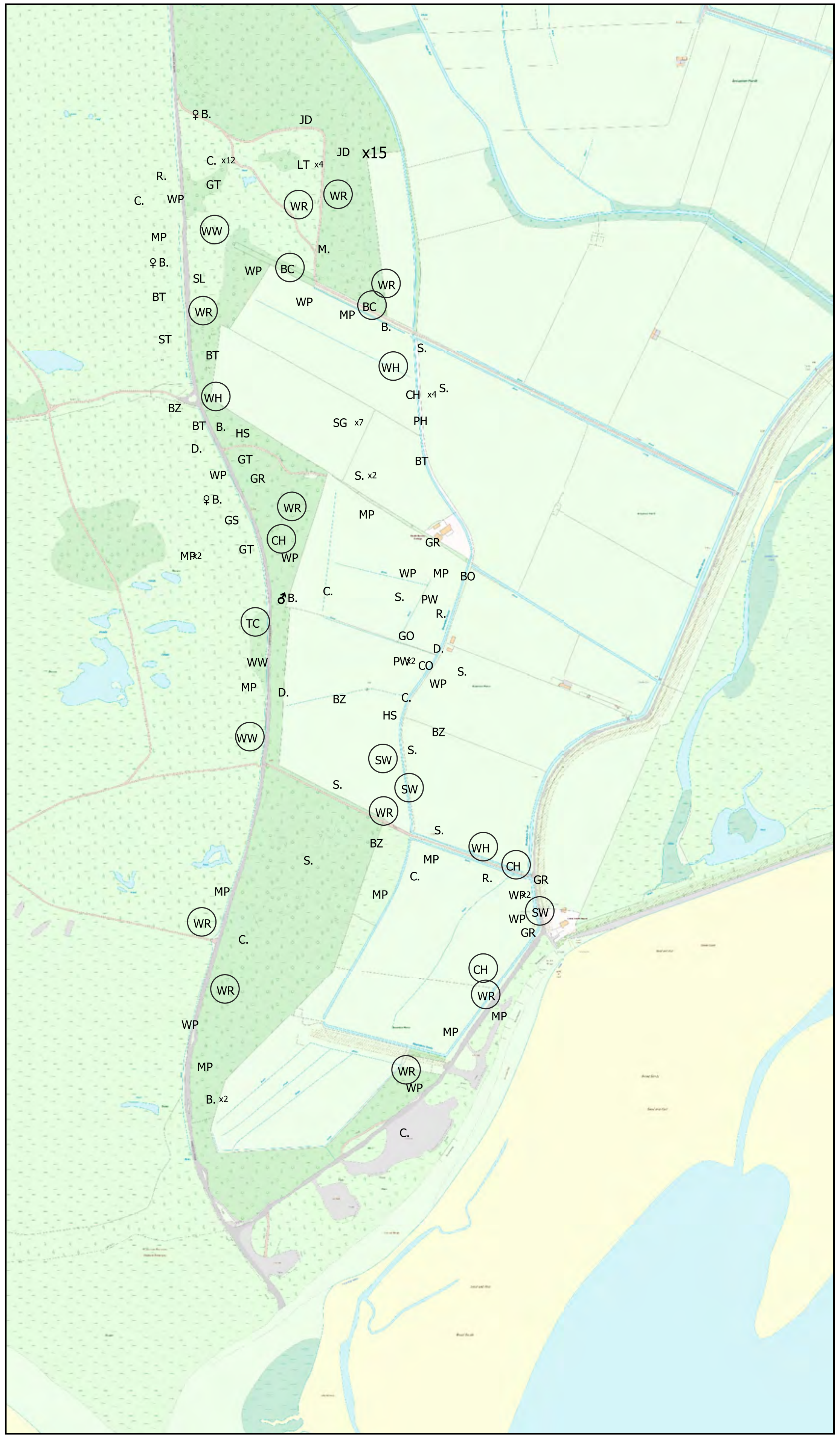
Project: White Cross Offshore Windfarm

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
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BZ	Buzzard
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C.	Cettis warbler
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CF	Chiffchaff
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GT	Great tit
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J.	Jay
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MH	Moorhen
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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

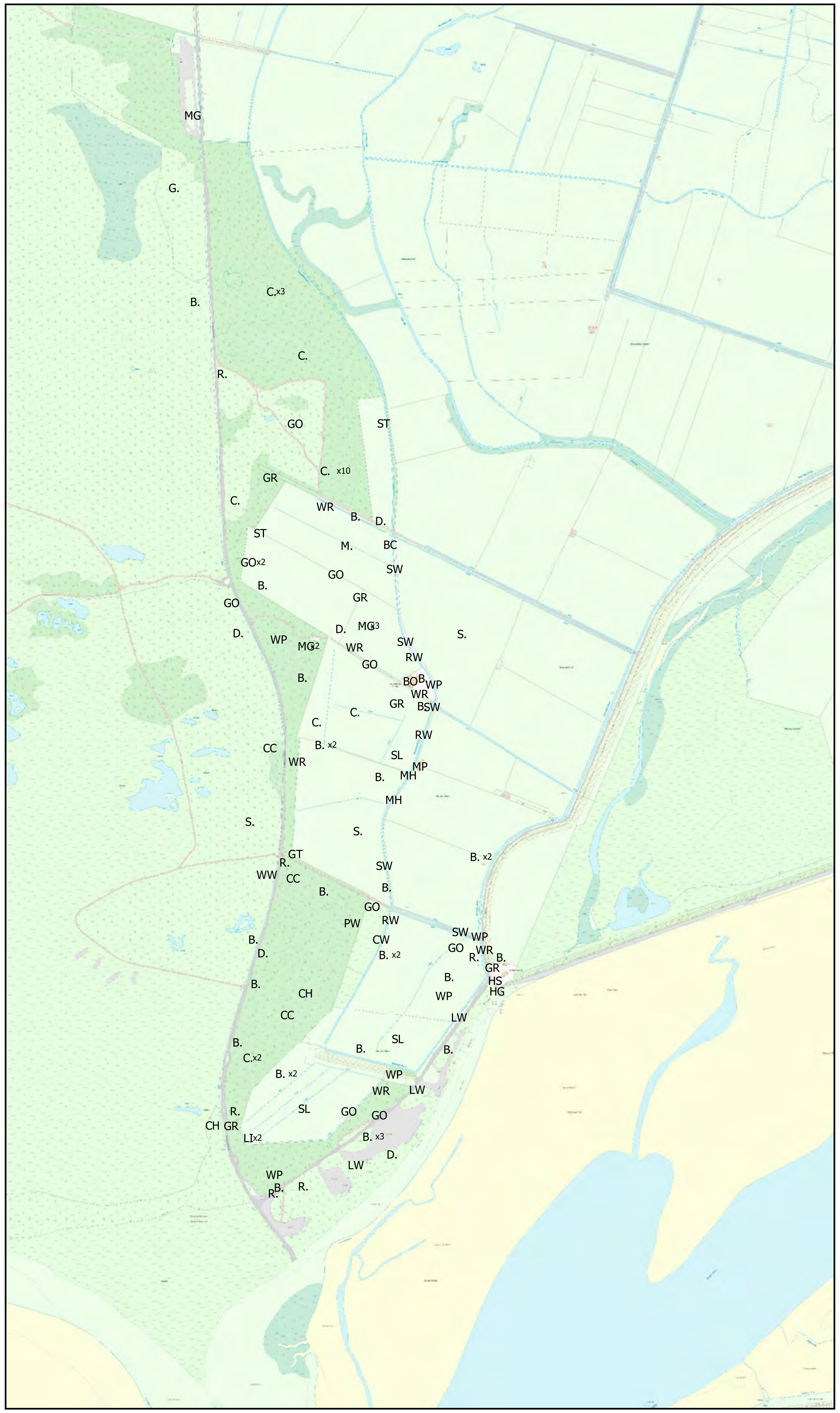
ECOLOGIC

Appendix 1: The Braunton Marshes bird transect resuts maps.

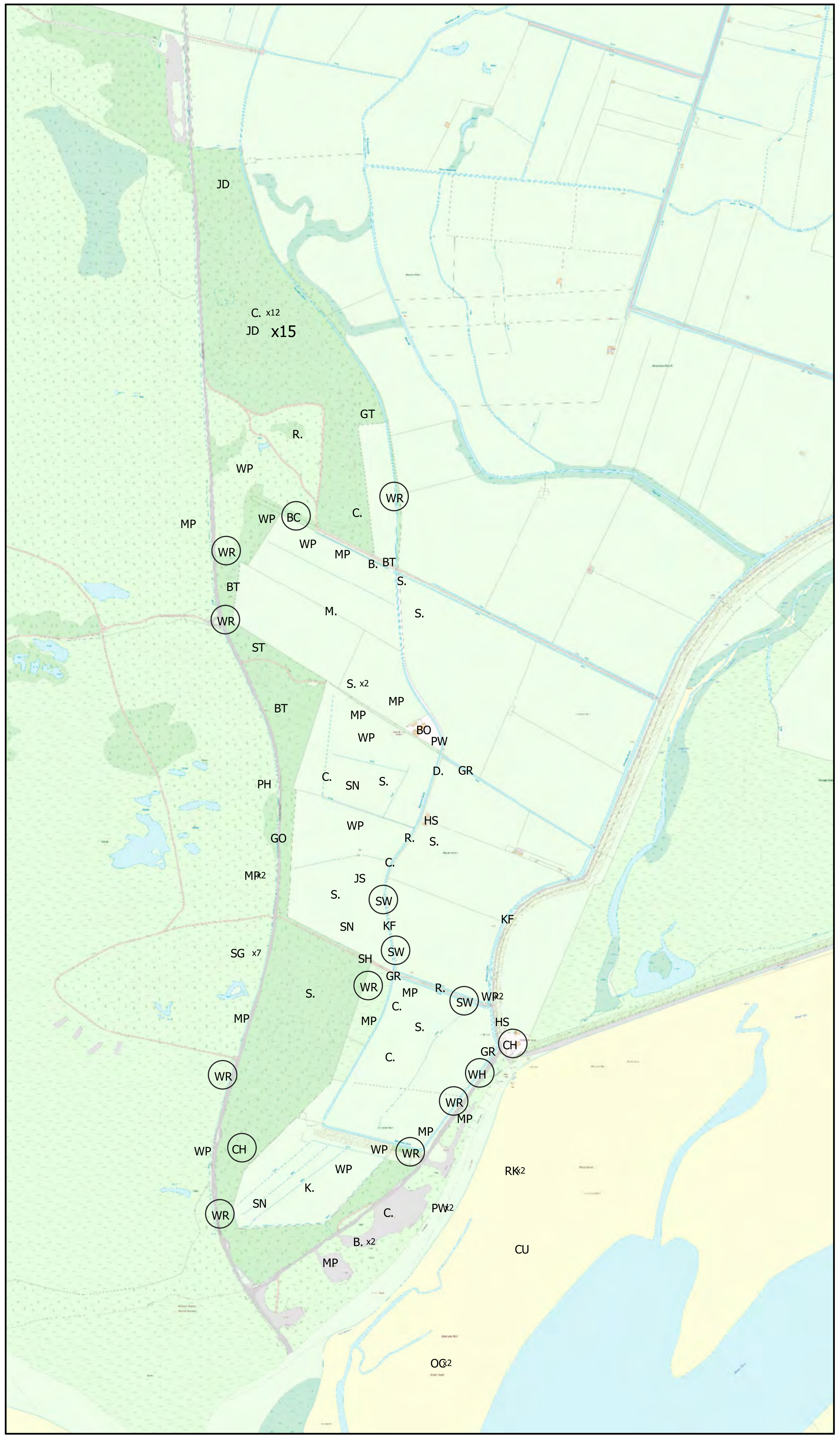
Project: White Cross Offshore Windfarm

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

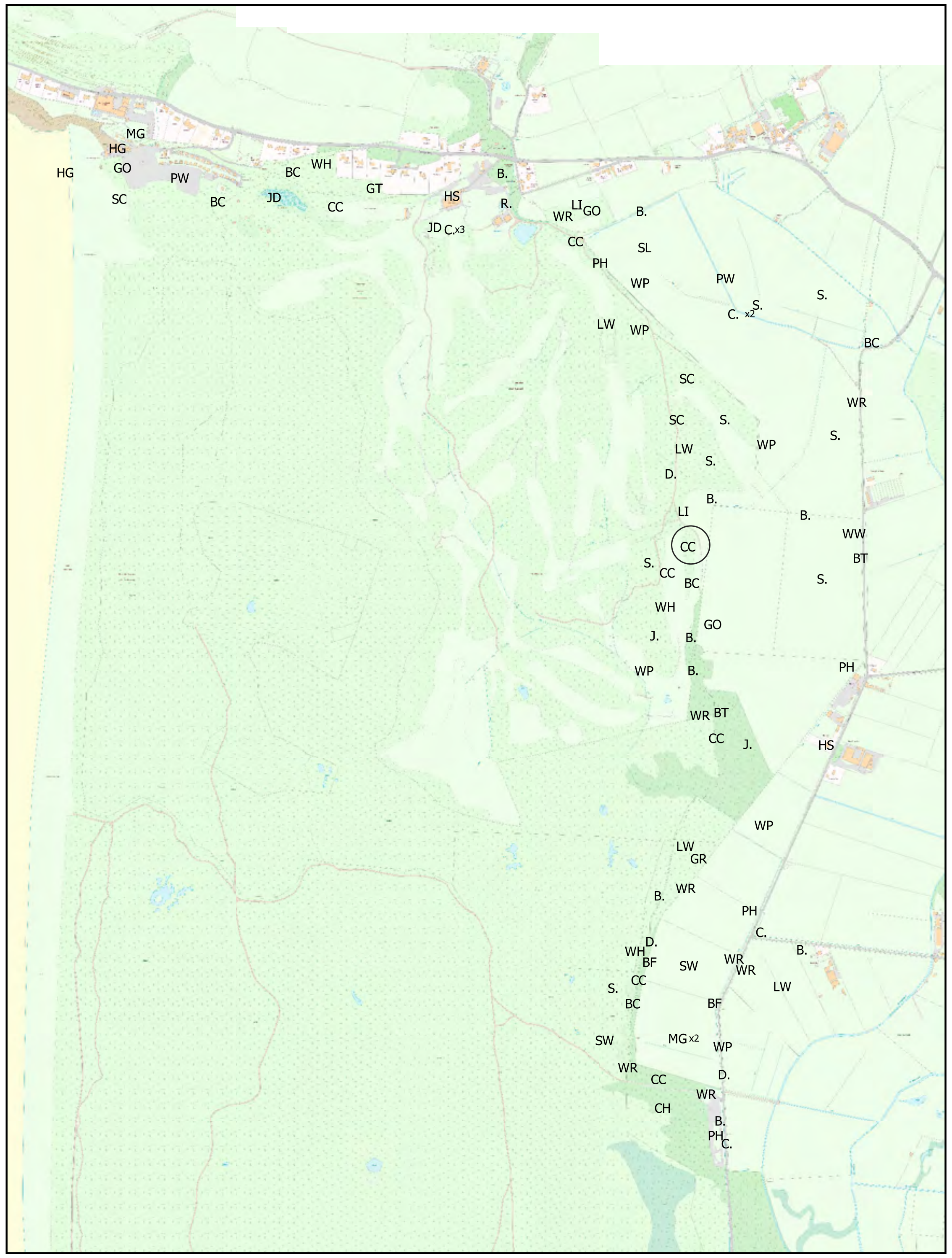
ECOLOGIC

Appendix 1: The Braunton Marshes bird transect resuts maps.

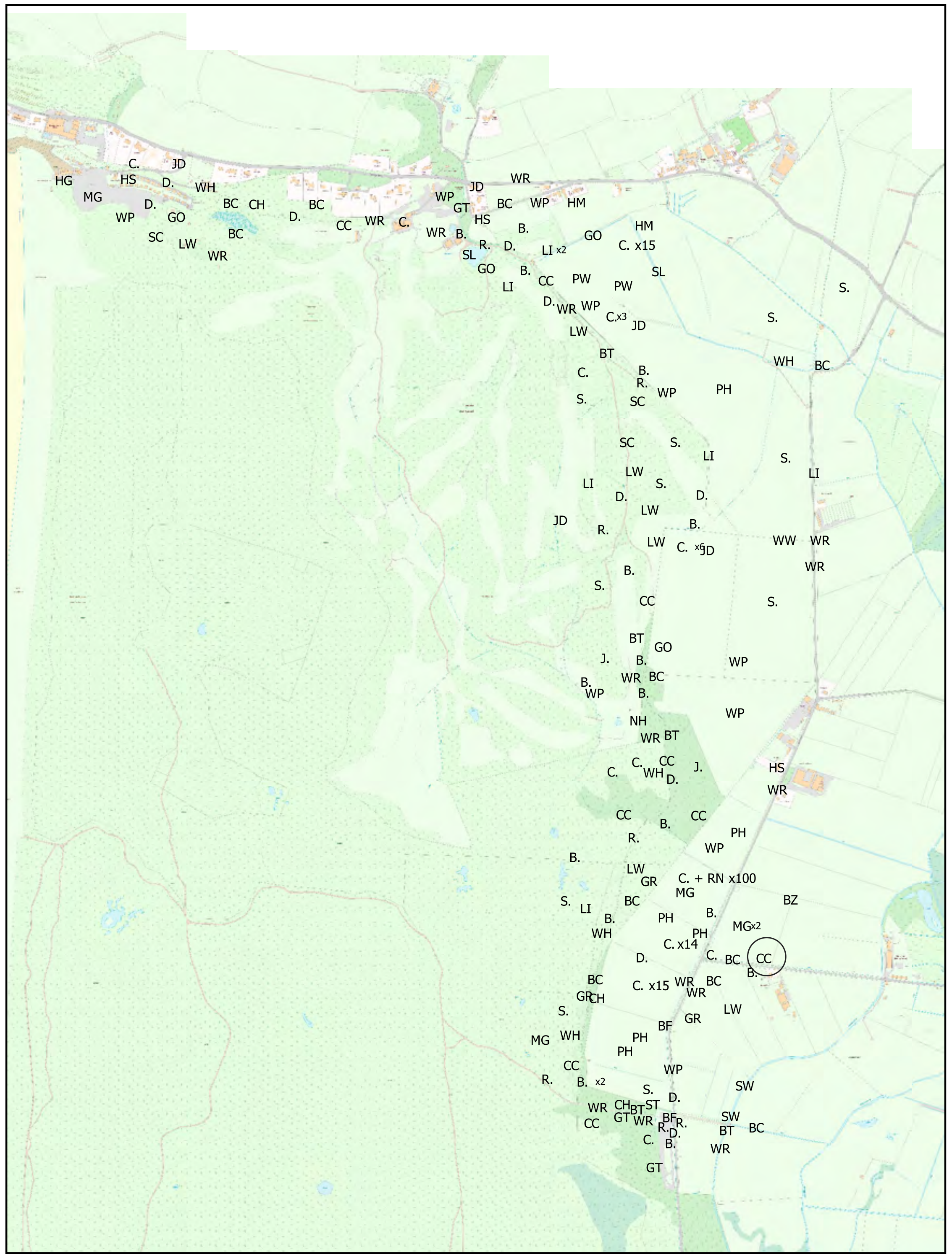
Project: White Cross Offshore Windfarm

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

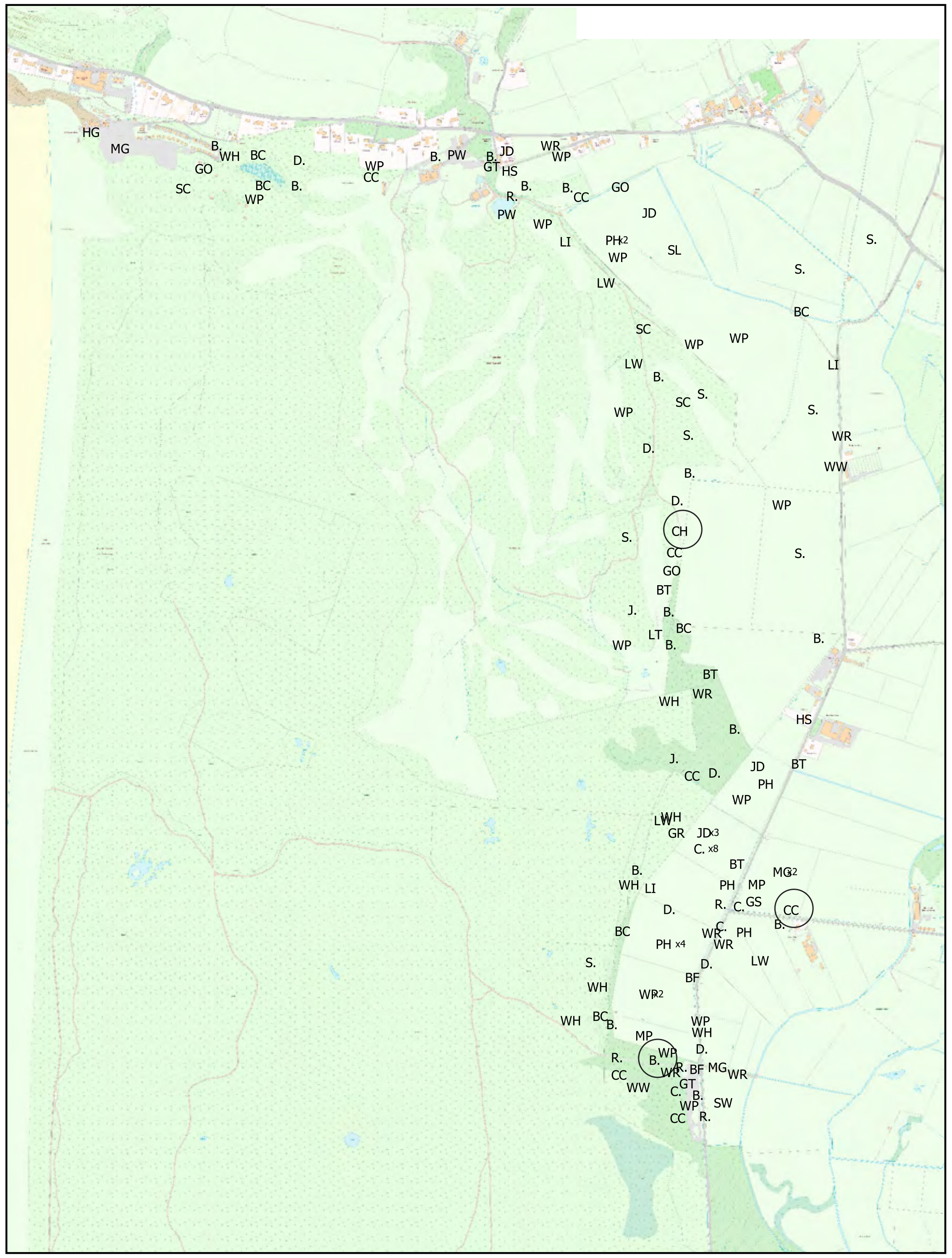
N

Appendix 1: The Saunton bird transect maps.

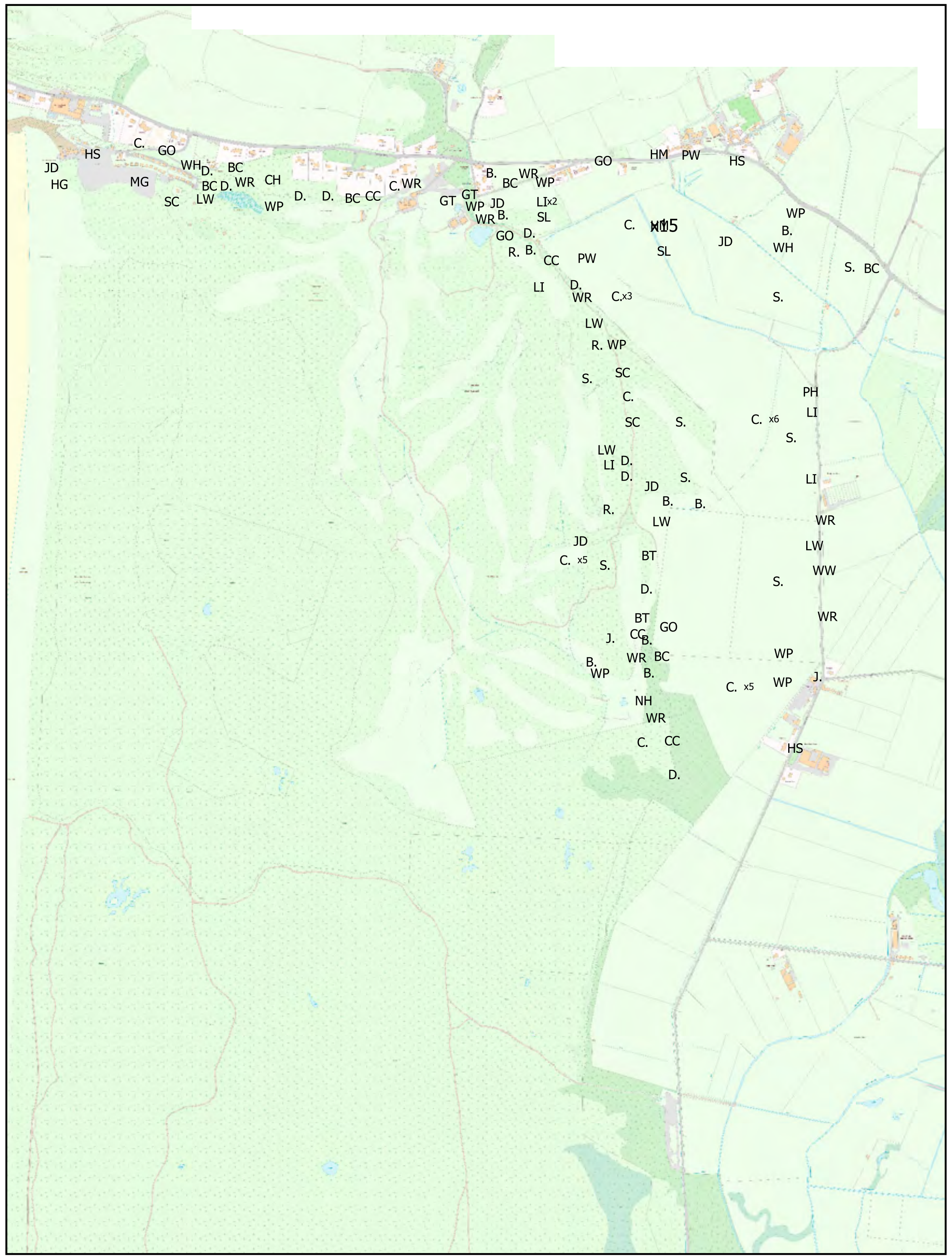
Project: White Cross Offshore Windfarm

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

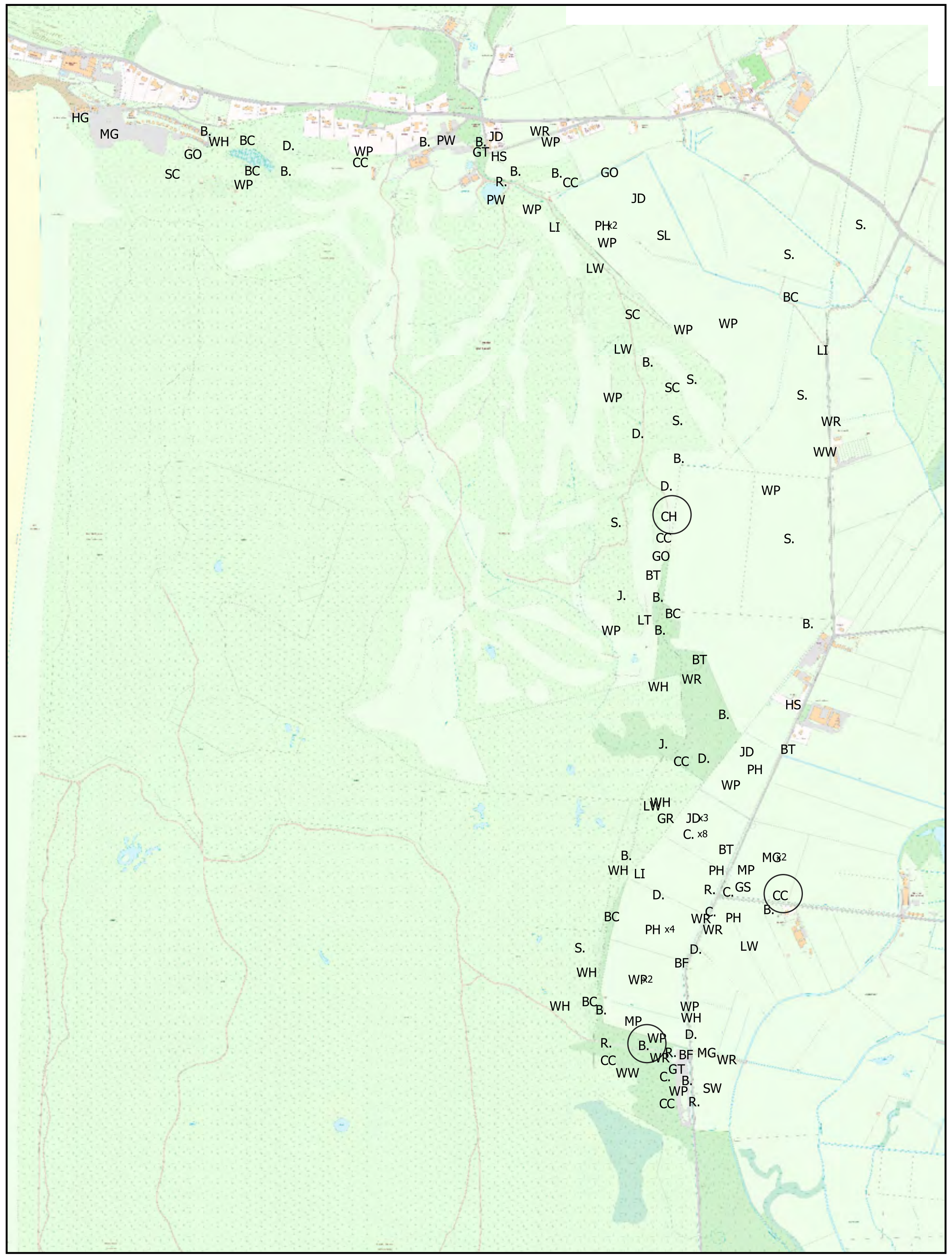
N

Appendix 1: The Saunton bird transect maps.

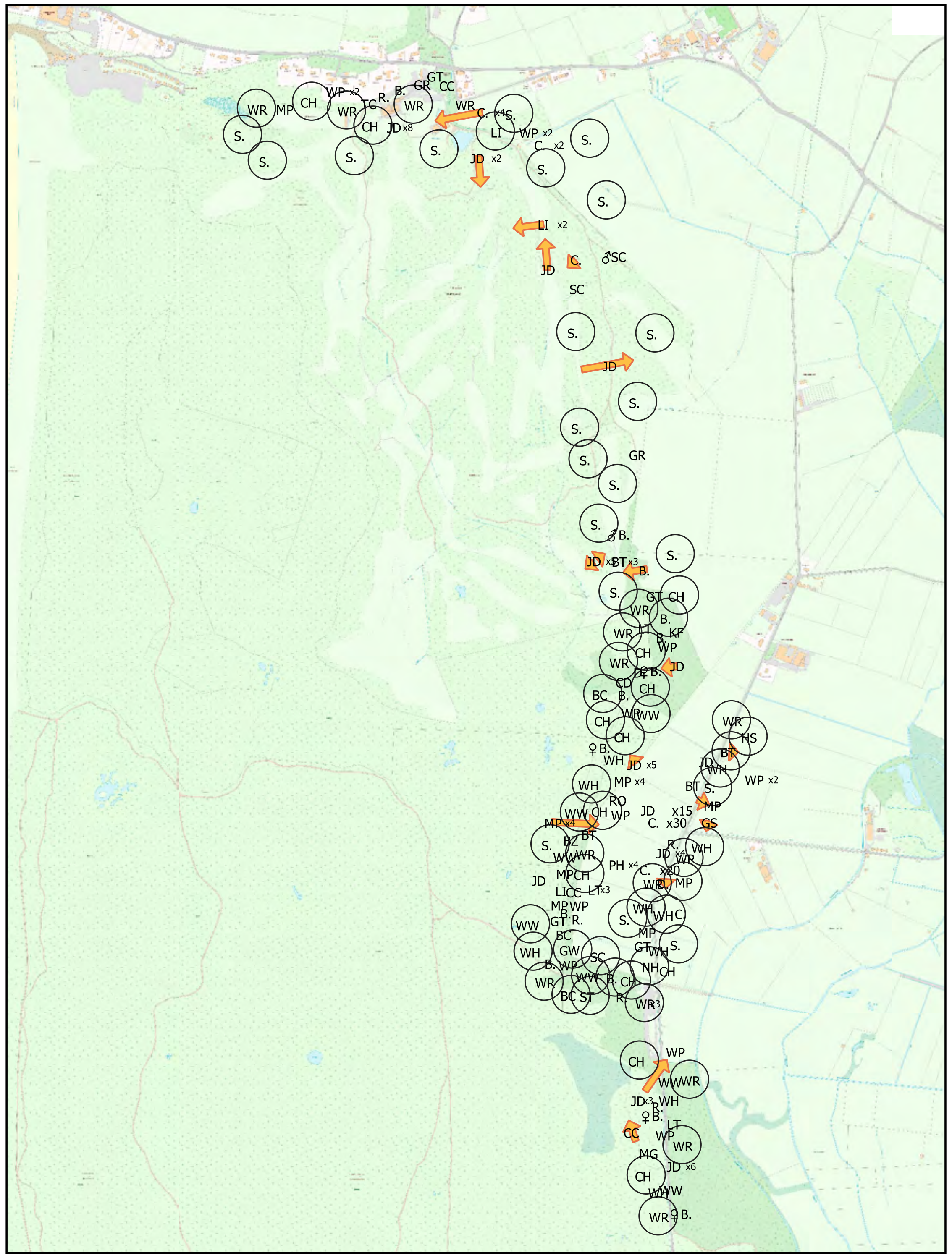
Project: White Cross Offshore Windfarm

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

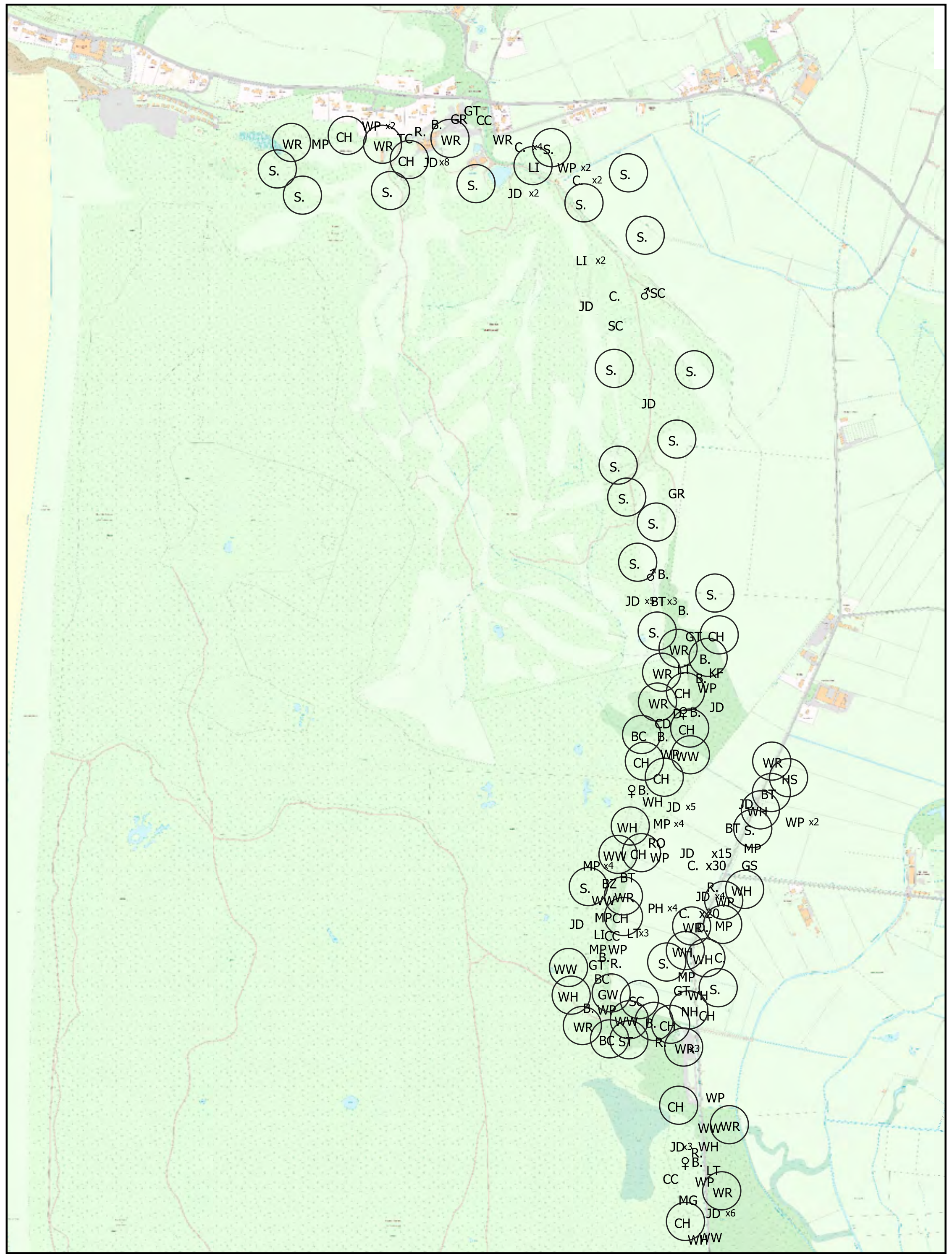
N

Appendix 1: The Saunton bird transect maps.

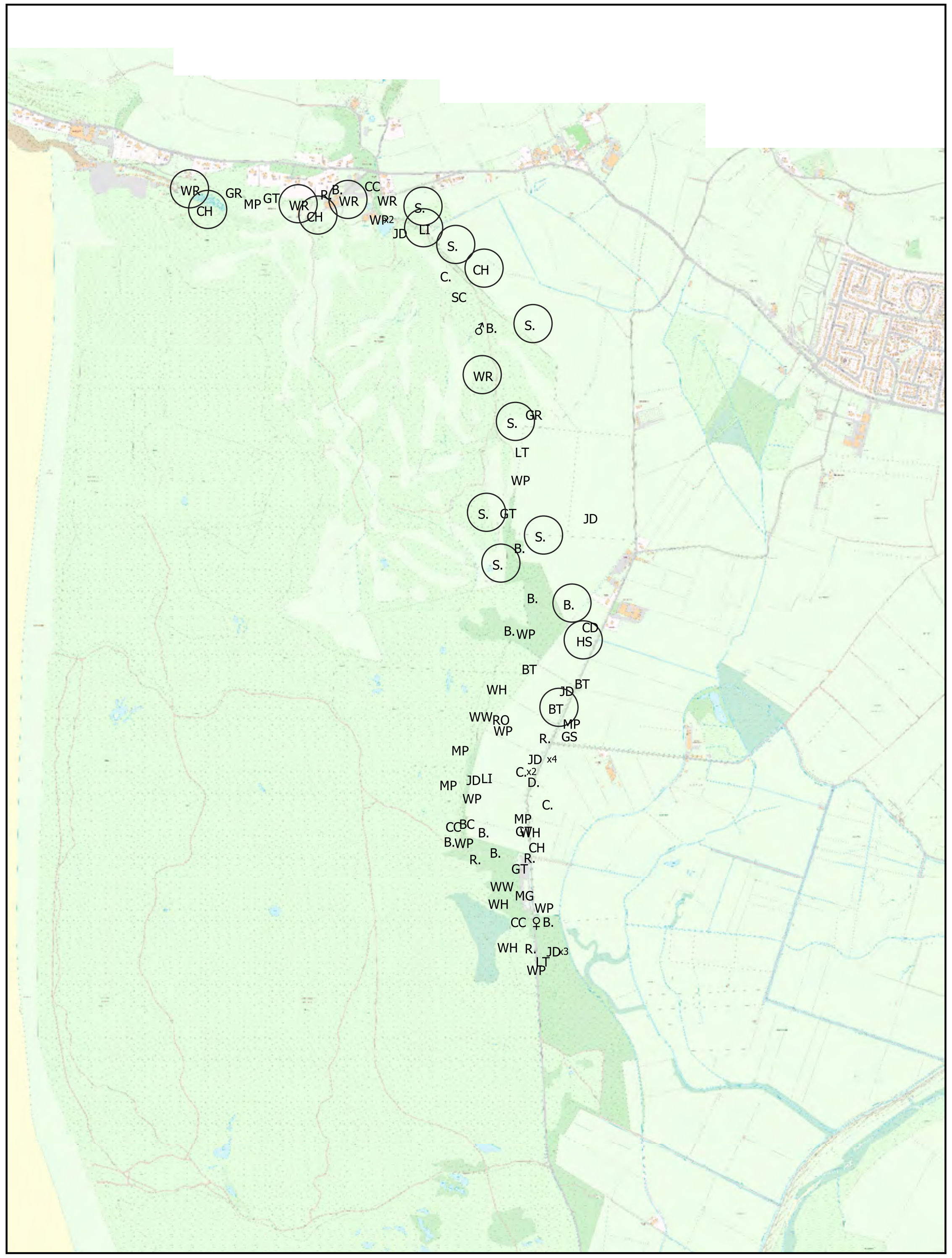
Project: White Cross Offshore Windfarm

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
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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

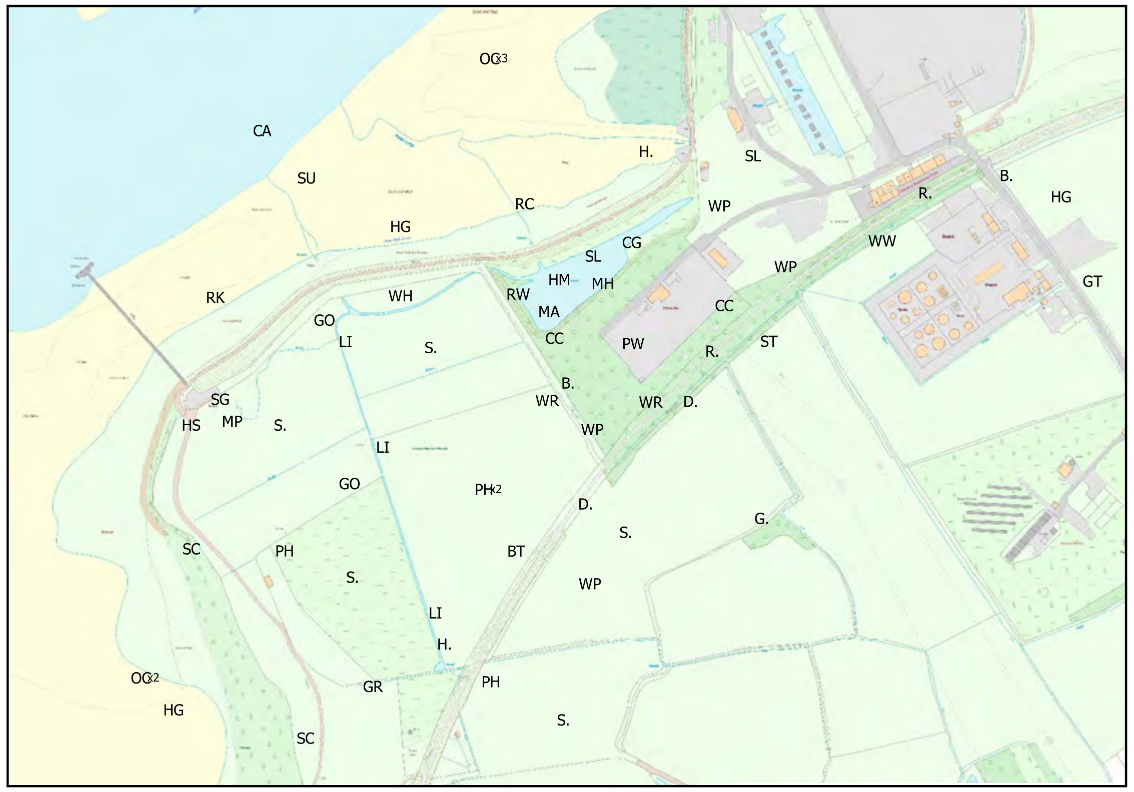
N

Appendix 1: The Saunton bird transect maps.

Project: White Cross Offshore Windfarm

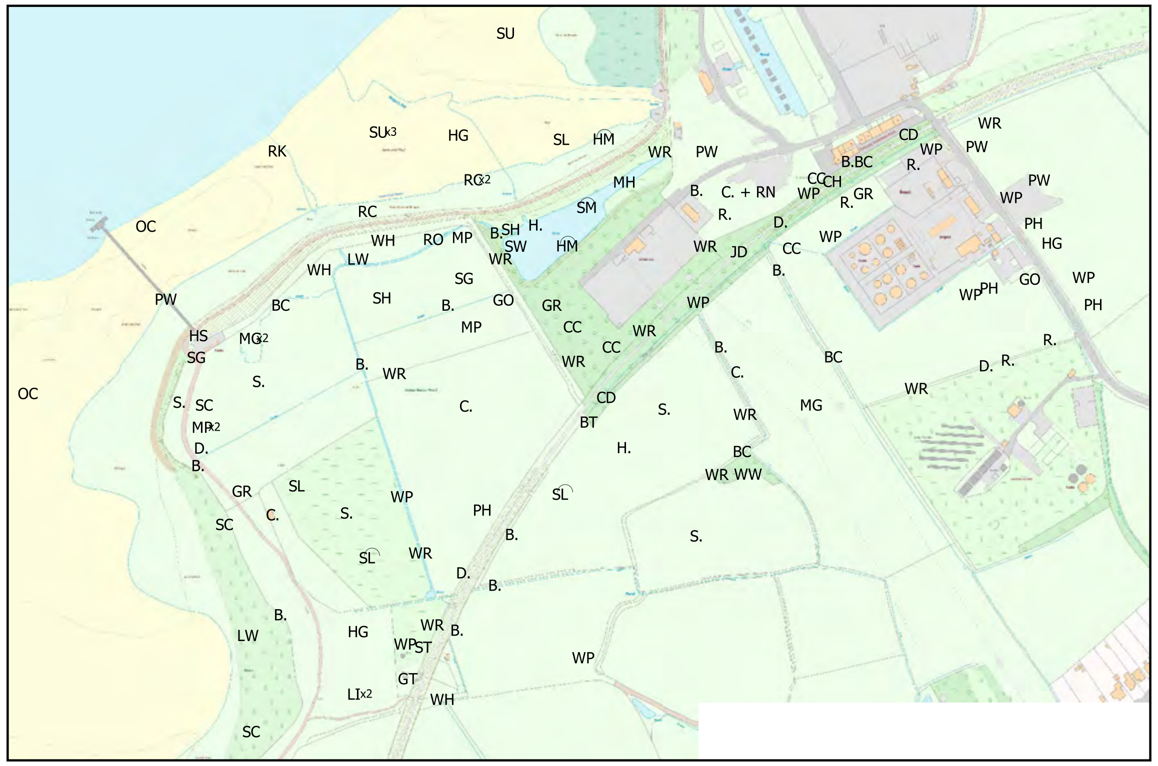
Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

Yelland - 15 April 2022

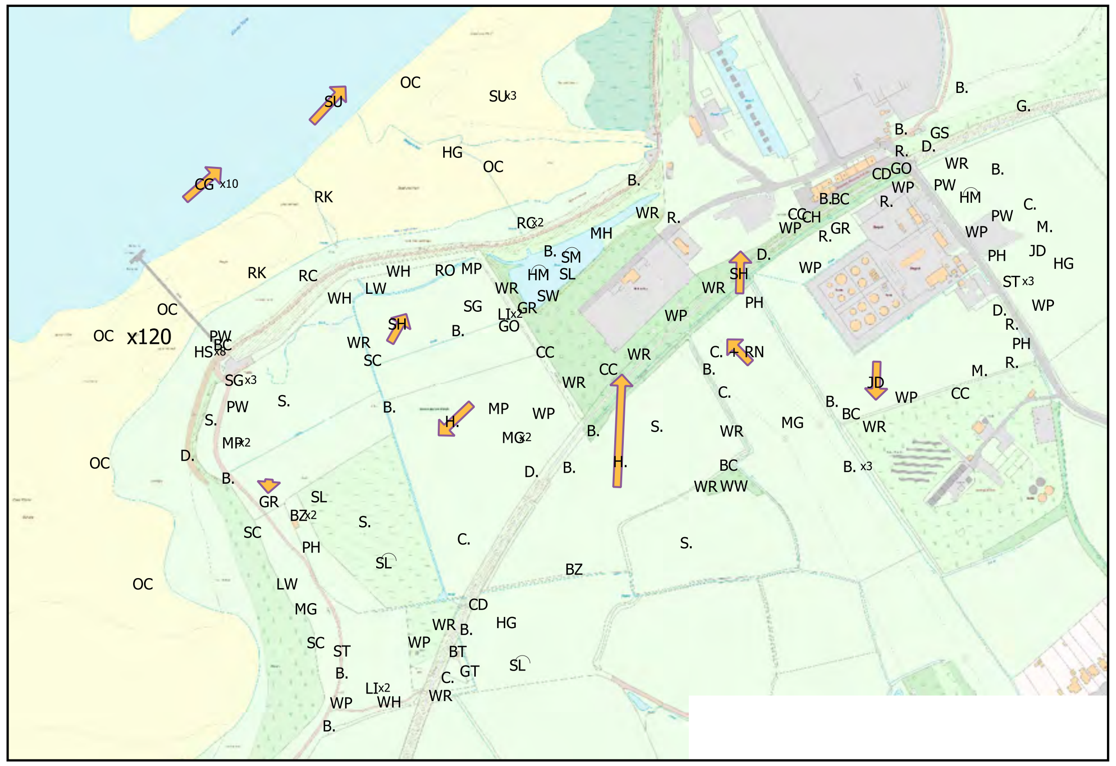


Yelland - 28 April 2022

Yelland - 2 May 2022



Yelland - 30 May 2022



Legend

flight direction

singing

circling

♂ Male

♀ Female

♀♂ Female & male

fam Family

juv Juvenile

x # of birds

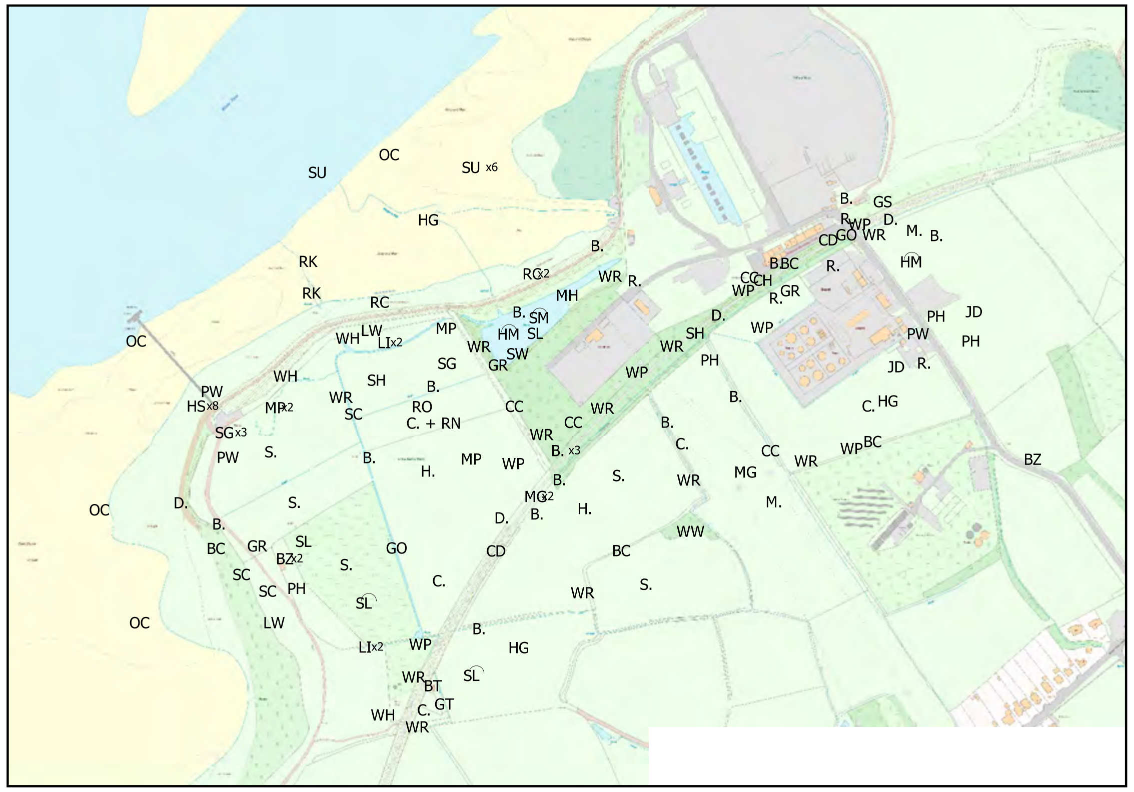
East Yelland BTO Bird Codes

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

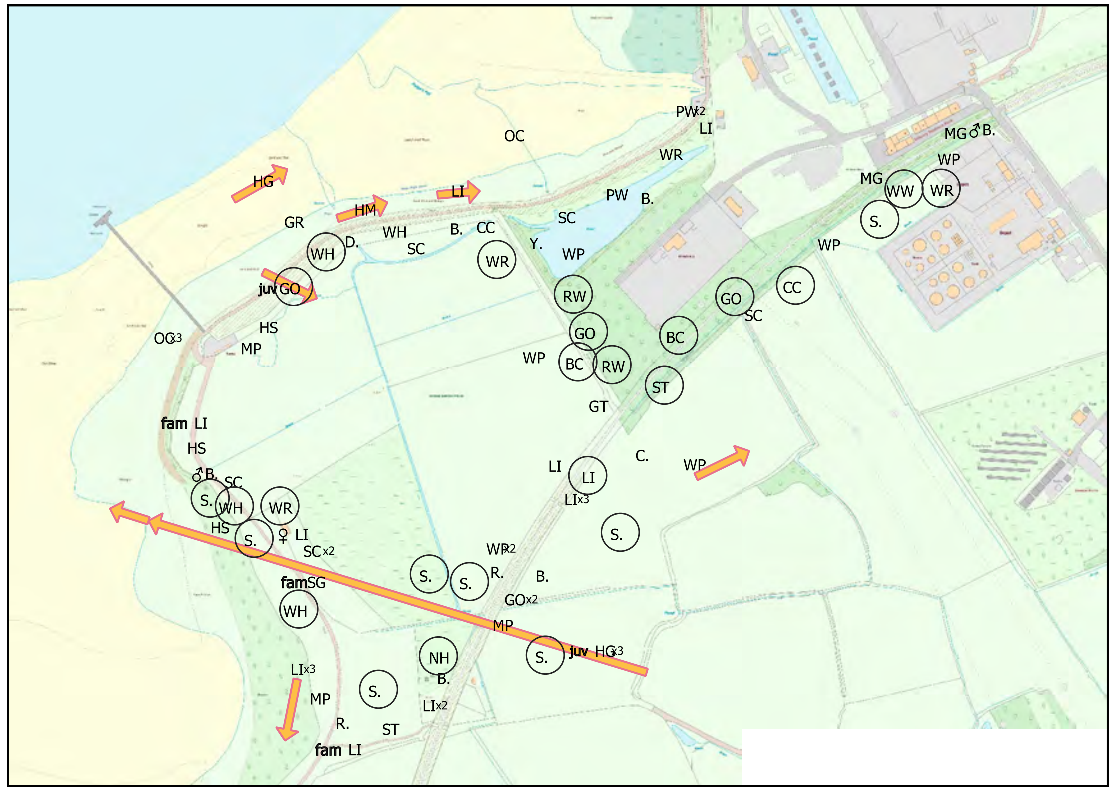
N

Appendix 1: The East Yelland bird transect maps.			
Project: White Cross Offshore Windfarm			
Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER

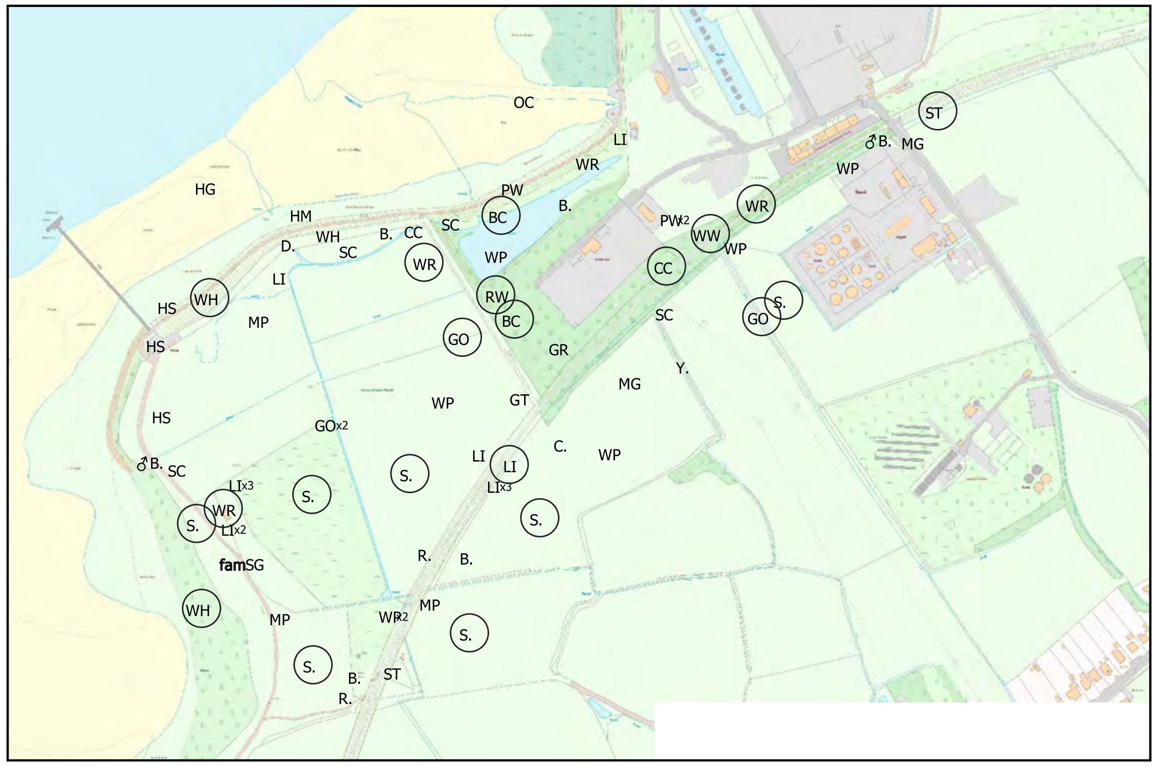
Yelland - 15 June 2022



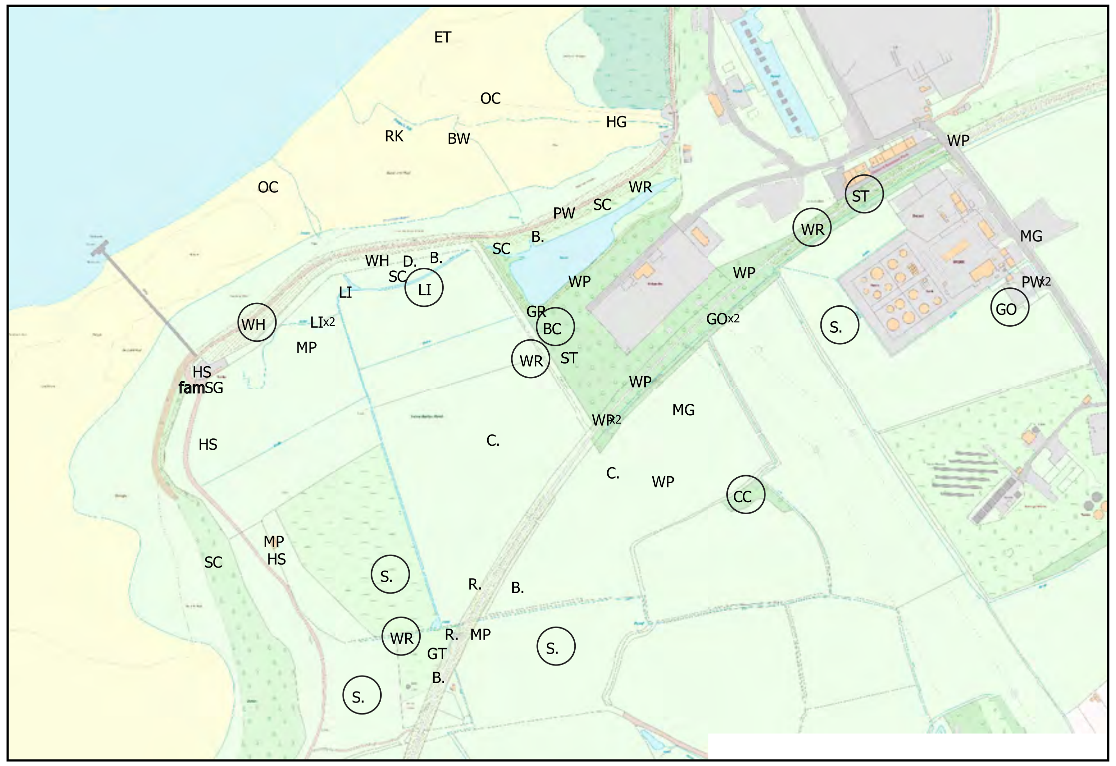
Yelland - 22 June 2022



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
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LW	Lesser whitethroat
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M.	Mistle thrush
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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

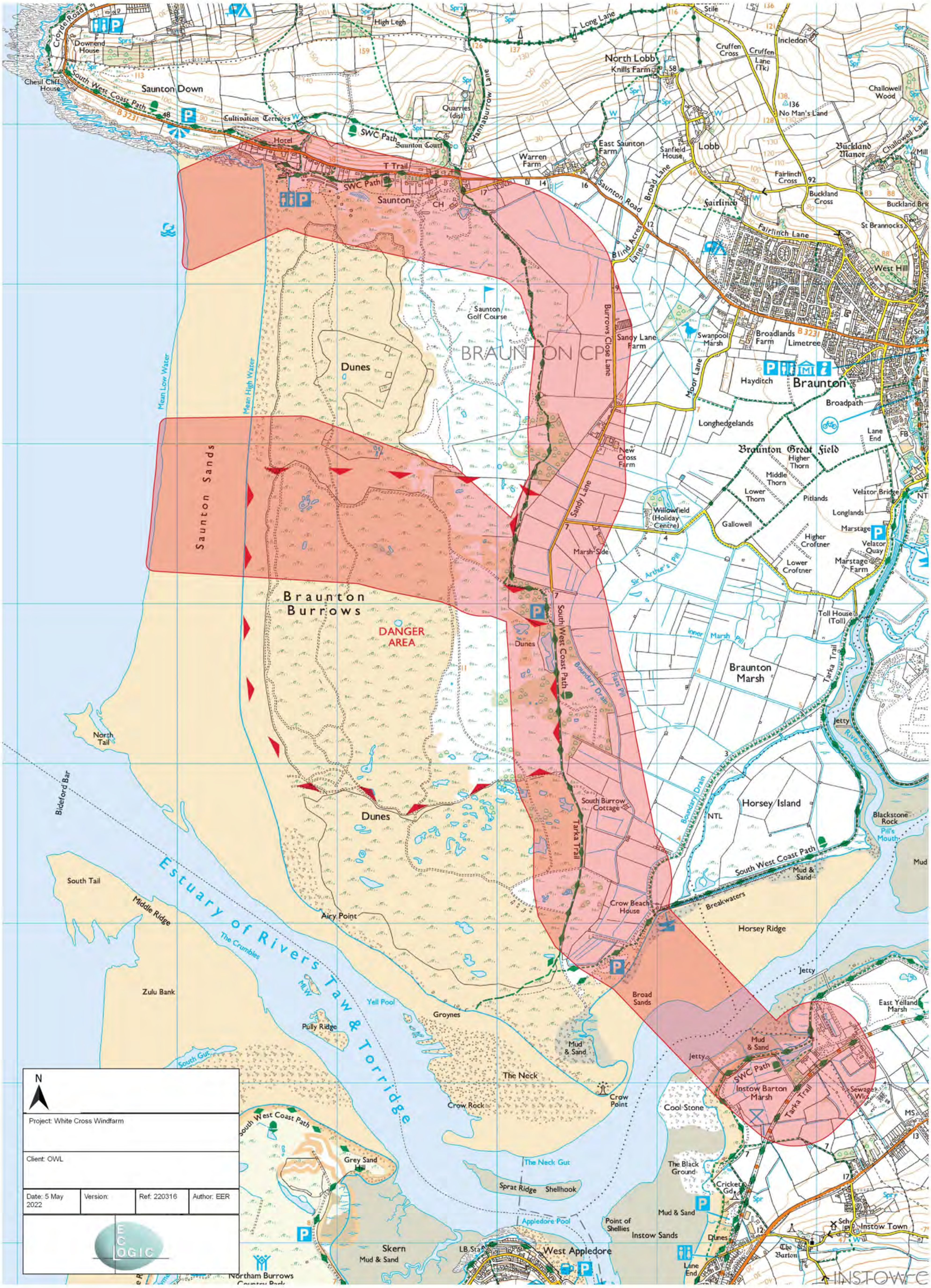
N

ECOLOGIC

Appendix 1: The East Yelland bird transect maps.

Project: White Cross Offshore Windfarm

Date: 23 September 2022	Version:	Ref: 220316 B	Author: EER



N

Project: White Cross Windfarm

Client: OWL

Date: 5 May 2022	Version:	Ref: 220316	Author: EER

ECOLOGIC

White Cross Offshore Windfarm Environmental Statement

Appendix 20.I: Great Crested Newt Survey: Habitat Suitability Index, eDNA & Population Class Assessment

Appendix 20.I Great Crested Newt Survey 2022
Habitat Suitability Index, eDNA & Population Class Assessment

White Cross Wind Farm
Braunton Burrows, Braunton Marsh & East Yelland
Devon

<table>
<tr><td>Report Reference:</td><td colspan="3">220313 GCN rev02</td></tr>
<tr><td>Client:</td><td colspan="3">Offshore Wind Ltd. (OWL)</td></tr>
<tr><td>Architect / Agent:</td><td colspan="3">Royal HaskoningDHV</td></tr>
<tr><td>Survey Date / s:</td><td colspan="3">HSI: 8th & 18th April 2022, eDNA: 28th & 29th April 2022
Population size class: May & June 2022</td></tr>
<tr><td>Report Date:</td><td>November 2022</td><td>OS Grid Ref:</td><td>SS 47933 32109
SS 46854 33424
SS 45734 34813
SS 45544 37296</td></tr>
<tr><td>Report Author:</td><td colspan="3">Erin Reardon BSc, PhD</td></tr>
<tr><td>Approved By:</td><td colspan="3">Andrew Charles BSc (Hons), MSc, MCIEEM</td></tr>
<tr><td rowspan="3">Surveyor / s & License N°:</td><td>Andrew Charles</td><td colspan="2">Great Crested Newt: 2016-20368-CLS-CLS</td></tr>
<tr><td>John Polley</td><td colspan="2">Great Crested Newt: 2015-18161-CLS-CLS</td></tr>
<tr><td>Erin Reardon</td><td colspan="2">Great Crested Newt: 2022-10583-CL08-GCN</td></tr>
<tr><td>Additional Surveyors</td><td colspan="3">Will Corbett, Paul Lott, Dominic Sheldon & Martin Clements</td></tr>
</table>

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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.

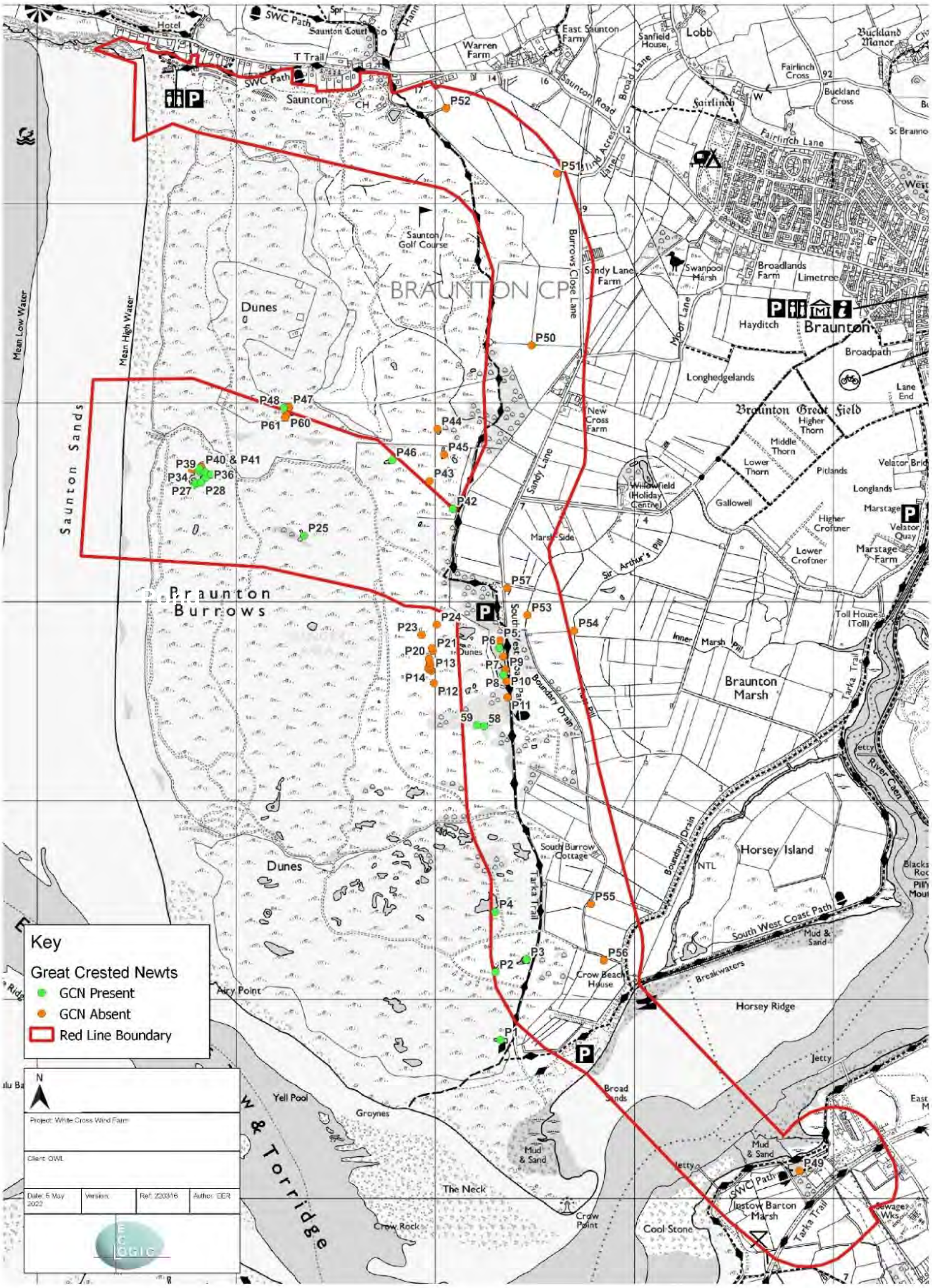

Figure 1-1. The survey area indicated with a red outline with numbered pond locations (orange circles = GCN absent; green circles = GCN present)

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.

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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 33


Pond 34

Pond 35


Pond 36


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**

	Survey method	POND NUMBER 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 20.J: Reptile Survey

Appendix 20.J 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

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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.

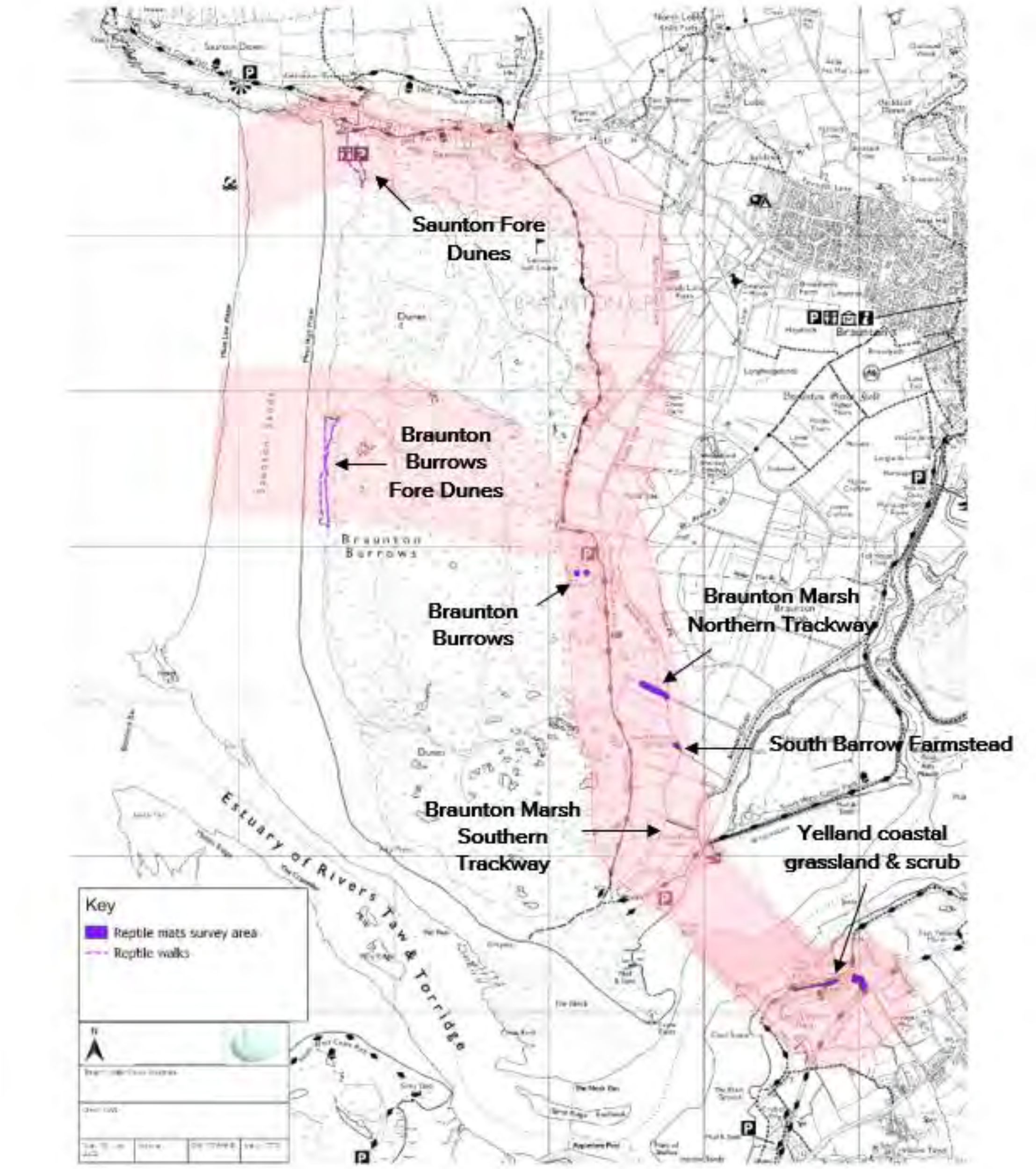

Figure 1-1. The proposed Onshore Export Cable Corridor routes indicated in red with reptile survey locations in purple

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

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WHITE CROSS

White Cross Offshore Windfarm Environmental Statement

Appendix 20.K: Terrestrial Invertebrate Survey

Appendix 20.K 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).

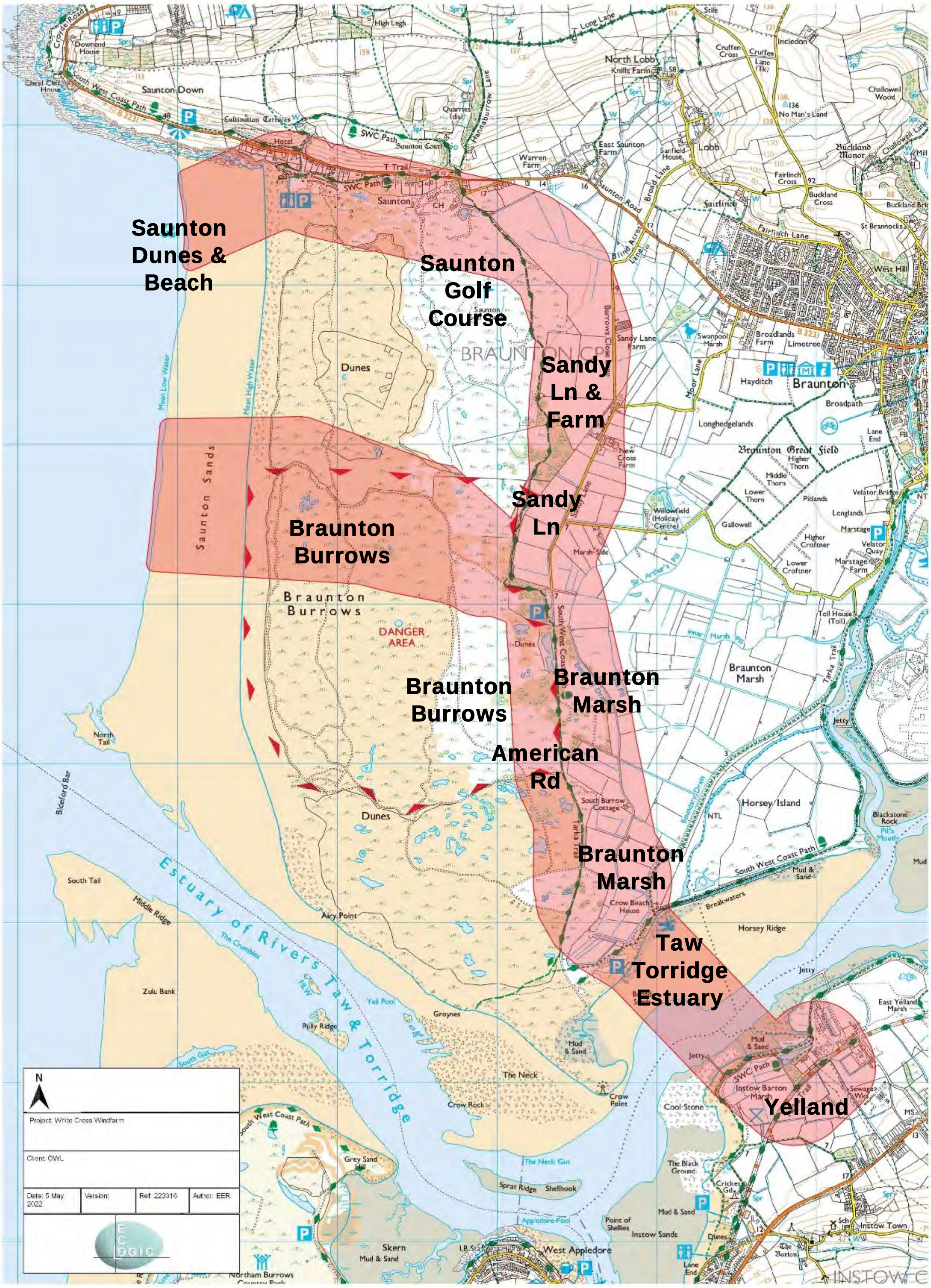


Figure 1-1 The proposed onshore cable corridor routes

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.

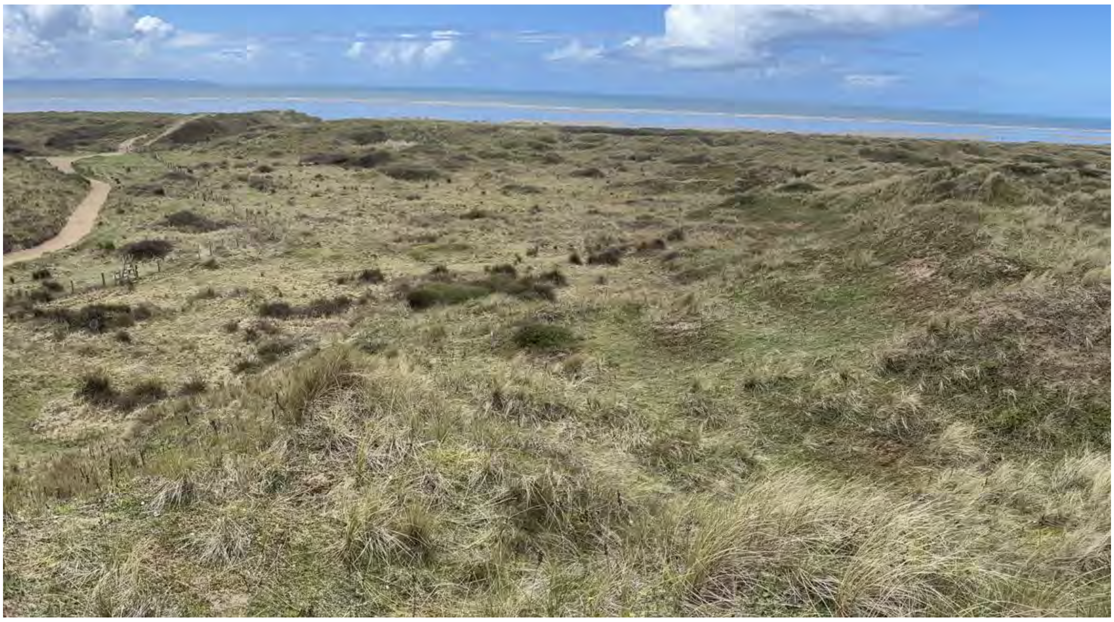
American Road continues north/south through the south-eastern extent of Braunton Burrows. A mosaic of mobile and fixed dune grassland, scrub, woodland and ditches further surround the road. Dune grassland to the east, comprised of more tightly grazed grassland with no public access. The dune grassland 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 Offshore Windfarm Environmental Statement

Appendix 20.L: Aquatic Macro-Invertebrate Survey

Appendix 20.L 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).

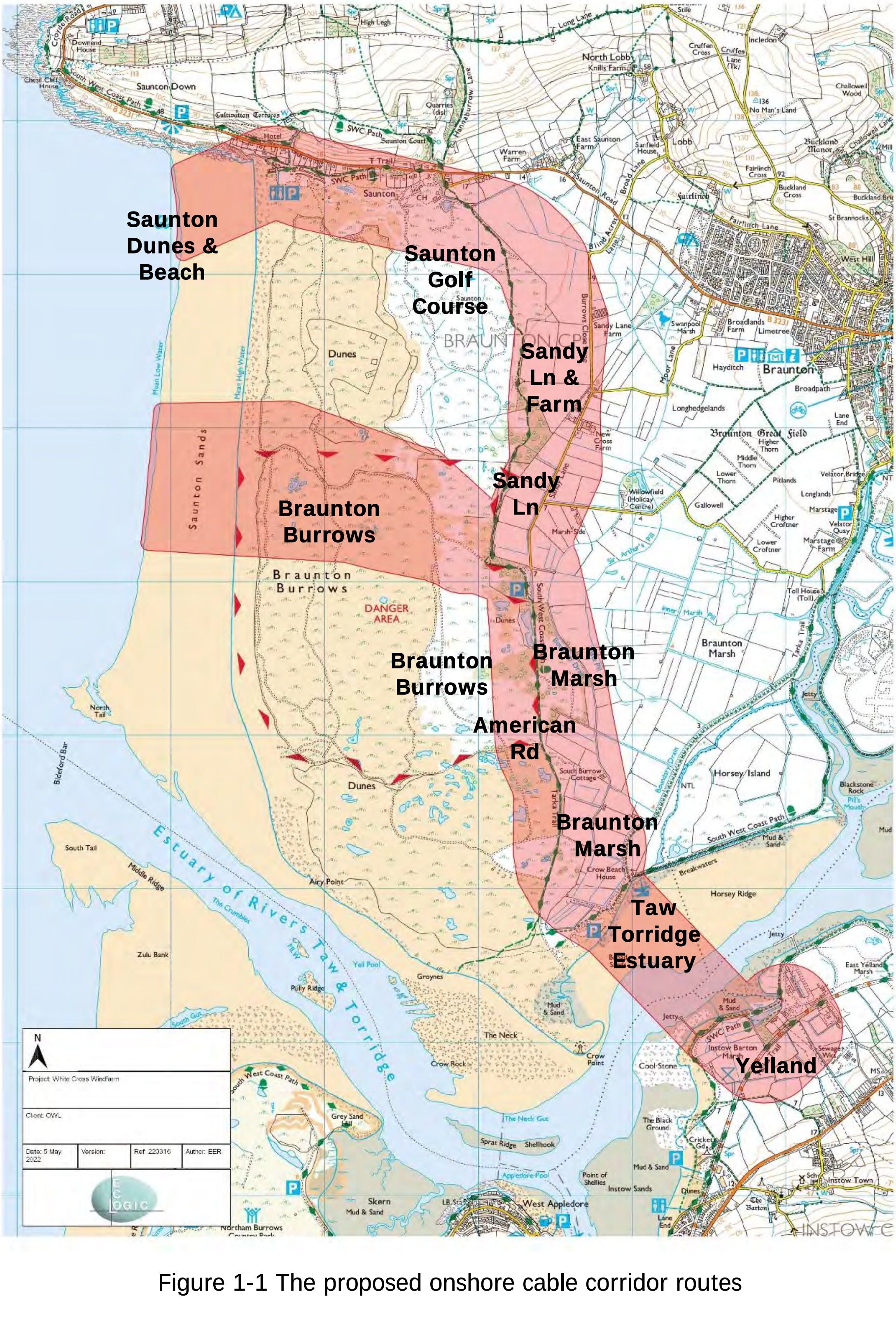

Figure 1-1 The proposed onshore cable corridor routes

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.

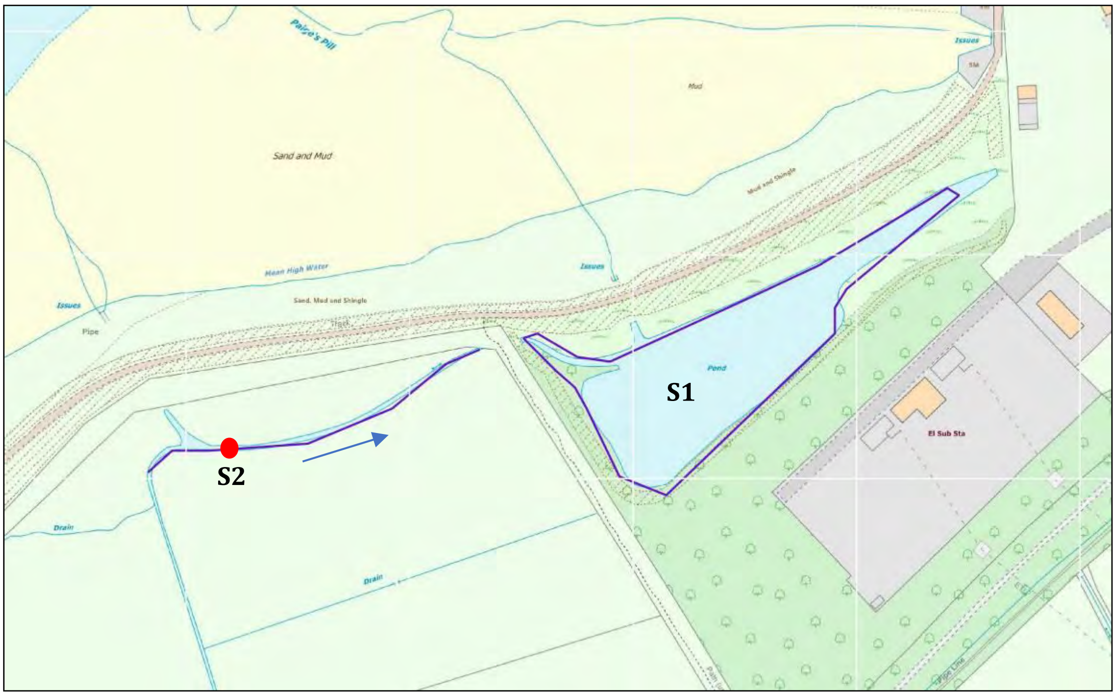

Figure 1-2: The locations of sampling sites at Yelland.

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).

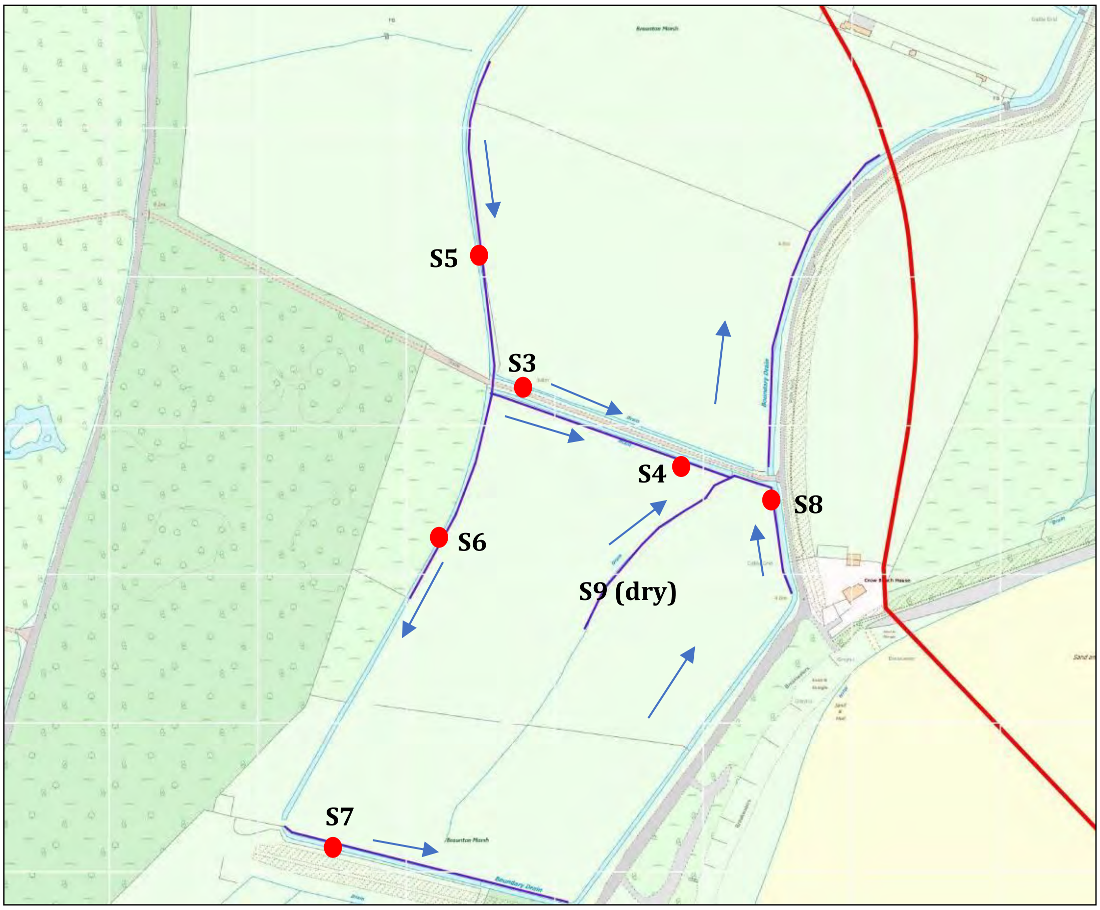

Figure 1-3: The locations of sampling transects on the southern part of Braunton Marsh (north of Crow Point).

Red dots indicate positions of transects and blue arrows predominant direction of drainage.

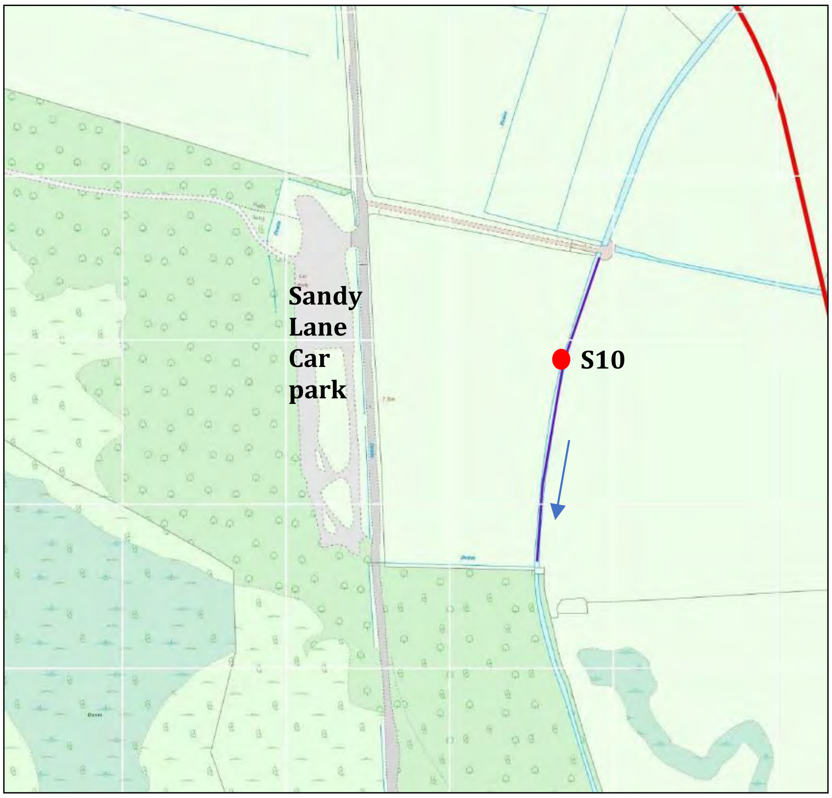

Figure 1-4: The location of Site S10 sampling transect on the Boundary Drain in the northern part of Braunton Marsh.

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).

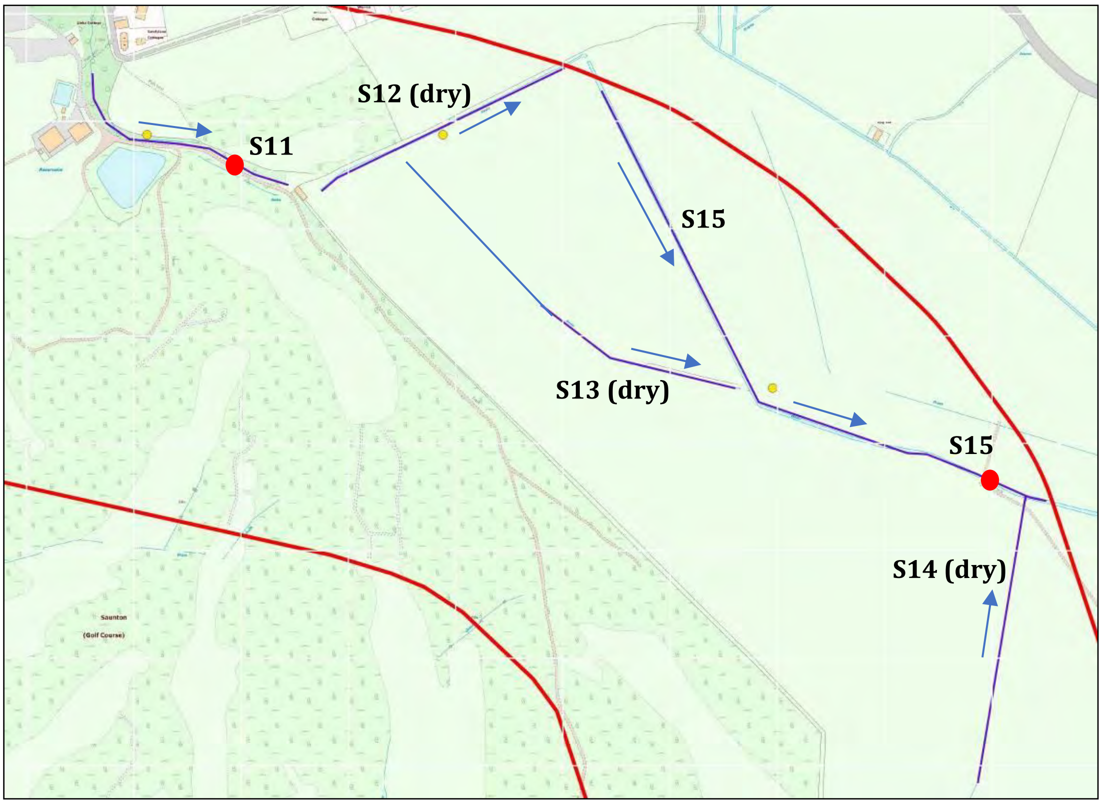

Figure 1-5: The locations of watercourses and sampling transects at Saunton Golf Course & Sandy Lane Farm.

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.

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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)	2 (33-66%)
Sand, gravel, cobbles (1-3)	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)	12
Number of uncommon plant species	2
Trophic Ranking Score (TRS)	8.2
Invertebrate metrics	
ASPT	4.5
Odonata + Megaloptera (OM) families	0
Coleoptera families	0
Community Conservation Index (CCI)	1.2
Average Conservation Score (CS)	1.2
Community Score (CoS)	1
Conservation Interest	**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

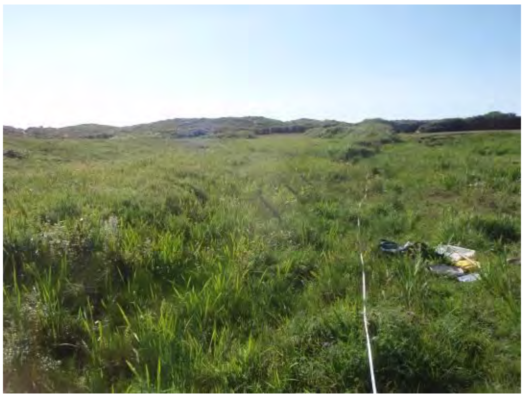

S2: West (upstream) end of transect looking east (left photo), and east (downstream) end of transect looking west (right photo)


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 20.M: National Vegetation Classification

Appendix 20.M 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.

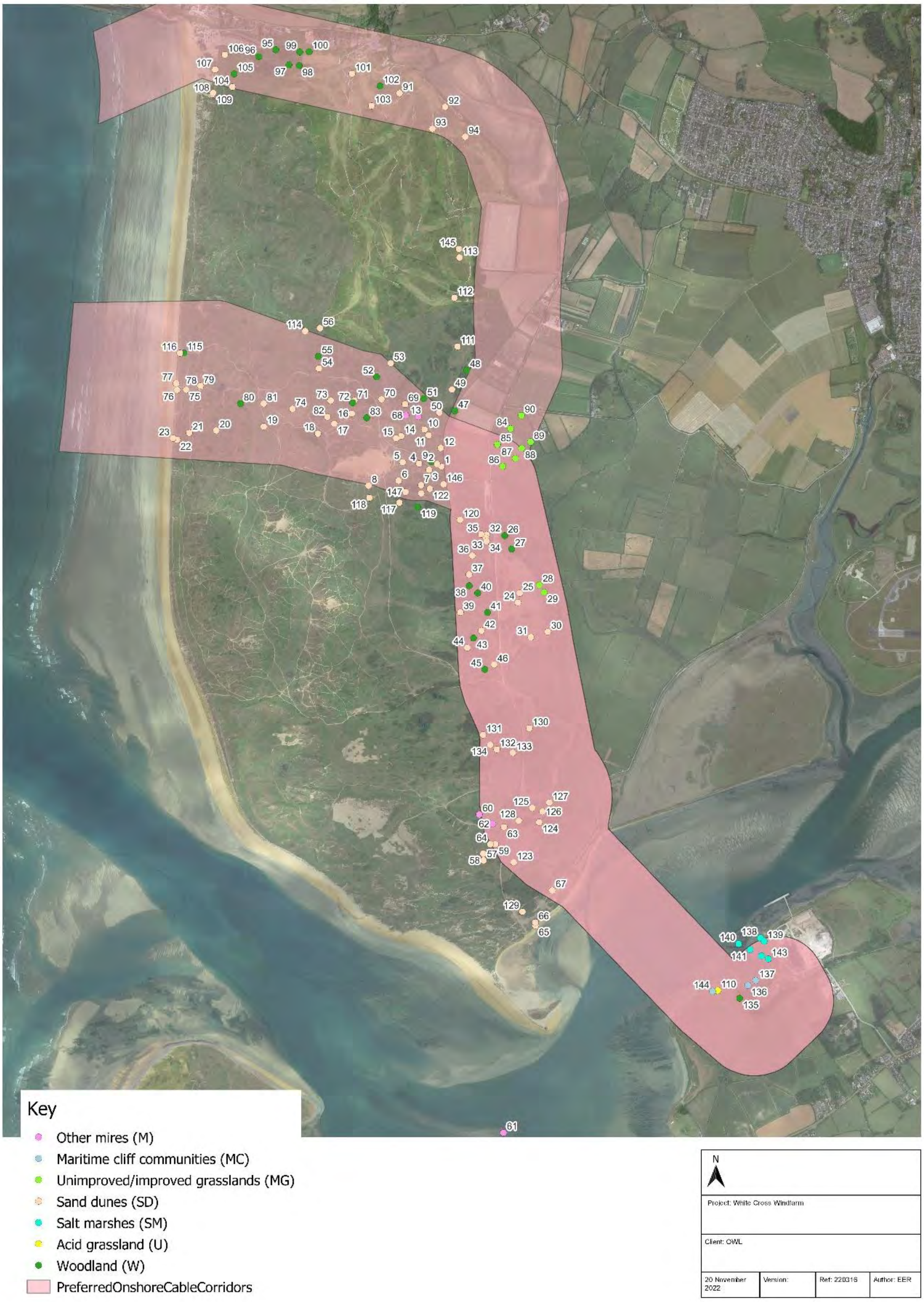

Figure 1.1. The terrestrial botanical quadrat survey locations within the proposed Onshore Cable Corridors for The Project. Point numbers represent quadrat numbers as detailed in Appendix 1.

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.

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https://www.ceh.ac.uk/services/modular-analysis-vegetation-information-system-mavis

Appendix 1. Quadrat Locations

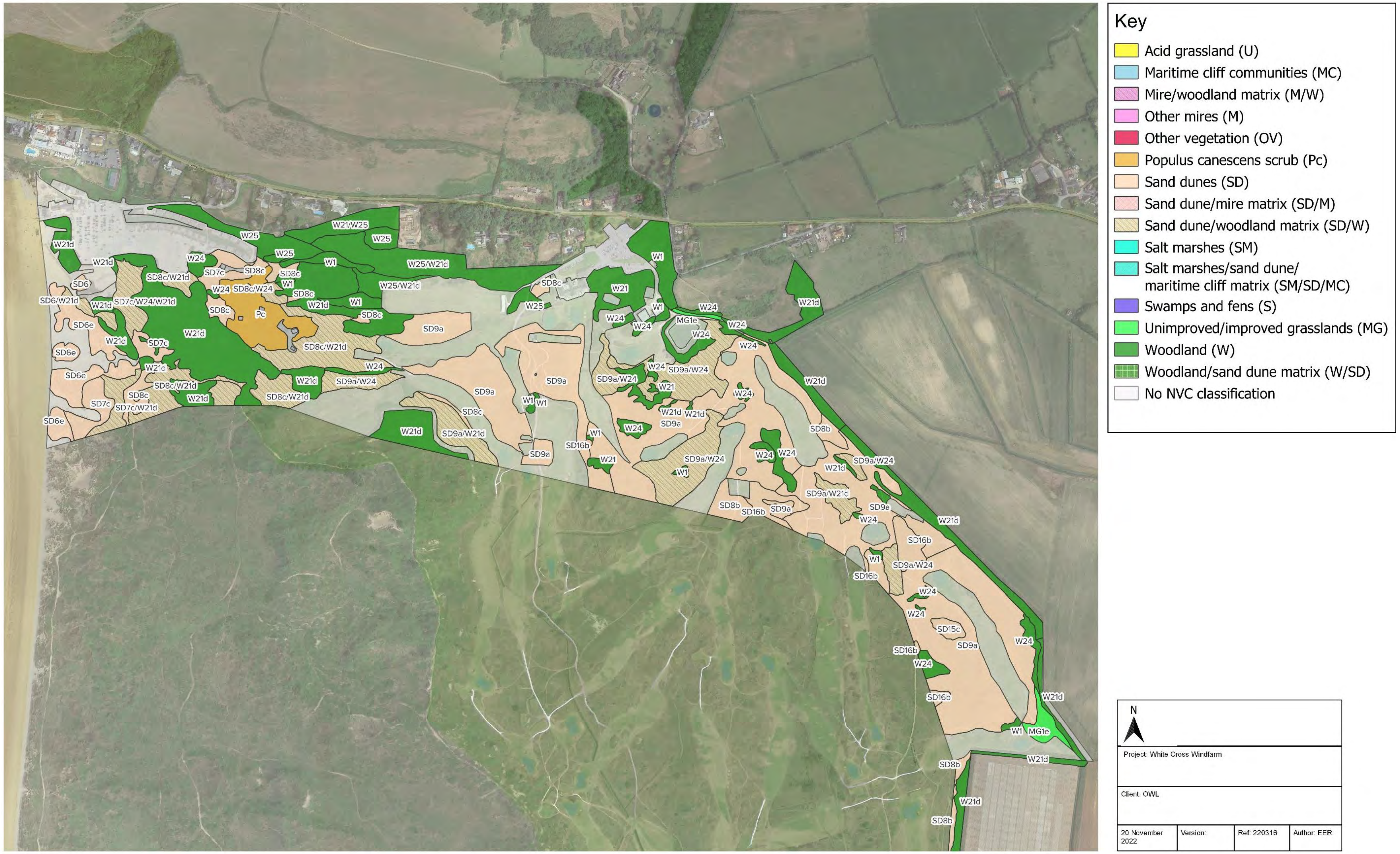
Number	NVC	Section	Grid Reference
1	SD8b	5	SS4605935168
2	SD8b	5	SS4603435182
3	SD15d	5	SS4598835149
4	SD15c	5	SS4593035184
5	SD15d	5	SS4583635193
6	SD8c	5	SS4581335086
7	SD15d	5	SS4594235060
8	SD7c	5	SS4563935057
9	W1	5	SS4600035195
10	SD7c	3	SS4596235381
11	SD15d	3	SS4598535348
12	SD8b	3	SS4605535274
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

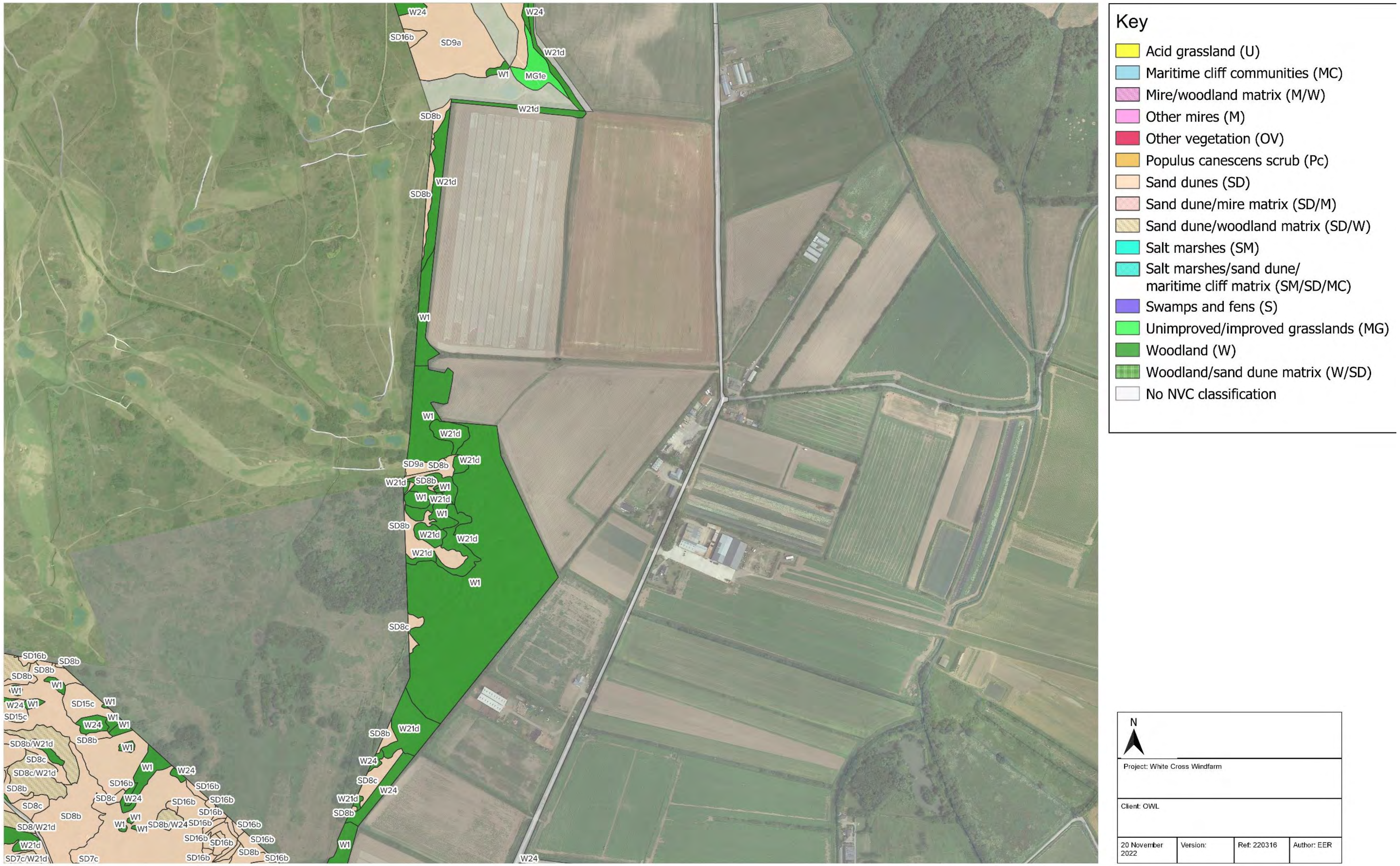
Number	NVC	Section	Grid Reference
98	W21d	1	SS4523937478
99	W25	1	SS4524337556
100	W25	1	SS4529737558
101	SD9a	2	SS4554437431
102	W21d	2	SS4570637360
103	SD9a	2	SS4565737246
104	SD7c	1	SS4485437355
105	W21d	1	SS4486437430
106	SD6e	1	SS4481137540
107	SD6e	1	SS4475537455
108	SD6e	1	SS4474137314
109	SD7c	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

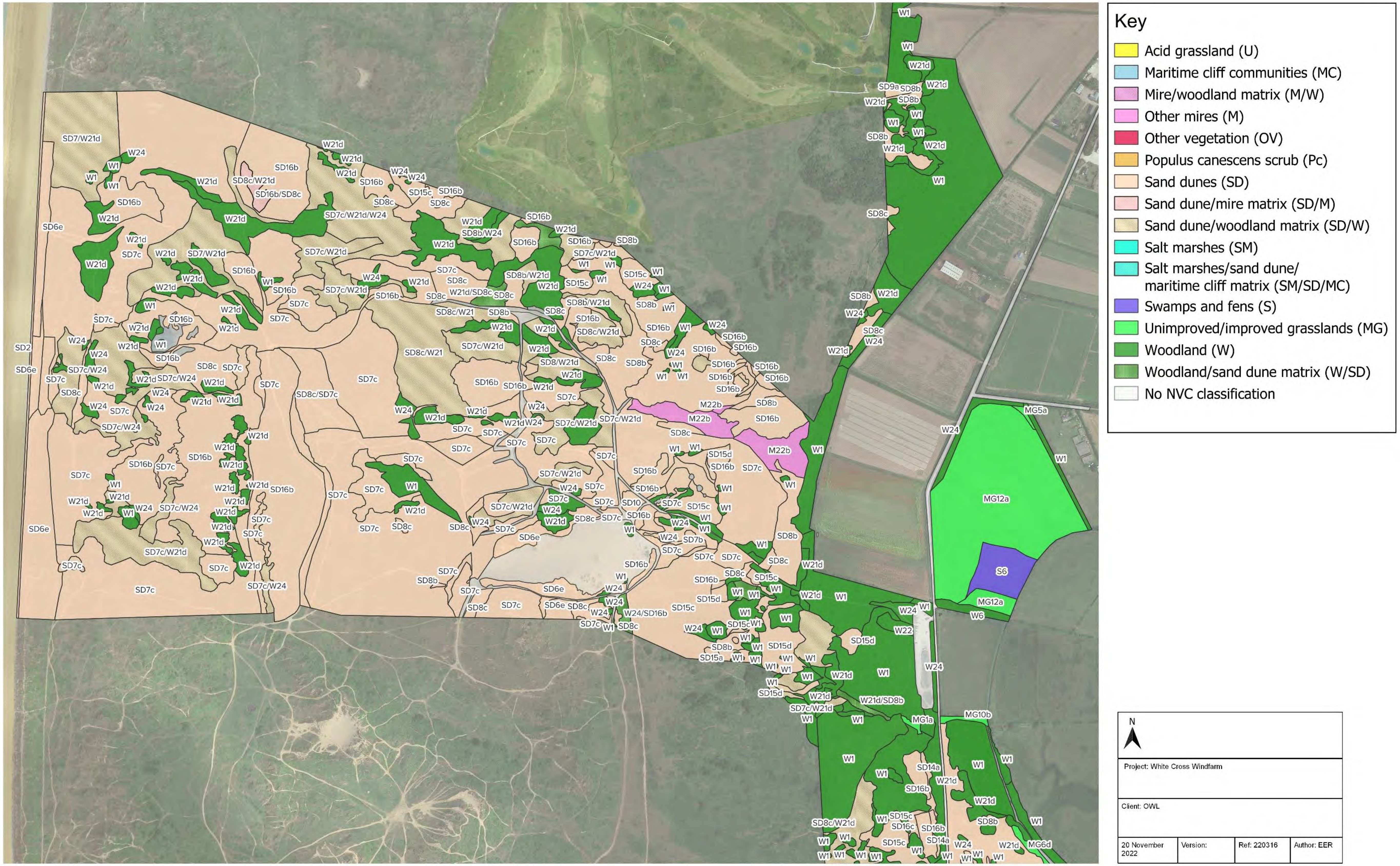
Map 1: Saunton Sands area



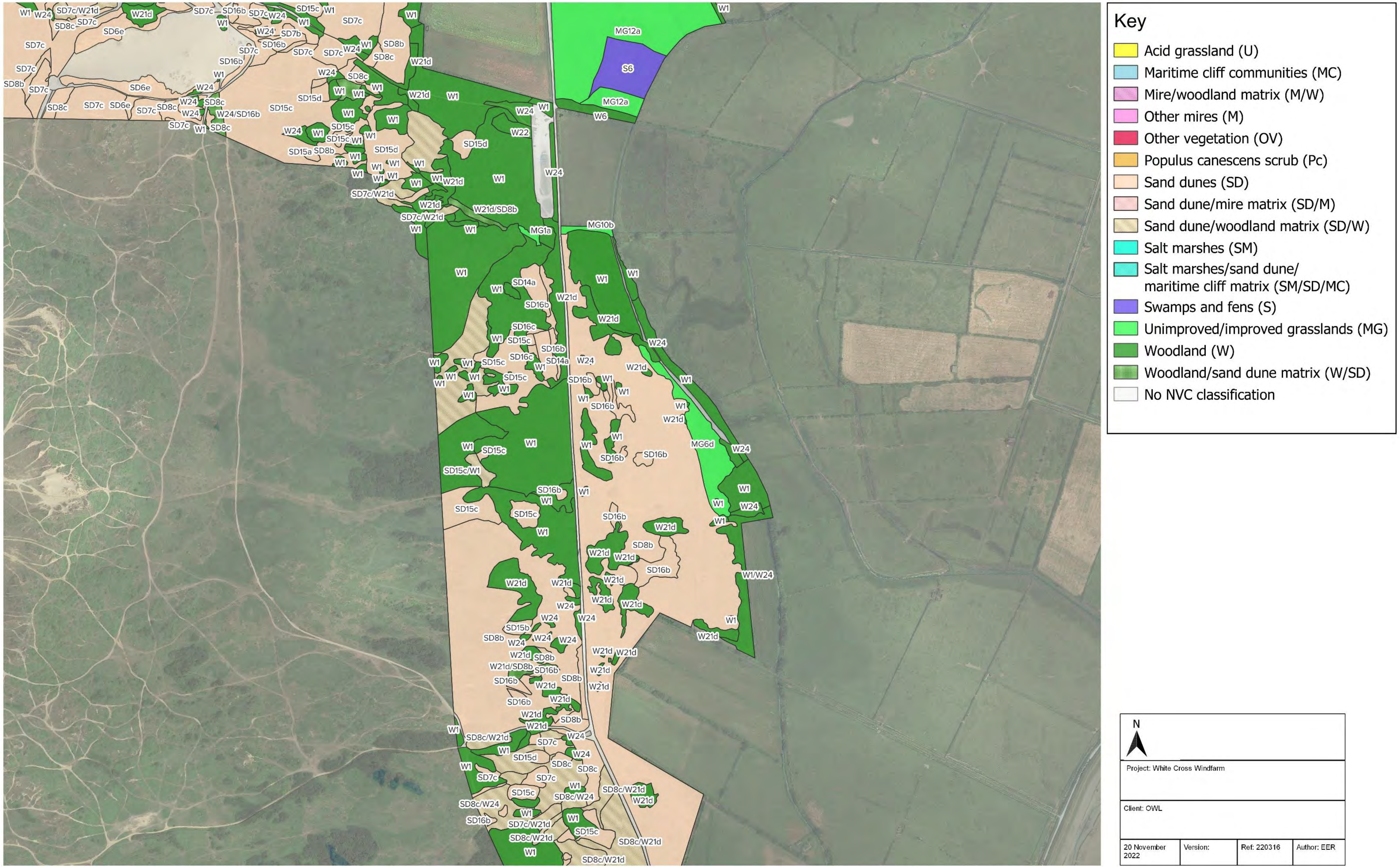
Map 2: Sandy Lane Farm area



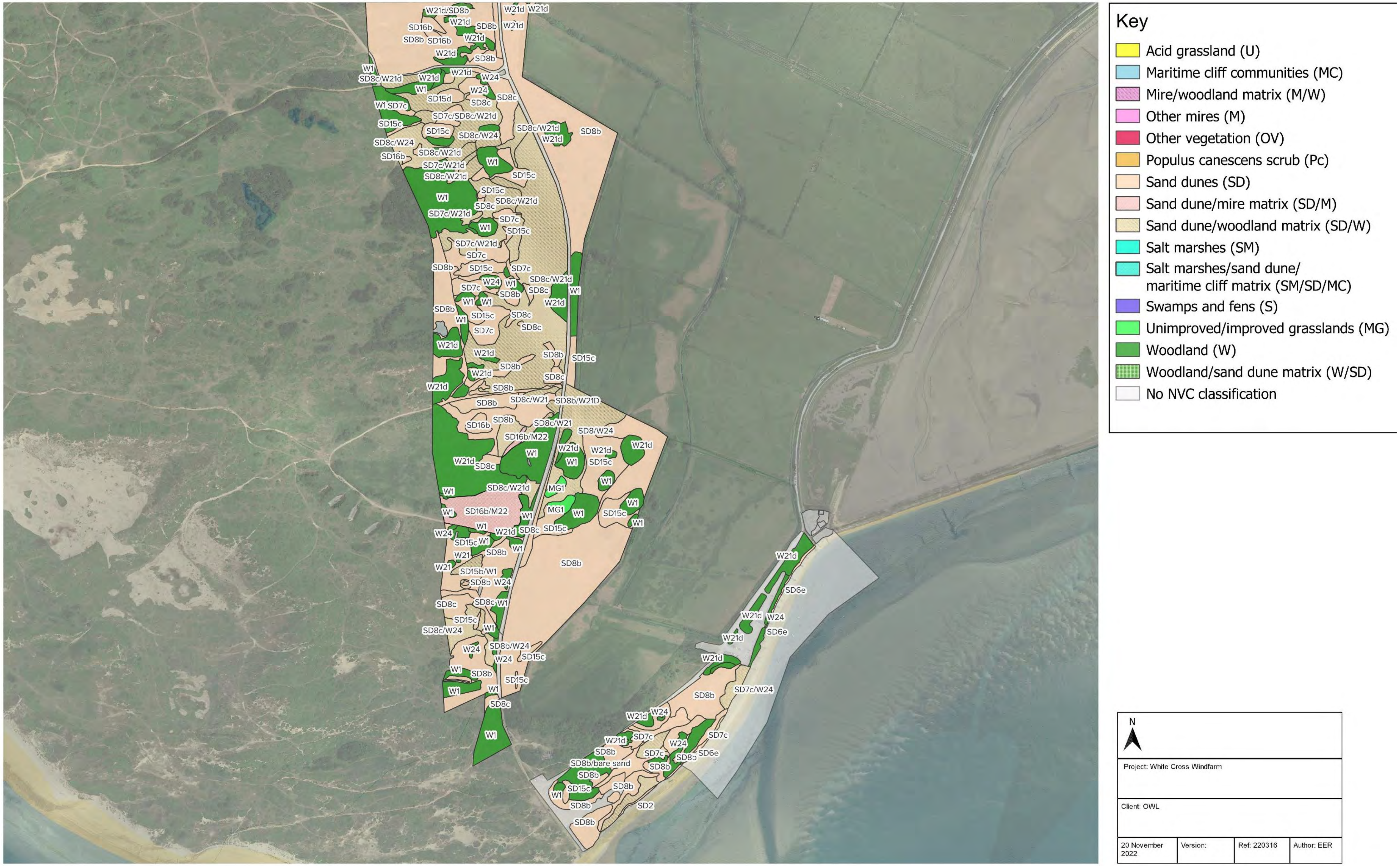
Map 3: Braunton Burrows central dune area



Map 4: American Road northern area



Map 5: American Road southern area



Map 6: East Yelland

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 20.N: Aquatic Vegetation Survey

Appendix 20.N 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)
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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).

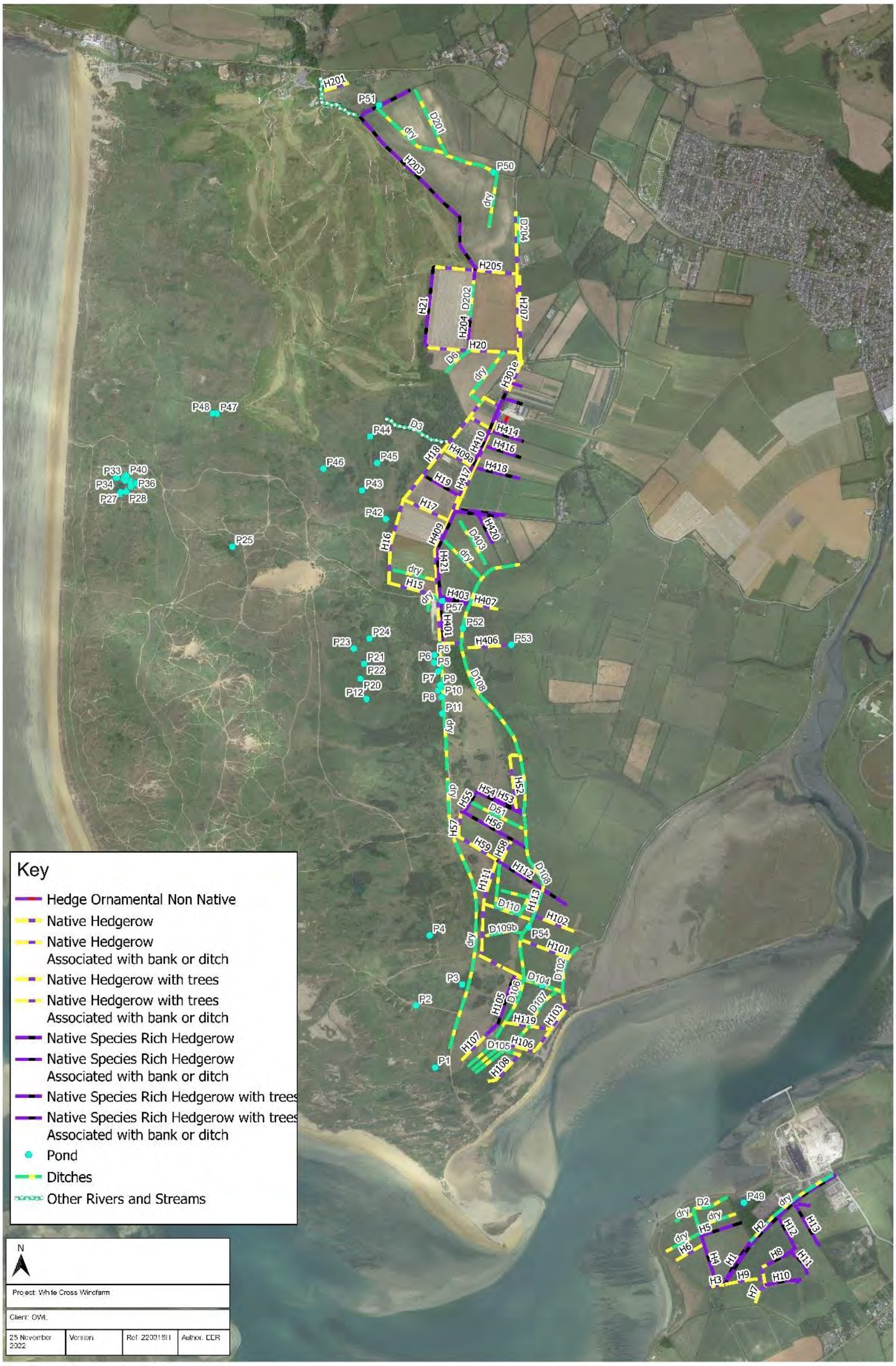


Figure 1.1. The surveyed aquatic locations within the proposed Onshore Cable Corridors for the Project.

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	
D102	SS 47089 33415	Adjacent road, channel bank 3 m, water 1 m deep & 2 m wide, salinity index 3 Endgroup A7a & E5		bramble	*Rubus fruticosus agg.*	F	
				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.

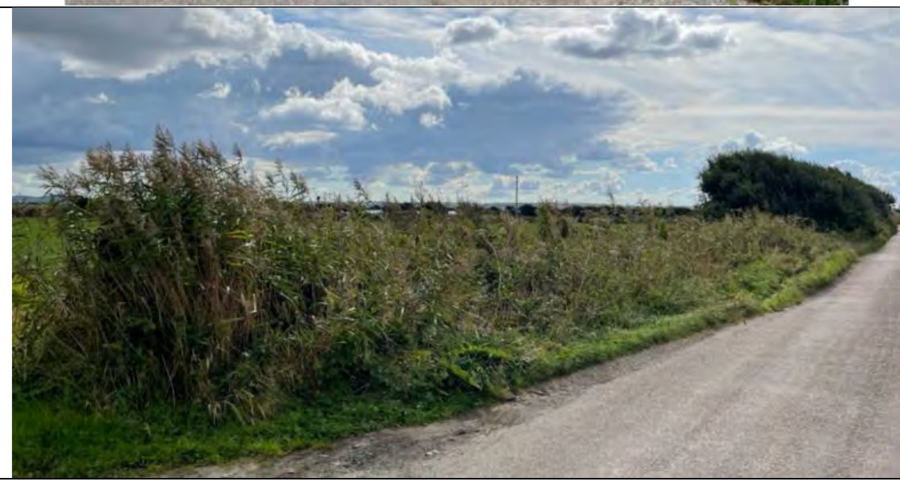
Ditch or Stream Ref (D or S)	Grid Reference	Description / Endgroup	Associated hedge	Common name	Latin name	DAFOR	Photo
				nettle	*Urtica dioica*	F	
D206	SS 46740 36335	Channel 10 m wide Endgroup E4	H210	bramble	*Rubus fruticosus agg.*	F	
				broadleaved dock	*Rumex obtusifolius*	O	
				comfrey	*Symphytum 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 soft rush yellow flag iris	*Salix caprea* *Juncus effusus* *Iris pseudacorus*	F O A	
D407	SS 46525 35047	Water 0.5 m deep, channel 3 m wide Endgroup E2	H407	broadleaved willowherb fool's watercress horsetail watercress yellow flag iris	*Epilobium montanum* *Apium nodiflorum* *Equisetum sp.* *Rorippa nasturtium-aquaticum* *Iris pseudacorus*	F A A F 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.

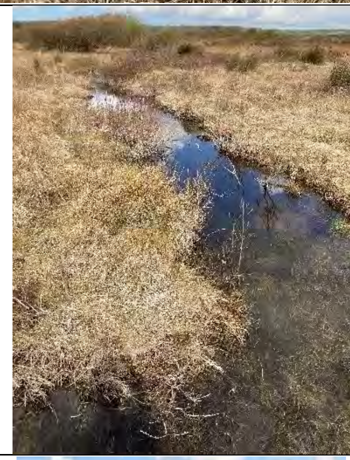
Pond	Grid reference	Description	Common name	Latin name	DAFOR	Photo
P18	SS 45969 34683	Shallow, irregularly shaped depression within dune grassland	silver weed	*Potentilla anserina*	O	
			creeping willow	*Salix repens*	O	
			sharp rush	*Juncus acutus*	O	
P19	SS 45969 34695	Shallow, irregularly shaped 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.

<table>
<tr><th>Pond</th><th>Grid reference</th><th>Description</th><th>Common name</th><th>Latin name</th><th>DAFOR</th><th>Photo</th></tr>
<tr><td rowspan="5">P36</td><td rowspan="5">SS 44871 35637</td><td rowspan="5">Shallow pond forms part of a pond complex within Partridge slack</td><td>sharp rush</td><td>Juncus acutus</td><td>O</td><td rowspan="5"></td></tr>
<tr><td>pond weed</td><td>Potamogeton sp.</td><td>O</td></tr>
<tr><td>water mint</td><td>Mentha aquatica</td><td>O</td></tr>
<tr><td>spear moss</td><td>Calliergonella cuspidata</td><td>O</td></tr>
<tr><td>creeping cinquefoil</td><td>Potentilla reptans</td><td>O</td></tr>
<tr><td rowspan="8">P37</td><td rowspan="8">SS 44875 35645</td><td rowspan="8">Shallow pond forms part of a pond complex within Partridge slack</td><td>club rush</td><td>Schoenoplectus lacustris</td><td>O</td><td rowspan="8"></td></tr>
<tr><td>water mint</td><td>Mentha aquatica</td><td>F</td></tr>
<tr><td>creeping cinquefoil</td><td>Potentilla reptans</td><td>O</td></tr>
<tr><td>creeping thistle</td><td>Cirsium arvense</td><td>O</td></tr>
<tr><td>marsh pennywort</td><td>Hydrocotyle vulgaris</td><td>F</td></tr>
<tr><td>sharp rush</td><td>Juncus acutus</td><td>O</td></tr>
<tr><td>pond weed</td><td>Potamogeton sp.</td><td>F</td></tr>
<tr><td>spear moss</td><td>Calliergonella cuspidata</td><td>F</td></tr>
<tr><td>P38</td><td>SS 44878 35638</td><td>Shallow pond forms part of a pond complex within Partridge slack</td><td>sharp rush</td><td>Juncus acutus</td><td>O</td><td></td></tr>
</table>

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			

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