~~MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS~~

~~Environmental Statement~~

~~Volume 3, Annex 3.3: Phase 1 habitat, national vegetation classification and hedgerow survey technical report~~

Deadline: Deadline ~~2~~5
Application Reference: EN020028

MOR001-FLO-CON-ENV-RPT-0056
MRCNS-J3303-RPS-10108

APFP Regulations: 5(2)(a)
Document reference: J3.3.3/~~F02~~F03
~~5 June~~22 September 2025

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Document status					
Version	**Purpose of document**	**Approved by**	**Date**	**Approved by**	**Date**
ES	For issue	AS	September 2024	IM	September 2024
F02	Deadline 2	HK	June 2025	~~HK~~IM	June 2025
F03	Deadline 5	GL	September 2025	IM	September 2025

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Glossary

Term	Meaning
400 kV grid connection cables	Cables that will connect the proposed onshore substations to the existing National Grid Penwortham substation.
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Baseline	The status of the environment without the Transmission Assets in place.
Biodiversity benefit	An approach to development that leaves biodiversity in a better state than before. Where a development has an impact on biodiversity, developers are encouraged to provide an increase in appropriate natural habitat and ecological features over and above that being affected.
Domin scale	A measure of percentage cover per plant species within a survey quadrat.
Evidence Plan Process	A voluntary consultation process with specialist stakeholders to agree the approach to, and information to support, the Environmental Impact Assessment and Habitats Regulations Assessment processes for certain topics.
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Expert Working Group	A forum for targeted engagement with regulators and interested stakeholders through the Evidence Plan Process.
Export cable corridor	The specific corridor of seabed (seaward of Mean High Water Springs) and land (landward of Mean High Water Springs) from the Generation Assets to the National Grid Penwortham substation.
Ground flora	Usually the lowest level of vegetation recorded in layered vegetation, typically woodland.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
Morecambe OWL	Morecambe Offshore Windfarm Limited is ~~a joint venture between Zero-E Offshore Wind S.L.U. (Spain) (a Cobra group company) (Cobra) and Flotation Energy Ltd.~~owned by Copenhagen Infrastructure Partners' (CIP) fifth flagship fund, Copenhagen Infrastructure V (CI V).

Term	Meaning
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substations.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.
Onshore Infrastructure Area	The area within the Transmission Assets Order Limits landward of Mean High Water Springs. Comprising the offshore export cables from Mean High Water Springs to the transition joint bays, onshore export cables, onshore substations and 400 kV grid connection cables, and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses. Those parts of the Transmission Assets Order Limits proposed only for ecological mitigation/biodiversity benefit are excluded from this area.
Onshore Order Limits	See Transmission Assets Order Limits: Onshore (below).
Onshore substations	The onshore substations will include a substation for the Morgan Offshore Wind Project: Transmission Assets and a substation for the Morecambe Offshore Windfarm: Transmission Assets. These will each comprise a compound containing the electrical components for transforming the power supplied from the generation assets to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.
Order limits	The limits within which the Transmission Assets may be carried out.
Preliminary Environmental Information Report	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
Protected species	A species of animal or plant which it is forbidden by law to harm or destroy.
Quadrat	Typically square areas of a defined size within which vegetation in a plant community is recorded.
Understorey	The typically shrubby component of woodland vegetation, between the canopy and ground flora layers.
Study area	This is an area which is defined for each environmental topic which includes the Transmission Assets Order Limits as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each topic is intended to cover the area within which an impact can be reasonably expected.
Survey area	The area within which each survey has been undertaken. This may differ from the Study Area as a Survey Area will be based on species or survey-specific guidance on the extent of survey required, which may be limited by, for example, habitat conditions, or be defined in terms of buffer areas around an area of potential impact.

Term	Meaning
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning.
Transmission Assets Order Limits: Onshore	The area within which all components of the Transmission Assets landward of Mean High Water Springs will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds). Also referred to in this report as the Onshore Order Limits, for ease of reading.

Acronyms

Acronym	Meaning
BHS	Biological Heritage Site
BSBI	Botanical Society of Britain and Ireland
ES	Environmental Statement
EWG	Expert Working Group
FISC	Field Identification Skills Certificate
GWDTE	Groundwater Dependent Terrestrial Ecosystem
INNS	Invasive Non-Native Species
JNCC	Joint Nature Conservation Committee
LNR	Local Nature Reserve
MAVIS	Modular Analysis of Vegetation Information System
NVC	National Vegetation Classification
PEIR	Preliminary Environmental Information Report
SSSI	Site of Special Scientific Interest
TN	Target Note
UK	United Kingdom

Units

Unit	Description
%	Percentage

Unit	Description
cm	Centimetres
ha	Hectares
km	Kilometres
kV	Kilovolt
M	Metres

1 Phase 1 habitat survey, national vegetation classification and hedgerow survey technical report

1.1 Introduction

1.1.1 Overview

1.1.1.1 This document forms Volume 3, Annex 3.3: Phase 1 habitat, national vegetation classification and hedgerow survey technical report of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as the Transmission Assets). The ES presents the findings of the Environmental Impact Assessment (EIA) process for the Transmission Assets.

1.1.1.2 Phase 1 habitat survey is a field survey technique used to rapidly classify and map semi-natural vegetation and other wildlife habitats located within or near a proposed development site.

1.1.1.3 Hedgerow surveys are used to classify hedgerows as to whether they are 'important' or 'not important' as defined in the Hedgerow Regulations 1997 ('the Hedgerow Regulations). 'Important' hedgerows are considered to be of greater ecological importance than 'not important' hedgerows.

1.1.1.4 National Vegetation Classification (NVC) surveys enables comparison of data on plant communities with reference samples as described in British Plant Communities volumes 1-5 (Rodwell, 1991a; 1991b; 1992; 1995; 2000), which allows data on vegetation to be described and evaluated in a standardised way.

1.1.1.5 This document presents and characterises the results of phase 1 habitat, hedgerow and NVC surveys undertaken as part of the ES for the Transmission Assets. These results provide a basis for describing the extent, distribution, and ecological importance of habitats, hedgerows and vegetation communities within and in proximity to the Transmission Assets. Figures and summary tables and are provided for phase 1 habitats, along with separate figures and tables showing hedgerows and watercourses.

1.1.1.6 This document has been updated to respond to Natural England Relevant Representation (RR-1601 1601.G.19) which requested a figure showing the locations of each of the NVC survey sites based on the X, Y coordinates. The Applicants confirm that the findings of the survey presented in this annex remain unchanged.

1.1.1.7 This document has been updated at Deadline 5 to respond to Natural England (Appendix K4- Risk and Issues Log, RI_G14 REP4-139). Clarification was requested in relation to confirming who undertook which of the surveys referenced in the report, and when they were undertaken, i.e., providing a clear reference to the 2024 NVC surveys, and the older NVC survey undertaken by Skelcher in 2016 (which is shown in **Figure 1.4**).

1.1.1.8 The Deadline 5 updates also respond to the request from Natural England (Appendix K4- Risk and Issues Log, RI_G1 REP4-139) to update the NVC

mapping of the Lytham St Annes Dunes Site of Special Scientific Interest (SSSI) and Local Nature Reserve (LNR) as well as to complete a baseline NVC survey and NVC mapping of the St Anne's Old Links Golf Course Biological Heritage Site (BHS) (provided in **Appendix D** and **Appendix E**).The NVC survey was undertaken by a botanical specialist with a level six Field Identification Skills Certificate (FISC) from the Botanical Society of Britain and Ireland (BSBI).

1.1.2 Study area

1.1.2.1 The study area is intended to cover the area within which an impact can be reasonably expected to occur and describes the geographical extent subject to desk-based research.

1.1.2.2 The study area is the area subject to desk based research for habitats and comprises the Onshore Order Limits and a 2 kilometre (km) buffer (hereafter referred to as the 'study area'). The buffer is considered the industry standard and appropriate zone of influence for the Transmission Assets.

1.1.2.3 The location and geographic extent of the study area is presented in Volume 3, Annex 3.1: Onshore ecology desk study technical report of the ES.

1.1.3 Survey area

1.1.3.1 The survey area is defined as the area within which each survey has been undertaken and is based on species or site-specific guidance on the extent of survey required. The survey area for phase 1 habitat, NVC and hedgerow surveys (hereafter referred to as the 'survey area') is defined as a 150 metre (m) buffer around the Onshore Order Limits, as shown in **Figure 1.1**.

1.1.3.2 The buffer of 150 m was chosen to provide an appropriate level of contextual habitat data adjacent to the Onshore Order Limits, in order to ensure that the ES is accurately informed with data from within the Transmission Assets Order Limits (i.e. that may be subject to direct impacts) and data from outside the Transmission Assets Order Limits (i.e. that may be subject to indirect impacts).

1.1.3.3 For the purposes of this technical report and for ease of reference, the survey area has been separated into sections. The location and extent of the sections are shown in **Figure 1.1** and comprise: section 1, section 2, section 3, section 4, section 5, section 6, section 7a and section 7b.

1.1.3.4 These sections were informed through discussions with the Applicants and allowed the location of ecological features to be more accurately described in relation to the Onshore Order Limits, to facilitate the description of the baseline conditions and assessment.

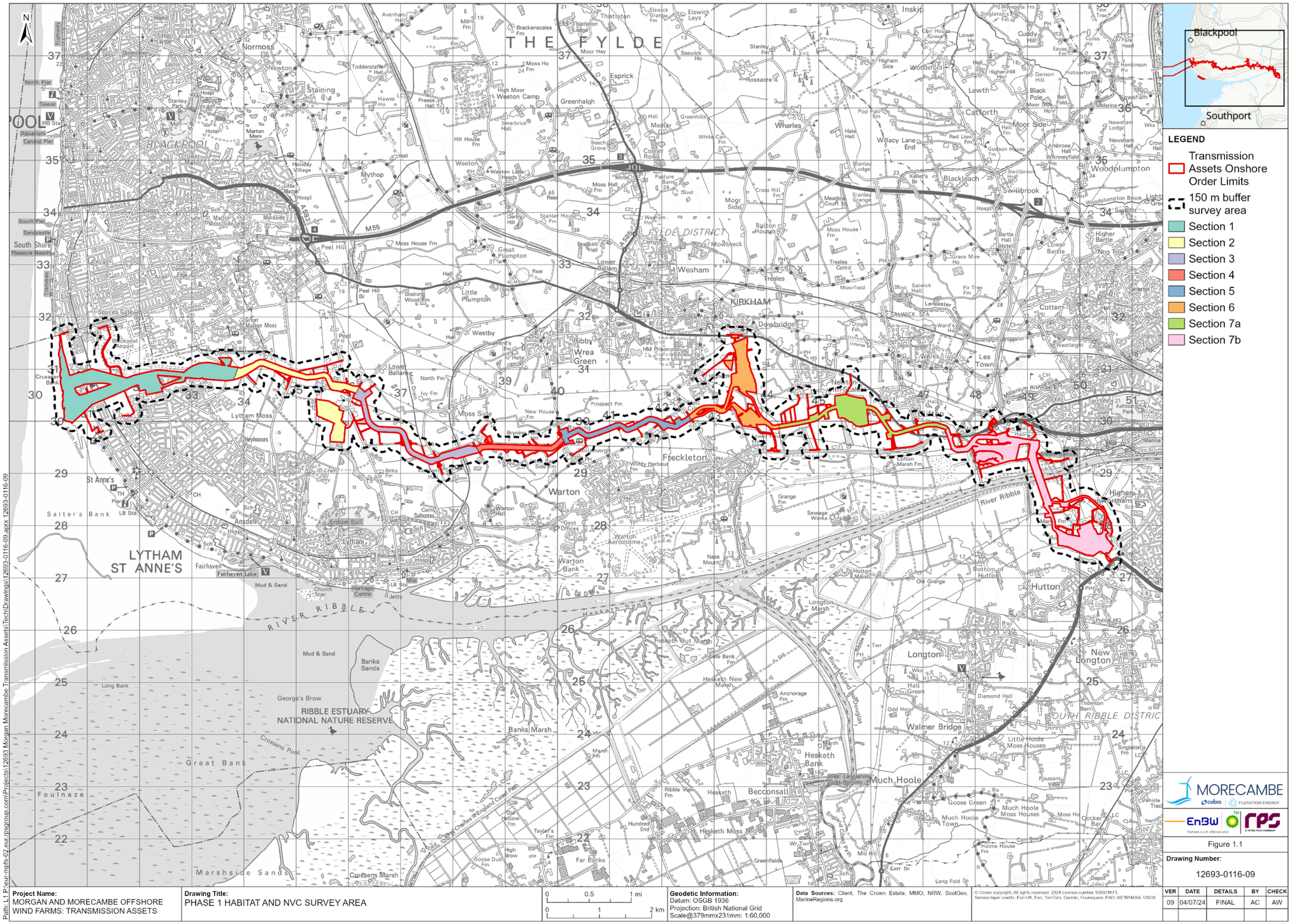


Figure 1.1: Survey area

1.1.4 Relevant legislation

1.1.4.1 With few exceptions, habitats and vegetation communities are not legally protected in the UK other than through designation as statutory sites of nature conservation importance, as supporting habitat for protected species and through duties placed on public bodies. Legislation which is relevant in this context includes:

- the Conservation of Habitats and Species Regulations 2017, (as amended) including through selecting, managing and restoring sites that contain examples of Annex I habitats of the Habitats Directive to a favourable conservation status;
- the Wildlife and Countryside Act 1981 (as amended), including through notification and protection of ~~Sites of Special Scientific Interest (SSSIs)~~SSSIs under Part II of the Act;
- the Natural Environment and Rural Communities (NERC) Act 2006 that includes a legal duty under Section 41 of the Act to provide a list of habitats and species of principal importance to enable public bodies to comply with the biodiversity duty;
- the Environment Act 2021 through the strengthened biodiversity duty that includes a requirement for public authorities to prepare nature recovery and protected site strategies; and
- the Hedgerow Regulations 1997, which includes provisions for protection of 'important' hedgerows (hedgerows that have existed for 30 years or more and satisfy at least one of the criteria listed in Part II of Schedule 1 of the Regulations).

1.1.4.2 Further details on this legislation can be found in Volume 3, Chapter 3: Onshore ecology and nature conservation of the ES.

1.1.5 Consultation

1.1.5.1 In October 2022, the Applicants submitted a Scoping Report to the Planning Inspectorate, which described the scope and methodology for the technical studies being undertaken to provide an assessment of any likely significant effects for the construction, operation and maintenance and decommissioning phases of the Transmission Assets.

1.1.5.2 The scope, methodology and findings of the phase 1, hedgerow and NVC surveys, including those undertaken beyond the current Onshore Order Limits, were discussed, and agreed with stakeholders via regular onshore ecology Expert Working Group (EWG) meetings. Further detail regarding consultation undertaken with respect to onshore ecology, including terrestrial invertebrate surveys can be found in Volume 3, Chapter 3: Onshore ecology and nature conservation of the ES.

1.2 Methodology

1.2.1 Overview

1.2.1.1 A combination of desk studies and field surveys were undertaken to ascertain the presence (or likely habitats present) within the study and survey areas. The results of the desk study are presented in Volume 3, Annex 3.1: Onshore ecology desk study technical report of the ES and summarised below.

1.2.1.2 Desk study

1.2.1.3 Information on protected and notable habitats within the survey area was collected from existing studies and datasets. These are summarised in **Table 1.1**.

1.2.1.4 In addition, for any areas where access could not be obtained, aerial photographs (viewed via Google maps and Google Earth Pro) were used to map habitats present. As noted in **paragraph 1.2.2.3**, 91.5% of the of the habitats within the Onshore Order Limits was subject to site-based Phase 1 surveys and 8.5% of the habitats required mapping via aerial photography.

Table 1.1: Summary of key desktop sources for Transmission Assets relevant to phase 1 habitat, hedgerow and NVC

Title	Source	Year	Author
Multi-Agency Geographic Information for the Countryside (MAGIC)	Department for the Environment, Food & Rural Affairs (Defra)	2024	Defra
UK Protected Area Joint Nature Conservation Committee (JNCC)	JNCC website	2024	JNCC
A vegetation survey of the Fylde Sand Dunes and Saltmarshes 2016	Fylde Sand Dune Project	2016	Graeme Skelcher

1.2.2 Site-specific surveys

Phase 1 habitat survey

Overview

1.2.2.1 The phase 1 habitat surveys were undertaken between May 2022 and July 2024 to map habitat types present and identify potential for protected or notable species within the phase 1 habitat survey area. The surveys were undertaken by ecologists suitably experienced in undertaking phase 1 habitat surveys in accordance with the standard methodology set out in the Joint Nature Conservation Committee (JNCC) Handbook for Phase 1 Habitat Survey - a technique for environmental audit (JNCC, 2010).

1.2.2.2 All habitat types recorded within the phase 1 habitat survey area were mapped using the JNCC Phase 1 Habitat Classification scheme, including phase 1 habitat types. In addition to habitat types, the phase 1 habitat surveys also identified habitats of potential value to legally protected or otherwise notable species. The results of the phase 1 habitat surveys provided in this report have not been used to determine the presence or likely absence of a protected or otherwise notable species within the phase 1 habitat survey area.

Limitations

1.2.2.3 Phase 1 habitat surveys were completed for 91.5% of the Onshore Order Limits and 81.4% of the total survey area, as shown in **Figure 1.2**. This was due to access limitations such as access refusals or on-site access restrictions. Areas subject to aerial survey were predominantly built-up areas with little ecological value. The remaining 8.5% of the Onshore Order Limits and 18.6% of the survey area were assessed indirectly based on surveys from adjacent parcels, using aerial photography and desk-based analysis of the inaccessible areas.

1.2.2.4 As it is only a small proportion of the Onshore Order Limits for which phase 1 habitat surveys have not been completed, the use of aerial photography to fill in these gaps does not affect the validity of the baseline assessment. This is especially true considering that much of the unvisited habitats are either built-up areas (e.g., residential development, garden or hardstanding) or comprises agricultural land and associated habitats. Overall, the coverage and approach is considered appropriate and robust for the purposes of informing the baseline conditions reported in Volume 3, Chapter 3: Onshore ecology and nature conservation of the ES.

1.2.2.5 Some of the phase 1 habitat surveys were initially undertaken during sub-optimal conditions. For example, during the winter months (i.e., December to February). Where this was the case and where access was possible, these parcels were revisited in optimal conditions, to provide further survey results and affirm/update the phase 1 survey data.

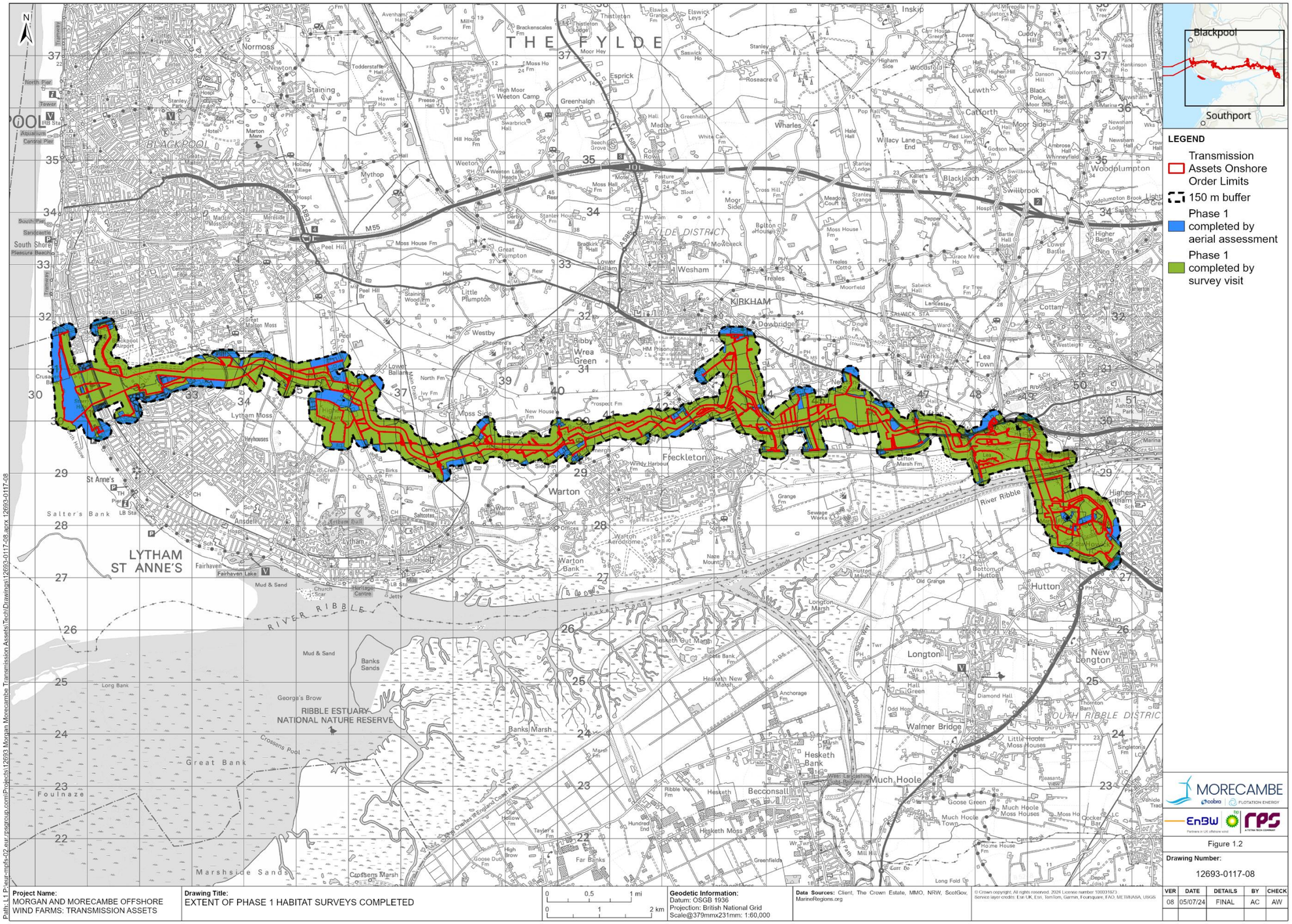


Figure 1.2: Phase 1 habitat survey coverage

Hedgerow surveys

Overview

1.2.2.6 Results of phase 1 habitat surveys were used to confirm where hedgerows were located and how many woody species each hedgerow comprised. Woody species are perennial plants with stem(s) and branches from which buds and shoots develop. Hedgerows with four or more woody species were subject to an assessment in accordance with the Hedgerow Regulations ('Hedgerow Regulations survey').

1.2.2.7 All hedgerows within the onshore substation areas were subject to a hedgerow condition assessment ('condition survey') in accordance with Natural England's Biodiversity Metric (4.0) (Natural England, 2023).

1.2.2.8 All surveyors were suitably trained and experienced with the appropriate level of botanical knowledge for undertaking the survey methodologies above.

Hedgerow Regulations survey

1.2.2.9 All hedgerows in the survey area with more than four woody species were scoped in for Hedgerow Regulations surveys. The Hedgerow Regulations surveys followed the methods defined in the Defra Hedgerow Survey Handbook (Defra, 2007). Hedgerow Regulations surveys were undertaken from April to June 2024.

1.2.2.10 In accordance with the requirements of the Hedgerow Regulations, each hedgerow scoped in for a Hedgerow Regulations survey was assessed to determine if it was classed as 'important' or 'not important' in relation to ecological importance. Hedgerows can also be assessed for their importance in relation to cultural heritage. This is detailed separately in Volume 3, Chapter 5: Historic environment of the ES.

1.2.2.11 The survey involved recording the ecological information along at least one 30 m section of each hedgerow. For hedgerows 30 m or less in length the whole hedgerow was surveyed. For hedgerows between 30 m and 100 m in length the central 30 m was surveyed. For hedgerows between 100 m to 200 m the hedgerow was divided in two and each central 30 m section surveyed. For hedgerows over 200 m in length the hedgerow was divided into three sections and the central 30 m of each section surveyed.

1.2.2.12 The information recorded for each survey, including a brief description of the information is presented in **Table 1.2** below.

Table 1.2: Hedgerow attributes recorded to assess importance

Information recorded	Description
Hedgerow type	The type of hedgerow that could include shrubby hedgerow, shrubby hedgerow with trees, line of trees.
Length	Length of the hedgerow in metres.
Connection with other hedgerows	The number of connections with other hedgerows to determine whether the hedgerow forms part of a hedgerow network.

Information recorded	Description
Extent and location of survey	Details of the wider area that included either the whole hedgerow or the 30 m section(s).
Adjacent land use	Description of the adjacent land use e.g. arable, pasture, woodland, water, etc.
Associated features	Description of associated features including a bank or wall; if the bank or wall was at least half the length of the hedgerow; a ditch; if the ditch was at least half the length of the hedgerow; any gaps of no more than 10% of the length of the hedgerow; any standard tree per 50 m of the length of the hedgerow; whether at least three ground flora woodland species (as defined in Schedule 2 of the Hedgerow Regulations) were located within 1 m of the hedgerow; any connections scoring four or more points, where connection with a hedgerow counts as one, and a connection with broadleaved woodland or a pond counts as two; and any parallel hedge located within 15 m of the hedgerow.
Undisturbed ground and perennial herbaceous vegetation cover	Average width of undisturbed ground. Average width of perennial herbaceous vegetation.
Nutrient enrichment ground flora indicator species	Percentage of hedgerow per 30 m samples recorded with more than 20 % cover of nettle *Urtica sp.*, cleaver *Galium aparine*, or dock *Rumex sp.*
Recently introduced, non-native species	Percentage of hedgerow per 30 m samples with no more than 10% cover of recently introduced, non-native species.
Hedgerow shape	Percentage of total number of hedgerows surveyed in each shape category including trimmed and dense, intensively managed, untrimmed, tall and leggy, untrimmed with outgrowths, recently coppiced, or recently laid.
Dimensions	Average height and width of hedgerow, excluding any bank beneath the hedgerow, gaps, and any hedgerow trees and their height, and estimated at the widest point for the width.
Integrity (i.e. ‘gappiness’)	Percentage of hedgerow with gaps less than 10 % of the hedgerow length, no gap greater than 5 m, and base of leafy growth less than 0.5 m from the ground for a shrubby hedgerow.
Isolated hedgerow trees	Percentage of young trees with a diameter at breast height of 1-5 cm within the total number of trees in the sample, percentage of veteran trees with a diameter at breast height of 1 m or more within total number of trees in the sample, average number of isolated hedgerow trees per 100 m of hedgerow, total number of isolated hedgerow trees along the section of hedgerow being surveyed.
Woody species per 30 m	Number of woody species per 30 m length including structural species, not climbers (other than rose *Rosa sp.*) or bramble.
Details of hedgerow management; ground flora species per 30 m; and veteran tree features	Details of both recent and older hedgerow management. Records of ground flora species and cover. Presence of veteran tree features including dead wood attached to the tree, loose, split, missing and dead bark, bark sap runs, tears, splits, scars, lightning strikes, hollow trunks or hollows in major limbs, or major rot sites.

1.2.2.13 Hedgerows were considered ecologically ‘important’, in accordance with the Hedgerow Regulations if they were at least 30 years old and met one of the following criteria.

- Contained protected species listed in part 1 of Schedule 1, Schedule 5 or Schedule 8 of the Wildlife and Countryside Act 1981 (as amended).
- Contained species that are endangered, vulnerable, and rare and identified in the British Red Data books (Perring and Farrell, 1983; Shirt, 1987; Bratton, 1991; Stewart and Church, 1992).
- Included woody species, and associated features as specified in Schedule 1, Part II Criteria, paragraph 7(1) of The Hedgerows Regulations 1997. In summary, and specifically for north west England, the hedgerow must include one or more of the following:
  - at least six woody species;
  - at least five woody species plus at least three associated features (detailed below);
  - at least five woody species including black poplar, large-leaved lime, small-leaved lime or wild service tree; or
  - at least four woody species and at least four associated features.

1.2.2.14 The aforementioned associated features include:

- a bank or wall for at least half the length;
- a ditch for at least half the length;
- gaps over no more than 10 % of the length;
- at least one standard tree per 50 m;
- at least three ground flora woodland species as defined in Schedule 2 of the Regulations within 1 m of the hedgerow;
- connections scoring four or more points, where connection with a hedgerow counts as one, and a connection with broadleaved woodland or a pond counts as two; or
- a parallel hedge within 15 m.

1.2.2.15 Neither connections or parallel hedges are counted as associated features if public rights of way are included within the criterion.

Condition Assessment

1.2.2.16 The condition of hedgerows was assessed in accordance with the Habitat Condition Assessment sheet for Natural England's Biodiversity Metric (4.0) (Natural England, 2023).

Limitations

1.2.2.17 Optimal time for Hedgerow Regulations surveys is between April and September. Surveys in 2024 were commenced in April and finished in June 2024, therefore within this optimal period. No limitations to the hedgerow surveys were identified.

NVC survey

Overview

1.2.2.18 The NVC survey is a detailed botanical survey technique designed to identify plant communities. The preceding phase 1 habitat surveys are designed to identify habitats only. Habitats that could support notable plant communities, or diverse assemblages of plant species, including rare or scarce species associated with ~~Sites of Special Scientific Interest (~~SSSI~~)~~ were scoped in for NVC survey. This section of the report details the following NVC surveys:

1. The four woodland NVC surveys were undertaken by the Applicants in July 2023, with reference to the guidelines set out in National Vegetation Classification: Users' handbook (Rodwell, 2006). All surveys were undertaken by competent botanical surveyors with a level four ~~Field Identification Skills Certificate (~~FISC~~)~~ from the ~~Botanical Society of Britain and Ireland (~~BSBI~~)~~ at a minimum. The results can be found in Section X of this report.
2. NVC surveys ~~of the sand dunes at landfall~~ were undertaken in 2016 ~~for~~on behalf of the Fylde Sand Dunes Project (Skelcher, 2016~~) and results from those surveys are referred to below. Refer to Skelcher (2016) for methods employed during those surveys.~~).
3. ~~Ground~~A ground truthing ~~NVC surveys of the sand dunes at landfall were~~exercise undertaken by the Applicants in ~~August~~ 2024. These surveys sought to reconcile the data from the Skelcher (2016) report with direct observation in the field, with a focus on the hydrologically sensitive dune slack communities present. The survey followed the guidelines set out in Rodwell (2006), as above~~.~~, and quadrat surveys were undertaken across the dunes. As above, all surveys were undertaken by competent botanical surveyors with a level four FISC from the BSBI at a minimum. The locations of the quadrats associated with ~~this~~the Applicants' survey undertaken in August 2024 are shown in ~~**Figure 1.3.**~~.
4. In response to Natural England the Applicants undertook a full NVC survey in 2025 of the Lytham St Annes Dunes SSSI/ LNR and St Anne's Old Links Golf Course BHS. The 2025 NVC survey reports for these areas are presented in Appendix D and Appendix E, respectively.

Methodology overview

1.2.2.19 Each habitat or contiguous or connected habitat potentially valuable for its plant communities was assigned a number for the purposes of undertaking NVC surveys and referred to as a 'site' (e.g. site 1, site 2, site 3). At each site, a walkover was undertaken to select a sample location where vegetation could be recorded. A sample location within each site was chosen based on similar stands of vegetation. The vegetation was then sampled using quadrats distributed in the stand.

1.2.2.20 For woodland sites, a 50 m x 50 m quadrat was used to record the tree and shrub data. For woodland ground flora, 4 m x 4 m or 10 m x 10 m quadrats were used. Within small woodland blocks, where five 50 m x 50 m samples

could not be taken due to the woodland's size (i.e. smaller than 50 m x 50 m), the whole woodland stand was used as the quadrat for canopy and the understorey. Within such areas 4 m x 4 m or 10 m x 10 m quadrats were recorded for the field and ground layers.

1.2.2.21 For the Applicants NVC survey of Lytham St Annes Dunes SSSI/LNR and the St Anne's Old Links Golf Course BHS, quadrats of 2 m x 2 m were used.

~~1.2.2.21~~1.2.2.22 Within each quadrat, all species were recorded with an estimate of percentage cover and abundance using the Domin scale (Rodwell, 2006), which is a measure of percentage cover per plant species within a survey quadrat (see **Table 1.3** below).

Table 1.3: Domin scale

Percentage of quadrat (%)	Domin Value
91-100	10
76-90	9
51-75	8
34-50	7
26-33	6
11-25	5
4-10	4
<4 (many individuals)	3
<4 (several individuals)	2
<4 (few individuals)	1

~~1.2.2.22~~1.2.2.23 A frequency value for each species, depending on the number of quadrats in which it was recorded, was calculated for each group of quadrats in a sample of similar vegetation, as per **Table 1.4** below.

Table 1.4: Frequency class of each species recorded (adapted from Rodwell, 2006)

Frequency value	Percentage of quadrats (%)	Measure of frequency
I	1-20	Scarce
II	21-40	Occasional
III	41-60	Frequent
IV	61-80	Constant
V	81-100	Constant

~~1.2.2.23~~1.2.2.24 Data collected from each site was reviewed to ascertain its vegetation type as defined in the five published British Plant Communities volumes (Rodwell, 1991a; 1991b; 1992; 1995; 2000). This was done manually through use of the keys and the floristic tables provided in the British Plant Communities volumes and by visual comparison of the collected data with the published data. Plant species were identified and recorded onsite using The Wildflower Key (Rose and O'Reilly, 2006), Colour Identification Guide to Grasses, Sedges, Rushes, and Ferns (Rose, 1989) for higher plants and the Mosses and Liverworts of Britain and Ireland (Atherton, et al., 2010) for bryophytes.

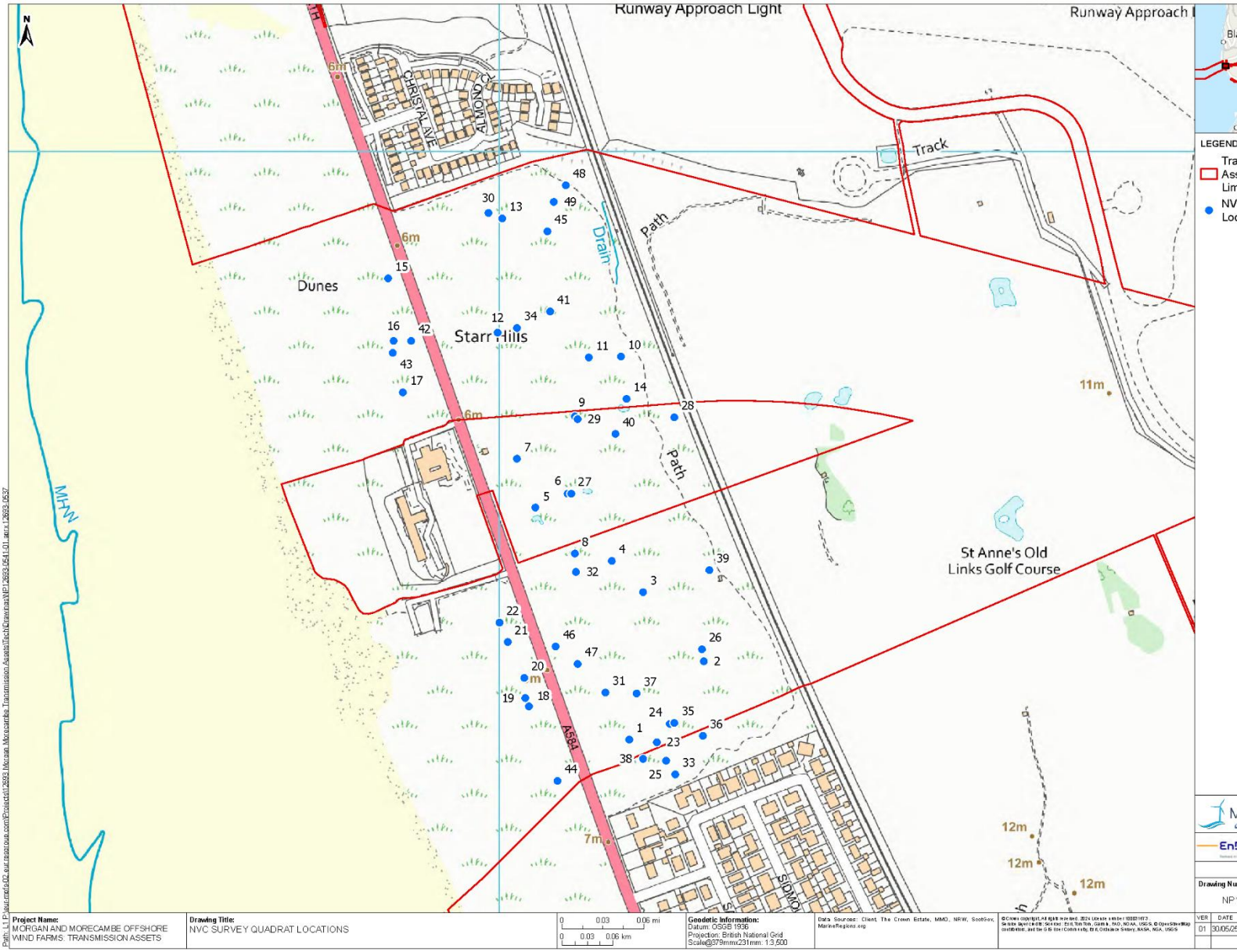
~~1.2.2.24~~1.2.2.25 NVC communities were identified by the presence of constant species, i.e., species that are almost always present and tend to be reasonably abundant. Subcommunities were indicated by the presence of differential and/or preferential species. Preferential species are plants which are distinctly more frequent within one or more of the subcommunities than the others. Differential species have a more exclusive affiliation.

~~1.2.2.25~~1.2.2.26 The computer program MAVIS (Modular Analysis of Vegetation Information System) was used to facilitate comparison of data collected from each site with published data and aid the assignment of sites to a plant community. The tabulated results of the NVC surveys were entered into MAVIS. Matching coefficients were computed between the published floristic tables and the NVC survey results. Both the output from MAVIS and the manual assignment of data were compared to ascertain the most appropriate plant community.

~~1.2.2.26~~1.2.2.27 Each plant community is defined by an NVC name and code as listed within floristic tables within the British Plant Communities volumes. The code starts with one or two letters corresponding to their vegetation type, followed by a number starting with one and increasing sequentially for each different plant community, for example ‘MG7’, which is the rye grass leys and related grasslands plant community.

~~1.2.2.27~~1.2.2.28 Each plant community also has their own sub-communities based on differences in species composition. Where a sub-community has been identified, these are defined by lower case letters. In the case of MG7, this could be MG7a, MG7b through to MG7f.

~~1.2.2.28~~ Botanical nomenclature used in this technical report is as per the New Flora of the British Isles, Fourth Edition (Stace, 2019).



1.2.2.29 ~~Figure 1.3: NVC quadrat locations~~

1.3 Results

1.3.1 Desk study

1.3.1.1 For the small percentage of the survey area where access for survey was not available, aerial photographs were used to identify habitats.

1.3.1.2 For full desk study results relevant to habitats present within the phase 1 habitat, NVC and hedgerow survey areas, refer to Volume 3, Annex 3.1: Onshore ecology desk study technical report of the ES.

NVC surveys undertaken in 2016 on behalf of the Fylde Sand Dunes Project (Skelcher, 2016)

1.3.1.3 An NVC survey of the sand dunes was produced for the Fylde Sand Dunes Project (Skelcher 2016). A brief review of that report is presented here, relating to the section of the sand dunes within the Onshore Order Limits.

1.3.1.4 From west (seaward side) moving east towards Clifton Drive North, the NVC communities start with bare sand and pioneer dune vegetation, grading into the Lytham St Annes Dunes ~~Site of Special Scientific Interest (SSSI).~~SSSI. SD4 Elymus foredune and SD5 Elymus mobile dune and SD6 Ammophila mobile dunes dominate initially and then as the dunes become more stable, the SD7 Ammophila – Festuca fixed dune community dominates, grading further into SD8 Festuca – Galium dune grassland and SD9 Ammophilia - Arrhenatherum dune grassland closer to the road. MG7e Modified Dune Grassland is also present here. Interspersed within the fixed dune and dune grassland communities are dune slacks, predominantly SD16 Salix – Holcus dune slacks.

1.3.1.5 East of Clifton Drive North, and up to the railway line and the boundary of Lytham St Annes Dunes SSSI, communities are predominantly SD8, SD9 and SD16 with areas of MG7e and SD7, with abundant areas of SD16.

1.3.1.6 Digitised results of the Skelcher (2016) survey are shown in **Figure 1.3** below.

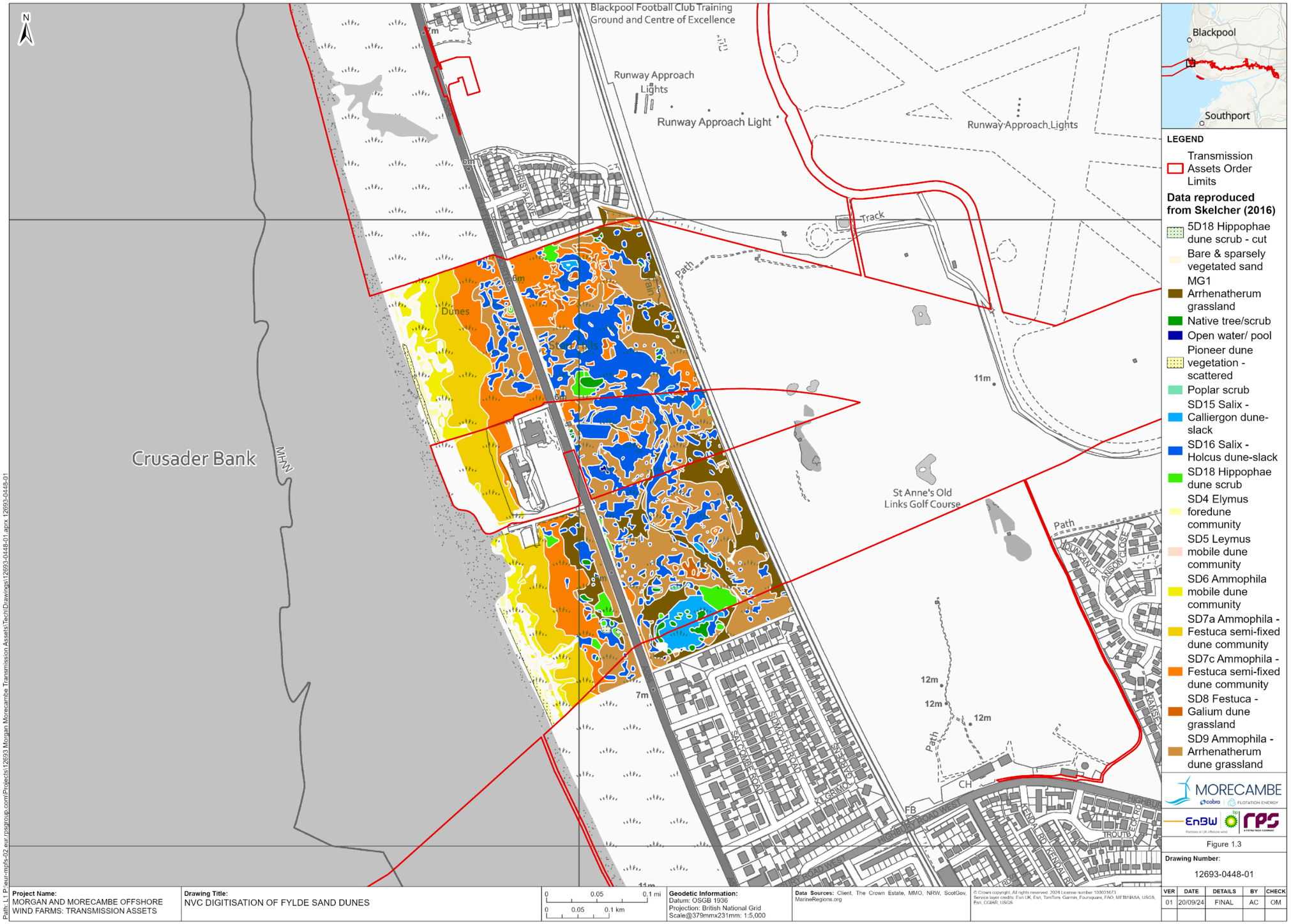


Figure 1.3: NVC digitisation of Fylde sand dunes (from Skelcher (2016))

1.3.2 Site-specific surveys

Phase 1 Habitat Survey

1.3.2.1 Habitat types recorded within the survey area are presented in Table 1.5 below. The table includes the phase 1 habitat code, habitat type, relative frequency, the published description of the habitat type and its location within the phase 1 habitat survey area. The area in hectares (ha) or length (m) of each habitat type recorded within the phase 1 habitat survey area are provided in **Table 1.6** below.

1.3.2.2 The location and extent of habitat types located within the phase 1 habitat survey area is shown in **Figure 1.4** to **Figure 1.11**.

1.3.2.3 Target notes as numbered on **Figure 1.4** to **Figure 1.11** are of Invasive Non-Native Species (INNS) recorded during phase 1 habitat surveys. Full records are provided in Appendix A of this annex.

1.3.2.4 Lengths of hedgerows, including those assessed as being 'important' are covered separately in **section 1.1.3**. Lengths of watercourses are also covered in **section 1.1.3**.

Figure 1.4: Phase 1 – Section 1, habitat survey results

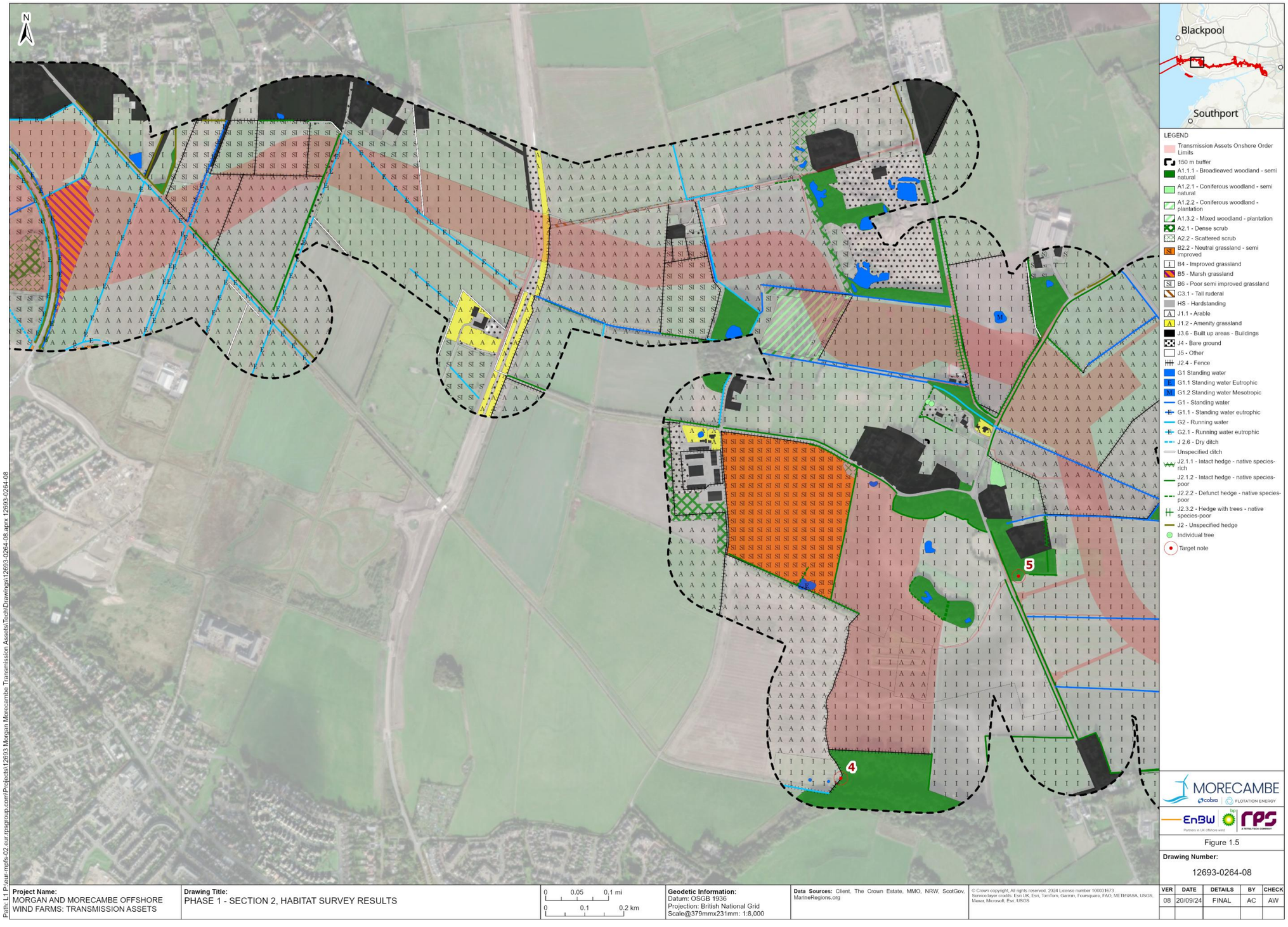


Figure 1.5: Phase 1 – Section 2, habitat survey results

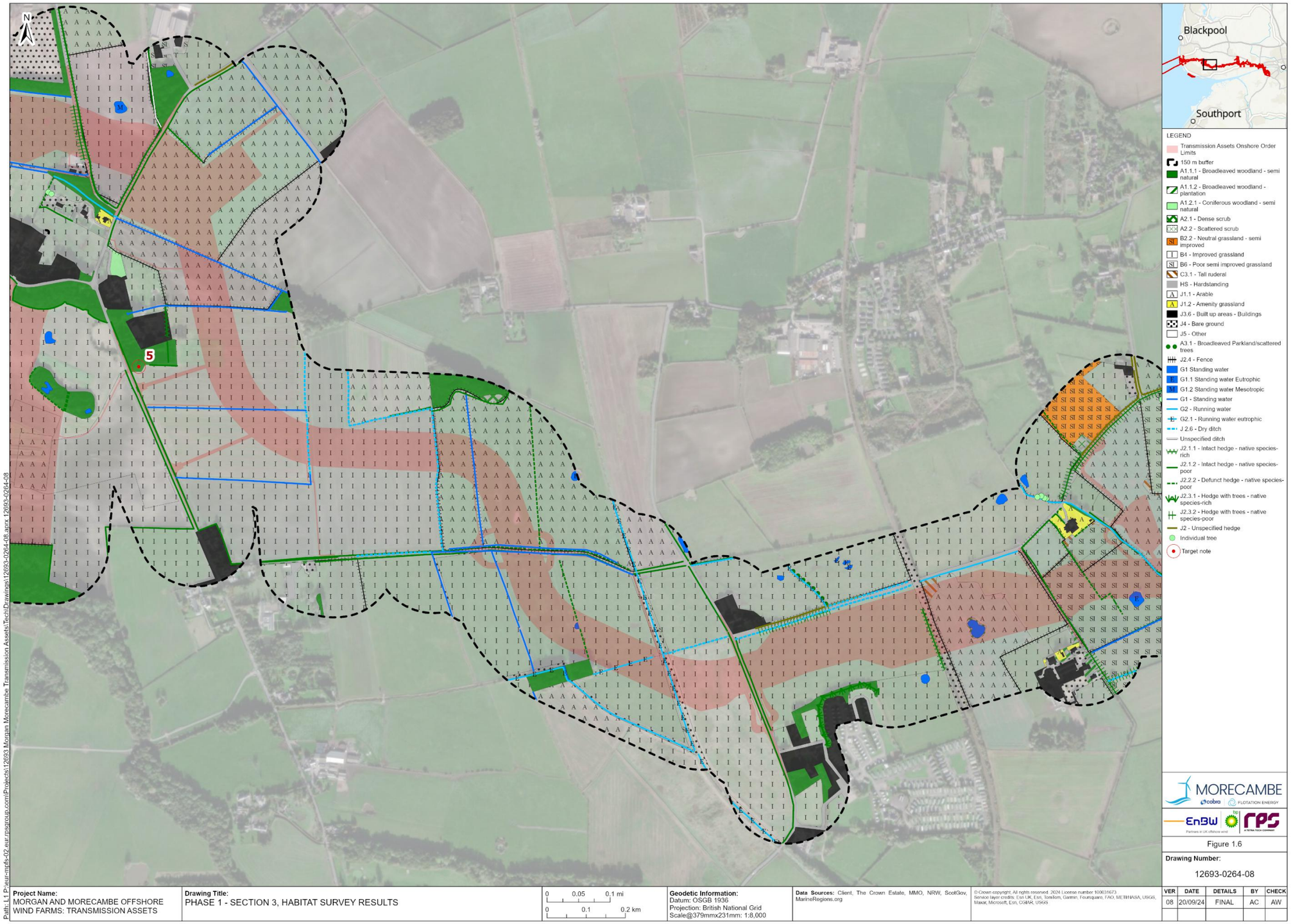


Figure 1.6: Phase 1 – Section 3, habitat survey results

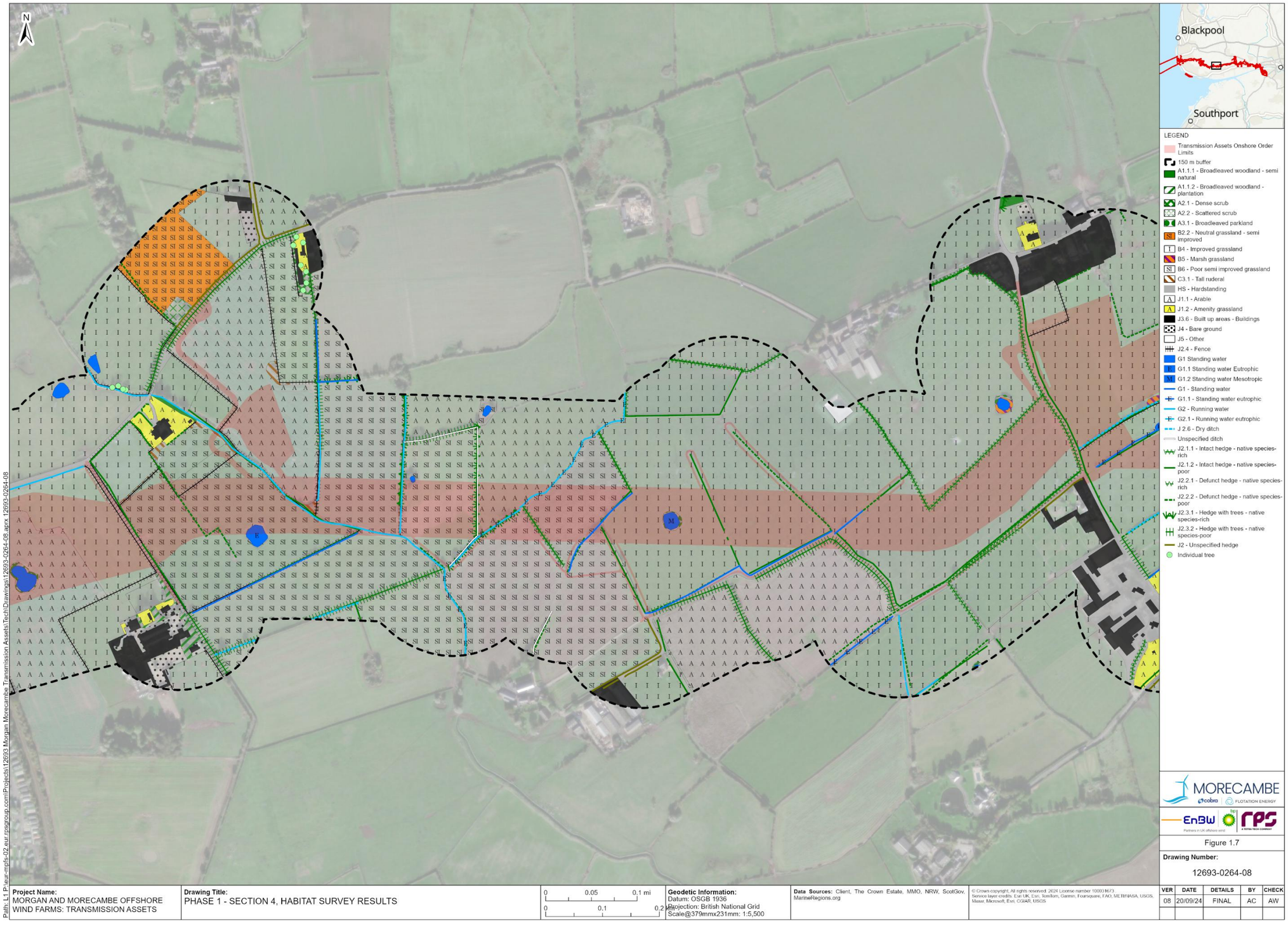


Figure 1.7: Phase 1 – Section 4, habitat survey results

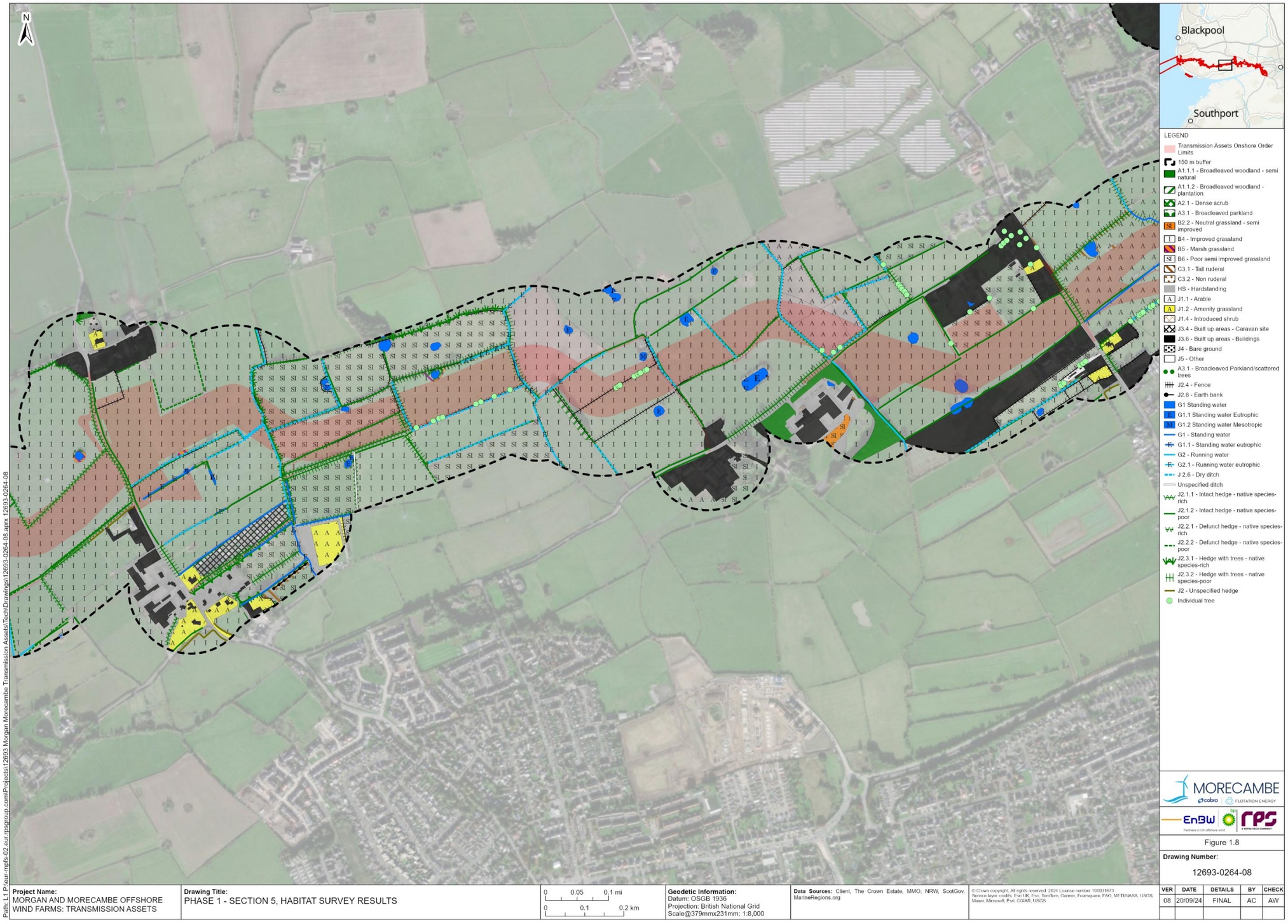


Figure 1.8: Phase 1 – Section 5, habitat survey results

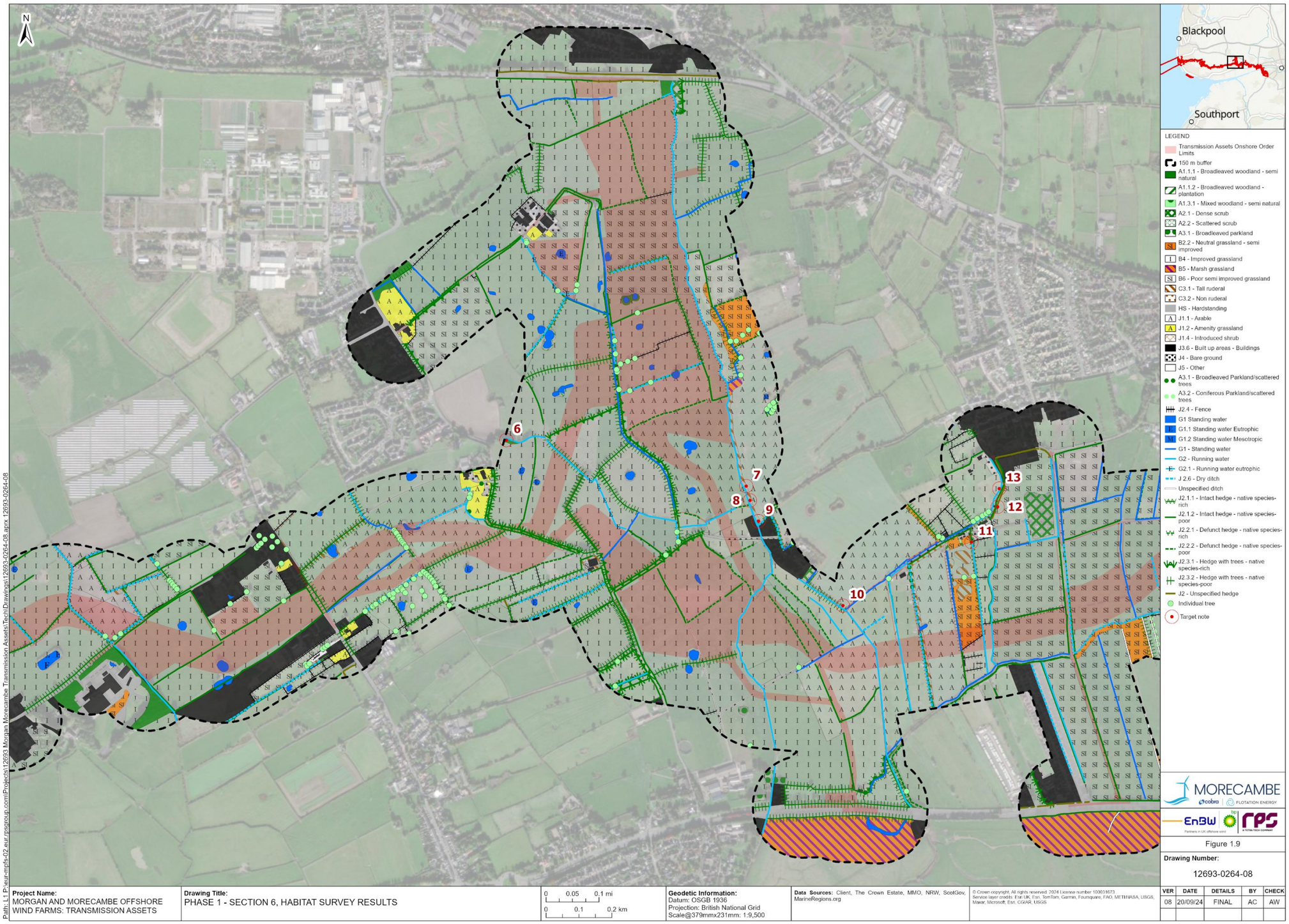


Figure 1.9: Phase 1 – Section 6, habitat survey results

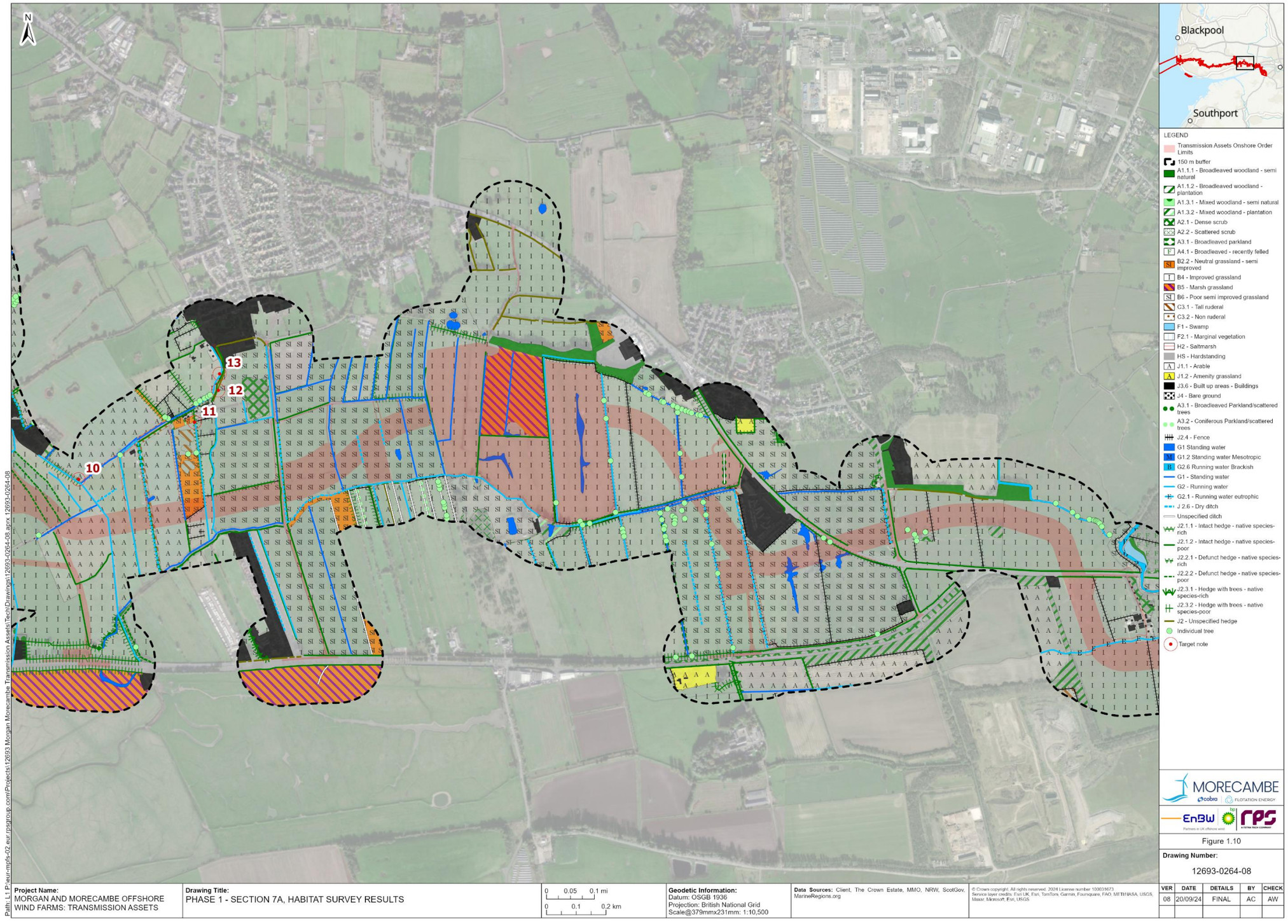


Figure 1.10: Phase 1 – Section 7A, habitat survey results

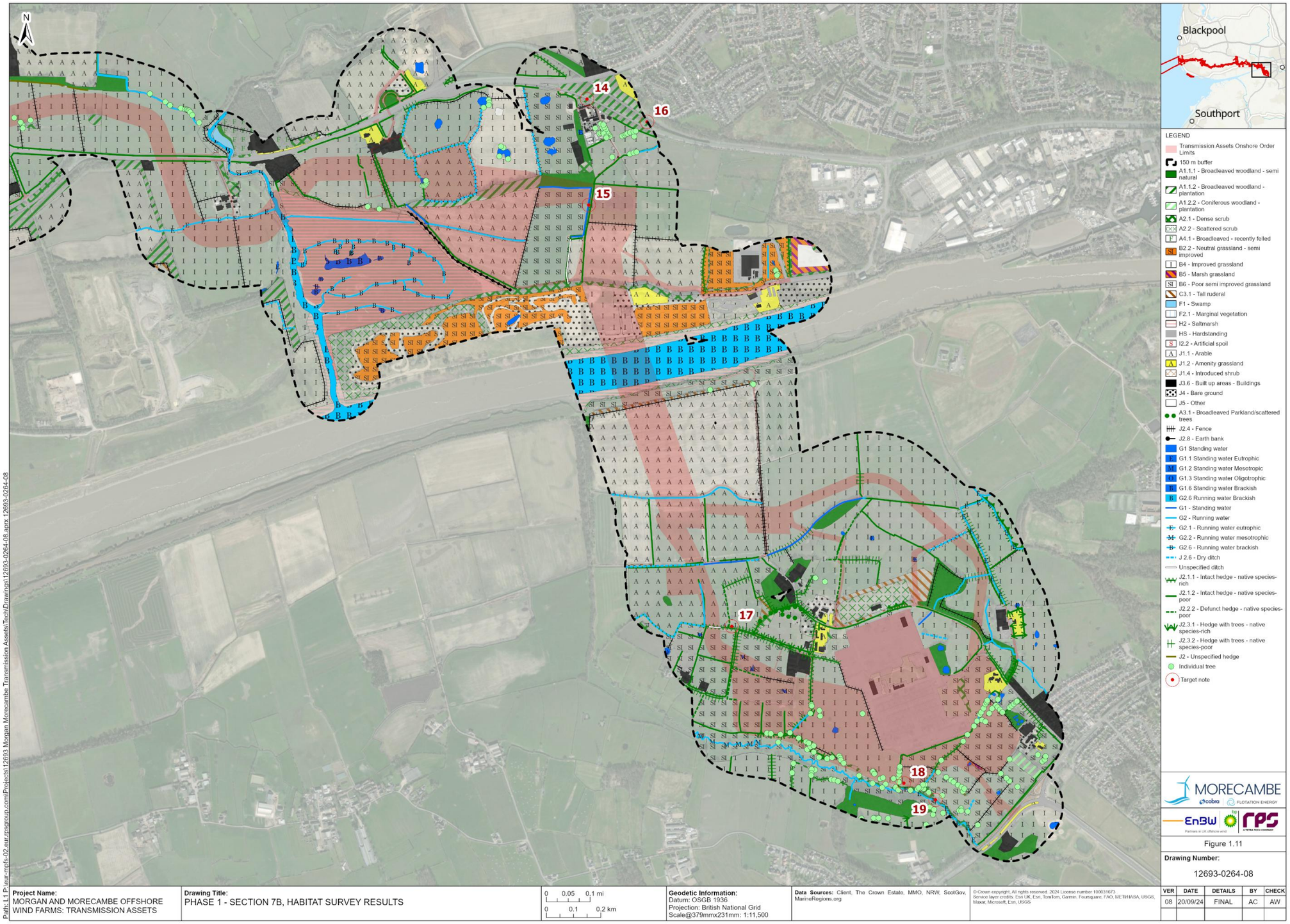


Figure 1.11: Phase 1 – Section 7B, habitat survey results

Table 1.5: Habitat types identified within the phase 1 habitat survey area

Phase 1 habitat code (JNCC, 2010)	Habitat type	Relative frequency of habitat type (across survey area)	Location
A.1.1.1	**Semi-natural broadleaved woodland** – vegetation dominated by broadleaved trees more than 5 m high when mature, forming distinct canopy and must not have obviously been planted by humans.	Occasional	Present within sections 1, 2, 3, 6, 7a and 7b in small areas and outside the Transmission Assets Order Limits.
A.1.1.2	**Plantation broadleaved woodland** – vegetation dominated by broadleaved trees more than 5 m high when mature, forming distinct canopy and has obviously been planted by humans (evidenced by structured planting, use of guards etc).	Occasional	Present in sections 1, 4, 7a and 7b in small areas only and outside the Transmission Assets Order Limits.
A1.2.1	**Semi natural coniferous woodland -** vegetation dominated by coniferous trees more than 5 m high when mature, forming distinct canopy and must not have obviously been planted by humans.	Rare	Outside of the Transmission Assets Order Limits only.
A.1.2.2	**Plantation coniferous woodland** – vegetation dominated by coniferous trees more than 5 m high when mature, forming distinct canopy and has obviously been planted by humans (evidenced by structured planting, use of guards etc).	Rare	Present in section 2 and outside the Transmission Assets Order Limits.
A.1.3.1	**Semi-natural mixed woodland** – vegetation dominated by a mix of broadleaved and coniferous trees (Neither can exceed 90 percent (%) dominancy) more than 5 m high when mature, forming distinct canopy and must not have obviously been planted by humans.	Rare	Present only outside the Transmission Assets Order Limits.
A.1.3.2	**Plantation mixed woodland** – comprises vegetation dominated by a mix of broadleaved and coniferous trees (with neither exceeding 90% dominancy) more than 5 m high when mature and has obviously been planted by humans (evidenced by structured planting, use of guards etc.	Rare	Present in sections 2 and 7a and outside the Transmission Assets Order Limits.
A.2.1	**Dense/continuous scrub** – Dense seral or climax vegetation dominated by locally native shrubs, usually less than 5 m tall with few scattered trees.	Occasional	Present in all sections in small areas aside from 7a and outside the Transmission Assets Order Limits.

Phase 1 habitat code (JNCC, 2010)	Habitat type	Relative frequency of habitat type (across survey area)	Location
A.2.2	**Scattered scrub** – Seral or climax vegetation dominated by locally native shrubs, usually less than 5 m tall with few scattered trees.	Rare	Present in sections 1, 2 7b and outside the Transmission Assets Order Limits.
A3.1	**Broadleaved Parkland/scattered trees –** Trees which cover less than 30% of ground.	Rare	Present in section 4 in small amounts, and outside the Transmission Assets Order Limits.
A.4.1	**Broadleaved woodland recently felled** – The only areas of felled trees which should be included in this category are those whose future land use is uncertain, for instance when it is not clear whether they are to be replanted or used for crops.	Rare	Present only outside of the Transmission Assets Order Limits.
B.2.2	**Semi-improved neutral grassland** – Grassland that retains some features of a neutral grassland but due to limited modification by artificial fertilisers, slurry, intensive grazing, herbicide application or drainage has a less diverse range of species and may include some agricultural species.	Occasional	Present within section 2 (over 10 ha), and small sections within sections 7a and 7b. Also found outside the Transmission Assets Order Limits.
B.4	**Improved grassland** – Grasslands heavily effected by grazing, drainage, herbicide application, inorganic fertilisers or heavy doses of manure or slurry. Very limited range of grass species and few common forbs, mainly those resistant to mowing or grazing such as dandelion *Taraxicum officinale,* white clover *Trifolium repens,* sorrel *Rumex acetosa,* daisy *Bellis perennis,* meadow buttercup *Ranunculus acris,* rye grass *Lolium perenne* and bulbous buttercup *Ranunculus bulbosus*. Important indicators include: • bright green, lush and even sward, dominated by grasses; • low diversity of forb species; and • more than 50% rye grass, white clover and other agricultural species.	Common	Present throughout all sections surveyed in large amounts.

Phase 1 habitat code (JNCC, 2010)	Habitat type	Relative frequency of habitat type (across survey area)	Location
B.5	**Marsh/marshy grassland** – This is a diffuse category covering certain purple moor grass Molinia grasslands, grasslands with a high proportion of rush *Juncus* species, sedge *Carex* species or meadow sweet *Filipendula ulmaria* and wet meadows and pastures supporting communities of species such as marsh marigold *Caltha palustris* or valarian *Valeriana* species, where broadleaved herbs rather than grasses, predominate.	Occasional	Present mostly in areas outside of the Transmission Assets Order Limits and within small areas of sections 1, 5 6 and 7b, with larger areas present in section 7a.
B.6	**Poor semi-improved grassland** – Similar to neutral semi-improved grassland but with less species diversity and likely to have less species indicative of the substrate conditions.	Common	Present throughout all sections.
C.3.1	**Tall ruderal** – Tall perennial or biennial dicotyledons, usually more than 25 centimetre (cm) high of species such rosebay willowherb *Chamaenerion angustifolium,* common nettle *Urtica dioica* and Japanese knotweed *Reynoutria japonica*.	Frequent	Present throughout all sections apart from section 5.
C3.2	**Other tall herb and fern – non-ruderal** – Non-wooded stands of species such as beech fern *Oreopteris limbosperma,* lady fern *Athyrium felix-femina,* buckler ferns *Dryopteris* species or great wood-sedge *Luzula sylvatica*.	Rare	Present within section 5 and outside the Transmission Assets Order Limits.
F1	**Swamp –** Presence of tall emergent vegetation often within areas between open water and exposed land. May occasionally be seldom immersed when succeeding to marshy grassland.	Rare	Present only outside the Transmission Assets Order Limits.
F2.1	**Marginal and inundation – marginal vegetation** – This category encompasses all narrow strips of emergent vegetation occurring on the (often steep) margins of lowland watercourses, where the water table is permanently high.	Rare	Present only outside the Transmission Assets Order Limits.

Phase 1 habitat code (JNCC, 2010)	Habitat type	Relative frequency of habitat type (across survey area)	Location
G.1	**Standing water** – Includes lakes, reservoirs, pools, flooded gravel pits, ponds, water-filled ditches, canals and brackish lagoons. Ditches usually measured in linear lengths rather than areas – refer to section **1.3.2.** Note that some of the standing water recorded in this survey is periodically dry, for example at Morecambe substation.	Common	Present throughout all sections.
G1.1	**Standing water eutrophic –** Nutrient rich standing water. Ditches measured in linear lengths rather than areas – refer to **section 1.3.2.**	Rare	Present within sections 2, 4, 6 and 7b, and outside the Transmission Assets Order Limits.
G1.2	**Standing water mesotrophic –** Standing water moderately enriched with nutrients Ditches measured in linear lengths rather than areas – refer to **section 1.3.2**.	Rare	Present within sections 4 and 7b in small areas, and outside the Transmission Assets Order Limits.
G1.3	**Standing water oligotrophic –** standing water not enriched with nutrients.	Rare	Present outside of the Transmission Assets Order Limits only.
G.1.6	**Standing water brackish** –Standing water with salinity levels between freshwater and seawater.	Rare	Present only in section 7b northwest of the River Ribble within saltmarsh.
G.2	**Running water** – Rivers and streams with running water. Running water measured via linear length – refer to **section 1.3.2**.	Common	Present in all sections except 1 and 3.
G2.1	**Running water eutrophic –** Nutrient rich running water. Running water measured via linear length – refer to **section 1.3.2**.	Rare	Present in all sections except 7a
G2.2	**Running water mesotrophic –** Running water moderately enriched with nutrients. Running water measured via linear length – refer to **section 1.3.2**.	Rare	Present in section 6 in small amounts and outside the Transmission Assets Order Limits.

Phase 1 habitat code (JNCC, 2010)	Habitat type	Relative frequency of habitat type (across survey area)	Location
G.2.6 B	**Running water brackish** – Running water with salinity levels between freshwater and seawater. Running water measured via linear length – refer to **section 1.3.2**.	Rare	Present in section 7b and outside the Transmission Assets Order Limits.
H1.1	**Intertidal mud/sand -** Intertidal habitat on mud/sand substrate.	Frequent	Present outside the Transmission Assets Order only.
H2	**Saltmarsh –** Coastal grassland with the presence of salt water. Salt tolerant species present.	Rare	Present within section 7b, and outside of the Transmission Assets Order Limits.
H6	**Sand-dune –** Accumulation of sand shaped into a mound with a ridge.	Rare	Present within section 1 in large amounts and outside the Transmission Assets Order Limits.
H6.5	**Dune grassland** – All grassland occurring on consolidated and flattened dunes should be classified in this category. Generally, little marram *Ammophila arenaria* will be present.	Rare	Present within section 1 in large amounts and outside the Transmission Assets Order Limits.
H6.6	**Dune heath** – All heathland occurring on consolidated and flattened dunes should be included in this category. Heather *Calluna* is usually the dominant ericoid, with grey heather and cross-leaved heath *Erica tetralix* also common. Sand sedge *Carex arenaria* is often present and lichens, particularly cup lichen *Cladonia* species, are often abundant. Occasionally, juniper *Juniperus communis* may be present.	Rare	Present only within section 1 in small amounts.
HS	**Hardstanding –** Hard artificial surface	Frequent	Present in all sections.
I2.2	**Spoil** – Includes abandoned industrial areas and tips of waste material such as coal mine spoil and slag.	Rare	Present only outside the Transmission Assets.

Phase 1 habitat code (JNCC, 2010)	Habitat type	Relative frequency of habitat type (across survey area)	Location
J.1.1	**Arable** – Arable cropland, horticultural land, freshly ploughed land and recently re-seeded grassland, potentially managed for silage.	Common	Present throughout all sections.
J.1.2	**Amenity grassland** – This comprises intensively managed and regularly mown grasslands, typical of lawns, playing fields, golf course fairways and many urban 'savannah' parks, in which rye grass, with or without white clover, often predominates. The sward composition will depend on the original seed mixture used and on the age of the community. Herbs such as daisy, great plantain *Plantago major* and dandelion may be present.	Occasional	Present in all sections with larger areas present in section 1 and small amounts in sections 2 and 7b.
J1.4	**Cultivated/disturbed land, introduced shrub –** Shrub habitat dominated by vegetation that is not locally native.	Rare	Present in small areas of sections 1 and 7b and outside the Transmission Assets Order Limits.
J.2.1.1	**Intact native species rich hedge** – Hedge with at least five native species and little/no gaps. Measured in linear length – see **section 1.3.2**.	Occasional	Present in sections 3 to 6 and 7b in small amounts, and outside the Transmission Assets Order Limits.
J.2.1.2	**Intact native species poor hedge** – Hedge with less than five native species and little/no gaps. Measured in linear length – see **section 1.3.2**.	Frequent	Present throughout all sections except section 1, and outside the Transmission Assets Order Limits.
J.2.2.1	**Defunct native species rich hedge** – Hedge with at least five native species and gaps that render the barrier not stockproof. Measured in linear length – see **section 1.3.2**.	Occasional	Present in sections 4 to 6, and outside the Transmission Assets Order Limits.
J.2.2.2	**Defunct native species poor hedge** – Hedge with less than five native species and gaps that render the barrier not stockproof. Measured in linear length – see **section 1.3.2**.	Frequent	Present throughout all sections except section 1, and outside the Transmission Assets Order Limits.

Phase 1 habitat code (JNCC, 2010)	Habitat type	Relative frequency of habitat type (across survey area)	Location
J.2.3.1	**Native species rich hedge with trees** – Hedge with trees along its length with at least five native species. Measured in linear length – see **section 1.3.2**.	Occasional	Present within sections 4, 5, 6 and 7b, and outside the Transmission Assets Order Limits.
J.2.3.2	**Native species poor hedge with trees** – Hedge with trees along its length with less than five native species. Measured in linear length – see **section 1.3.2**.	Occasional	Present within sections 2 and 4 to 7b, and outside the Transmission Assets Order Limits.
J.2.4	**Fence.**	Frequent	Present throughout all sections.
J.2.6	**Dry ditch.** Measured in linear length - refer to **section 1.3.2**.	Frequent	Present throughout all sections.
J.2.8	**Earth bank.**	Rare	Only a short length present within section 7b.
J3.4	**Built up area, caravan site –** Area built up with the presence of caravans.	Rare	Present only outside the Transmission Assets Order Limits.
J.3.6	**Buildings** – Buildings or built-up areas. We have included concrete foundations in this category.	Common	Present in all sections apart from sections 3 and 4.
J.4	**Bare ground** – Bare ground includes any type of bare soil or other substrate not already covered in another habitat type (e.g., bare peat E4, intertidal H1, shingle H3).	Occasional	Present in all sections apart from section 1 and 4.
J.5	**Other habitat** – Any habitat not encompassed by other phase 1 habitat classifications.	Rare	Present in section 1 only, and outside the Transmission Assets Order Limits.

Table 1.6: Extent of habitat types identified within the survey area

Phase 1 habitat code and type	Section 1(ha)	Section 2(ha)	Section 3(ha)	Section 4(ha)	Section 5(ha)	Section 6(ha)	Section 7a (ha)	Section 7b (ha)	Grand Total (Onshore Order Limits) (ha)	Grand Total (Onshore Order Limits) (%)	150 m buffer (ha)	Grand Total (survey area) (ha)	Grand Total (survey area) (%)
A1.1.1 - Woodland - broad-leaved - semi-natural	0.10	0.01	0.01			0.08	0.00	0.89	**1.10**	**0.20%**	33.02	**34.12**	**1.77%**
A1.1.2 - Woodland - broad-leaved - plantation	0.22			0.01			0.11	0.98	**1.32**	**0.24%**	9.92	**11.23**	**0.58%**
A1.2.1 - Woodland - coniferous - semi-natural									**0.00**	**0.00%**	0.20	**0.20**	**0.01%**
A1.2.2 - Woodland - coniferous - plantation		0.82							**0.82**	**0.15%**	2.17	**3.00**	**0.16%**
A1.3.1 - Woodland - mixed - semi-natural							0.00		**0.00**	**0.00%**	0.03	**0.03**	**0.00%**
A1.3.2 - Woodland - mixed - plantation		0.05					0.12		**0.17**	**0.03%**	0.87	**1.04**	**0.05%**
A2.1 - Scrub - Dense/continuous	3.85	0.02	0.05	0.00	0.01	0.01		0.71	**4.65**	**0.84%**	11.19	**15.84**	**0.82%**
A2.2 - Scrub - scattered	1.56	0.12						0.52	**2.20**	**0.40%**	9.81	**12.01**	**0.62%**
A3.1 - Parkland/scattered trees - Broad-leaved				0.03					**0.03**	**0.00%**	0.36	**0.39**	**0.02%**
A4.1 - Recently-felled woodland - broad-leaved									**0.00**	**0.00%**	1.55	**1.55**	**0.08%**
B2.2 - Neutral grassland - semi-improved		10.56					0.41	0.03	**11.00**	**1.99%**	20.58	**31.58**	**1.63%**
B4 - Improved grassland	3.62	27.22	25.27	8.82	25.94	41.75	33.86	32.84	**199.33**	**36.15%**	493.29	**692.61**	**35.84%**
B5 - Marsh/marshy grassland	1.83				0.00	0.01	5.62	0.05	**7.51**	**1.36%**	11.88	**19.40**	**1.00%**
B6 - Poor semi-improved grassland	51.96	4.99	0.18	8.03	3.71	9.48	16.02	22.57	**116.94**	**21.21%**	241.46	**358.41**	**18.54%**
C1.2 - Bracken - scattered	0.15	0.20	0.11	0.07		0.06	0.08	0.57	**1.25**	**0.23%**	6.36	**7.61**	**0.39%**
C3.1 - Tall ruderal					0.09				**0.09**	**0.02%**	0.19	**0.28**	**0.01%**
C3.2 - Non-ruderal									**0.00**	**0.00%**	0.26	**0.26**	**0.01%**
F1 - Swamp									**0.00**	**0.00%**	0.03	**0.03**	**0.00%**
F2.1 - Marginal vegetation		10.56					0.41	0.03	**11.00**	**1.99%**	20.58	**31.58**	**1.63%**
G1 - Standing water	0.38	0.02	0.14	0.00	0.09	0.25	0.84	0.10	**1.83**	**0.33%**	5.45	**7.28**	**0.38%**
G1.1 - Standing water - eutrophic		0.09		0.04		0.06		0.01	**0.20**	**0.04%**	1.00	**1.21**	**0.06%**
G1.2 - Standing water - mesotrophic				0.07				0.04	**0.10**	**0.02%**	0.14	**0.24**	**0.01%**
G1.3 - Standing water - oligotrophic									**0.00**	**0.00%**	0.04	**0.04**	**0.00%**
G1.6 - Standing water - brackish								0.69	**0.69**	**0.12%**	0.00	**0.69**	**0.04%**
G2.6 - Running water - brackish									**0.00**	**0.00%**	0.00	**0.00**	**0.00%**
H1.1 - Intertidal - mud/sand	31.32								**31.32**	**5.68%**	40.50	**71.82**	**3.72%**
H2 - Saltmarsh								22.25	**22.25**	**4.04%**	5.33	**27.58**	**1.43%**
H6 - Sand dune	12.04								**12.04**	**2.18%**	23.14	**35.18**	**1.82%**

Phase 1 habitat code and type	Section 1(ha)	Section 2(ha)	Section 3(ha)	Section 4(ha)	Section 5(ha)	Section 6(ha)	Section 7a (ha)	Section 7b (ha)	Grand Total (Onshore Order Limits) (ha)	Grand Total (Onshore Order Limits) (%)	150 m buffer (ha)	Grand Total (survey area) (ha)	Grand Total (survey area) (%)
H6.5 - Sand dune - dune grassland	9.09								**9.09**	**1.65%**	3.89	**12.99**	**0.67%**
H6.6 - Sand dune - dune heath	0.50								**0.50**	**0.09%**	0.14	**0.64**	**0.03%**
H6.8 - Sand dune - open heath	7.56	1.38	0.88	0.56	0.72	1.44	1.34	15.05	**28.93**	**5.25%**	53.47	**82.40**	**4.26%**
HS - Hard standing									**0.00**	**0.00%**	0.01	**0.01**	**0.00%**
I2.2 - Artificial spoil	2.54	13.43	14.29	2.32	1.62	14.25	1.54	28.64	**78.62**	**14.26%**	204.72	**283.34**	**14.66%**
J1.1 - Cultivated/disturbed land - arable	10.25	0.19				0.00		0.05	**10.49**	**1.90%**	25.65	**36.14**	**1.87%**
J1.2 - Cultivated/disturbed land - amenity grassland	0.15							0.04	**0.18**	**0.03%**	0.44	**0.63**	**0.03%**
J1.4 - Cultivated/disturbed land - introduced shrub									**0.00**	**0.00%**	1.38	**1.38**	**0.07%**
J3.4 - Built-up areas - caravan site	1.05	0.07		0.00	0.02	0.08	0.03	0.33	**1.58**	**0.29%**	133.63	**135.20**	**7.00%**
J3.6 - Built-up areas - buildings		0.31	0.59	0.00	0.11	0.86	0.50	2.39	**4.76**	**0.86%**	24.38	**29.14**	**1.51%**
J4 - Bare ground	0.08								**0.08**	**0.01%**	1.24	**1.32**	**0.07%**
J5 - Other habitat	31.32								**31.32**	**5.68%**	40.50	**71.82**	**3.72%**
Total	**138.34**	**59.47**	**41.54**	**19.95**	**32.31**	**68.36**	**60.48**	**130.97**	**551.42**	**100.00%**	1,381.35	**1,932.77**	**100.00%**

Hedgerow survey

1. For ease of reference a set of figures showing hedgerows mapped during the phase 1 survey are provided in **Figure 1.12** to **Figure 1.19**. These figures also show the locations of 'important' hedgerows.
2. A table showing the length and type of hedgerows surveyed within the survey area is provided in **Table 1.7**.

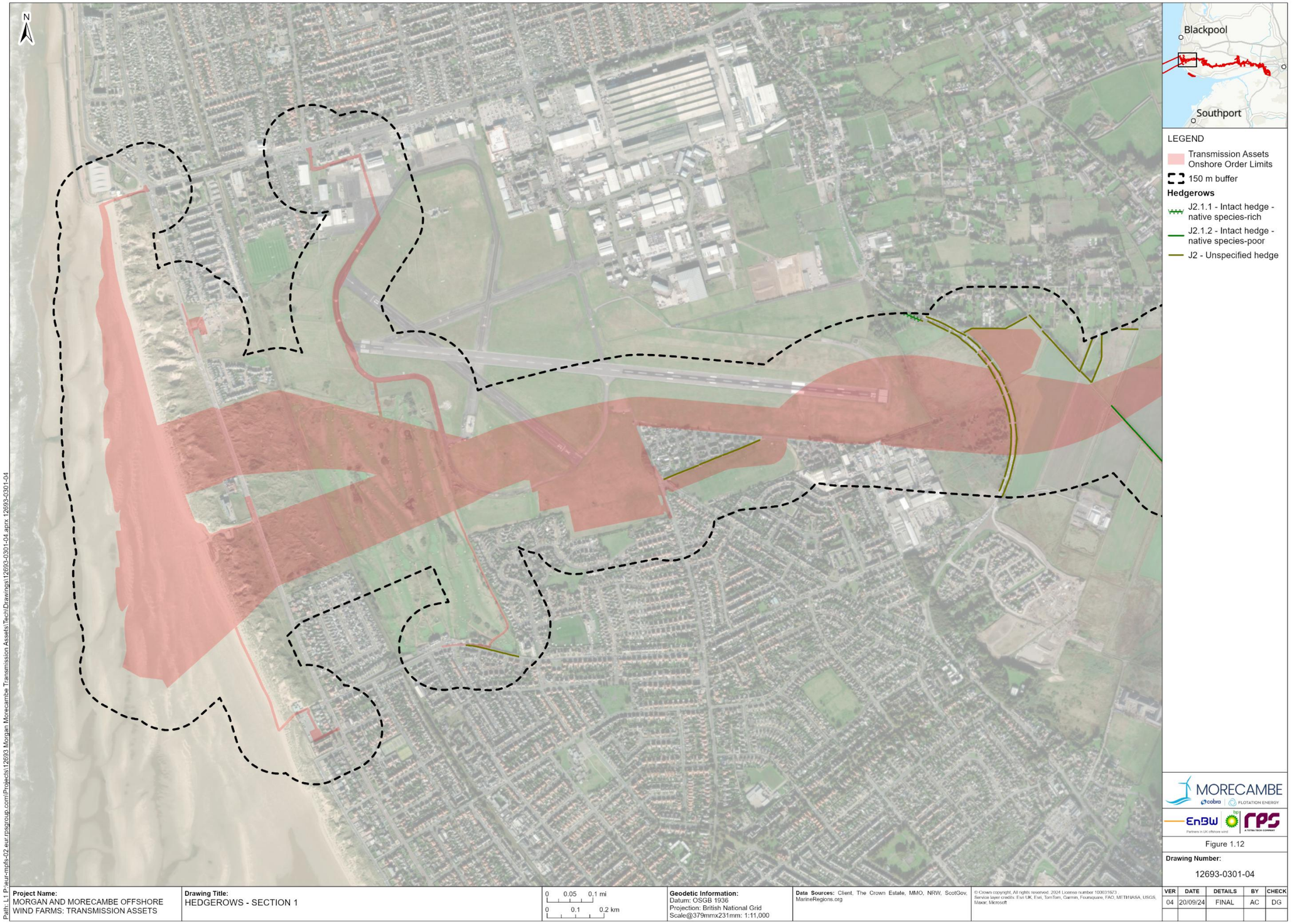


Figure 1.12: Hedgerows – Section 1

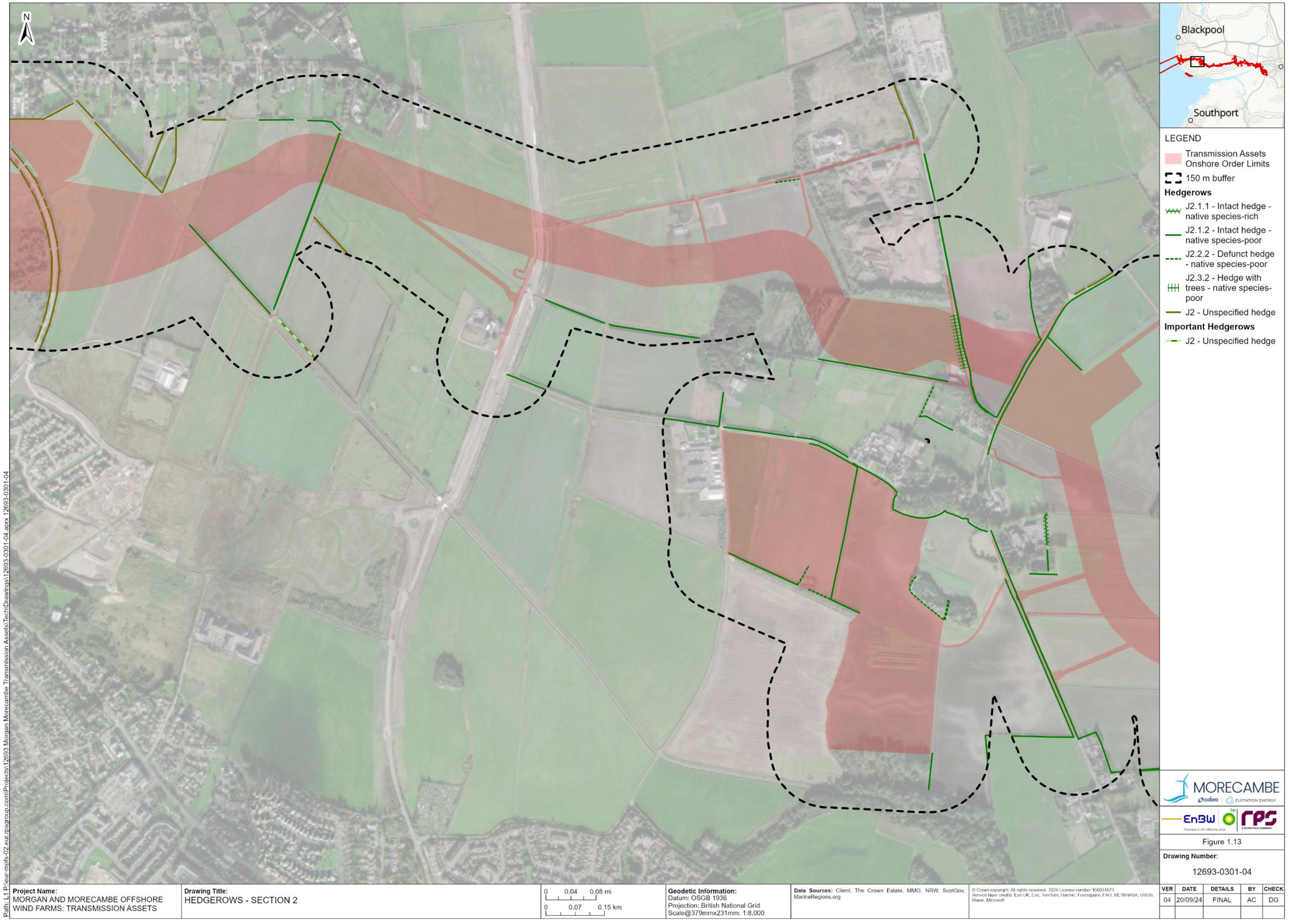


Figure 1.13: Hedgerows – Section 2

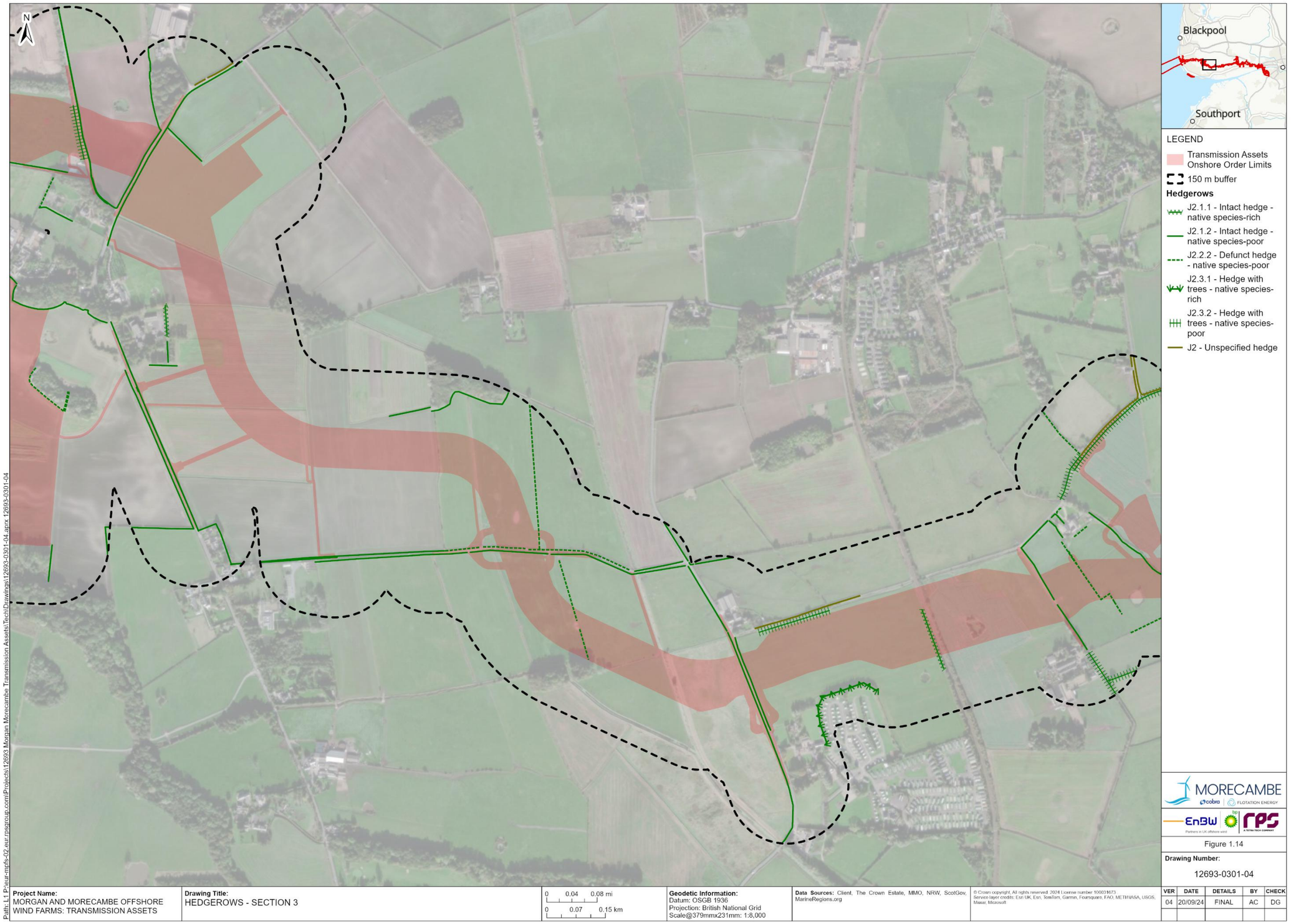


Figure 1.14: Hedgerows – Section 3

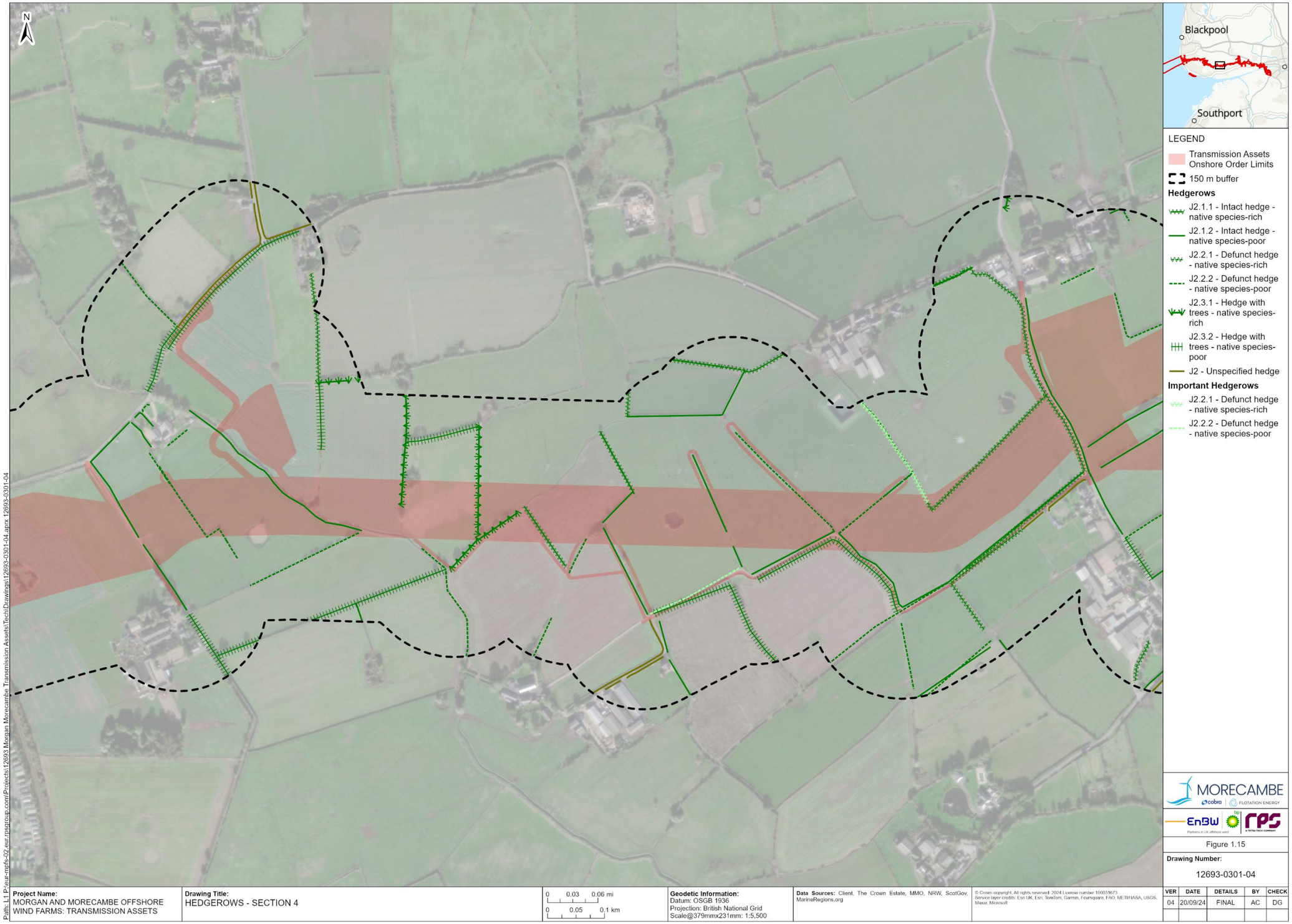


Figure 1.15: Hedgerows – Section 4

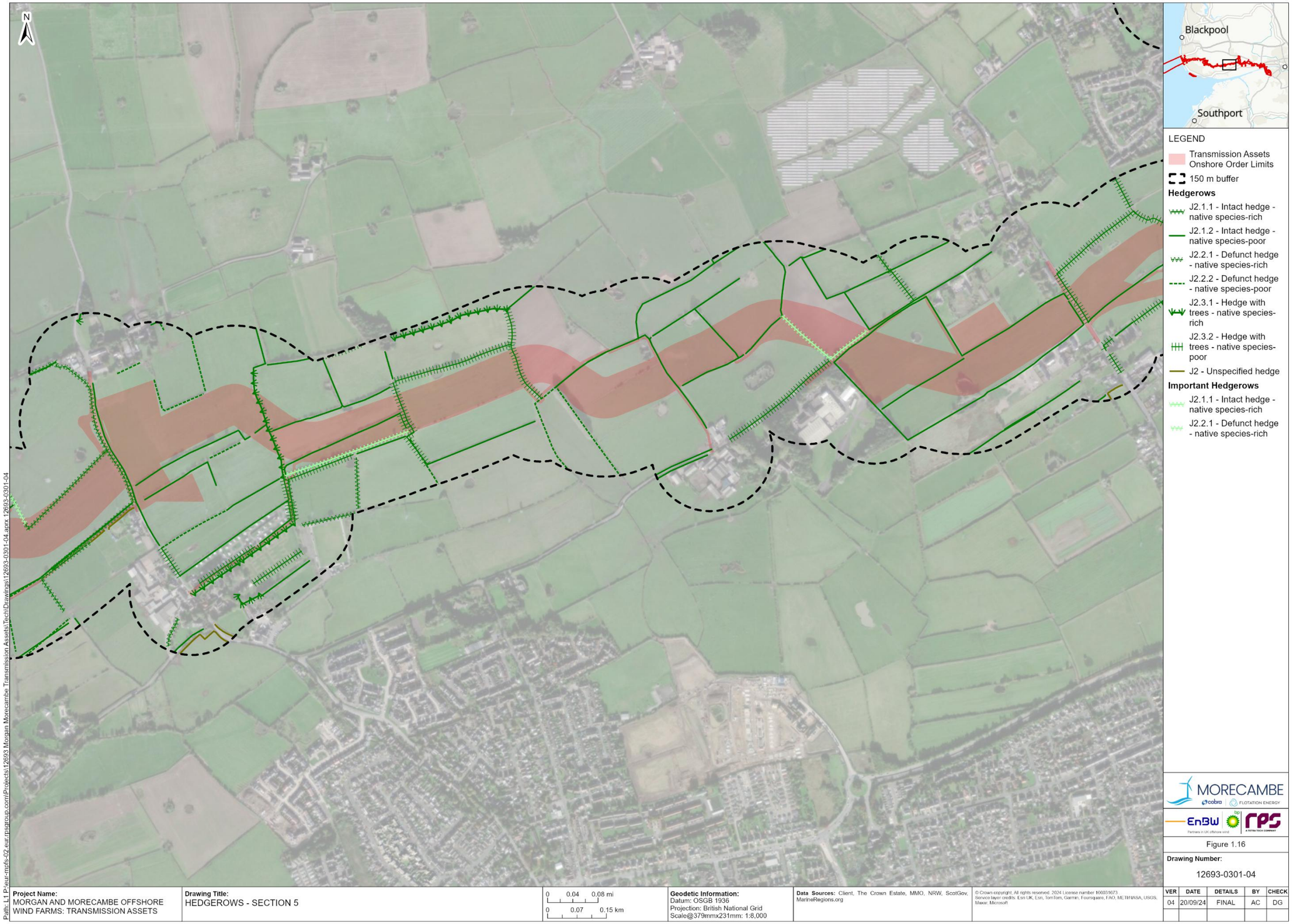


Figure 1.16: Hedgerows – Section 5

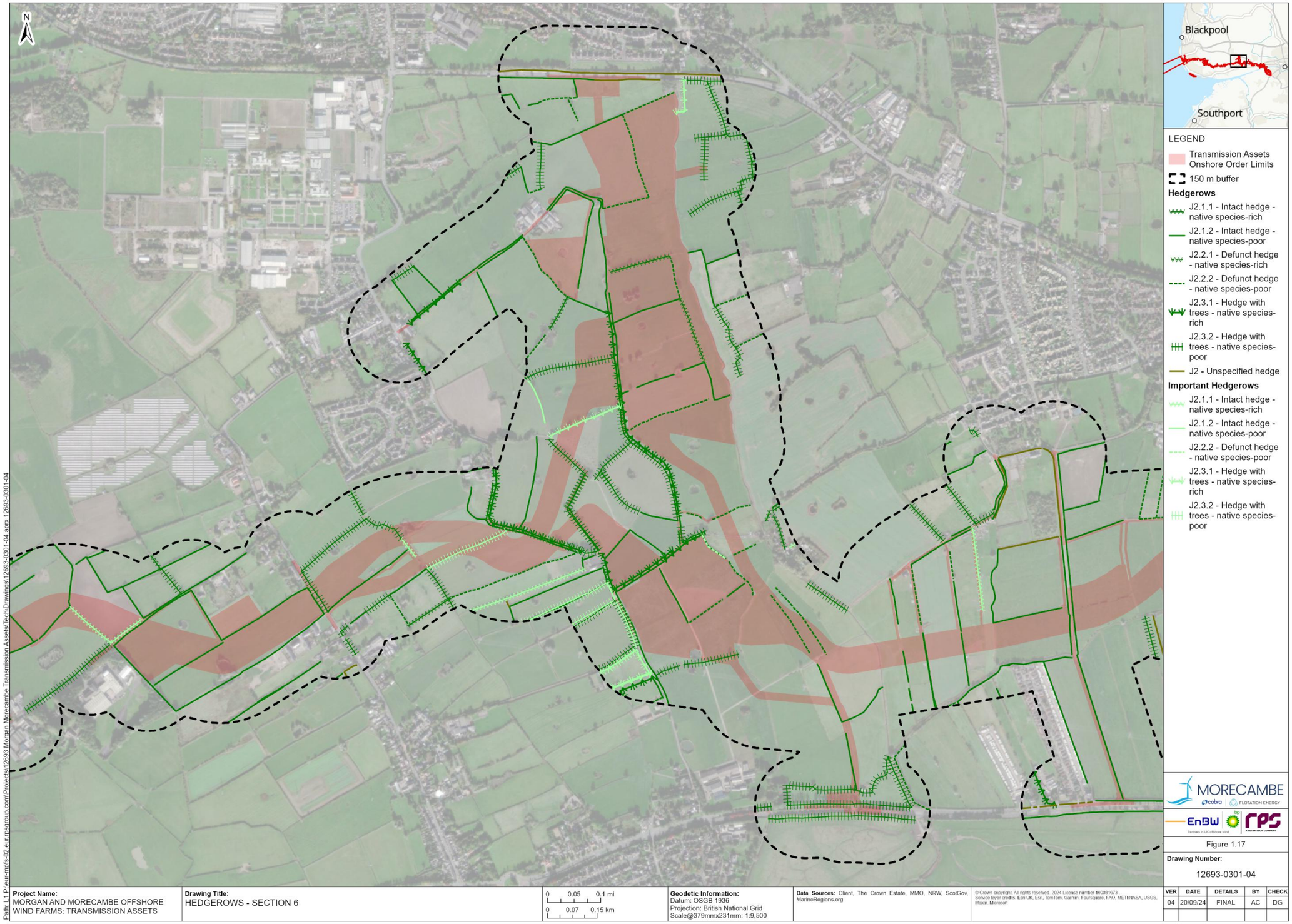


Figure 1.17: Hedgerows – Section 6

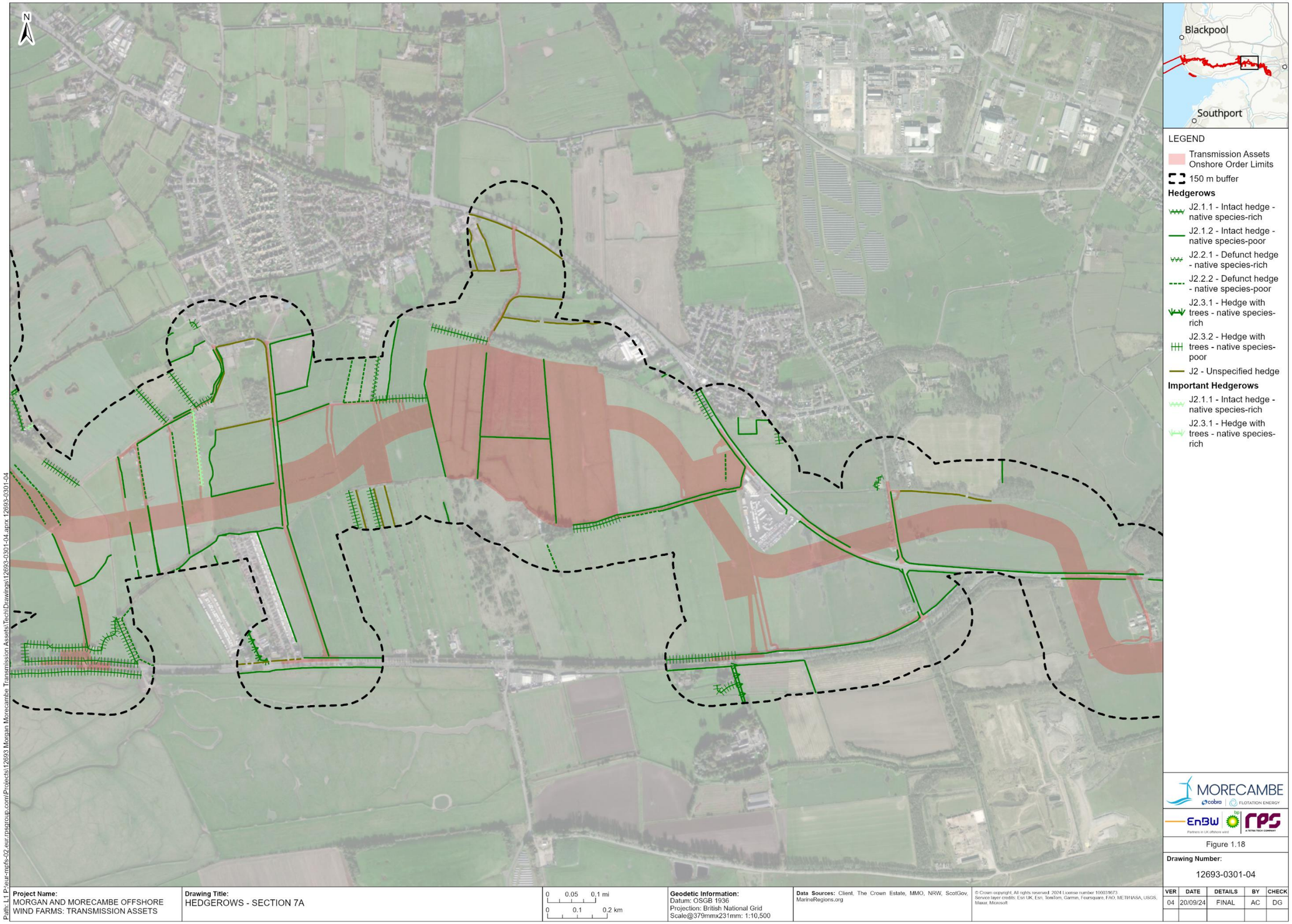


Figure 1.18: Hedgerows – Section 7a

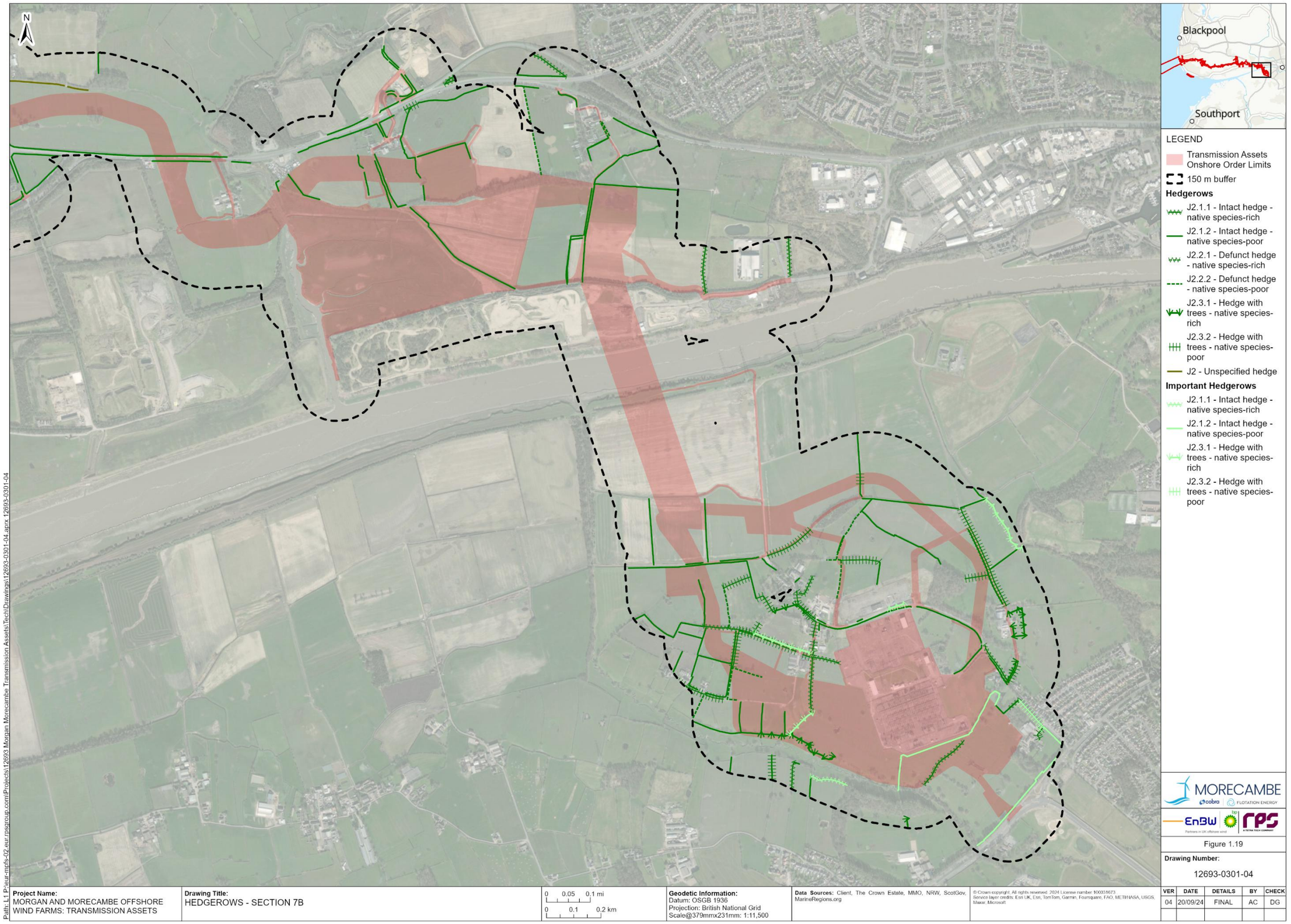


Figure 1.19: Hedgerows – Section 7b

Table 1.7: Hedgerow lengths identified within the survey area

Hedgerow type	Section 1 (m)	Section 2 (m)	Section 3 (m)	Section 4 (m)	Section 5 (m)	Section 6 (m)	Section 7a (m)	Section 7b (m)	Grand total (Onshore Order Limits) (m)	Grand total (Onshore Order Limits) (%)	150 m buffer (m)	Grand total (survey area) (m)	Grand total (survey area) (%)
J2.1.1 - Intact hedge - native species-rich			124	76	442	197		459	**1,298**	**4.41%**	3,123	**4,421**	**3.86%**
J2.1.2 - Intact hedge - native species-poor		2,337	1,315	614	2,259	3,060	3,409	5,290	**18,284**	**62.04%**	44,040	**62,324**	**54.36%**
J2.2.1 - Defunct hedge - native species-rich				407	254	206			**867**	**2.94%**	2,029	**2,897**	**2.53%**
J2.2.2 - Defunct hedge - native species-poor		252	326	475	9	1,722	182	225	**3,190**	**10.82%**	9,595	**12,785**	**11.15%**
J2.3.1 - Hedge with trees - native species-rich				216	173	958		509	**1,856**	**6.30%**	4,833	**6,689**	**5.83%**
J2.3.2 - Hedge with trees - native species-poor		140		249	358	1,660	0	602	**3,009**	**10.21%**	13,528	**16,537**	**14.42%**
J2 - Unspecified hedge	835					120	9		**965**	**3.27%**	8,038	**9,003**	**7.85%**
Total	**835**	**2,729**	**1,765**	**2,037**	**3,494**	**7,923**	**3,601**	**7,085**	**29,469**	**100.00%**	**85,187**	**114,656**	**100.00%**
Important hedgerow length (total)				**18**	**442**	**281**		**697**	**1,437**	**4.88%**	**4,606**	**6,043**	**5.27%**

Watercourses

1.3.2.5 For ease of reference a set of figures showing watercourses mapped during the phase 1 survey are provided in **Figure 1.20** to **Figure 1.27**.

1.3.2.6 A table showing the length and type of hedgerows surveyed within the survey area is provided in **Table 1.8**.

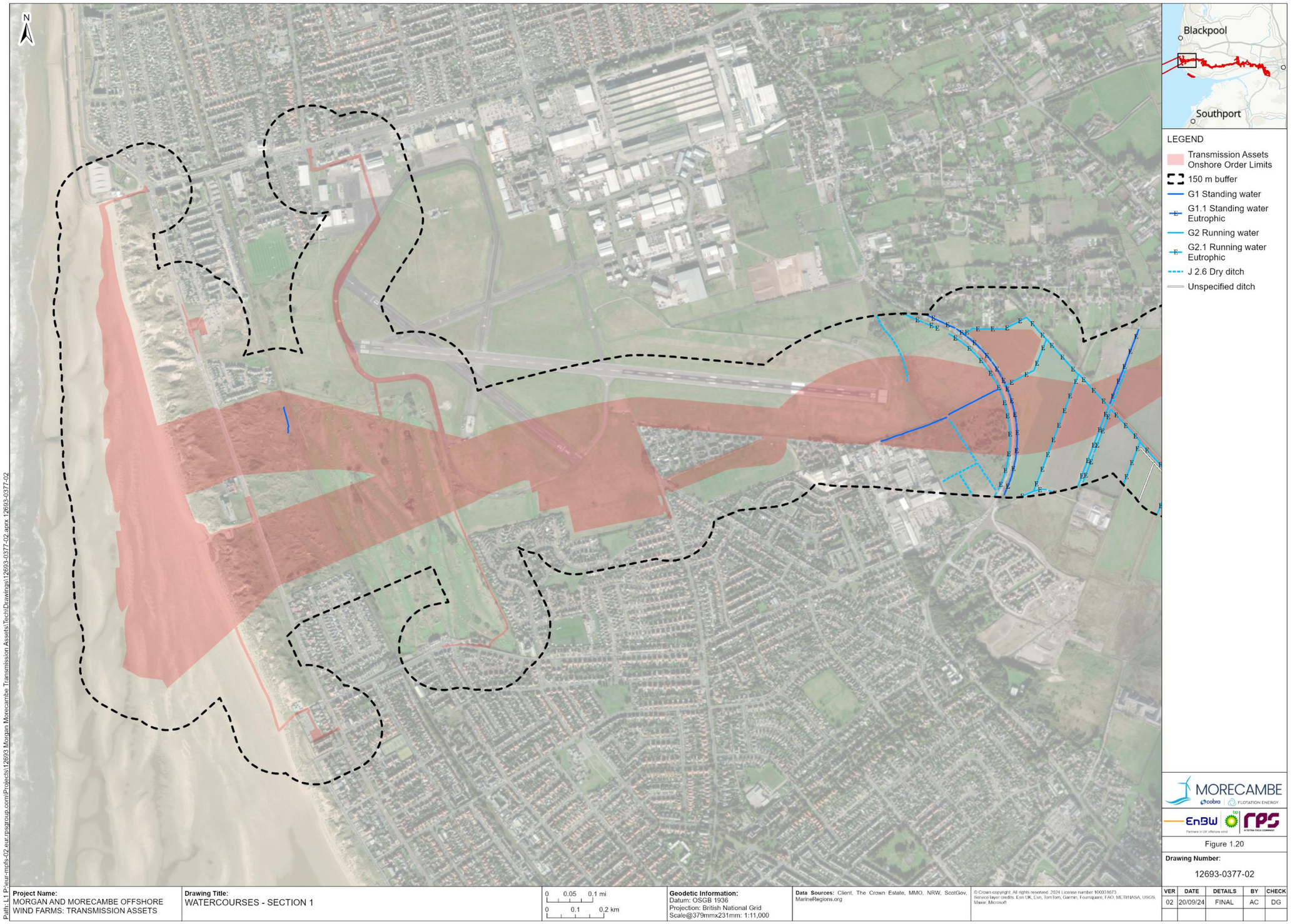


Figure 1.20: Watercourses – Section 1

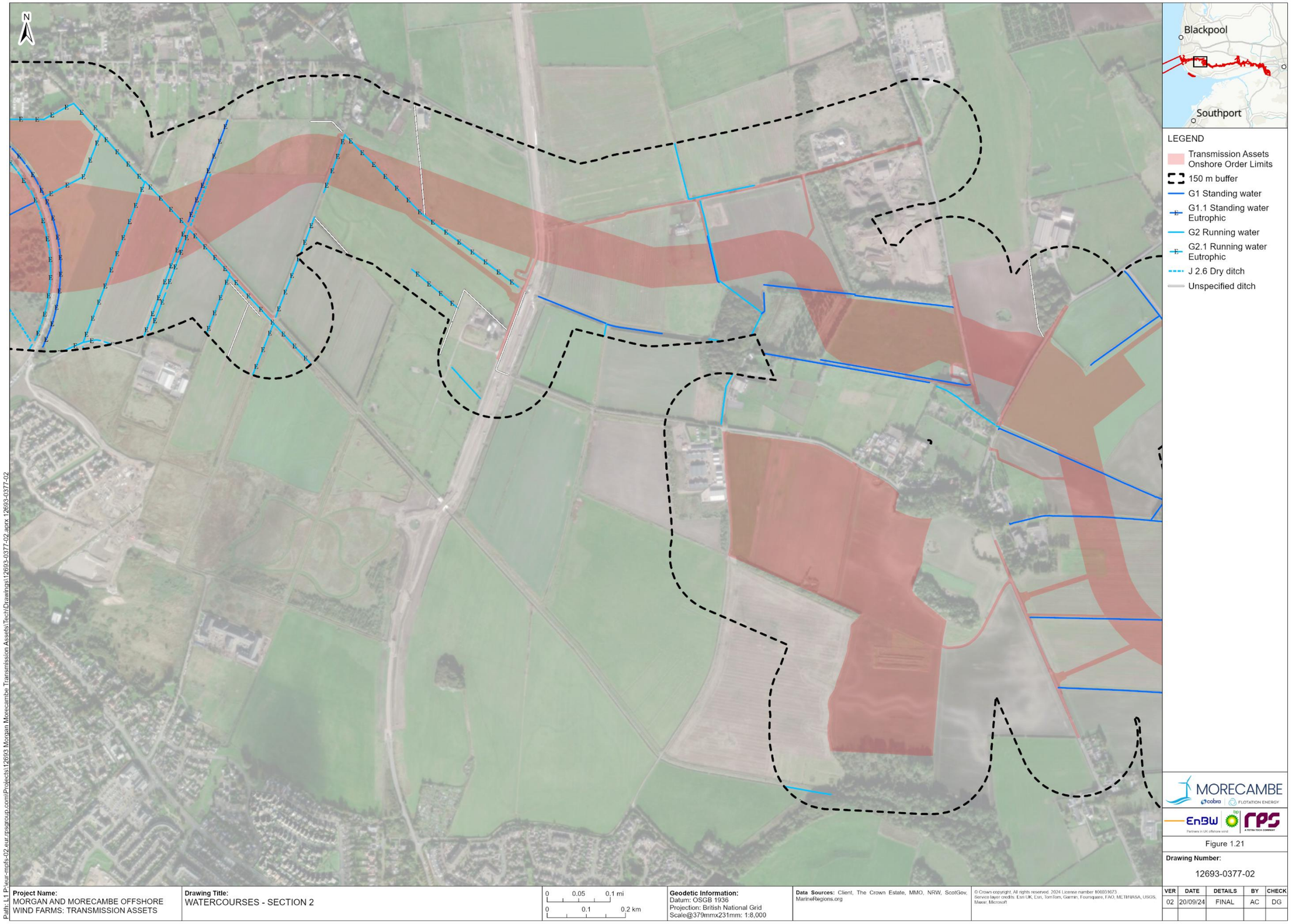


Figure 1.21: Watercourses – Section 2

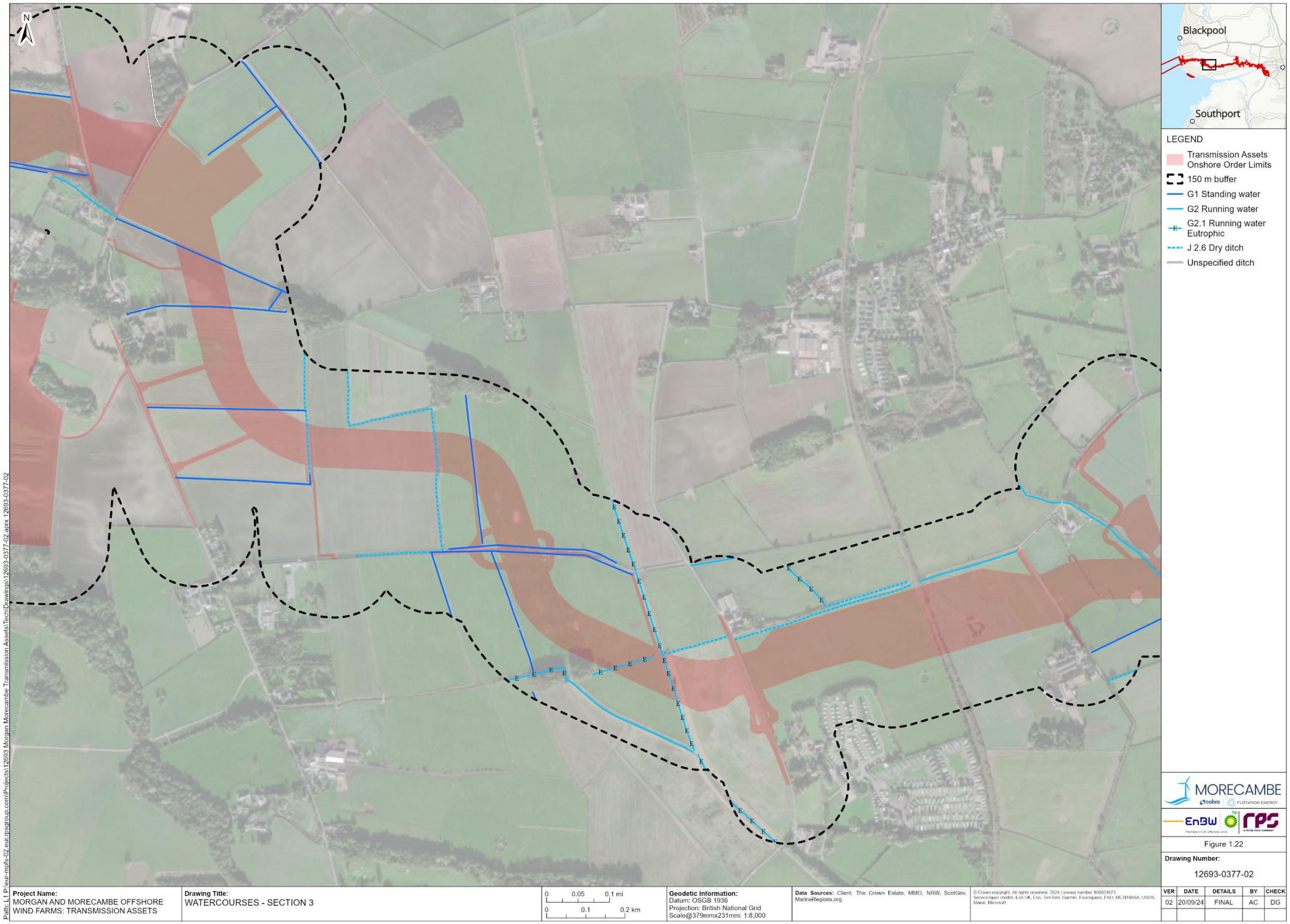


Figure 1.22: Watercourses – Section 3

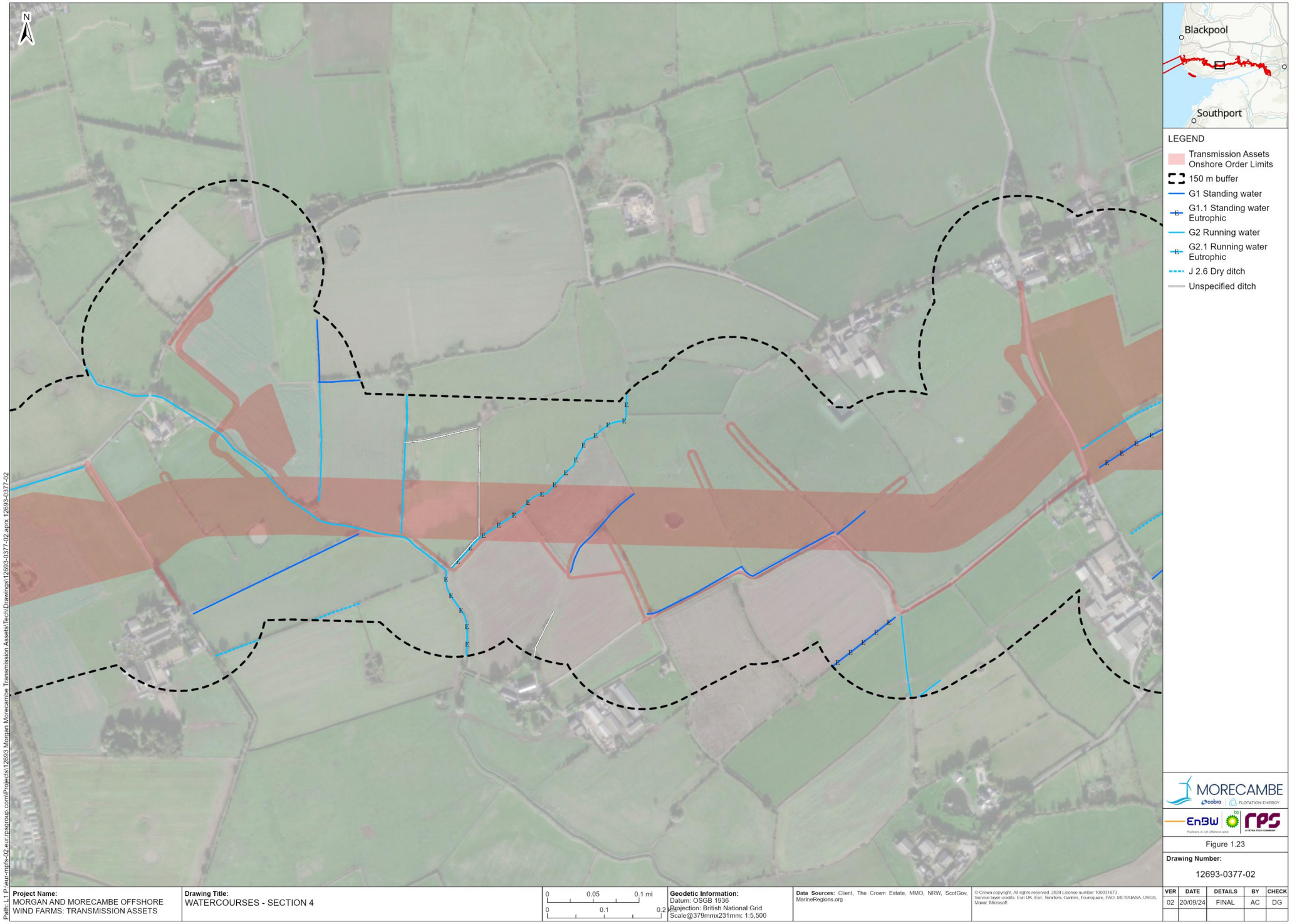


Figure 1.23: Watercourses – Section 4

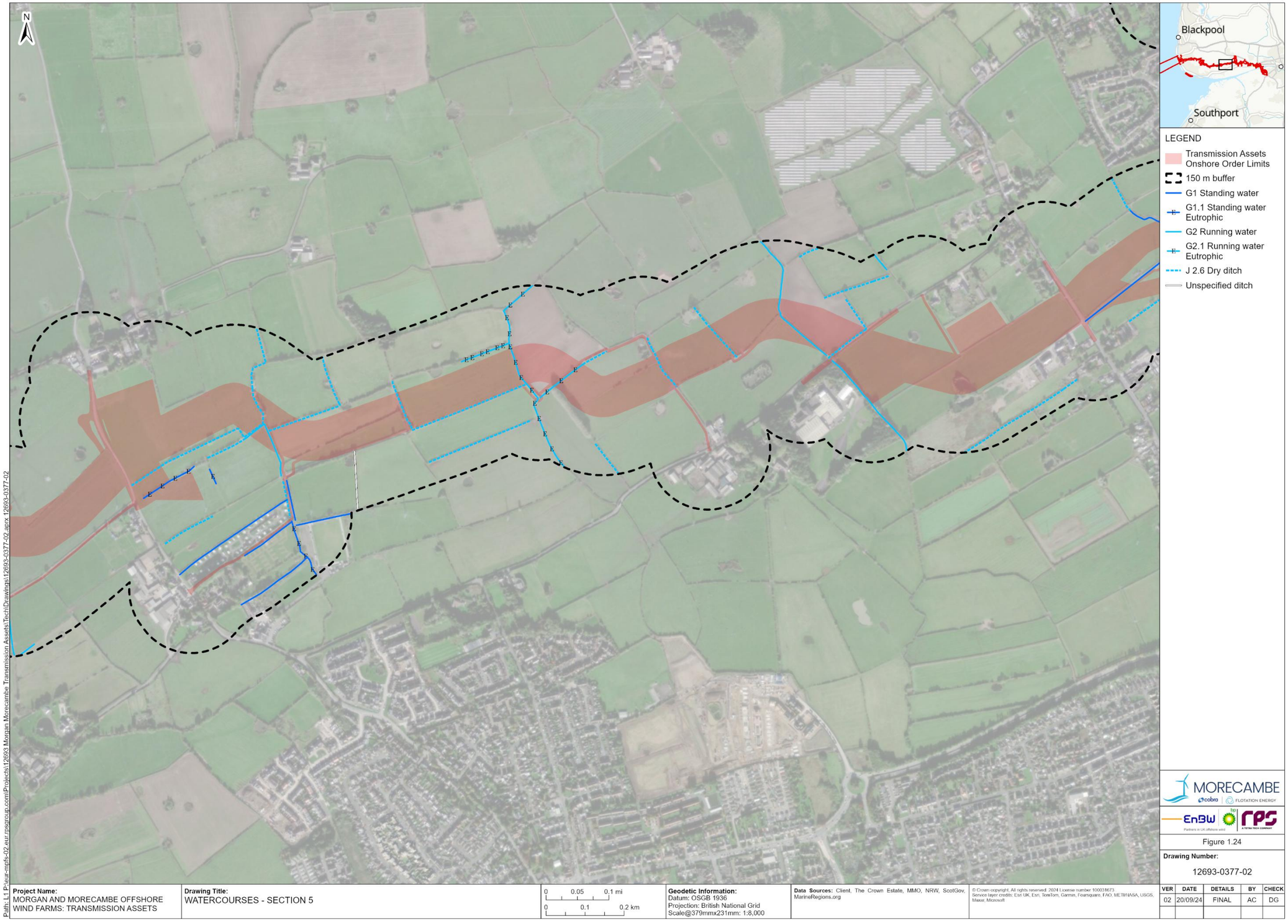


Figure 1.24: Watercourses – Section 5

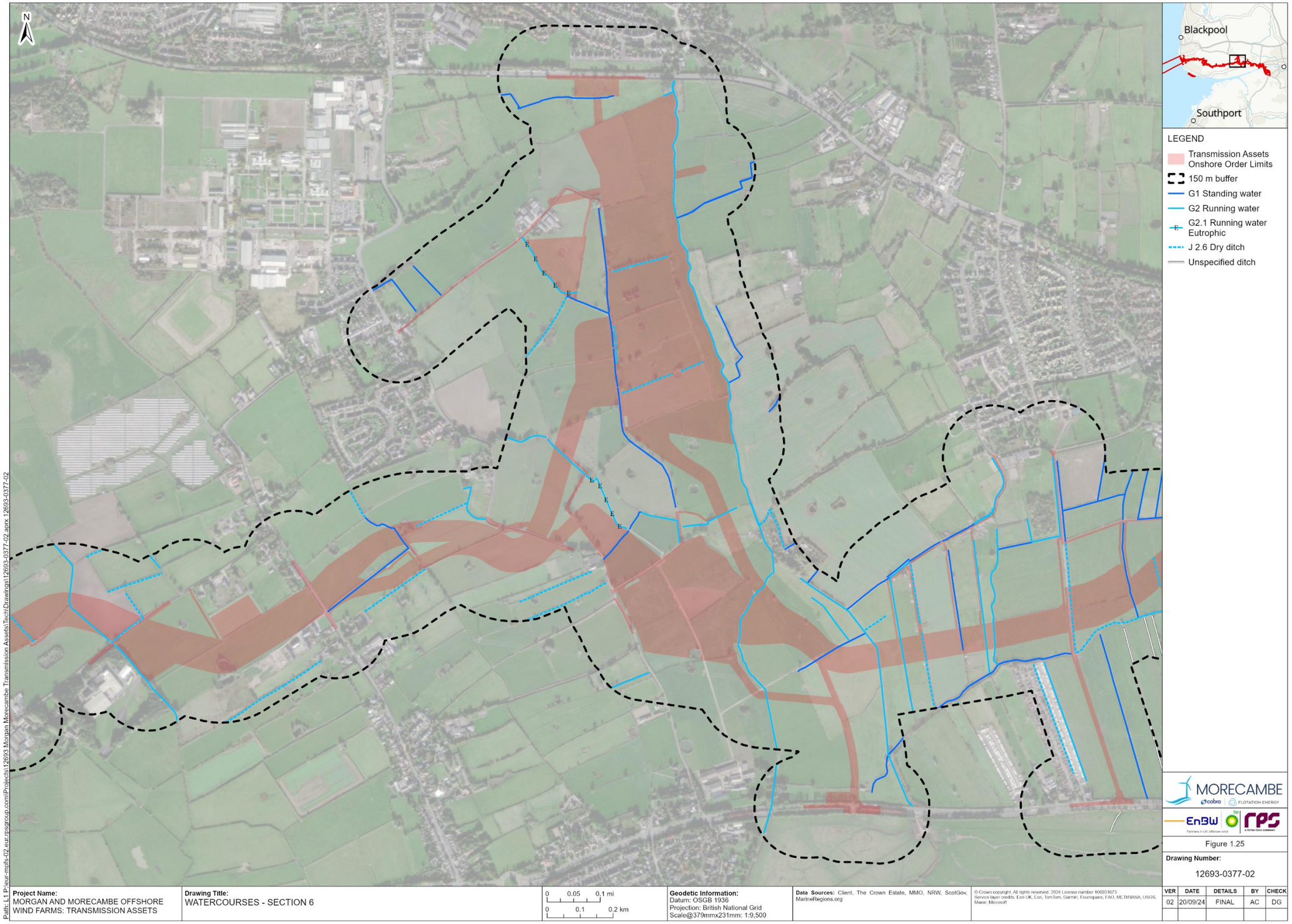


Figure 1.25: Watercourses – Section 6

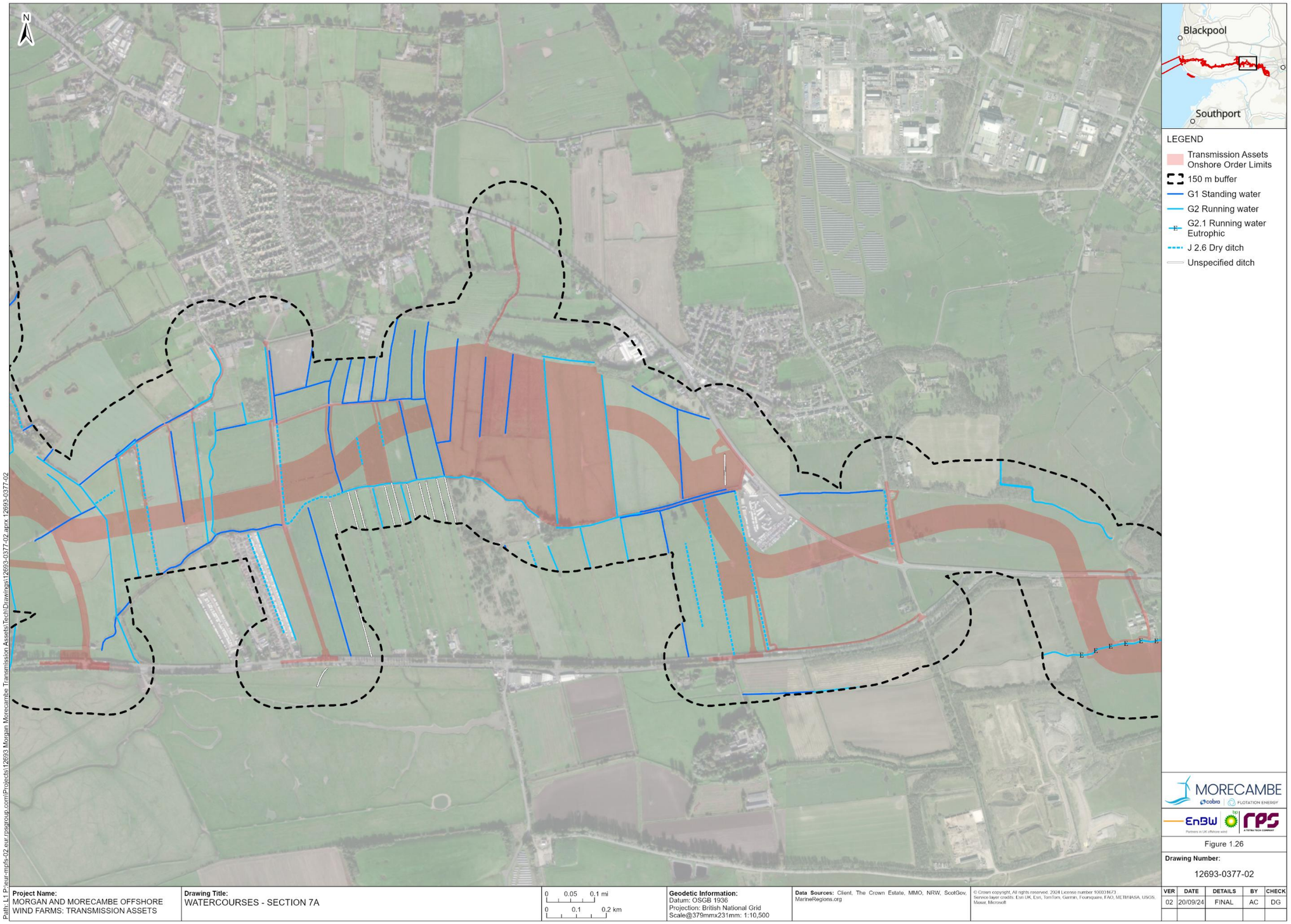


Figure 1.26: Watercourses – Section 7a

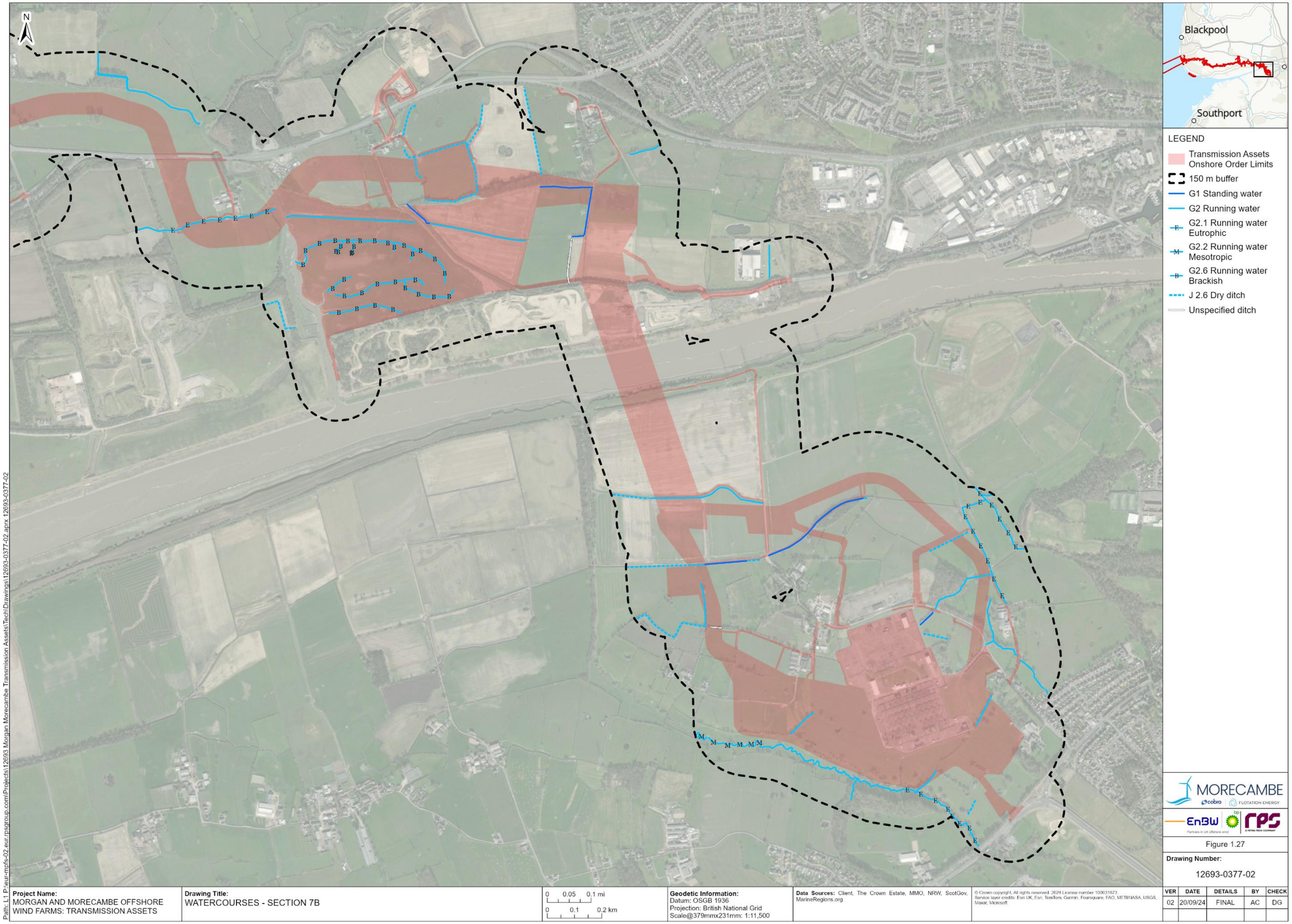


Figure 1.27: Watercourses – Section 7b

Table 1.8: Watercourse lengths identified within the survey area

Watercourse type	Section 1 (km)	Section 2 (km)	Section 3 (km)	Section 4 (km)	Section 5 (km)	Section 6 (km)	Section 7a (km)	Section 7b (km)	Grand Total (Onshore Order Limits) (km)	Grand Total (Onshore Order Limit) (%)	150 m buffer (km)	Grand Total (survey area) (km)	Grand Total (survey area) (%)
G1 - standing water	0.281	0.118	0.000	0.000	0.080	0.000	0.000	0.000	0.479	1.31	16.402	16.881	18.42
G1.1 - standing water - eutrophic	0.000	0.102	0.000	0.408	0.310	1.301	1.488	1.389	4.998	13.72	1.021	6.018	6.57
J2.6 - Dry ditch	1.503	1.734	1.608	0.935	1.588	3.204	4.040	3.784	18.396	50.51	11.205	29.601	32.30
Unspecified ditch	0.531	0.354	1.121	0.260	0.000	1.067	1.517	0.658	5.507	15.12	3.783	9.290	10.14
G2 - Running water	0.469	0.906	0.247	0.165	0.200	0.271	0.000	0.206	2.464	6.77	13.852	16.316	17.80
G2.1 - Running water - eutrophic	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.00	7.438	7.438	8.12
G2.2 - Running water - mesotrophic	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.725	0.725	1.99	0.361	1.087	1.19
G2.6 - Running water - brackish	0.222	0.134	0.240	0.000	0.999	0.565	0.933	0.757	3.850	10.57	1.169	5.019	5.48
Total	**3.007**	**3.349**	**3.216**	**1.768**	**3.177**	**6.408**	**7.977**	**7.520**	**36.420**	**100.00**	**55.230**	**91.650**	**100.00**

1.3.3 NVC

Overview

1.3.3.1 Surveys were originally scoped in for five sites within the survey area~~.~~ (four woodland sites and the Fylde sand dunes at the landfall site). Sites were scoped in for NVC survey due to the species richness and abundance and likely higher potential conservation concern of these habitats identified, or were requested ~~to~~ following consultation comments. Surveys revealed that two out of the five woodland sites did not conform with an NVC community, and that phase 1 habitat survey was sufficient to define habitat type. Consequently, detailed NVC surveys were not conducted for ~~sites 3 and 4.~~woodland sites 3 and 4. An additional site, St Anne's Old Links Golf Course BHS (which is adjacent to the Lytham St Anne's Dunes SSSI, although separated from it by the railway line), was scoped in for NVC survey in 2025 following comments received from stakeholders during the Examination (refer to Appendix K4- Risk and Issues Log, RI_G1 REP4-139).

NVC Results of the Woodland Sites

1.3.3.2 Woodland sites 1 and 2 were found to most closely conform with the W8 and W8e woodland community.

1.3.3.3 The location of four woodland NVC sites (1 to 4) are presented in Figure 1.28 to **Figure 1.30**. The full results of the NVC surveys at each woodland site are set out in **Table 1.9** below, including their respective plant communities, based on analysis using MAVIS, where such analysis was undertaken. Descriptions of each site are provided in **paragraphs 1.3.3.6** to **1.3.3.14** below.

1.3.3.4 For the two woodland sites where full NVC assessment was undertaken by the Applicants, the full species list and other survey information is provided in **Appendix B**.

~~1.3.3.5 Results of the NVC survey at Fylde sand dunes, including a comparison to the results published in Skelcher (2016) and details of the respective plant communities (based on MAVIS analysis), is provided in **paragraphs 1.3.2.23 to 1.3.2.34** below. The full species list and other survey information is provided in **Appendix C**.~~

Figure 1.28: Vegetation communities – Site 1 and 2

Figure 1.29: Vegetation communities – Site 4

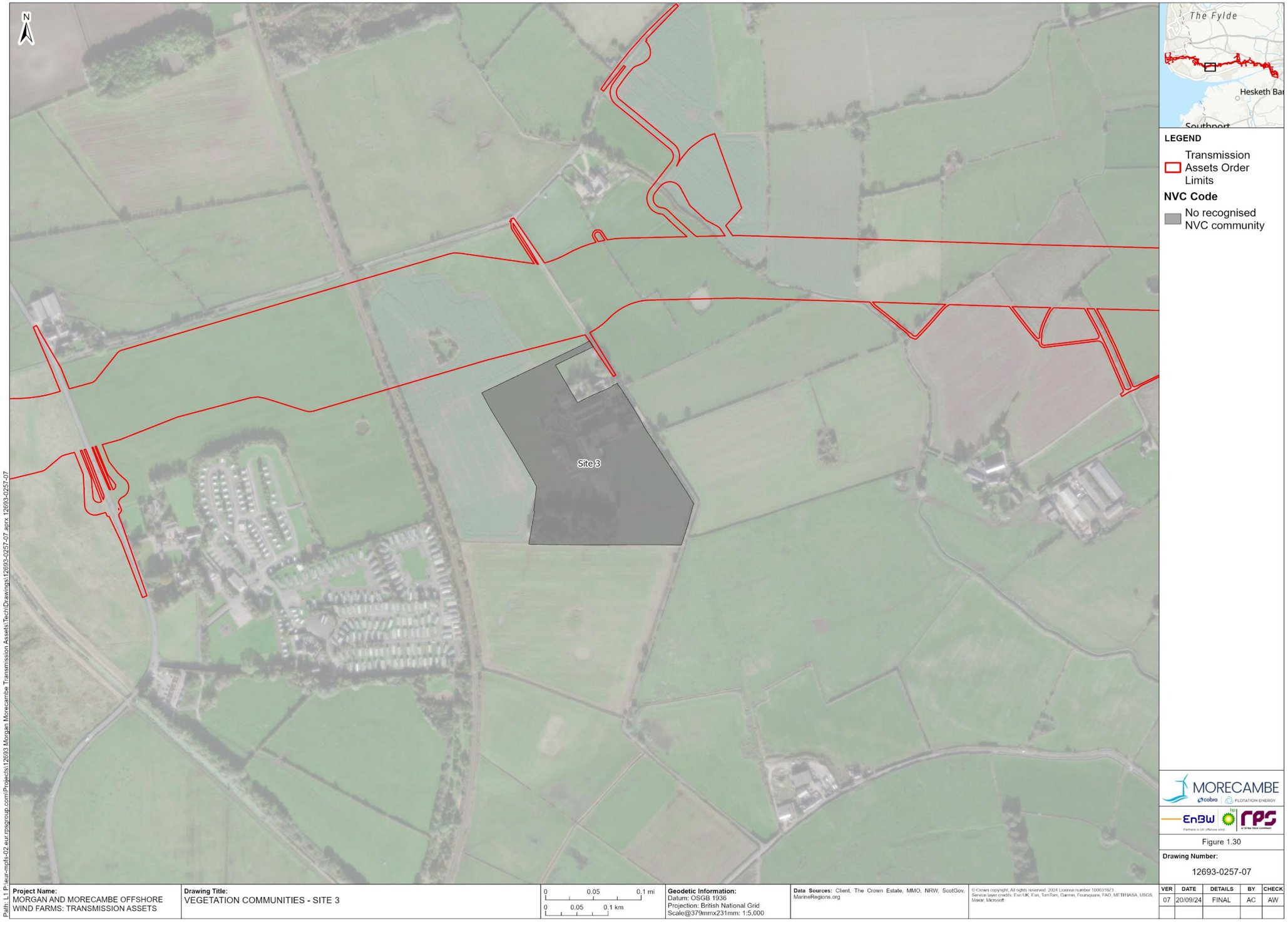
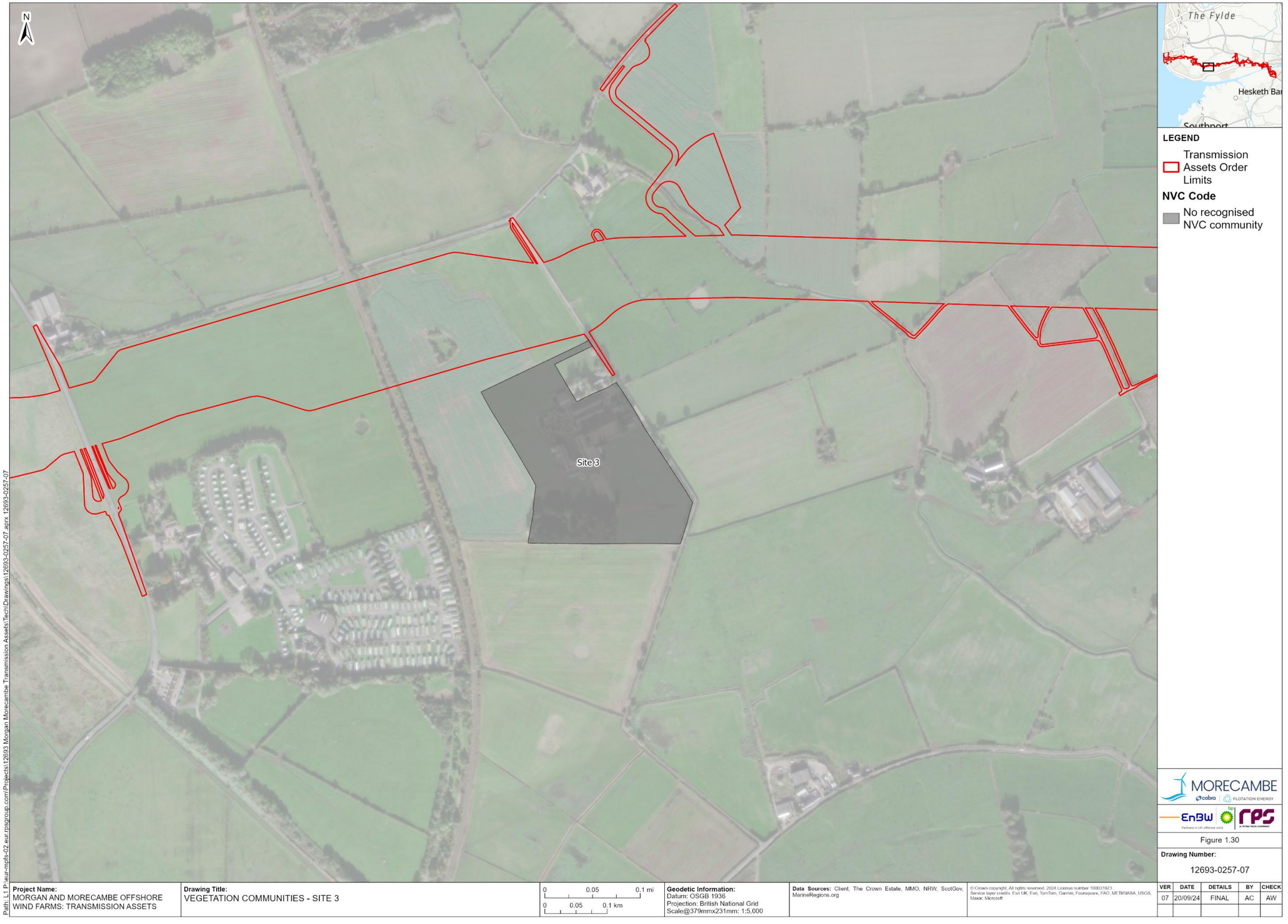


Figure 1.30: Vegetation communities – Site 4



~~Figure 1.~~31: ~~Vegetation communities~~ - site 3

Table 1.9: NVC woodland survey results

NVC community code	NVC sub-community type	Sites where NVC community type was present
W8	N/A – most closely resembles the W8 *Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland community, low abundance and scattered instances of species make it impossible to assign a clear subcommunity.	1
W8e	*Fraxinus excelsior-Acer campestre-Mercurialis perennis* woodland, *Geranium robertianum* sub-community	2
No recognised NVC community in surveyed parcel	N/A to NVC survey, NVC analysis not required.	3 and 4 – NVC community not present

Site 1 – W8

1.3.3.6 Site 1 is southwest of the National Grid Penwortham Substation, but outside the Transmission Assets Order Limits. Site 1 most closely resembled a W8 Fraxinus excelsior-Acer campestre-Mercurialis perennis woodland community. The site comprised of a woodland block, a small part of which was accessible to grazing livestock. Canopy species included dominant sycamore Acer pseudoplatanus, turkey oak Quercus cerris, abundant species included ash Fraxinus excelsior, Hybrid black poplar Populus x canadensis and occasional species included beech Fagus sylvatica, downy birch Betula pubescens, English oak Quercus robur and bird cherry Prunus padus.

1.3.3.7 Site 1's understory consisted of frequent elder Sambucus nigra and other occasional species in low abundance, including sycamore, hazel Corylus avellana, holly Ilex aquifolium, hawthorn Crataegus monogyna, yew Taxus baccata, Turkey oak, crab apple Malus sylvestris, sweet chestnut Castanea sativa, hornbeam Carpinus betulus, rowan Sorbus aucuparia, Rhododendron ponticum, silver birch, bird cherry and beech.

1.3.3.8 The ground layer in Site 1 consisted of a number of species including Yorkshire fog Holcus lanatus, wood dock Rumex sanguineus, bramble Rubus fruticosus agg., red campion Silene dioica, wood avens Geum urbanum, herb robert Geranium robertianum, Himalayan balsam, dandelion Taraxacum officinale agg. common nettle Urtica dioica, common hogweed Heracleum sphondylium, wood millet Milium effusum, fringed willowherb Epilobium ciliatum, remote sedge Carex remota, cleavers Galium aparine, false oat grass Arrhenatherum elatius, ivy Hedera helix, hybrid bluebell Hyacinthoides × massartiana, bittersweet Solanum dulcamara, common honeysuckle Lonicera periclymenum, cocksfoot Dactylis glomerata, ground ivy Glechoma hederacea, cow parsley Anthriscus sylvestris and hawthorn saplings.

1.3.3.9 The ground flora of site 1 was dominated by bramble and red campion, frequent species included wood millet, remote sedge and ivy, and all other species rarely occurred.

Site 2 – W8e

1.3.3.10 Site 2 is mostly outside the Transmission Assets Order Limits and is present northeast of the National Grid, Penwortham Substation. Site 2 most closely resembled the W8e - Fraxinus excelsior-Acer campestre-Mercurialis perennis woodland, Geranium robertianum sub-community woodland. The site comprised of a woodland block. Canopy species included dominant beech, frequent lime Tilia x europaea, sycamore, occasional bird cherry and rare pedunculate oak Quercus robur, white willow Salix alba, ash and sweet chestnut.

1.3.3.11 Site 2's understory consisted of frequent English elm Ulmus procera and hazel, occasional lime, wych elm Ulmus glabra, rare hawthorn, holly, pedunculate oak, English oak, beech, bird cherry, rowan, sycamore, Rhododendron ponticum, elder, ash and field maple.

1.3.3.12 The ground flora layer included a range of species including wood millet, ivy, wood avens, ash saplings, herb Robert, lords and ladies Arum maculatum, bramble, dog's mercury, wood dock, ground ivy, hedge mustard Alliaria petiolata, beech, hawthorn and ash saplings, wych elm, hybrid bluebell, red campion and wall lettuce.

1.3.3.13 Out of the ground flora species those most abundant included bramble, wood millet and ivy whilst all other species rarely occurred.

Sites 3 and 4

1.3.3.14 There were no recognised NVC communities for site 3 or site 4. It was deemed that phase 1 survey provided enough detail as these sites did not conform with an NVC community.

~~**Fylde sand dunes**~~

Ground truthing exercise at Lytham St Annes SSSI in 2024

1.3.3.15 Results of the NVC survey at Fylde sand dunes undertaken by the Applicants in August 2024, including a comparison to the results published in Skelcher (2016) and details of the respective plant communities (based on MAVIS analysis), is provided in **paragraphs 1.3.3.18** to **1.3.3.29** below. The full species list and other survey information collected during the August 2024 surveys undertaken by the Applicants is provided in Appendix C.

1.3.3.16 An updated map was not prepared following the completion of NVC ground truthing surveys by the Applicants in August 2024, although the quadrat locations are shown in **Error! Reference source not found.**. This was on the basis that the survey results from the 2024 surveys concurred with the previous survey outputs and therefore the existing NVC mapping was considered sufficient to inform the ecological impact assessment.

~~1.3.3.15~~1.3.3.17 As set out in paragraph **1**, surveys were undertaken by the Applicants between 13 and 16 August 2024 to identify whether the NVC surveys for the wetland communities at the sand dunes at landfall in 2016 still accurately reflected the ecological baseline. The location of the NVC quadrats is shown in **Figure 1.3**, although the habitat map was not updated (the habitat map shown in **Figure 1.4** is taken from the Skelcher 2016 NVC survey of the sand dunes). It was not updated in 2024 because the 2016 survey reported a broadly accurate representation of the current wetland ecological communities present (refer to **paragraphs 1.3.3.28** and **1.3.3.32** and **Appendix D**).

~~1.3.3.16~~1.3.3.18 Five NVC communities were identified during the August 2024 surveys – the dune slack communities SD17, SD16, SD15, and drier dune grassland/grassland communities SD9 and MG1. These are summarised in **paragraphs ~~1.3.2.25 to 1.3.2.32~~ below.1.3.3.20** to **1.3.3.27** below.

SD17 *Potentilla anserina* – *Carex nigra* dune slack community

~~1.3.3.17~~1.3.3.19 This community is typified by abundant creeping bent Agrostis stolinifera, silverweed Potentilla anserina and common sedge Carex nigra. Also frequent are red fescue Festuca rubra and Yorkshire fog Holcus lanatus. In addition, the bryophyte Calliergonella cuspidatum is locally abundant within this community.

SD16 *Salix repens* – *Holcus lanatus* dune-slack community

~~1.3.3.18~~1.3.3.20 This community is typified by dominant creeping willow Salix repens, with high frequencies of both Yorkshire fog Holcus lanatus and red fescue Festuca rubra. Occasional species within this community *are Agrostis stolinifera* and *Poa pratensis*.

~~1.3.3.19~~1.3.3.21 Rubus – caesius was identified as the sub-community. This fits well following floristic analysis as Rubus-caesius is present throughout, being present in 20 out of 21 quadrats.

SD15 *Salix repens – Calliergon cuspidatum* dune-slack community

~~1.3.3.20~~1.3.3.22 This community is typified by a high frequency of creeping willow *Salix repens*, marsh pennywort *Hydrocotyle vulgaris*, water mint *Mentha aquatica* and *Calliergonella cuspidatum*. Also frequent are marsh bedstraw *Galium palustre*, marsh willowherb *Epilobium palustre*, marsh *horsetail Equisetum palustre* and greater bird's-foot trefoil *Lotus pedunculatus*.

~~1.3.3.21~~1.3.3.23 In addition, ~~The~~the area defined by Skelcher (2016) as Iris dominated dune mire/dune slack is clearly present. Three quadrats were taken and although distinctly different from the above defined SD15 community, the best fit is still SD15a.

~~1.3.3.22~~1.3.3.24 An area previously defined as S12 – *Typha latifolia* swamp by Skelcher (2016) was also sampled. The results from this area has a best fit to SD15. However, it is worth noting that further into the centre of the Typha area (as defined by Skelcher (2016)), the species diversity may very well

decrease and move towards a more homogenous stand. The Typha area is then probably best defined as a sliding scale between SD15 and S12.

SD9 *Ammophila arenaria-Arrhenatherum elatius* dune grassland

~~1.3.3.23~~1.3.3.25 This community is typified by the presence of co-dominant false oat-grass Arrhenatherum elatius with red fescue Festuca rubra and marram grass Ammophila arenaria. These quadrats were all within areas previously identified as SD16 in Skelcher (2016).

MG1 *Arrhenatherum elatius* grassland

~~1.3.3.24~~1.3.3.26 This community is typified by presence of coarse grasses such as false oat-grass Arrhenatherum elatius alongside cock's foot Dactylis glomerata and Yorkshire fog Holcus lanatus. These quadrats were all within areas previously identified as SD16 in Skelcher (2016).

Comparison to Skelcher (2016)

~~1.3.3.25~~1.3.3.27 The survey confirmed that the 2016 survey reported a broadly accurate representation of the current wetland ecological communities present. The key differences are as follows.

- Areas on top or on the side of sand dunes where surveyed are not SD16 but rather mainly SD9. This correlates well with the fact that dune slacks are not known to occur on these high elevations.
- From extensive walkover surveys and a number of quadrats taken, even areas that were previously defined as SD16 at lower elevations did not always fit this community due to a lack of associated species, despite *Salix repens* being the dominant species in this area.
- There was found to be an increase in SD15 communities. These were located within previously defined SD16 areas.
- There was a small increase in the areas defined as SD16 dune slack in the Ribble Estuary SSSI.
- SD15 communities and SD16 communities were not found to occur above an elevation of 7 m.
- The Iris and Typha dominated dune slacks located in the south seem to have grown in size. However, since these fall within the SD15 community the overall affect is the SD15 area is largely the same here.

~~1.3.3.26~~1.3.3.28 In relation to the moisture sensitive areas of the dune complex, the dune slacks were found to have the same National Vegetation Classification as outlined in the 2016 report. Dune slacks depend on a high groundwater table, which makes them very sensitive to water level changes. Any reduction in groundwater can dry them out, leading to significant changes in their ecological balance. For example, as the water table drops and slacks become drier, moisture-loving species typical of SD15 communities such as *Calliergon cuspidatum*, *Carex nigra*, and *Mentha aquatica* decline. *Salix repens* may persist but become more scattered, as it

can tolerate slightly drier conditions. SD16 is associated with slightly drier, but still moist, dune slacks and is transitional between wetter slack types like SD15 and drier dune grasslands (SD9, SD8 and SD7). These communities exist throughout the dune complex.

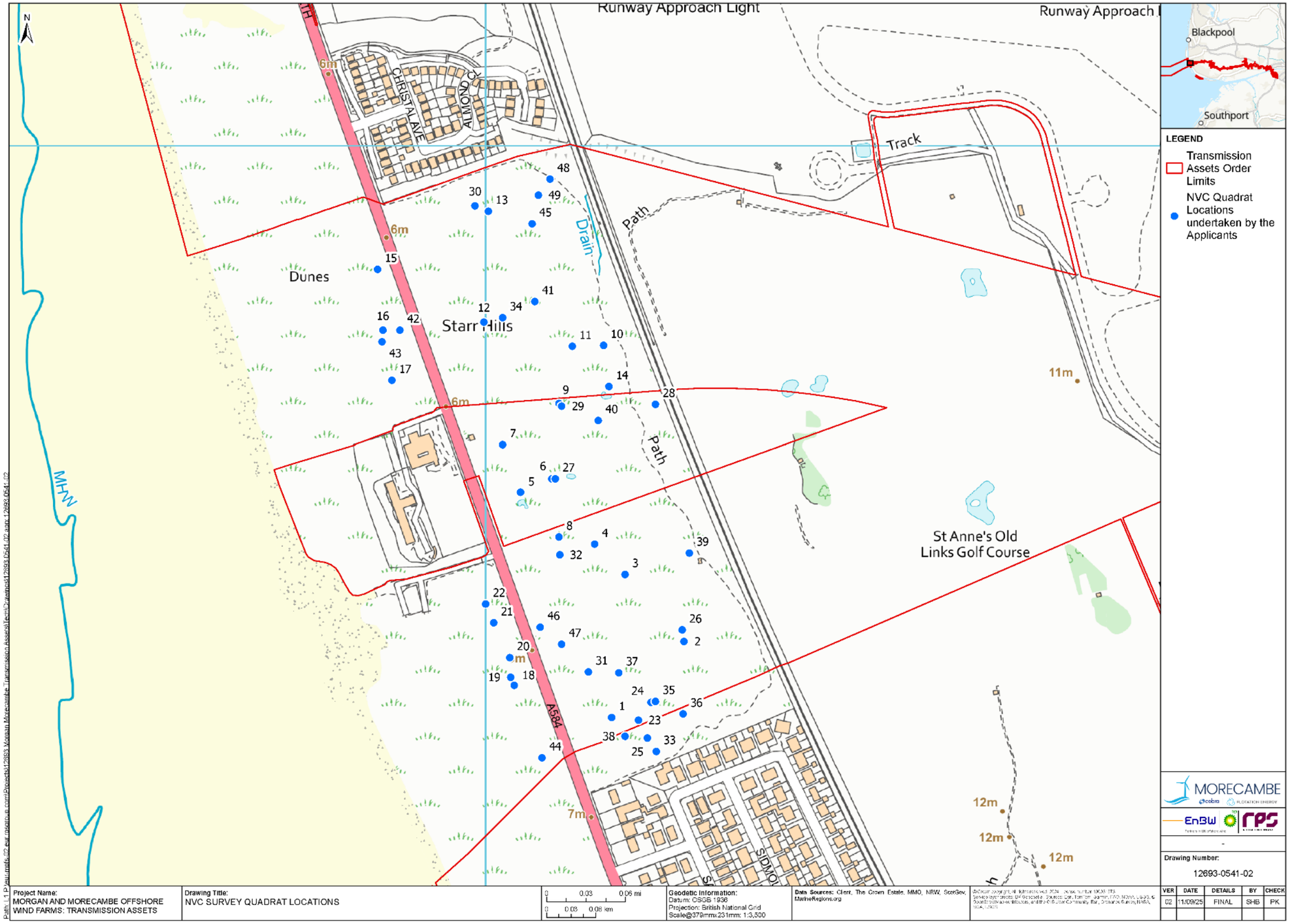


Figure 1.31: NVC quadrat locations (Applicants' Survey undertaken in August 2024)

NVC Survey of Lytham St Annes SSSI

1.3.3.29 The updated NVC map and details on the updated NVC survey of the Fylde sand dunes undertaken by the Applicants in August 2025 is provided in Appendix D and discussed in **paragraph 1.3.3.30** to **paragraph 1.3.3.33** .

1.3.3.30 The results of the updated NVC survey undertaken by the Applicants in September 2025 indicated a total of four topogenous wetland types including three communities of wet dune and one swamp, all of which correspond with the habitat types recorded in previous surveys. The wet dune habitats SD16, SD16/SD17 and SD17 are likely to exhibit high groundwater dependency and are evaluated to represent 'groundwater dependent terrestrial ecosystems' (GWDTE) while the area of identified swamp habitat (S28) is likely to exhibit low groundwater dependency.

1.3.3.31 A total of 27 important plant taxa were identified during the survey including a rare Juncus hybrid (Juncus x lancastriensis), dune helleborine (Epipactus dunensis), bog pondweed (Potamogeton polygonifolius) and unbranched bur-reed (Sparganium emersum). Of the habitat affiliations identified, many important flora were particularly affiliated with dune slack, with little overlap between those found in fixed dune grassland verses those found within slack vegetation. In total 15 of the 27 important taxa were affiliated with dune slack, while 15 were affiliated with foredune, semi-fixed and fixed dune vegetation.

1.3.3.32 Overall, the 2025 surveys indicated a similar suite of dune habitats to those recorded in previous surveys (2016 and 2024) of the dunes, with western side of the SSSI (on the western side of Clifton North Drive) typified by the drier dune habitat types, and the dunes in the eastern part of the SSSI associated with the LNR area on the eastern side of Clifton Drive North being characterised by a greater extent of wetland and dune slack habitat types, as was also recorded in previous surveys of the SSSI/ LNR (refer to **Figure 1.3** of **Appendix D**).

St Anne's Old Links Golf Course BHS

1.3.3.33 The 2025 surveys confirmed the findings of the Phase 1 habitat survey undertaken by the Applicants that the BHS is dominated by grassland habitat. The predominant habitat type recorded was dry, acidophilous dune grassland and scrub most often comprising degraded and somewhat enriched forms of SD12 Carex – Festuca – Agrostis dune grassland with W23 Ulex europaeus – Rubus fruticosus scrub, with one small fragment of remaining dune heath (NVC H11 Calluna vulgaris – Carex arenaria heath). Smaller areas of dry SD9 Ammophila-Arrhenatherum dune grassland, MG1 Arrhenatherum grassland and W24 Rubus-Holcus scrub also existed alongside these more calicfugeous habitats. In addition to these semi-natural vegetation types, the remainder of the golf course comprised a series of heavily managed fairways, tees and greens that were found to be best affiliated with the NVC community MG7 Lolium ley.

1.3.3.34 Whilst topogeneous wetland vegetation was observed, this was typically extremely limited in extent and confined to a small number of artificial ponds within the golf course. SD15 and SD16 dune slack vegetation with Salix

repens was recorded across the outskirts of pool margins covering several square metres only, while swamp vegetation comprising planted Typha and Caltha typically dominated the expanse of pools. A review of aerial imagery indicates that Ponds 1 and 4 within the golf course were substantially modified approximately 20 years ago. The baseline NVC survey and mapping of the St Anne's Old Links Golf Course BHS therefore confirmed previous assumptions within the assessment that the habitats the golf course have been heavily influenced by substantial anthropogenic modifications (including groundwater abstraction) over the past 125 years since the golf course was established on the dunes in 1901. There are some very small areas of marginal pond vegetation (equating to c. 25 square metres in total across the four ponds within the golf course) with affinity to the dune slack community SD15, although the extent to which these small habitat fragments are groundwater dependent given the level of modifications to the surrounding land is unclear, and they are therefore considered to be a 'likely GWDTE'.

1.4 Summary

1.4.1 Overview

1.4.1.1 This technical report presents the results of the phase 1 habitat, national vegetation classification and hedgerow survey desk study and the field surveys undertaken to inform Volume 3, Chapter 3: Onshore ecology and nature conservation of the ES.

1.4.2 Phase 1 summary

1.4.2.1 Phase 1 habitat surveys were undertaken between May 2022 and July 2024 to map broad habitat types present and identify potential for protected or notable species within the phase 1 habitat survey area. All broad habitat types recorded within the phase 1 habitat survey area were mapped using the JNCC phase 1 habitat classification scheme, including phase 1 habitat types (JNCC, 2010).

1.4.2.2 Habitats present within the Onshore Order Limits predominantly comprised the following habitats.

- B4 improved grassland (199.325 ha, 36.16%);
- B6 poor semi-improved grassland (116.994 ha, 21.21%); and
- J1.1 arable (78.623 ha, 14.26%).

1.4.2.3 Together these three habitat types comprise nearly 72% of habitats within the Onshore Order Limits.

1.4.2.4 A range of other habitat types within the Onshore Order Limits were recorded, including the following.

- HS hard standing and J3.6 buildings (combined 30.511 ha, 5.53%);
- H2 saltmarsh (22.254 ha, 4.04%, present in Section 7b - Lea Marsh);
- J1.2 amenity grassland (26.26 ha, 2.7%);

- H6 sand dune (12.036 ha, 2.18%, present in Section 1 at the west end of the survey area);
- B2.2 semi-improved neutral grassland (10.999 ha, 2%, mostly in Section 2); and
- J1.2 Amenity grassland (10.488 ha, 1.90%, mostly in Section 1).

1.4.2.5 All other habitats within the Onshore Order Limits are present in areas of less than 10 ha (1.65% or below).

1.4.2.6 Sand dunes are present at Section 1 but not in any other section within the Onshore Order Limits.

1.4.2.7 Watercourses and ditches were present throughout, including streams, standing and running water and wet and dry ditches. Over 18 km of dry ditches were present, along with 5.5 km of unspecified ditches and 5.5 km of wet ditches (combined totals for G1 standing water and G1.1 standing eutrophic water). Approximately 7 km of running water (combined totals for G2.6 running water (brackish), G2 running water and G2.1 running water (eutrophic)) was recorded within the survey area.

1.4.3 Hedgerow summary

1.4.3.1 Over 28 km of hedgerows were mapped within the Transmission Assets Order Limits, the majority of which (18 km, 63.7%) comprised J2.1.2 intact species-poor native hedgerows. Other hedge types present included:

- J2.2.2 Defunct species-poor native hedgerows (3.17 km, 11.2%);
- J2.3.2 Intact species-poor hedgerows with trees (2.47 km, 9.7%); and
- J2.1.1 Intact species-rich native hedgerows (1.63 km, 5.7%).

1.4.3.2 Of the total of 28 km of hedgerow recorded in the Onshore Order Limits, 1.46 km were assessed as being ‘important’ hedgerows as defined by the Hedgerow Regulations. Important hedgerows were recorded in Sections 7b (0.70 km), 5 (0.42 km), 6 (0.28 km) and 4 (0.06 km).

1.4.3.3 A further 4.8 km of ‘important’ hedgerows were mapped outside of the Onshore Order Limits, but inside the survey area (the 150 m buffer).

1.4.4 NVC summary

1.4.4.1 Two areas of woodland habitat were assessed to NVC community level, and these were identified as woodland communities W8 and W8e. Details of the species recorded can be found in Appendix B.

1.4.4.2 The NVC survey undertaken at the sand dune habitats at landfall in August 2024 and in 2025 confirmed that the 2016 survey reported ~~an~~a broadly accurate representation of the current wetland botanical communities present within the dune slacks. The same NVC communities were found in moisture-sensitive areas of the dune complex. Dune slacks depend on a high groundwater table, which makes them very sensitive to water level changes, and multiple dune slack communities were found during surveys (SD17,

SD16 and SD15). Results from the quadrat surveys and a full species list are provided in Appendix C.

1.4.4.3 The updated NVC mapping (undertaken by the Applicants in July 2025) confirmed the findings of previous surveys that the SSSI/ LNR dunes support a rare and nationally important dune habitat and botanical species assemblage, with the GWDTEs being dominated by the dune slack communities SD17, SD16 and SD15.

~~1.4.4.2~~1.4.4.4 The baseline NVC survey and mapping of the St Anne's Old Links Golf Course BHS (undertaken by the Applicants in September 2025) confirmed previous assumptions within the assessment that the habitats within the golf course have been heavily modified by substantial anthropogenic modifications (including groundwater abstraction) over the past 125 years since the golf course was established on the dunes in 1901. There are some very small areas of marginal pond vegetation (equating to c. 25 square metres in total across the four ponds within the golf course) with affinity to the dune slack community SD15, although the extent to which these small habitat fragments are groundwater dependent given the level of modifications to the surrounding land is unclear, and they are therefore considered to be a 'likely GWDTE'.

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Appendix A: Target Notes - INNS

Target note ID	Section	INNS Species
1	Section 1	Monbretia *Montbretia crocosmia x crocosmiiflora* recorded on bank
2	Section 1	Japanese Rose *Rosa rugosa*
3	Section 1	Stand of Japanese rose approx. 30m in length encroaching from adjacent land
4	Section 2	Himalayan Balsam *Impatiens glandulifera*
5	Section 3	Rhododendron *Rhododendron ponticum* bush within private garden
6	Section 6	Moderate amount of Himalayan balsam present in wet ditch
7	Section 6	Himalayan balsam present throughout drain
8	Section 6	Himalayan balsam present throughout drain
9	Section 6	Himalayan balsam present throughout drain
10	Section 6	Himalayan balsam present throughout drain
11	Section 7a	Japanese rose
12	Section 7a	Japanese rose
13	Section 7a	Japanese rose
14	Section 7b	Large area of Himalayan balsam approximately 50m long and 10m at its widest point, coinciding with area of evident tree thinning.
15	Section 7b	Abundant Himalayan balsam along wet ditch and track verge
16	Section 7b	3m x 3m stand of Japanese rose.
17	Section 7b	Himalayan balsam
18	Section 7b	Himalayan balsam
19	Section 7b	Himalayan balsam present along entire length of watercourse.

Appendix B: NVC survey sheets (August 2024)

(Refer to Error! Reference source not found. for quadrat locations).

NVC survey Site 1				
Survey duration	3 hours			
Weather Conditions	Changeable. Warm			
Wind	0		**Air Temperature (°C)**	19
Rain	0		**Cloud Cover**	4
Broad habitat types present	Woodland			
Site and vegetation description (Include notes on management/habitat condition) and any site constraints				
Deciduous woodland. Trees of varying ages, from saplings to oaks over a metre in diameter. Several dead standing trees. Very difficult to distinguish between canopy and understorey.				
Quadrat Reference (refer to)	**1**		**2**	
Quadrat Size ² (m x m)	50 x 50		50 x 50	
Co-ordinates	350462	428033	350359	350359
Aspect	Flat		North	
Slope (degrees)	0		4	
Canopy mean height (m) and cover (%)	14	90	14	95
Understorey mean height (m) and cover (%)	5	60	3	50
Ground flora mean height (cm) and cover (%)	30	50	20	70

Species List (Latin Name)	DOMIN VALUE		Frequency	Range
Canopy	**20x125**	**50x50**		
Tilia x europaea	4	4		
Fagus sylvatica	8	5	II	4 - 4
Acer pseudoplatanus	5	5	II	5 - 8

Species List (Latin Name)	DOMIN VALUE		Frequency	Range
Quercus petraea	6	5	II	5 - 5
Salix alba	1	0	II	5 - 6
Castanea sativa	1	0	I	1 - 1
Quercus robur	0	1	I	1 - 1
Prunus avium	0	4	I	1 - 1
Fraxinus excelsior	0	2	I	4 - 4
Understorey	**20x125**	**50x50**		
Ulmus procera	6		I	6 - 6
Tilia × europaea	6	4	II	4 - 6
Ulmus glabra	6		I	3 - 3
Crataegus monogyna	2	2	II	2 - 2
Ilex aquifolium	2		I	2 - 2
Quercus petraea	2		I	2 - 2
Fagus sylvatica		2	I	2 - 2
Prunus avium	2	4	II	2 - 4
Sorbus aucuparia	2	4	II	2 - 4
Acer pseudoplatanus	2	4	II	2 - 4
Rhododendron ponticum		5	I	5 - 5
Corylus avellana		5	I	5 - 5
Sambucus nigra		1	I	1 - 1
Fraxinus excelsior	1		I	1 - 1
Prunus spinosa	1		I	1 - 1
Acer campestre	1		I	1 - 1
Ground Flora	**4x4**	**4x4**		
Milium effusum	4	4	II	4 - 4
Hedera helix	4		I	4 - 4
Geum urbanum	1	1	II	1 - 1
Fraxinus excelsior (Juv)	1	2	II	1 - 2

Species List (Latin Name)	DOMIN VALUE		Frequency	Range
Geranium robertianum	2	5	II	2 - 5
Dactylis glomerata		1	I	1 - 1
Arum maculatum	1		I	1 - 1
Urtica dioica				
Rubus fruticosus	6	5	II	5 - 6
Heracleum sphondylium				
Mercurialis perennis	1	1	II	1 - 1
Rosa canina (Juv)				
Rumex sanguineus	1	1	II	1 - 1
Prunus avium (Juv)				
Taraxacum officinale				
Glechoma hederacea	1	1	II	1 - 1
Alliaria petiolata	1	1	II	1 - 1
Fagus sylvatica (Juv)	1		I	1 - 1
Quercus petraea (Juv)				
Ulmus glabra	1		I	1 - 1
Sorbus aucuparia				
Hyacinthoides x massartiana	1		I	1 - 1
Crataegus monogyna (Juv)	1		I	1 - 1
Fraxinus excelsior (Juv)	2	2	II	2 - 2
Lolium perenne		1	I	1 - 1
Silene dioica		1	I	1 - 1
Lactuca muralis		1	I	1 - 1

NVC survey site 2	
Survey duration	3 hours

NVC survey site 2						
Weather Conditions	warm, calm					
Wind	0		**Air Temperature (°C)**	15		
Rain	0		**Cloud Cover**	4		
Broad habitat types present	Woodland					
Site and vegetation description (Include notes on management/habitat condition) and any site constraints						
Deciduous woodland. Dominated by *Populus x canadensis, Acer pseudoplatanus, Quercus cerris & Fagus sylvatica*.						
Quadrat Reference (refer to)	**1**		**2**		**3**	
Quadrat Size ² (m x m)	50 x 50m		50 x 50m		50 x 50m	
Co-ordinates	349967	427283	350017	427400	350141	427357
Aspect	Flat		NW		Flat	
Slope (o)	0		6		0	
Canopy mean height (m) and cover (%)	12	85	14	80	14	75
Understorey mean height (m) and cover (%)	2	30	3	45	2.5	25
Ground flora mean height (cm) and cover (%)	20	50	0	0	0	

Species List (Latin Name)	DOMIN VALUE			Frequency	Range
Canopy	**50x50**	**50x50**	**50x50**		
Acer pseudoplatanus	4	8		III	
Fraxinus excelsior		1	7	II	4 - 8
Populus x canadensis		6	6	II	1 - 7

Species List (Latin Name)	DOMIN VALUE			Frequency	Range
Fagus sylvatica		4	1	II	6 - 6
Quercus cerris	9			II	1 - 4
Betula pubescens	4			I	9 - 9
Quercus robur		1		I	4 - 4
Prunus avium			2	I	1 - 1
				I	2 - 2
Understorey	**50x50**	**50x50**	**50x50**		
Sambucus nigra		4		III	
Acer pseudoplatanus	1	2	1	I	4 - 4
Corylus avellana	1	2	3	III	1 - 2
Salix caprea				III	1 - 3
Ilex aquifolium	1	1			
Crataegus monogyna	1	4	1	II	1 - 4
Taxus baccata		1		III	1 - 4
Quercus cerris	4			I	1 - 1
Malus sylvestris	1			I	4 - 4
Castanea sativa	3			I	1 - 1
Carpinus betulus	3			I	3 - 3
Sorbus aucuparia	1			I	3 - 3
Rhododendron ponticum	1	4		I	
Betula pubescens	1			II	
Fagus sylvatica		1	1	I	1 - 1
Prunus avium			1	II	
				I	1 - 1

Species List (Latin Name)	DOMIN VALUE			Frequency	Range
Ground flora	**4x4**	**4x4**	**4x4**		
Holcus lanatus	1		1	III	
Carex pendula				II	1 - 1
Rumex sanguineus		1	1		
Rubus fruticosus	5	5	7	II	1 - 1
Ranunculus repens				III	5 - 7
Silene dioica		3	4		
Geum urbanum		1	3	II	3 - 4
Geranium robertianum			3	II	1 - 3
Impatiens glandulifera		1		I	1 - 1
Taraxacum officinale				I	1 - 1
Urtica dioica			1		1 - 1
Plantago major				I	1 - 1
Heracleum sphondylium		1			
Milium effusum	5	4	4	I	1 - 1
Fraxinus excelsior (Juv)				III	4 - 5
Epilobium ciliatum		1			
Carex remota	4		1	I	1 - 1
Galium aparine			1	II	1 - 4
Circaea lutetiana				I	1 - 1
Salix cinerea (Juv)					
Arrhenatherum elatius			1		
Juncus effusus		5		I	1 - 1
Hedera helix		5	4		

Species List (Latin Name)	DOMIN VALUE			Frequency	Range
Tellima grandiflora				II	4 - 5
Hyacinthoides × massartiana	2	2			
Mercurialis perennis				II	2 - 2
Oxalis acetosella					
Asplenium scolopendrium					
Acer pseudoplatanus (Juvenile)		3			
Dryopteris filix-mas					
Salanum dulcamara	1				
Equisetum telmateia				I	1 - 1
Lonicera periclymenum	1				
Dactylis glomerata		1	1	I	1 - 1
Senecio jacobaea				II	1 - 1
Arum maculatum					
Glechoma hederacea			1		
Crataegus monogyna (Juv)			1	I	1 - 1
Anthriscus sylvestris			1	I	1 - 1

Appendix C: Fylde sand dunes NVC survey sheets (August 2024)

(Refer to Error! Reference source not found. for quadrat locations).

SD15 - Salix repens – Calliergon cuspidatum dune-slack community

Scientific Name	Common name	Quadrat Quadrat (refer to)												Constancy	Range
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12		
Hydrocotyle vulgaris	Marsh Pennywort	9	8	8	6	6	4	7	8	8	1	5	8	V	1 - 9
Salix repens	Creeping Willow	6	7	5	7	7	7	7	7	8	10	8	9	V	5 - 10
Agrostis stolonifera	Creeping Bent	7	5	4	6	6	2	5	3			1	3	V	1 - 7
Carex nigra	Common Sedge	7	8	4	9	8	8	7	3	1		9		IV	1 - 9
Rubus caesius	Dewberry		1		1	1	1	2	7	2	3	3	2	IV	1 - 7
Equisetum palustre	Marsh Horsetail	8		5	1		1				2	2		IV	1 - 8
Calliergonella cuspidata	Pointed Spear Moss	9	7	5		2	6	1	1			1		III	1 - 9
Epilobium palustre	Marsh Willowherb	2	1	2	2					1		1		III	1 - 2
Juncus articulatus	Jointed Rush	6	2			1								III	1 - 6
Plantago lanceolata	Ribwort Plantain					6	3	1	2					III	1 - 6
Carex flacca	Glaucous sedge						1	2	3				1	II	1 - 3
Danthonia decumbens	Heath grass						1							II	1 - 1
Eleocharis palustris	Common Spike-rush			1										II	1 - 1
Eriophorum	Eriophorum	2	1	2										II	1 - 2
Galium aparine	Cleavers				1						1			II	1 - 1
Holcus lanatus	Yorkshire Fog					2	1	1						II	1 - 2
Kindbergia praelonga	Common Feather-moss					1				4	7			II	1 - 7
Lotus corniculatus	Bird's-foot trefoil					1		3	1					II	1 - 3
Mentha aquatica	Water Mint	2		5				6		1	1	1		II	1 - 6
Myosotis	Forget me Not	1	1											II	1 - 1

Scientific Name	Common name	Quadrat Quadrat (refer to)												Constancy	Range
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12		
Poa pratensis	Smooth Meadow-grass						1							II	1 - 1
Ranunculus acris	Meadow Buttercup					1		1						II	1 - 1
Vicia cracca	Tufted Vetch				1					8		3	2	II	1 - 8
Carex arenaria	Sand Sedge			1									3	I	1 - 3
Equisetum	Horsetail					1								I	1 - 1
Equisetum fluviatile	Water Horsetail		4											I	4 - 4
Filipendula ulmaria	Meadowsweet						1					1		I	1 - 1
Juncus compressus	Round-fruited Rush						1							I	1 - 1
Juncus conglomeratus	Compact Rush						1				1			I	1 - 1
Juncus inflexus	Hard Rush			6						8				I	6 - 8
Lathyrus pratensis	Bird's-foot trefoil				1					2	1	2		I	1 - 2
Molinia caerulea	Purple Moor Grass					1								I	1 - 1
Potentilla reptans	Creeping cinquefoil						8							I	8 - 8
Ranunculus flammula	Lesser Spearwort	1												I	1 - 1
Centaurea nigra	Common Knapweed							1						I	1 - 1
Equisetum arvense	Field Horetail							1		1	1			I	1 - 1
Epipactis palustris	Marsh Helleborine							2						I	2 - 2
Arrhenatherum elatius	False Oat grass									2	3			I	2 - 3
Heracleum sphondylium	Hogweed										1			I	1 - 1
Solanum dulcamara	Bittersweet										1			I	1 - 1
Elytrigia repens	Common couch										1			I	1 - 1
Calystegia silvatica	Large Bindweed											4		I	4 - 4

Scientific Name	Common name	Quadrat Quadrat (refer to)												Constancy	Range
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12		
Myosotis laxa	Tufted Forget-me-not											2		I	2 - 2
Cirsium arvense	Creeping Thistle											1		I	1 - 1
Persicaria amphibia	Amphibious Bistort											1		I	1 - 1
Carex nigra	Common Sedge												6	I	6 - 6
Dactylis glomerata	Cocksfoot												1	I	1 - 1

SD 16 - *Salix repens – Holcus lanatus* dune-slack community

Scientific Name	Common name	Quadrat Quadrat (refer to)																				Constancy	Range
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	
Salix repens	Creeping Willow	5	9	7	6	6	5	6	8	7	8	8	7	9	4	6	6	7	7	2	6	6	V	2 - 9
Holcus lanatus	Yorkshire Fog	4	1	3	2	8	7	2	6	2	4		3	2	4	2	2	2	2	4	6	2	V	1 - 8
Rubus caesius	Dewberry	2	2	4	6	3		6	6	4	5	4	4	6	4	8	7	2	6	2	5	5	V	2 - 8
Festuca rubra	Red fescue	8	7	7	6	5	3	3	4	2	3	1	1	4	8	5	3	4	4	4	5	6	V	1 - 8
Arrhenatherum elatius	False Oat-grass	4	4	7	8	2		2	1	7		3	2				6	2				6	IV	1 - 8
Equisetum arvense	Field horsetail		4	5	2	1			2						1	6	1			1	6	8	IV	1 - 8
Hydrocotyle vulgaris	Marsh Pennywort	4		8	8	8	4	7	6	7	1	6	9	6				5	7		7		IV	1 - 9
Plantago lanceolata	Ribwort Plantain	5	5		1	1	3	3	2	1	5	1		5		4	1	2		2		1	IV	1 - 5
Agrostis stolonifera	Creeping Bent	4			2	3	2	8				2		2			4	3	1	2			III	1 - 8
Carex flacca	Glaucous sedge	9	1	3	6			2	2	2	5			4				3	4	2	1		III	1 - 9

Scientific Name	Common name	Quadrat Quadrat (refer to)																				Constancy	Range
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	
Dactylis glomerata	Cocksfoot	4	4			2	1			3					3	3	5	2		1	1		III	1 - 5
Lathyrus pratensis	Meadow Vetchling	4	6	8				1		2		8								2	1		III	1 - 8
Lotus corniculatus	Bird's-foot trefoil	1	1	2	2	1	1	2	3		4	2	2	1					1	1	1		III	1 - 4
Poa pratensis	Smooth meadow grass			1		1	1		1				1	1	1	3		2	3	2	2		III	1 - 3
Anthoxanthum odoratum	Sweet vernal-grass	2	1			3	2	1												4	2		II	1 - 4
Carex nigra	Common Sedge	3			1	3			3					3				2	1				II	1 - 3
Cirsium arvense	Creeping thistle											1			2	1	1			1	1	1	II	1 - 2
Kindbergia praelonga	Common feather-moss			2	2	2				2				2									II	2 - 2
Mentha aquatica	Water mint			2					6									1					II	1 - 6
Ononis spinosa	Spiny restharrow		1			1									2	3		1				1	II	1 - 3
Rhinanthus minor	Yellow rattle	4		4		2	1								3		1			4			II	1 - 4
Agrimonia eupatoria	Agrimony	1						1	2														I	1 - 2
Angelica sylvestris	Wild Angelica																	5					I	5 - 5
Anthriscus caucalis	Anthriscus caucalis															1							I	1 - 1

Scientific Name	Common name	Quadrat ~~Quadrat~~ (refer to)																				Constancy	Range
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	
Aster x salignus	Common Michaelmas Daisy						2													1			I	1 - 2
Brachythecium rutabulum	Rough-stalked Feather-moss											2	7										I	2 - 7
Calliergonella cuspidata	Pointed Spear-moss							1	2				1	5									I	1 - 5
Campanula	Bell flower		1																				I	1 - 1
Cardamine pratensis	Cuckoo flower					1																	I	1 - 1
Carex arenaria	Sand sedge																		1		2		I	1 - 2
Cerastium fontanum	Common Mouse-ear								1														I	1 - 1
Crataegus monogyna	Common hawthorn									4													I	4 - 4
Dactylorhiza	Marsh Orchid Species																			1			I	1 - 1
Daucus carota	Wild Carrot														1	4							I	1 - 4
Epipactis palustris	Marsh Helleborine							1	3					1									I	1 - 3
Filipendula ulmaria	Meadowsweet					1																	I	1 - 1
Galium aparine	Cleavers													4									I	4 - 4
Heracleum sphondylium	Hogweed			1																			I	1 - 1
Hippophae rhamnoides	Sea Buckthorn																			1			I	1 - 1

Scientific Name	Common name	Quadrat Quadrat (refer to)																				Constancy	Range
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	
Jacobaea vulgaris	Common ragwort														1						1		I	1 - 1
Juncus articulatus	Jointed Rush							1						1									I	1 - 1
Lotus pedunculatus	Greater bird's-foot-trefoil						5																I	5 - 5
Luzula campestris	Field Wood-rush				1																		I	1 - 1
Molinia caerulea	Purple Moor Grass					4																	I	4 - 4
Phleum pratense	Timothy									1													I	1 - 1
Hieracium sp.	Hawkweed		1																				I	1 - 1
Potentilla anserina	Silverweed														5		3		2	1			I	1 - 5
Potentilla reptans	Creeping cinquefoil						1		5										1				I	1 - 5
Ranunculus acris	Meadow buttercup	1			1	1	1							1									I	1 - 1
Ranunculus bulbosus	Bulbous buttercup																	1				1	I	1 - 1
Solidago canadensis	Goldenrod																			7			I	7 - 7
Taraxacum agg.	Dandelion				1																		I	1 - 1
Trifolium pratense	Red Clover				1		7																I	1 - 7
Trifolium repens	White Clover							1															I	1 - 1

Scientific Name	Common name	Quadrat Quadrat (refer to)																				Constancy	Range
		Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	
Vicia cracca	Tufted Vetch									2		2		2							5	6	I	2 - 6
Danthonia decumbens	Heath grass													3									I	3 - 3

SD17 *Pontentilla* dune slack community

Scientific Name	Common name	Quadrat Quadrat (refer to)	Constancy	Range
		Q1		
Festuca rubra	Red Fescue	9	V	9 - 9
Potentilla anserina	Silverweed	8	V	8 - 8
Elymus repens	Common couch	7	V	7 - 7
Vicia cracca	Tufted Vetch	4	V	4 - 4
Agrostis stolonifera	Creeping Bent	2	V	2 - 2
Typha latifolia	Bulrush	2	V	2 - 2
Juncus inflexus	Hard Rush	2	V	2 - 2
Alopecurus pratensis	Meadow foxtail	1	V	1 - 1
Epilobium palustre	Marsh Willowherb	1	V	1 - 1
Lathyrus pratensis	Meadow Vetchling	1	V	1 - 1
Salix repens	Creeping Willow	1	V	1 - 1
Galium	Galium	1	V	1 - 1
Equisetum fluviatile	Water Horsetail	1	V	1 - 1
Persicaria amphibia	Amphibious Bistort	1	V	1 - 1
Equisetum arvense	Field horsetail	1	V	1 - 1

SD15 Iris community

Scientific Name	Common name	~~Quadrat~~ Quadrat (refer to)			Constancy	Range
		Q1	Q2	Q3		
Iris pseudacorus	Yellow Iris	9	8	9	III	8 - 9
Carex nigra	Common Sedge	6	8	1	III	1 - 8
Salix repens	Creeping Willow	1	1	1	III	1 - 1
Vicia cracca	Tufted Vetch	4	2	3	III	2 - 4
Calliergonella cuspidata	Pointed Spear-moss	5	1		II	1 - 5
Equisetum palustre	Marsh Horsetail		1	2	II	1 - 2
Galium	Galium	1		1	II	1 - 1
Hydrocotyle vulgaris	Marsh pennywort	6		4	II	4 - 6
Rumex crispus	Curly dock		1	1	II	1 - 1
Mentha aquatica	Water Mint	2			I	2 - 2
Agrostis stolonifera	Creeping Bent			3	I	3 - 3
Arrhenatherum elatius	False Oat-grass			2	I	2 - 2
Carex hirta	Hairy Sedge			1	I	1 - 1
Cirsium arvense	Creeping Thistle			1	I	1 - 1
Epilobium palustre	Marsh Willowherb	1			I	1 - 1
Festuca rubra	Red Fescue			4	I	4 - 4
Filipendula ulmaria	Meadowsweet		1		I	1 - 1
Hypericum maculatum	Imperforate St John's-wort			1	I	1 - 1
Lathyrus pratensis	Meadow Vetchling			2	I	2 - 2
Myosotis	Forget-me-not	1			I	1 - 1
Potentilla reptans	Creeping cinquefoil			1	I	1 - 1
Ranunculus flammula	Lesser spearwort		1		I	1 - 1
Ranunculus repens	Creeping Buttercup			1	I	1 - 1

Scientific Name	Common name	~~Quadrat~~ Quadrat (refer to)			Constancy	Range
		Q1	Q2	Q3		
Rhinanthus minor	Yellow rattle			1	I	1 - 1
Rubus caesius	Dewberry			1	I	1 - 1
Solanum dulcamara	Bittersweet		2		I	2 - 2

SD9 Dune grassland community

Scientific Name		~~Quadrat~~ Quadrat (refer to)			Constancy	Range
		Q1	Q2	Q3		
Iris pseudacorus	Yellow Iris	9	8	9	III	8 - 9
Carex nigra	Common Sedge	6	8	1	III	1 - 8
Salix repens	Creeping Willow	1	1	1	III	1 - 1
Vicia cracca	Tufted Vetch	4	2	3	III	2 - 4
Calliergonella cuspidata	Pointed Spear-moss	5	1		II	1 - 5
Equisetum palustre	Marsh Horsetail		1	2	II	1 - 2
Galium	Galium	1		1	II	1 - 1
Hydrocotyle vulgaris	Marsh pennywort	6		4	II	4 - 6
Rumex crispus	Curly dock		1	1	II	1 - 1
Mentha aquatica	Water Mint	2			I	2 - 2
Agrostis stolonifera	Creeping Bent			3	I	3 - 3
Arrhenatherum elatius	False Oat-grass			2	I	2 - 2
Carex hirta	Hairy Sedge			1	I	1 - 1
Cirsium arvense	Creeping Thistle			1	I	1 - 1
Epilobium palustre	Marsh Willowherb	1			I	1 - 1
Festuca rubra	Red Fescue			4	I	4 - 4
Filipendula ulmaria	Meadowsweet		1		I	1 - 1

Scientific Name		Quadrat Quadrat (refer to)			Constancy	Range
		Q1	Q2	Q3		
Hypericum maculatum	Imperforate St John's-wort			1	I	1 - 1
Lathyrus pratensis	Meadow Vetchling			2	I	2 - 2
Myosotis	Forget-me-not	1			I	1 - 1
Potentilla reptans	Creeping cinquefoil			1	I	1 - 1
Ranunculus flammula	Lesser spearwort		1		I	1 - 1
Ranunculus repens	Creeping Buttercup			1	I	1 - 1
Rhinanthus minor	Yellow rattle			1	I	1 - 1
Rubus caesius	Dewberry			1	I	1 - 1
Solanum dulcamara	Bittersweet		2		I	2 - 2

SD15 Typha community

Scientific Name		Quadrat Quadrat (refer to)	Constancy	Range
		Q1		
Calliergonella cuspidata	Pointed Spear-moss	8	V	8 - 8
Hydrocotyle vulgaris	Marsh pennywort	8	V	8 - 8
Equisetum palustre	Marsh horsetail	8	V	8 - 8
Typha latifolia	Bulrush	7	V	7 - 7
Equisetum fluviatile	Water horsetail	7	V	7 - 7
Agrostis stolonifera	Creeping Bent	6	V	6 - 6
Mentha aquatica	Water Mint	5	V	5 - 5
Alopecurus geniculatus	Marsh Foxtail	2	V	2 - 2
Iris pseudacorus	Water Mint	2	V	2 - 2
Juncus articulatus	Jointed rush	2	V	2 - 2
Myosotis laxa	Tufted Forget-me-not	1	V	1 - 1

Quadrat data table

Overall Quadrat Number (refer to)	NVC type	NVC specific quadrat number	Coefficient	Elevation	Wetness	Location	
						X	Y
1	SD17	1	28.11	5	6.3	331141	430362
2	SD16	1	45.17	5	5.7	331222	430447
3	SD16	2	36.85	6	5.7	331156	430522
4	SD16	3	49.96	6	6.1	331122	430556
5	SD16	4	45.78	5	6	331039	430614
6	SD16	5	38.27	5	6.3	331074	430629
7	SD16	6	40.82	5	6.3	331019	430667
8	SD16	7	48.39	5	6.4	331082	430564
9	SD16	8	51.32	5	6.4	331082	430713
10	SD16	9	40.22	5	6.1	331132	430778
11	SD16	10	55.61	5	5.8	331097	430777
12	SD16	11	39.93	5	6.4	330998	430804
13	SD16	12	50.82	6	6.7	331003	430928
14	SD16	13	49.12	5	6.4	331138	430732
15	SD16	14	42.52	5	5.7	330879	430863
16	SD16	15	41.6	6	5.7	330885	430795
17	SD16	16	43.07	5	6	330895	430739
18	SD16	17	47.38	5	6.4	331032	430398
19	SD16	18	57.92	5	6.3	331028	430407

Overall Quadrat Number (refer to)	NVC type	NVC specific quadrat number	Coefficient	Elevation	Wetness	Location	
						X	Y
20	SD16	19	44.69	5	5.6	331027	430429
21	SD16	20	48.19	5	6.1	331009	430468
22	SD16	21	38.19	5	5.9	331000	430489
23	SD15	1	54.01	5	7.7	331171	430359
24	SD15	2	53.29	5	7.8	331185	430379
25	SD15	3	57.38	5	7.5	331181	430339
26	SD15	4	47.96	5	7.3	331220	430460
27	SD15	5	57.38	5	7.3	331078	430629
28	SD15	6	52.86	6	6.6	331190	430712
29	SD15	7	55.01	5	7.1	331085	430710
30	SD15	8	49.73	5	7.1	330988	430934
31	SD15	9	46.55	5	6.9	331115	430413
32	SD15	10	35.55	6	6.7	331083	430544
33	SD15	11	54.52	5	7.2	331191	430324
34	SD15	12	48.7	5	6.8	331019	430809
35	Iris - SD15	1	46.47	5	8	331190	430380
36	Iris - SD15	2	38.71	5	8.1	331221	430366
37	Iris - SD15	3	44.42	5	7.1	331149	430412
38	Typha - SD15	1	42.63	5	8.4	331156	430341
39	SD9	1	39.17	7	5.6	331228	430546

Overall Quadrat Number (refer to)	NVC type	NVC specific quadrat number	Coefficient	Elevation	Wetness	Location	
						X	Y
40	SD9	2	52.71	6	5.8	331126	430694
41	SD9	3	45.19	6	6.2	331055	430827
42	SD9	4	53.4	5	5.9	330904	430795
43	SD9	5	53.4	6	5.6	330884	430782
44	SD9	6	51.78	6	5.7	331063	430317
45	SD9	7	47.46	9	6	331052	430914
46	SD9	8	43.84	8	5.9	331061	430463
47	SD9	9	52.74	7	5.9	331085	430444
48	MG1	1	47.62	6	6.2	331072	430964
49	MG1	2	35.85	6	6.2	331059	430946

Appendix D: National Vegetation Survey of the Lytham St Annes Dunes SSSI/ LNR

MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 3, Annex 3.3, Appendix D: National Vegetation Survey of the Lytham St Annes Dunes SSSI/ LNR

Deadline: 5
Application Reference: EN020028

Document Numbers:
MRCNS-J3303-RPS-10108A
MOR001-FLO-CON-ENV-RPT 0056

Document Reference:
F3.3.3

22 September 2025
F03

Document status					
Version	**Purpose of document**	**Approved by**	**Date**	**Approved by**	**Date**
F03	Submission at Deadline 5	GL	September 2025	IM	September 2025

Prepared by:

RPS

Prepared for:

Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd

Contents

Tables

Figures

Glossary

Term	Meaning
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore export cables, landfall, and onshore infrastructure for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Onshore Order Limits	See Transmission Assets Order Limits: Onshore (below).
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds).

Acronyms

Acronym	Meaning
EcIA	Ecology Impact Assessment
Ha	Hectare
GIS	Geographic Information System
GWDTE	Ground water dependent terrestrial ecosystem
FISC	Field Identification Skills Certificate
HPI	Habitats of Principal Importance
LNR	Local Nature Reserve
MAVIS	Modular Analysis of Vegetation Information System
NVC	National Vegetation Classification
SSSI	Site of Special Scientific Interest

Units

Unit	Description
%	Percentage
d.p.	Decimal place
m	Metres
m^2	Metres squared

1 National Vegetation Survey of Lytham St Annes Dunes SSSI/ LNR

1.1 Introduction

1.1.1.1 This document comprises the results of the National Vegetation Classification (NVC) survey of Lytham St Annes Dunes Site of Special Scientific Interest (SSSI)/ Local Nature Reserve (LNR). It forms Appendix D to Volume 3, Annex 3.3: Phase 1 habitat, national vegetation classification and hedgerow survey technical report of the Environmental Statement prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as the Transmission Assets) (document reference J3.3.3/F02). This report included NVC data obtained during 2016 by Skelcher, G covering the site (see Figure 1.4 of document reference J3.3.3/F02) which identified a large range of community types within the survey area.

1.1.1.2 This document has been prepared in response to comments from Natural England regarding the need to thoroughly assess the impacts on dune slack vegetation at Lytham St Anne SSSI/LNR. Natural England also advised that detailed dune slack surveys should be undertaken during summer 2025 (refer to Appendix K4 - Natural England's Risk and Issues Log (REP4-139). This survey was required to characterise extant vegetation types across the site, whether they correspond to priority, Annex I or irreplaceable habitat or Ground Water Dependent Terrestrial Ecosystem (GWDTE) categories (refer to the Outline Hydrogeological Risk Assessment for Lytham St Annes Dunes SSSI (S_D3_6/F02)).

1.1.1.3 The document presents and characterises the results of the summer 2025 NVC survey undertaken as part of Deadline 5 for the Transmission Assets. These results provide a basis for describing the extent, distribution, and ecological importance of vegetation communities within and in proximity to the Transmission Assets.

1.2 Site description

1.2.1.1 The site at Lytham St Annes Dunes SSSI is dominated by a range of habitat types over a variable topography, all of which occur over a combination of coastal blown sand and shallow peats within some slacks. These habitats include embryonic and shifting dune, semi-fixed dune, fixed dune grassland and dune slack. Of the dune slacks present, many are calcareous in character, typically including those slacks closer to the seaward fringe, while many slacks which are older in the east show a more well-established and acidophilous character.

1.3 Scope

1.3.1.1 The aims of this survey and assessment report are summarised as follows:

- Undertake a National Vegetation Classification (NVC) habitat survey across the site in accordance with the standard established throughout the British Plant Communities series (Rodwell, 1991-2000) alongside a survey for important taxa;
- The analysis of raw field data using Modular Analysis of Vegetation Information System (MAVIS) software and subsequent identification of important habitats, including Habitats of Principal Importance (HPIs) (also known as 'priority habitats'), Annex I habitats, irreplaceable habitats and GWDTEs;
- A desk study with literature review, including exploration of MAGiC maps (DEFRA, 2025), open access data and other relevant literature and resources; and
- An outline of measures which are recommended to be adopted to enhance habitats and ensure impacts to important floristic features are avoided and/or minimised.

1.4 Survey Area

1.4.1.1 The survey area is defined as the area within which the survey has been undertaken and is based on species or site-specific guidance on the extent of survey required. The survey area for the NVC survey (hereafter referred to as the 'survey area') consists of sand dune and modified sand dune habitats at the Lytham St. Annes SSSI/LNR as shown in **Figure 1.1**. The survey area also includes the approximate seaward dune extent (seaward fringe of embryonic and shifting dune).

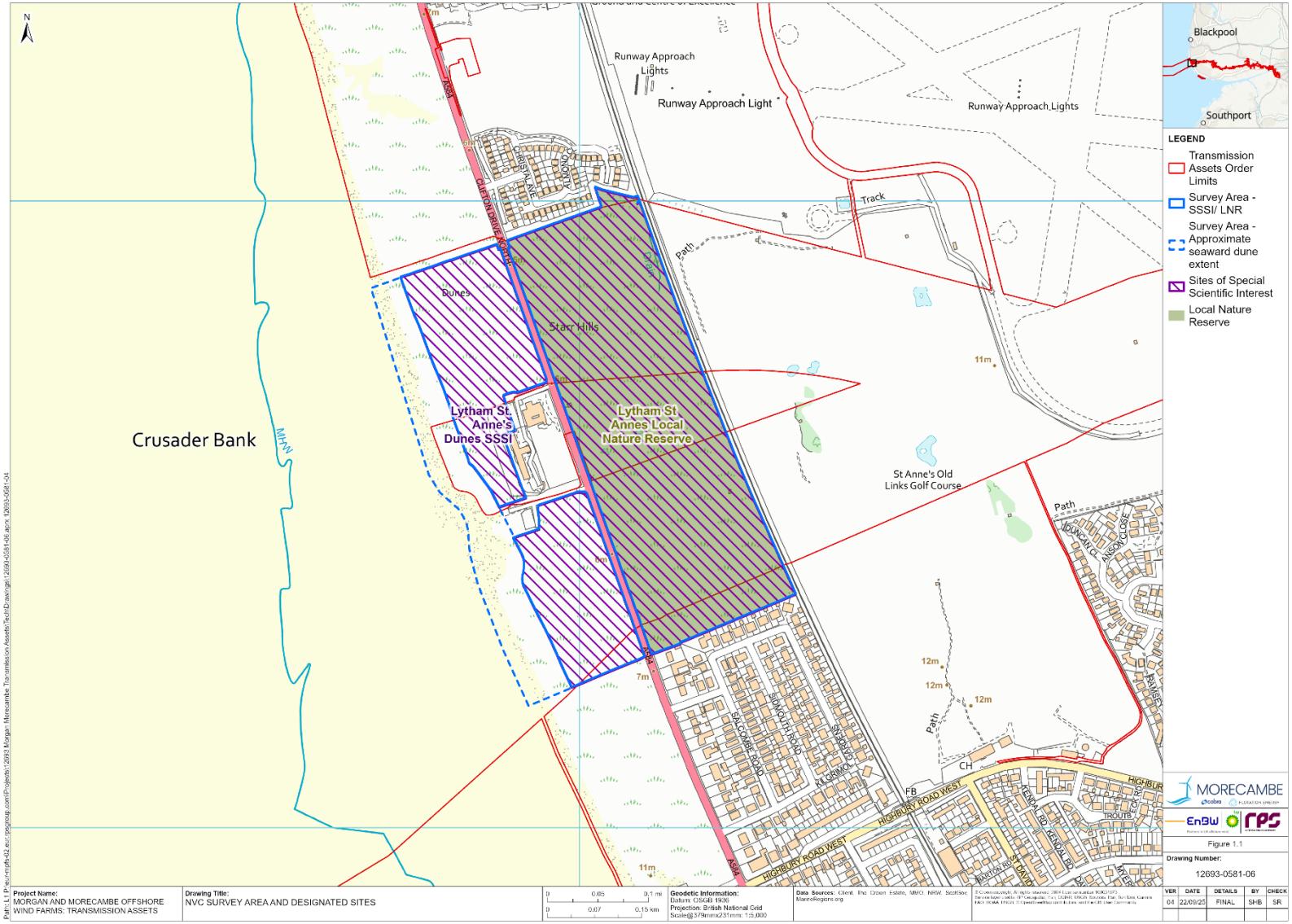

Figure 1.1: NVC survey area

1.5 Methodology

1.5.1 Desk study

1.5.1.1 A review of historic reporting alongside aerial imagery was undertaken prior to the survey of the site. This review was undertaken in tandem with a review of priority habitat data on MAGIC maps (including those habitats which are reliant upon groundwater regimes) to appraise the site and surrounding environment for areas which appear across relevant priority habitat and other inventories.

1.5.1.2 Botanical Society of Britain and Ireland (BSBI) distributional data was utilised where appropriate[1], in accompaniment with British Geological Society data available via Geology Viewer[2] and a range of other open-source data and available literature.

1.5.2 Field survey

1.5.2.1 An important plant survey was conducted in tandem with an NVC habitat survey across the totality of the survey area over the period 24 to 27 August 2025 in favourable weather conditions. Times and conditions recorded for surveys are given in **Table 1.1.**

Table 1.1: Conditions observed across survey visit

Date	24 July 2025	25 July 2025	26 July 2025	27 July 2025
Times of survey	0930 - 1600	0930 - 1600	0930 - 1600	0930 - 1400
Visibility	Good visibility throughout survey	Good visibility throughout survey	Good visibility throughout survey	Good visibility throughout survey
Rain	No rain	No rain	No rain	No rain
Cloud cover	10% cloud cover	5% cloud cover	5% cloud cover	5% cloud cover
Wind	Calm – no wind	Calm – no wind	Light wind	Calm – no wind

1.5.2.2 The survey employed methods consistent with the National Vegetation Classification: User's Handbook (Rodwell, 2006). The survey comprised community-level botanical surveys of sand dune habitats at the Lytham St. Annes SSSI/LNR. The survey was used to categorise habitat types within both survey areas, at the community and, where possible, sub-community level.

1.5.2.3 Evidence was drawn from habitat descriptions and floristic tables (Rodwell et al., 1991-2000), supported by MAVIS analysis, as appropriate. Where homogeneous and species-poor stands of swamp and scrub vegetation were observed, these were simply described as a

[1] Botanical Society of Britain and Ireland: available at https://bsbi.org/maps

[2] Available at: https://geologyviewer.bgs.ac.uk/?_ga=2.138468471.51961822.1695285963-63978984.1695285963

whole stand, in the absence of MAVIS. Site photographs were taken and important plants were recorded and mapped within each quadrat.

1.5.2.4 Following the field-based survey, an assessment of communities identified was undertaken. This was informed by relevant conservation designations each community type may be associated with, and aimed to assign communities a level of conservation importance along a geographic scale, from local to international.

1.5.2.5 Where large, relatively homogeneous stands existed, a minimum of five targeted quadrat samples (relevés[3]) of an appropriate size for the habitat were deployed wherever possible. This is with the exception of species-poor swamp communities and scrub where descriptions were simply taken of stands and their constituent flora accordingly. Similarly, where stands occurred over small areas below a Minimum Mappable Area (MMA) of 10 m x 10 m, notes with descriptions of these stands were taken, while the stands themselves were taken as components of wider community areas. Sampling quadrat size broadly included 2 x 2 m for open habitats, as per standing guidance provided by Rodwell (2006).

1.5.2.6 The survey used qualitative methods as appropriate, including quadrat and stand sampling, to identify and categorise habitat types to NVC community or sub-community level. Quadrats were temporarily marked out using bamboo canes.

1.5.2.7 Where quadrat samples were obtained, measures for frequency were calculated using the Domin scale (see **Table 1.2** below) dependent upon abundance within any given sample. A constancy value of I-V was calculated for species in instances where five or more samples were obtained.

Table 1.2: Domin scale

Cover	Domin Value
91-100	10
76-90	9
51-75	8
34-50	7
26-33	6
11-25	5
4-10	4
<4 (many individuals)	3
<4 (several individuals)	2
<4 (few individuals)	1

[3] A sample placed within representative vegetation, in a stand.

1.5.2.8 Floristic survey data (see **Appendix A**) was analysed with use of floristic tables and habitat descriptions across the Rodwell series1 to evidence characterisation with stands mapped within **Figure 1.3** with the use of QGIS. MAVIS was used to add further support to habitat characterisation. It should be noted that MAVIS was purely used as a means of supplementary evidence and was not used as a sole means of identification. This conforms with the NVC User's handbook which, in point 7.2 states:

'*The ecological interpretation of the results remains the responsibility of the surveyor. All that computer analysis can do is define sample groups on the basis of statistical similarities and differences: to characterise vegetation types from the end-groups produced by such analysis requires skill and experience. For comparison with NVC data, a first step is to construct floristic tables that summarise the frequency and abundance values of the constituent species among the samples*.'

1.5.2.9 Following the identification of stand types to community and, where possible, sub-community level, NVC types were correlated to relevant priority, Annex I, irreplaceable habitat and GWDTE categories aligned with published guidance. A broad range of core best-practice guidance and legislation was used to support characterisation, which includes the following:

- Biodiversity Gain Requirements (Irreplaceable Habitats) Regulations 2024 (UK Government, 2024).
- Joint Nature Conservation Committee (JNCC) UK BAP Priority Habitat descriptions (JNCC, 2025a)
- Guidelines for the Selection of Biological Sites of Special Scientific Interest (SSSIs) (JNCC, 2025b).
- The Interpretation Manual of European Union Habitats (European Commission, 2013).
- JNCC supplementary advice on UK Annex I habitats (JNCC, 2025c).
- UK Technical Advisory Group guidance on the identification and risk assessment of GWDTEs.

1.5.2.10 In addition to NVC survey, information on particularly important taxa was captured during the survey (refer to **section 1.6.2**), although it is acknowledged that this does not constitute a primary aim of this report. Transects of a maximum 20 m apart were walked across all habitats to identify important species, and capture abundance and distributional data.

1.5.2.11 For the purposes of this document, important taxa are defined as any plant species, subspecies or hybrid which is:

- Red-listed in England or Great Britain (UK TAG, 2004 and Stroh, 2014);

- Occurring at fewer than 100 hectad[4] localities at country or GB level (country-scarce / nationally scarce);
- Occurring at fewer than 15 hectad localities at country or GB level (country-rare/nationally rare);
- Endemic;
- Scarce or rare at regional, county or local level[5];
- Listed under s.41 National Environment and Rural Communities Act 2006[6]; and/or
- Listed under Schedule 5 Conservation of Habitats and Species Regulations 2017 (as amended); and/or
- Listed under Schedule 8 Wildlife & Countryside Act 1981 (as amended).

1.5.2.12 This approach aligns with the characterisation of Important Ecological Features as defined by the Chartered Institute of Ecology and Environmental Management (CIEEM) within standing Ecological Impact Assessment (EcIA) guidelines (CIEEM, 2018).

1.5.2.13 Nomenclature for higher plants follows Stace (2019) and follows the British and Irish BBS checklist for bryophytes (Blockeel et al, 2020).

1.5.3 Assessment

1.5.3.1 Following the identification of sward types and important taxa, the relative importance of these along a geographic frame of reference was characterised. This was done using the framework below (**Table 1.3**), adapted from existing guidance including EcIA guidelines (CIEEM, 2022) and the Design Manual for Roads and Bridges: Sustainability & Environment Appraisal LA 108 Biodiversity (Highways England, 2020).

1.5.3.2 A frequency value for each species, depending on the number of quadrats in which it was recorded, was calculated for each group of quadrats in a sample of similar vegetation, as per **Table 1.3** below.

Table 1.3: Adopted evaluation framework for the assessment of conservation importance

Geographic scale application	Assessment criteria for habitats
International	European designated sites where identified habitats are a listed feature, e.g., Special Protection Areas. All habitats listed within Annex I Habitats Directive (Interpretation manual of EU Habitats (European

[4] Hectad records include records within 10x10km squares. Also see www.bsbi.org/maps

[5] This was ascertained through review of BSBI and British Bryological Society mapped plant distributions.

[6] Including species which are a conservation priority within England

Geographic scale application	Assessment criteria for habitats
	Commission, 2013)). Including any globally protected or noteworthy species.
National	Nationally designated sites where identified habitats are a listed feature, including SSSIs. All habitats which meet relevant criteria for a national designation but do not currently form part of such a designation (SSSI selection guidelines (Bainbridge *et. al.*, 2013)). All irreplaceable habitats which do not fall under Annex I habitat categories, including some examples of ancient woodland, saltmarsh and lowland fen for example. All species and/or species populations which are rare, scarce or otherwise notable at the national level.
Regional	All semi-natural national priority habitats which do not fulfil relevant criteria for a national designation and/or do not fall under defined irreplaceable habitat categories. Habitats which lie within regionally designated sites where those habitats are a listed feature. Habitats which meet published selection criteria for the designation of a regionally designated site. Species which may be rare or listed at regional level, although widespread elsewhere nationally.
County	Habitats which lie within county designated sites (e.g. Local Nature Reserves) where those habitats are a listed feature. Habitats which meet published county designated site criteria. Species which are rare or scarce at county level, although these may be more widespread within the region.
Local	All habitats which do not meet the above criteria such, excluding habitats of negligible value to wildlife (e.g. hardstanding with no colonising vegetation). This may include widespread habitats such as g3c Other neutral grassland, g4 Modified grassland, etc. All species which are important at local level which do not meet the above criteria. This may include species with conservation designations where they are widespread.

Geographic scale application	Assessment criteria for habitats
Negligible	Habitats which are unvegetated and associated with negligible wildlife interest (i.e. unvegetated hardstanding)

1.5.3.3 Although all forms of priority Coastal Sand Dune are regarded as irreplaceable habitats, sand dunes are highly variable ecosystems and contain a large range of habitats which are often subject to vastly different environmental sensitivities. For example, acidophilous habitats developed over coastal in-blown sand such as acid grassland and dune heath may take between 300-400 years to form whereby the top c.15cm of sand is leached (Salisbury, 1925). Acidophilous habitats are therefore subject to substantially greater sensitivity to disturbance when compared to embryonic and mobile dune. Similarly, humid dune slacks subject to specific hydrological regimes would be likely to exhibit greater sensitivity to changes in hydrology when compared to dry dune ridge.

1.5.3.4 In recognition of the range of specific environmental sensitivities which apply to habitats within dune systems, specific reference has been made within **section 1.7** with respect to environmental context.

1.5.4 Limitations and assumptions

1.5.4.1 The field survey was completed within the optimal period for botanical survey, often regarded as May-September, although some species with particularly early or late phenologies may have been missed. Nonetheless, the survey was led by a highly experienced, Field Identification Skills Certificate (FISC) Level 6 botanist (Botanical Society of Britain & Ireland) who is familiar with vegetative plant ID across the full range of UK terrestrial habitats. Following a field survey, seasonality is not considered to constitute a significant impediment to an assessment of existing habitats within the survey boundary.

1.5.4.2 Many cryptic taxa, including apomictic species under the genera Hieracium, Rubus and Taraxacum, could not always be identified to species-level due to seasonal constraints. Plants across these genera are only able to be identified in the presence of all relevant vegetative parts, flowers and/or fruits. Furthermore, most species within these genera may only reliably be identified by country experts, of which there are 3 for *Hieracium*, 6 for *Rubus* and 1 for *Taraxacum* (Rich, 2022). It is unrealistic to identify all cryptic taxa on any site; where identified, these genera were recorded to aggregate level where appropriate. This limitation has therefore been addressed as far as is reasonably practicable and is not considered to be a significant constraint for the purposes of this survey and assessment.

1.5.4.3 The surveyor is not a specialist bryologist and some taxa, particularly those which require microscopic identification, are likely to have been omitted from survey data. However, a reasonable effort was made to identify non-vascular plants wherever possible. This report does not

constitute a specialist bryological assessment or an assessment for other visually similar groups, including lichenised or other macro fungi.

1.5.4.4 Measurements have been calculated utilising software such as 'QGIS' (a Geographic Information System or GIS), aerial imagery and third-party plans provided by the client, all of which may have varying levels of inaccuracy. To mitigate inaccuracy, alongside QGIS with aerial imagery, 'Coreo in-field mapping software' was utilised during field survey to ensure key points and boundaries are mapped as accurately as possible; this is therefore not considered to be a significant constraint.

1.6 Results

1.6.1 Desk results

1.6.1.1 The Lytham St Annes Dunes SSSI is designated primarily for its supralittoral sediment, alongside a range of other features contained within the SSSI (Natural England, 1991) which includes:

- Declining and species at the edge of their range – *Sagina nodosa*, Knotted pearlwort;
- Invertebrate assemblage;
- Nationally scarce plant – *Vulpia fasciculata*, Dune Fescue
- Population of declining plant species and species at the edge of their range – *Carex oederi*, Small-Fruited Yellow Sedge;
- Population of declining plant species and species at the edge of their range - *Eryngium maritimum*, Sea Holly;
- Population of declining plant species and species at the edge of their range - *Parentucellia viscosa*, Yellow Bartsia;
- Population of declining plant species and species at the edge of their range - *Orobanche minor*, Common Broomrape;
- SD15 - *Salix repens - Calliergon cuspidatum* dune-slack community;
- SD16 - *Salix repens - Holcus lanatus* dune slack community;
- SD17 - *Potentilla anserina - Carex nigra* dune-slack community;
- SD4 - *Elymus farctus ssp. boreali-atlanticus* foredune community;
- SD5 - *Leymus arenarius* mobile dune community;
- SD6 - *Ammophila arenaria* mobile dune community;
- SD7 - *Ammophila arenaria - Festuca rubra* semi-fixed dune community;
- SD8 - *Festuca rubra - Galium verum* fixed dune grassland; and

- Overall vascular plant assemblage[7].

1.6.1.2 A review of Magic maps shows the majority most of the site to be included within the priority habitat inventory for Coastal Sand Dunes priority habitat, excluding portions of new embryonic dune found outside the SSSI (see **Figure 1.2**).

[7] More information on SSSI features available at: https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=s1005632

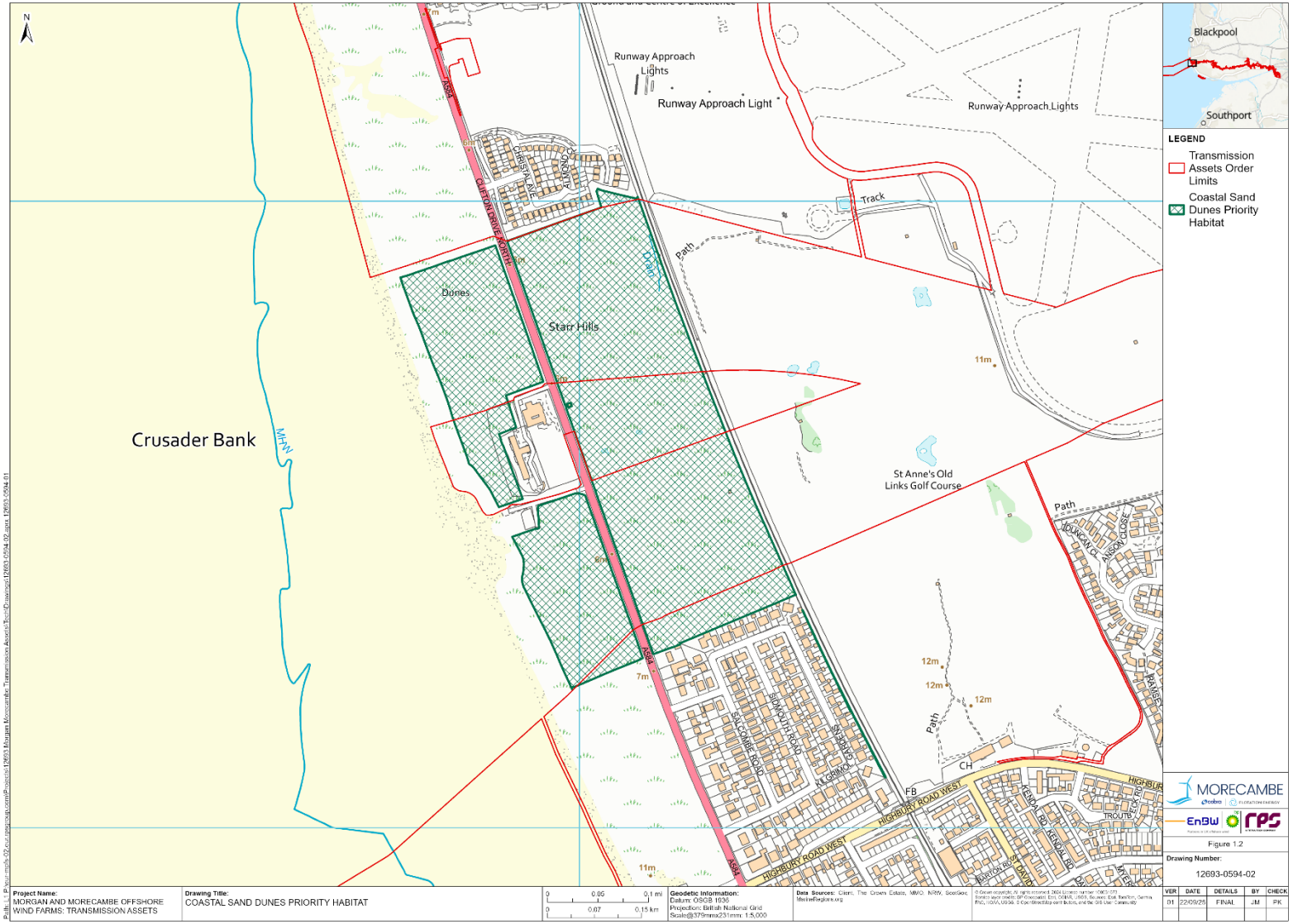

Figure 1.2: Coastal Sand Dunes priority habitat

1.6.2 Field results

National Vegetation Classification: Results

1.6.2.1 Descriptions for NVC communities found across the site are given below. Further detail on qualitative survey data with species lists may be obtained from an overview of floristic tables available within **Appendix A**. A summary of NVC communities and their respective conservation designations have been provided within **Table 1.4** below and presented in **Figure 1.3**.

Table 1.4: Summary of NVC types found at the site and their respective conservation designations

NVC community	Priority habitat	Annex 1 habitat	Irreplaceable habitat
SD4	Coastal Sand Dunes	H2110 Embryonic shifting dunes	Coastal Sand Dunes
SD5a	Coastal Sand Dunes	H2110 Embryonic shifting dunes	Coastal Sand Dunes
SD4/SD5a	Coastal Sand Dunes	H2110 Embryonic shifting dunes	Coastal Sand Dunes
SD6d	Coastal Sand Dunes	H2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes')	Coastal Sand Dunes
SD7a	Coastal Sand Dunes	H2130 *Fixed coastal dunes with herbaceous vegetation (grey dunes)	Coastal Sand Dunes
SD8b	Coastal Sand Dunes	H2130 *Fixed coastal dunes with herbaceous vegetation (grey dunes)	Coastal Sand Dunes
SD9a	Coastal Sand Dunes	-	Coastal Sand Dunes
SD16b	Coastal Sand Dunes	H2190 Humid dune slacks	Coastal Sand Dunes
SD16/17	Coastal Sand Dunes	H2190 Humid dune slacks	Coastal Sand Dunes
SD17c	Coastal Sand Dunes	H2190 Humid dune slacks	Coastal Sand Dunes
SD18	Coastal Sand Dunes	H2160 Dunes with *Hippophae rhamnoides*	Coastal Sand Dunes
S28a	Coastal Sand Dunes		Coastal Sand Dunes

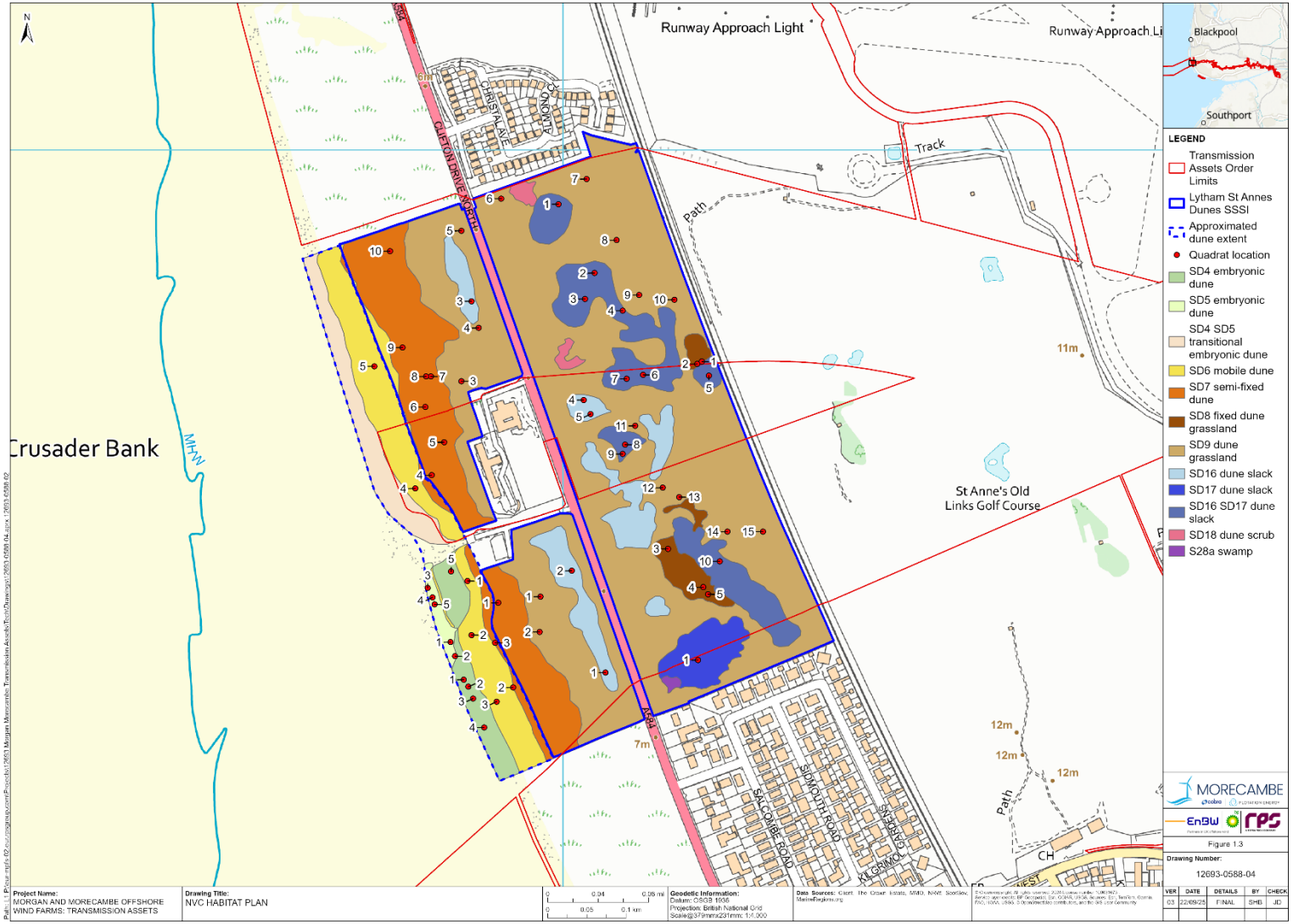

Figure 1.3: NVC habitat mapping showing likely GWDTE extent (2025 survey)

SD4 *Elymus fractus ssp. borealis* foredune community

1.6.2.2 Areas of embryonic dune are frequently characterised by near-monocultures of sand couch (*Elytrigia junceiformis* syn. *Elymus farcatus*), with both marram (*Ammophila arenaria*) and lyme-grass (*Leymus arenarius*) forming generally rare components of this habitat type. These areas are best characterised as SD4 foredune given the constancy and overwhelming abundance of sand couch and may be found across a narrow band approximating to 0.7 ha facing seaward. In addition to sand couch, scattered plants of sea rocket (*Cakile maritima*), sea sandwort (*Honckenya peploides*), prickly sandwort (*Salsola kalii*) and frosted orache (*Atriplex laciniata*) may be found very locally, scattered below SD4 in what may be described as a developing SD2 *Honckenya – Cakile* strandline. These areas, however, were too small to regard as individual stands and as such were simply regarded as components of SD4 vegetation.

1.6.2.3 MAVIS analysis found a good fit with SD4 foredune, awarding a confidence interval of 62.50 which concurs with the assessment of the surveyor.

1.6.2.4 SD4 swards, although widespread and readily characterised by their species-poor character and prominence of *E. junceiformis*, are a generally rare and localised habitat in Britain with approximately 150ha remaining in England and <1000ha remaining nationally (JNCC, 2018).

1.6.2.5 All examples of SD4 foredune are encapsulated by the priority and irreplaceable habitat type ‘Coastal Sand Dunes’, and Annex I habitat category H2110 Embryonic shifting dunes (European Commission, 2018).

SD5a *Leymus arenarius* mobile dune community, species-poor sub-community

1.6.2.6 Small areas of foredune dominated entirely by lyme-grass occur over frontal dunes in close association with SD4, encompassing an area of approximately 0.2 ha (1 d.p). No other associates were recorded of this community from quadrat sampling, making the species-poor sub-community the best-fit for this stand.

1.6.2.7 MAVIS analysis awards a very good confidence interval of 92.59 to characterisation of this stand as SD5a, which concurs with the assessment of the surveyor.

1.6.2.8 While stands of SD5 may typically align with the Annex I habitat H2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes'), where SD5 occurs across frontal dunes in close association with *E. junceiformis*, particularly in northern England where *L. arenarius* is more abundant, these stands are best aligned with H2110 Embryonic shifting dunes, of which there is an estimated 150 ha remaining in England in total (JNCC, 2025d). All areas of SD5 are further captured by the priority and irreplaceable habitat category ‘Coastal Sand Dunes’.

SD4 foredune / SD5a mobile dune community

1.6.2.9 Over an approximate area of 1.0 ha in the north-west, foredune is dominated by homogeneous, alternating stands of both *E, junceiformis* and *L. arenarius*. Given the alternating variation found within this area, this foredune has simply been mapped as a transition between SD4 and SD5.

1.6.2.10 As for identified stands of SD4 and SD5a, this transition is encapsulated by the priority and irreplaceable habitat type 'Coastal Sand Dunes', and Annex I habitat category H2110 Embryonic shifting dunes.

SD6d *Ammophila arenaria* mobile dune community, Typical sub-community

1.6.2.11 Across approximately 2.5 ha areas with abundant marram (*A. arenaria*) exist immediately to the rear of SD4 and SD5 frontal dune communities. These areas are characterised not only by abundant marram, but also by a generally high area of bare ground which ranged between 5%-60% cover between quadrat samples, and a general scarcity in other accompanying taxa.

1.6.2.12 Quadrat sampling identified sand couch, sea spurge (*Euphorbia paralias*) and common cat's-ear (*Hypochaeris radicata*) as occasional components of the community, with dandelion (*Taraxacum officinale agg*.) and smooth sow-thistle (*Sonchus oleraceus*) as rare constituents. The overall absence of other constants and scarcity in other taxa corresponds well to the SD6d *A. arenaria* foredune, Typical sub-community which is often regarded as the most impoverished sub-community of SD6.

1.6.2.13 MAVIS analysis awards a good confidence interval of 64.78 to characterisation of this stand type as SD6d, which concurs with the assessment of the surveyor.

1.6.2.14 All stands of SD6 are captured under the priority and irreplaceable habitat category 'Coastal Sand Dunes', while also corresponding to the Annex I habitat category H2120 Shifting dunes along the shoreline with Ammophila arenaria ('white dunes'). Most recent estimates of H2120 nationally suggest that only 2,700 ha remains nationally, being generally somewhat more widespread and abundant compared to embryonic communities.

SD7a *Ammophila arenaria* – Festuca rubra semi-fixed dune Typical sub-community

1.6.2.15 Immediately inland from areas of extremely species-poor, SD6 mobile dune includes a more established, semi-fixed dune where marram, red fescue (*Festuca rubra* agg.), common cat's-ear (*Hypochaeris radicata*) and lesser hawkbit (*Leontodon saxatilis*) occur as constants. Within this community, dandelion (*Taraxacum officinale* agg.) may also be found frequently. The constancy, particularly of marram in association with red fescue and common cat's-ear is typical of the SD7 community.

1.6.2.16 In addition to its key constants, areas of SD7 dune across the Lytham Sand Dunes SSSI appear somewhat species-poor with an average of 6.3 species per sample, while key components of the more species-rich sub-communities are generally absent or rare. This particularly includes common restharrow (*Ononis repens*), sea couch (*Elymus athericus*) and mouse-ear hawkweed (*Pilosella officinarum*). Due to the absence of these key constants and overall impoverished nature of the stand, areas of SD7 dune are therefore best affiliated with the SD7a Typical sub-community.

1.6.2.17 MAVIS analysis attributes a reasonable confidence interval (50.00) to characterisation of this stand as SD7a, which concurs with the assessment of the surveyor.

1.6.2.18 While stands of SD7 occur around the coasts of Britain within suitable areas, it remains scattered and are generally scarce, with an estimated 3.9 ha on site. It corresponds to both the priority and irreplaceable habitat type 'Coastal Sand Dunes', and the Annex I category H2130 Fixed dunes with herbaceous vegetation ('grey dunes'), of which an approximated 5,300 ha is estimated to remain in Britain.

SD8b *Festuca rubra – Galium verum* fixed dune grassland, *Luzula campestris* sub-community

1.6.2.19 Where the absence in grazing by large ungulates has not caused a shift of dry dune to SD9 (described below) and open swards have been maintained, sometimes by rabbit grazing, SD8 vegetation may be found in the east of the SSSI over a reasonably small combined area of approximately 0.5 ha This open and species-rich vegetation is characterised by a range of graminoids and forbs which form constant components of the community. These most notably include common bent (*Agrostis capillaris*), sweet verna-grass (*Anthoxanthum odoratum*), red fescue, field wood-rush (*Luzula campestris*), lady's bedstraw (*Galium verum var. maritimum*), common bird's-foot trefoil (*Lotus corniculatus*), wild thyme (*Thymus drucei*) and great plait-moss (*Hypnum lacunosum*).

1.6.2.20 Both the abundance and range of graminoids and forbs, coupled with key constants and high species richness per sample averaging at 16 are characteristic of SD8 swards. Meanwhile, the constancy of common bent and field wood-rush, alongside frequent mouse-ear hawkweed are typical for the SD8b *Luzula* sub-community. While SD8 grasslands are generally regarded as calcareous habitats, the SD8b sub-community is the least calcareous of these, supporting a range of calicfugeous taxa and being generally over leached surface sands with a pH around 6 and being closely allied to the calicfugeous SD12 *Carex – Festuca – Agrostis* dune grassland.

1.6.2.21 MAVIS analysis awarded a reasonable confidence interval of 48.91 to characterisation as SD8b, which concurs with the assessment of the surveyor.

1.6.2.22 SD8 fixed dune grasslands are widespread, although especially concentrated across the coasts of the north and west of Britain. All

examples conform to the priority and irreplaceable habitat type ‘Coastal Sand Dunes’, and the Annex I category H2130 Fixed dunes with herbaceous vegetation ('grey dunes'), of which an approximated 5,300 ha is estimated to remain in Britain.

SD9a *Ammophila arenaria – Arrhenatherum elatius* dune grassland, Typical sub-community

1.6.2.23 SD9 fixed dune is the most abundant and widespread community type to be found across the Lytham Sand Dunes SSSI and occurs over approximately 15.5 ha . Although somewhat variable, areas of SD9 consistently exhibit marram, false oat-grass, red fescue and dewberry (*Rubus caesius*) as constants throughout. This combination of key associates is typical of SD9 dune grasslands which are characteristic of neglected dune grassland, often derived from a more species-rich SD8 grassland, both of which exist broadly over sands within the same pH range of 6-81.

1.6.2.24 While bloody crane’s-bill (*Geranium sanguineum*) exists in small, localised abundance off-site, its absence on site, coupled with low species-richness averaging at 8.6 per sample, are diagnostic of the SD9a Typical sub-community.

1.6.2.25 It was noted at the time of the survey that many small areas contained within the broader SD9 parcels were host to relict SD8, often on dune tops where thatch build-up was slowed due to gravity and reduced nutrient and water availability. These smaller areas, generally between one and five square metres in extent, were frequently host to important flora, including Isle-of-Man Cabbage (*Coincya monensis ssp. monensis*) (see **Table 1.5**).

1.6.2.26 MAVIS analysis found a good fit with SD9a, with a confidence interval of 61.05, concurring with the assessment of the surveyor.

1.6.2.27 SD9 grasslands are widespread around the coasts of Britain over inblown coastal sands where dune grassland is neglected, while they are particularly well-represented in the north-east of Britain. Although SD9a grasslands conform to the priority and irreplaceable habitat category ‘Coastal Sand Dunes’, they do not correspond to any Annex I habitat category.

SD16b *Salix repens – Holcus lanatus* dune-slack, Rubus caesius sub-community

1.6.2.28 Westerley-most dune slacks exhibit clear characteristics of SD16 vegetation, with creeping willow (*Salix repens*) and Yorkshire-fog (*Holcus lanatus*) present as key constants, alongside dewberry (*Rubus caesius*). These dune slacks were largely reasonably dry at the time of the survey, while marsh pennywort (*Hydrocotyle vulgaris*), water mint (*Mentha aquatica*) and common sedge (*Carex nigra*) were either rare or absent. Additionally, a well-developed bryophyte layer with *Calliergonella cuspidata* also did not exist within these slacks – all indication of SD16b *Rubus caesius* sub-community.

1.6.2.29 Albeit without any clear affinities to other slack communities, parts of SD16b slack were noted to be somewhat damper, with localised sections with marsh orchids (*Dactylorhiza cf. incarnata*), marsh helleborine (*Epipactus palustris*) and wild angelica (*Angelica sylvestris*).

1.6.2.30 Of particular note at the time of the survey was that many of the slacks have been subject to scything to slow the succession of dune slack to dune scrub. Within these areas which have been cut, forbs which are typically more characteristic of lowland hay meadows (NVC MG5) were notably somewhat more abundant, namely including common knapweed (*Centaurea nigra*), red clover (*Trifolium pratense*), ribwort plantain (*Plantago lanceolata*), meadow vetchling (*Lathyrus pratensis*) and meadow buttercup (*Ranunculus acris*).

1.6.2.31 MAVIS analysis awarded a reasonable confidence of 45.71 to characterisation of these slacks as SD16b, which concurs with the assessment of the surveyor.

1.6.2.32 SD16 dune slacks are widespread across the British coast over low parts of dune systems overlying inblown sand, albeit rare. Estimates for England suggest that only an estimated 285 ha of humid dune slack remains, while SD16 vegetation on site covers an area of approximately 1.7ha (1 d.p). All areas of SD16 correspond to the priority and irreplaceable habitat type 'Coastal Sand Dunes', and the Annex I category H2190 Humid dune slacks.

SD16/SD17 *Salix repens – Holcus lanatus / Potentilla anserina – Carex nigra* dune-slack transition

1.6.2.33 Areas of older dune slack in the east were noted at the time of the survey to show a tendency between two distinct community types – SD16 and SD17. They are characterised by the constancy of creeping willow with Yorkshire-fog, being reasonably dry with some variation, while also notably supporting large and widespread populations of common sedge and marsh pennywort, both of which were also constant. Within these stands, there did not at the time appear to be a well-established bryophyte layer as might otherwise be expected for SD15 *Salix – Calliergon* dune-slack, although the constancy of marsh pennywort may certainly indicate good affinities.

1.6.2.34 What was of further significance within these slacks was the often-patchily high cover of common sedge with creeping bent which showed greater affinities in the opinion of the surveyor to SD17 locally than it did SD15. This distinct admixture of constants in the absence of a well-established bryophyte layer has therefore been characterised as SD16/SD17 transitional slack communities.

1.6.2.35 In regard to additional affinities, two slacks located in the east of the survey site (quadrats 5 and 6) showed particularly acidophilous tendencies. Alongside the above-named constants, purple moor-grass (*Molinia caerulea*) was scattered alongside an unusually high cover of tormentil (*Potentilla erecta*) most often seen in M25 Molinion mires. Shallow peats were observed not only within these two slacks, but also all other SD16/SD17 surveyed dune slacks.

1.6.2.36 MAVIS analysis awards a reasonable confidence interval to both SD16 (53.75) and SD17 (45.10), which concurs with the assessment of the surveyor.

1.6.2.37 As above, areas of SD16/SD17 transition correspond to the priority and irreplaceable habitat type 'Coastal Sand Dunes', and the Annex I category H2190 Humid dune slacks. While rare in England, covering an estimated 285 ha, SD16/SD17 humid dune slack covers an area of approximately 2.4ha on site.

SD17c *Potentilla anserina – Carex nigra dune-slack, Hydrocotyle vulgaris – Ranunculus flammula* sub-community

1.6.2.38 A singular, large slack in the south-east of the site exists which predominantly supports areas of very wet vegetation overlying peat, being dominated by common sedge, marsh pennywort and water horsetail (*Equisetum fluviatile*) with creeping bent. Here, creeping willow exists at generally very low cover as scattered bushes, while marsh bedstraw (*Galium palustre*), albeit at low cover overall, forms a widely available component of the community. This overall reduction in abundance of creeping willow coupled with its abundance of common sedge, marsh pennywort and creeping bent is diagnostic of SD17c dune-slack, wherein all other typical associates of other allied sub-communities are either absent or rare. This especially includes red fescue, marsh marigold (*Caltha palustris*) and glaucous sedge (*Carex flacca*).

1.6.2.39 This large, wet slack covering an estimated 0.7 ha was notably varied in character, being principally formed of SD17c vegetation, although also supporting smaller areas of swamp vegetation formed of water horsetail (*Equisetum fluviatile*), yellow flag iris (*Iris pseucacorus*), branched bur-reed (*Sparganium erectum*) alongside a small area of open water with unbranched bur-reed (*S. emersum*), bog pondweed (*Potamogeton polygonifolius*), and spiked water milfoil (*Myriophyllum spicatum*), plus scattered grey willow (*Salix cinerea*). As these smaller parcels of wetland vegetation were too small to map independently, and they formed functionally linked habitats to the wider portion of SD17 dune slack, these have been included as constituent parts of SD17 slack. This is with the exception of a larger area of S28 Phalaris swamp which fringes the slack in the south which has been mapped independently and described below.

1.6.2.40 As this vegetation type covered only one slack, a singular representative sample was obtained and MAVIS analysis was not undertaken.

1.6.2.41 As above, areas of SD17 dune slacks correspond to the priority and irreplaceable habitat type 'Coastal Sand Dunes', and the Annex I category H2190 Humid dune slacks.

SD18 *Hippophae rhamnoides* dune scrub

1.6.2.42 In unmanaged areas where SD9 dry dune grassland had been colonised by incipient sea buckthorn (*Hippophae rhamnoides*) across

approximately 0.1 ha in total, these typically formed near-mono-specific woody stands, sometimes with accompanying grey willow and other woody vegetation, with little ground flora. This may be with the exception of scattered false oat-grass and marram. Therefore, this vegetation has been characterised to community-level only.

1.6.2.43 Although widespread across British coasts, as a native vegetation type this community only exists on the east coast of Britain. Elsewhere, it is often viewed as a conservation issue.

1.6.2.44 All examples of SD18 correspond to the priority and irreplaceable habitat type 'Coastal Sand Dunes', and the Annex I category H2160 Dunes with *Hippophae rhamnoides*.

S28a *Phalaris arundinacea swamp, P. arundinacea* sub-community

1.6.2.45 Bounding areas of SD17c in the south includes a large, monospecific stand of reed canary-grass (*Phalaris arundinacea*) equating to approximately 0.03 ha. This swamp vegetation is associated with little to no other associated taxa, excluding vegetation found at the edge of the stand alongside sporadic pointed spear-moss (*Calliergonella cuspidata*).

1.6.2.46 S28 is a common and widespread swamp community found throughout the British lowlands. However, while common and widespread, as it still occurs as a semi-natural habitat in association with dune slack, it remains to correspond to the priority and irreplaceable habitat type 'Coastal Sand Dunes'.

Important Plant Survey: Results

1.6.2.47 Important Plant Survey revealed the presence of 27 important taxa. These are summarised within **Table 1.5** below alongside notes on habitat association and abundance. Conservation designations which apply to important taxa may be summarised as:

- SCI – Species of Conservation Importance for north-west England
- NT – Near-Threatened in England
- VU – Vulnerable in England
- NS – Nationally Scarce
- NR – Nationally Rare
- Endemic – Endemic to the British Isles
- Scarce – Otherwise scarce at local, county or regional level

Table 1.5: Important plants identified during botanical survey of the site

Species	Habitat association	Range restricted (Y/N)	Conservation designations
Blue fleabane *(Erigeron acris)*	SD8	N - widespread and scattered across areas	SCI

Species	Habitat association	Range restricted (Y/N)	Conservation designations
		of SD8 fixed dune grassland	
Bog pondweed *(Potamogeton polygonifolius)*	SD17	Y - found only at w3w location tries.limp.prep	Scarce, SCI
Brookweed *(Samolus valerandii)*	SD16/17	Y - found in very small pockets of disturbed ground within SD16/17 dune slack in the east	
Carline thistle *(Carlina vulgaris)*	SD8, SD9	N - widespread and scattered across areas of SD8 and SD9, primarily within sparser vegetation	NT, SCI
Common cottongrass *(Eriophorum angustifolium)*	SD17	N - widespread within SD17c slack vegetation	VU, SCI
Common eyebright *(Euphrasia nemorosa)*	SD8, SD16	N - widespread, although local across named habitats	NT
Creeping willow *(Salix repens)*	SD9, SD16, SD17	N - widespread across named habitats	NT, SCI
Dune fescue *(Vulpia fasciculata)*	SD8	N - widespread and scattered within SD8, including on dune tops within relict, unmapped SD8 patches	NS, SCI
Dune helleborine *(Epipactis dunensis)*	SD16	N - widespread, although local across named habitats	En, NS, SCI
Frosted orache *(Atriplex laciniata)*	SD4, SD5	N - widespread across bare areas in front of embryonic dune ridge	SCI
Harebell *(Campanula rotundifolia)*	SD7, SD8, SD9, SD16	N - widespread across named habitats	NT
Heath dog violet *(Viola canina)*	SD8	Y - found as 5 plants around the w3w location oppose.slope.flip	VU, SCI
Isle-of-Man cabbage *(Coincya*	SD8, SD9	N - widespread and scattered within the	En, NS, SCI

Species	Habitat association	Range restricted (Y/N)	Conservation designations
monensis ssp. monensis)		east, primarily in sparse vegetation on dune tops, often including relict SD8	
Juncus hybrid *(Juncus balticus x J. inflexus)*	SD17	N - found in at least two large patches within SD17 slack	NR
Lesser spearwort *(Ranunculus flammula)*	SD16, SD17	N - widespread, although local across named habitats	VU, SCI
Marsh helleborine *(Epipactis palustris)*	SD16/SD17	N - widespread, although local across named habitats	NT, SCI
Marsh pennywort *(Hydrocotyle vulgaris)*	SD16, SD17	N - widespread across named habitats	NT, SCI
Portland spurge *(Euphorbia portlandica)*	SD7	N - widespread and scattered within areas of SD7	NS, SCI
Prickly saltwort *(Salsola kalii)*	SD5, SD5	N - widespread across bare areas in front of embryonic dune ridge	VU, SCI
Quaking-grass *(Briza media)*	SD9	Y - found only at w3w location maps.valley.chops over two discrete patches	NT, SCI
Sand cat's-tail *(Phleum arenarium)*	SD7, SD8	N - widespread across SD7 and some parts of SD8 dune grassland	NT, SCI
Sea holly *(Eryngium maritimum)*	SD4, SD5, SD6, SD7	N - widespread and scattered across named habitats	NT, SCI
Sea spurge *(Euphorbia paralias)*	SD6	N - widespread and scattered within SD6	SCI
Small-fruited yellow sedge *(Carex oederi)*	SD16/SD17	Y - found in very small pockets of disturbed ground within SD16/17 dune slack in the east	SCI
Spiked water milfoil *(Myriophyllum spicatum)*	SD17	Y - found only at w3w location tries.limp.prep	Scarce

Species	Habitat association	Range restricted (Y/N)	Conservation designations
Tormentil *(Potentilla erecta)*	SD16/SD17	Y - found generally only within the more acidophilous SD16/17 transitional slacks in the east	NT
Unbranched bur-reed *(Sparganium emersum)*	SD17	Y - found only at w3w location tries.limp.prep	Scarce, SCI

1.6.2.48 Of these important taxa identified, some are globally rare or endemic, including the *Juncus* hybrid and dune helleborine, respectively. Furthermore, some have not been recorded on the Lytham coast for extended periods of time. This includes bog pondweed which was last recorded on the Lytham coast in 1967, and unbranched bur-reed, which was last recorded on the Lytham coast in 1998.

1.7 Interpretation and assessment

1.7.1 Overview

1.7.1.1 The NVC survey of the site confirms much of the site is dominated by coastal sand dune priority and irreplaceable habitat, while a total of five distinct Annex I habitat types of international conservation importance have also been identified, including:

- H2110 Embryonic shifting dunes;
- H2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes');
- H2130 Fixed dunes with herbaceous vegetation ('grey dunes');
- H2160 Dunes with *Hippophae rhamnoides*; and
- H2190 Humid dune slacks.

1.7.1.2 The extent of these habitats have been mapped within **Figure 1.3**, while those NVC stands which are likely to constitute GWDTEs are discussed further below.

1.7.1.3 Of the stands identified, many have distinct environmental sensitivities. This includes hydrologically sensitive wetlands, especially the more decalcified vegetation within the east of the site, particularly including SD8 and some more acidophilous slack vegetation. Where dune vegetation is sensitive to disturbance (of decalcified superficial deposits which have taken centuries to leach), calcium-rich sand is intermixed with surface deposits which is capable of near-permanently destroying decalcified habitats.

1.7.1.4 A total of 27 important taxa were identified during survey of the site, some of which are rare at an international level, including *Juncus x lancastriensis* (*J. balticus x J. inflexus*) and dune helleborine. Furthermore, some of the important taxa located had not been recorded

on the Lytham coast for extended periods of time, most notably bog pondweed, which had not been recorded here in excess of 50 years. Of the habitat affiliations identified, many important flora were affiliated with dune slack, with little overlap between those found in fixed dune grassland verses those found within slack vegetation. In total, 15 of the 27 important taxa were affiliated with dune slack, while 15 were affiliated with foredune, semi-fixed and fixed dune vegetation, noting that there is some overlap (refer to **Table 1.5**).

1.7.2 Assessment of importance

1.7.2.1 An assessment of conservation importance of important floristic features has been broken down within **Table 1.6** below.

Table 1.6: Assessment of importance for floristic features

Feature	Importance along a geographic scale	Comments
Habitats		
Embryonic foredune (SD4, SD5, SD4/SD5)	International	All examples of foredune vegetation are encapsulated by the Annex I habitat H2110 Embryonic shifting dunes. A total area of 1.9ha (1 d.p) of this habitat was identified on site, while approximately 150ha is estimated to remain in England, equating to >1% of the national total.
Mobile dune (SD6)	International	Areas of SD6 mobile dune all correspond to the Annex I habitat H2120 Shifting dunes along the shoreline with *Ammophila arenaria* ('white dunes'). Areas of SD6 on site cover an approximate area of 2.5ha while an estimated 2700ha remains nationally.
Fixed dune grassland (SD7, SD8)	International	Areas of SD7 semi-fixed dune and SD8 fixed dune grassland all correspond to the Annex I habitat H2130 Fixed dunes with herbaceous vegetation ('grey dunes'). Of an estimated 5300ha remaining nationally, these habitats cover an approximated area of 4.4ha
Fixed dune grassland (SD9)	National	Areas of SD9a do not correspond to any Annex I habitat category, nonetheless they constitute a qualifying feature for the SSSI and correspond to the priority and irreplaceable habitat 'Coastal Sand Dunes'.
Dune slack (SD16, SD16/SD17, SD17)	International	Areas of dune slack across the identified communities correspond to the Annex I habitat category H2190 Humid dune slacks. Furthermore, a substantial area of this habitat type is contained on site, equating to a total estimated area of 4.7ha In England, an estimated 285ha of this habitat type remains. Therefore, areas of dune slack on site are likely to represent a

Feature	Importance along a geographic scale	Comments
		substantial proportion of the national total exceeding 1.5%.
Dune slack (S28)	National	Areas of S28a do not correspond to any Annex I habitat category, nonetheless they constitute a qualifying feature for the SSSI and correspond to the priority and irreplaceable habitat 'Coastal Sand Dunes'.
Dune scrub (SD18)	International	Whilst areas of dune scrub qualify as Annex I habitat H2160 Dunes with *Hippophae rhamnoides*, this does not represent a native vegetation type here. Therefore, conservation priorities may align with removal of this habitat to the benefit of other, native dune habitats.
Plants		
Blue fleabane *(Erigeron acris)* Carline thistle *(Carlina vulgaris)* Common cottongrass *(Eriophorum angustifolium)* Common eyebright *(Euphrasia nemorosa)* Creeping willow *(Salix repens)* Frosted orache *(Atriplex laciniata)* Harebell *(Campanula rotundifolia)* Lesser spearwort *(Ranunculus flammula)* Marsh pennywort *(Hydrocotyle vulgaris)* Prickly saltwort *(Salsola kalii)* Quaking-grass *(Briza media)* Tormentil *(Potentilla erecta)* Unbranched bur-reed *(Sparganium emersum)*	Local	Despite corresponding conservation designations, these plants may be found more widely on-site, along the coastline or elsewhere in the county across other habitat types. Therefore, their assessment of importance along a geographic scale remains at local level.

Feature	Importance along a geographic scale	Comments
Bog pondweed *(Potamogeton polygonifolius)* Brookweed *(Samolus valerandii)* Sand cat's-tail *(Phleum arenarium)* Sea holly *(Eryngium maritimum)* Sea spurge *(Euphorbia paralias)* Small-fruited yellow sedge (*Carex oederi)* Spiked water milfoil *(Myriophyllum spicatum)*	County	All of these species show reasonably restricted ranges at county level and are not necessarily widespread or abundant on-site and/or within the surrounding landscape, and so have been assessed as important at county level for the purposes of this assessment.
Heath dog violet *(Viola canina)* Marsh helleborine *(Epipactis palustris)*	Regional	Both heath dog violet and marsh helleborine are rare not only at county level, but farther afield within the region of northwest England.
Dune fescue *(Vulpia fasciculata)* Portland spurge *(Euphorbia portlandica)*	National	Both dune fescue and Portland spurge are restricted in their British distributions and nationally scarce. The site holds important populations of both of these species which have been assessed as important at national level.
Dune helleborine *(Epipactis dunensis)* Isle-of-Man cabbage *(Coincya monensis ssp. monensis)* Juncus hybrid *(Juncus balticus x J. inflexus)*	International	All of these species are rare / endemic at international level and have therefore been assessed as important at this level.

1.7.3 Ground Water Dependent Terrestrial Ecosystems

1.7.3.1 Of the community types identified, a range of topogenous wetlands were located. This includes wet dune and swamp as follows:

- SD16 dune slack;
- SD16/ SD17 transitional dune slack;
- SD17 dune slack; and
- S28 swamp.

1.7.3.2 No other wetland community types, or community types which are identified by the UK Technical Advisory Group to correspond to GWDTE categories were located on site.

1.7.3.3 An Outline Hydrogeological Risk Assessment for Lytham St Annes Dunes SSSI has been undertaken which is based on existing ground investigation data with no direct data pertaining to the ground conditions of the SSSI/LNR/BHS, including the groundwater regime and its likely seasonal variability.

1.7.3.4 Information has been requested from the St Annes Old Links Golf Club regarding the groundwater abstractions to inform the refinement of the hydrogeological conceptual model. This information is likely to include abstraction borehole logs and associated water table elevation observations, historical and current abstraction regimes including timings - both diurnal and seasonal - and rates of abstraction, uses of water whether consumptive or non-consumptive and understanding of any on any physical or temporal limitations or constraints on abstraction In the absence of hydrological data or inputs from a specialist hydrogeologist, these communities have therefore been assigned as 'likely GWDTEs' for the purposes of this assessment and mapped accordingly within **Figure 1.3** (refer to the Outline Hydrogeological Risk Assessment for Lytham St Annes Dunes SSSI (S_D3_6/F02)) .

1.7.3.5 Evidence from published UKTAG correspondence tables shows that, of the wetlands identified, most have a high dependence of groundwater. This is with the exception of the singular mapped stand of S28 swamp, which is likely to have a low groundwater dependency (UKTAG, 2009). A summary of groundwater dependence is provided within **Table 1.7** below.

Table 1.7: List of likely GWDTEs and their respective UKTAG groundwater dependency score

NVC community	UKTAG Groundwater dependency score	Comments
SD16b	1	High groundwater dependency
SD16 / SD17	1	High groundwater dependency
SD17c	1	High groundwater dependency
S28a	3	Low groundwater dependency

1.8 Summary

1.8.1.1 This technical report presents the results of the national vegetation classification survey to expand on Volume 3, Annex 3.3: Phase 1 habitat, national vegetation classification and hedgerow survey technical report (document reference J3.3.3/F02). The document presents and characterises the results of the summer 2025 NVC survey undertaken which identified a large number of important floristic features exist on site, ranging from local to international conservation importance.

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Appendix A

A.1 Floristic tables

SD4 (*Elymus fractus ssp. borealis* foredune community)

Scientific Name	Common Name	Quadrat					Range	Constancy
		1	2	3	4	5		
Elytrigia junceiformis	Sand couch	7	6	7	7	9	6-9	V
Ammophila arenaria	Marram	2					2	I
Leymus arenarius	Lyme-grass					1	1	I

SD5 (*Leymus arenarius* mobile dune community)

Scientific Name	Common Name	Quadrat					Range	Constancy
		6	7	8	9	10		
Leymus arenarius	Lyme-grass	7	6	8	7	7	6-8	V

SD6 (*Ammophila arenaria* mobile dune community)

Scientific Name	Common Name	Quadrat					Range	Constancy
		11	12	13	14	15		
Ammophila arenaria	Marram	9	9	9	10	7	7-10	V
Elytrigia junceiformis	Sand couch		1		2		1-2	II
Euphorbia paralias	Sea spurge	1	2				1-2	II
Hypochaeris radicata	Common cat's-ear	2			1		1-2	II
Sonchus oleraceus	Smooth sow-thistle				2		2	I
Taraxacum officinale agg.	Dandelion agg.		1				1	I

SD7 (*Ammophila arenaria - Festuca rubra* semi-fixed dune community)

Scientific Name	Common Name	Quadrat										Range	Constancy
		16	17	18	19	20	21	22	23	24	25		
Ammophila arenaria	Marram	7	7	7	8	6	7	7	6	7	9	6-9	V

Scientific Name	Common Name	Quadrat										Range	Constancy
		16	17	18	19	20	21	22	23	24	25		
Festuca rubra agg.	Red fescue agg.	5	4	3	4	5	5	5	5	5	5	3-5	V
Hypochaeris radicata	Common cat's-ear	3	2	3	3	4	3	3	4	4		2-4	V
Leontodon saxatile	Lesser hawkbit	4	4	4	4	3	4	3	4	5	3	3-5	V
Taraxacum officinale agg.	Dandelion agg.	2			1		2		3	2		1-3	III
Equisetum arvense	Field horsetail					3	3	3	2			2-3	II
Jacobaea vulgaris	Common ragwort		1		1				1	3		1-3	II
Arenaria serpyllifolia	Thyme-leaved sandwort					1			1			1	I
Brachythecium albicans	White feather-moss					4						4	I
Cerastium diffusum	Sea mouse-ear			2								2	I

Scientific Name	Common Name	Quadrat										Range	Constancy
		16	17	18	19	20	21	22	23	24	25		
Cirsium vulgare	Spear thistle				1							1	I
Crepis capillaris	Smooth hawk's-beard							2	3			2-3	I
Oenothera sp.	Evening primrose sp.						3					3	I
Ononis repens	Common restharrow							3				3	I
Rubus caesius	Dewberry							2				2	I
Tragopogon pratensis	Goat's-beard							1				1	I

SD8 (*Festuca rubra - Galium verum* fixed dune grassland)

Scientific Name	Common Name	Quadrat					Range	Constancy
		26	27	28	29	30		
Agrostis capillaris	Common bent	3	5	4	2	2	2-5	V
Anthoxanthum odoratum	Sweet vernal-grass	3	3	3	2	2	2-3	V

Scientific Name	Common Name	Quadrat					Range	Constancy
		26	27	28	29	30		
Festuca rubra agg.	Red fescue agg.	7	6	6	3	4	3-7	V
Galium verum	Lady's bedstraw	5	3	4	4	3	3-5	V
Lotus corniculatus	Common bird's-foot trefoil	3	3	3	3	3	3	V
Luzula campestris	Field wood-rush	4	3	3	3	2	2-4	V
Plantago lanceolata	Ribwort plantain	4	4	6	3	4	3-6	V
Thymus drucei	Wild thyme	6	7	6	6	6	6-7	V
Ammophila arenaria	Marram	3	1		1	3	1-3	IV
Campanula rotundifolia	Harebell		3	4	4	4	3-4	IV
Carex arenaria	Sand sedge		3	3	3	3	3	IV
Hypnum lacunosum	Great plait-moss	4	4	3	3		3-4	IV
Hypochaeris radicata	Common cat's-ear	3		2	3	3	2-3	IV
Ononis repens	Common restharrow		2	3	3		2-3	III

Scientific Name	Common Name	Quadrat					Range	Constancy
		26	27	28	29	30		
Pilosella officinarum	Mouse-ear hawkweed	4		3	2		2-4	III
Anthriscus sylvestris	Cow parsley				1	2	1-2	II
Arrhenatherum elatius	False oat-grass	1		1			1	II
Hieracium umbellatum	Umbellate hawkweed	1		2			1-2	II
Ranunculus bulbosus	Bulbous buttercup		3		3		3	II
Bromus hordeaceus	Soft brome				3		3	I
Dactylis glomerata	Cock's-foot			2			2	I
Euphrasia nemorosa	Common eyebright			2			2	I
Leontodon saxatile	Lesser hawkbit					3	3	I
Sedum acre	Biting stonecrop					3	3	I
Vulpia fasciculata	Dune fescue					4	4	I

SD9 (*Ammophila arenaria - Arrhenatherum elatius* dune grassland)

Scientific Name	Common Name	Quadrat															Range	Constancy
		31	32	33	34	35	36	37	38	39	40	41	42	43	44	45		
Ammophila arenaria	Marram	4	5	4	5	8	7	4	4	7	7	5	4	6	5	6	4-8	V
Arrhenatherum elatius	False oat-grass	7	5	4	4	3	4	4	7	4	5	4	6	4	5	4	3-7	V
Festuca rubra agg.	Red fescue agg.	2	4	2	4	3	3	5	4	3	4	5	4		5	4	2-5	V
Rubus caesius	Dewberry	8	7	7	8	7	7	7	6	5	5	6	7	5	6	7	5-8	V
Carex arenaria	Sand sedge	3	3	2		2	3	2	1	2	2		2				1-3	III
Ononis repens	Common restharrow	3	4	2	3	3		3		2		3		2	3		2-4	III
Equisetum arvense	Field horsetail			3	3	3							3		3		3	II
Holcus lanatus	Yorkshire-fog								2	1		5	3	4			1-5	II
Lotus corniculatus	Common bird's-foot trefoil				4		3				2	4	3	2			2-4	II
Salix repens	Creeping willow				3			2		1			4	3	3		1-4	II

Scientific Name	Common Name	Quadrat															Range	Constancy
		31	32	33	34	35	36	37	38	39	40	41	42	43	44	45		
Achillea millefolium	Yarrow							1								3	1-3	I
Agrostis capillaris	Common bent													3	4	4	3-4	I
Anacampis pyramidalis	Pyramidal orchid		1														1	I
Campanula rotundifolia	Harebell						3			3		3			4		3-4	I
Cerastium fontanum	Common mouse-ear								1								1	I
Cirsium arvense	Creeping thistle									1							1	I
Dactylis glomerata	Cock's-foot						3							3			3	I
Jacobaea vulgaris	Common ragwort			1											3		1	I
Lathyrus pratensis	Meadow vetchling							4		3			3				3-4	I

Scientific Name	Common Name	Quadrat															Range	Constancy
		31	32	33	34	35	36	37	38	39	40	41	42	43	44	45		
Lonicera japonica	Japanese honeysuckle			3													3	I
Plantago lanceolata	Ribwort plantain						2	3									2-3	I
Poa humilis	Spreading meadow-grass	3				3											3	I
Ranunculus acris	Meadow buttercup							1							3		1-3	I
Rumex crispus	Curled dock										2						2	I
Veronica chamaedrys	Germander speedwell								1								1	I
Vicia cracca	Tufted vetch														3		3	I

SD16 (*Salix repens - Holcus lanatus* dune-slack community)

Scientific Name	Common Name	Quadrat					Range	Constancy
		46	47	48	49	50		
Holcus lanatus	Yorkshire-fog	3	4	3	4	5	3-5	V

Scientific Name	Common Name	Quadrat					Range	Constancy
		46	47	48	49	50		
Plantago lanceolata	Ribwort plantain	4	3	2	4	5	2-5	V
Rubus caesius	Dewberry	7	6	8	3	5	3-8	V
Salix repens	Creeping willow	8	8	5	7	6	5-8	V
Vicia cracca	Tufted vetch	2	1	1	3	2	1-3	V
Arrhenatheum elatius	False oat-grass	4	2	3	2		2-4	IV
Lathyrus pratensis	Meadow vetchling	2	3	1	2		1-3	IV
Rhinanthus minor	Yellow rattle		3	2	1	3	1-3	IV
Carex arenaria	Sand sedge	1	2	3			1-3	III
Epilobium palustre	Marsh willowherb	3	3	2			2-3	III
Ononis repens	Common restharrow		4	4		2	2-4	III
Carex flacca	Glaucous sedge		1		2		1-2	II
Cirsium vulgare	Spear thistle	1	2				1-2	II

Scientific Name	Common Name	Quadrat					Range	Constancy
		46	47	48	49	50		
Lotus pedunculatus	Greater bird's-foot trefoil				3	2	2-3	II
Ranunculus acris	Meadow buttercup				3	3	3	II
Trifolium pratense	Red clover				4	4	4	II
Angelica sylvestris	Wild angelica			2			2	I
Centaurea nigra	Common knapweed					2	2	I
Elymus repens	Common couch	3					3	I
Hieracium umbellatum	Umbellate hawkweed	3					3	I
Hydrocotyle vulgaris	Marsh pennywort		4				4	I
Jacobaea vulgaris	Common ragwort	1					1	I
Lonicera periclymenum	Honeysuckle	3					3	I
Lotus corniculatus	Common bird's-foot trefoil			3			3	I

SD16/17 transition (*Salix repens – Holcus lanatus / Potentilla anserina – Carex nigra* dune-slack transition)

Scientific Name	Common Name	Quadrat										Range	Constancy
		51	52	53	54	55	56	57	58	59	60		
Holcus lanatus	Yorkshire-fog	4	4	4	4	2	3	2	3	4	5	2-5	V
Hydrocotyle vulgaris	Marsh pennywort	6	4	5	3	5	5	5	4	4	3	3-6	V
Rubus caesius	Dewberry	7	5	4	7	3	4	3	4	5	4	3-7	V
Salix repens	Creeping willow	7	6	8	7	6	7	6	4	5	6	4-8	V
Agrostis stolonifera	Creeping bent	4	3	4	2		1		4	4	4	1-4	IV
Carex nigra	Common sedge		5	1		5	4	6	6	4	5	1-6	IV
Plantago lanceolata	Ribwort plantain	3	4	3	2	4			5	4	4	2-5	IV
Equisetum palustre	Marsh horsetail	3	2			3	3	3				2-3	III
Festuca rubra agg.	Red fescue agg.			3	3		3	3		3	3	3	III
Anthoxanthum odoratum	Sweet vernal-grass					1			3	3		1-3	II

Scientific Name	Common Name	Quadrat										Range	Constancy
		51	52	53	54	55	56	57	58	59	60		
Lathyrus pratensis	Meadow vetchling		3	2			3				3	2-3	II
Mentha aquatica	Water mint							4	4	3		3-4	II
Molinia caerulea	Purple moor-grass		1			4			5	3		1-5	II
Ranunculus acris	Meadow buttercup				2			3	3	3		2-3	II
Trifolium pratense	Red clover			2					3	2		2-3	II
Arrhenatherum elatius	False oat-grass										3	3	I
Centaurea nigra	Common knapweed									3		3	I
Epipactis palustris	Marsh helleborine							2				2	I
Heracleum sphondylium	Hogweed				3							3	I

Scientific Name	Common Name	Quadrat										Range	Constancy
		51	52	53	54	55	56	57	58	59	60		
Jacobaea vulgaris	Common ragwort			3	1							1-3	I
Lotus corniculatus	Common bird's-foot trefoil	3		3								3	I
Poa humilis	Spreading meadow-grass					1						1	I
Potentilla erecta	Tormentil					5	4					4-5	I
Rhinanthus minor	Yellow rattle								2	3		2-3	I

SD17 (*Potentilla anserina - Carex nigra* dune-slack community)

Scientific Name	Common Name	Quadrat
		61
Carex nigra	Common sedge	7
Hydrocotyle vulgaris	Marsh pennywort	7
Equisetum fluviatile	Water horsetail	6

Scientific Name	Common Name	Quadrat
		61
Salix repens	Creeping willow	4
Agrostis stolonifera	Creeping bent	4
Epilobium palustre	Marsh willowherb	3
Juncus articulatus	Jointed rush	3
Rubus caesius	Dewberry	3
Eriophorum angustifolium	Common cottongrass	2
Equisetum palustre	Marsh horsetail	2
Vicia cracca	Tufted vetch	1
Galium palustre	Marsh bedstraw	1

Appendix B

B.1 Site Photographs

Plate 1: A general view of SD9 dune grassland with marram, false oat-grass and abundant dewberry

Plate 2: A view of SD6 mobile dune with marram

Plate 3: SD16 dune slack with creeping willow and emergent marsh orchid (*Dactylorhiza* spp.) infructescences

Plate 4: A landscape view of SD16 linear dune slack in the south-west

Plate 5: Dune helleborine within SD16 dune slack

Plate 6: Sea holly within SD7 semi-fixed dune

Plate 7: A view of SD7 semi-fixed dune with marram, red fescue and scattered forbs

Plate 8: Linear band of SD5 embryonic dune with lyme-grass

Plate 9: SD17 dune slack with abundant common sedge

Plate 10: SD17/S28 transition

Plate 11: Globally rare *Juncus balticus x J. inflexus* within SD17 dune slack

Plate 12: SD8 fixed dune grassland surrounded by encroaching SD9 rank dune grassland

Plate 13: Globally rare Isle-of-Man cabbage on dune ridge

Plate 14: Marsh helleborine within SD16/SD17 transitional dune slack

Plate 15: Transitional SD16/SD17 dune slack with purple moor-grass and tormentil showing affinities to NVC M25

Plate 16: Small yellow sedge within disturbed slack with common eyebright

Plate 17: Portland spurge within SD7 dune

Plate 18: Sea spurge within SD6 mobile dune

Plate 19: Emergent fringe of embryonic dune with scattered plants of sand couch and sea sandwort along the strandline

Plate 20: Frosted orache within SD4 embryonic dune vegetation

Plate 21: Heath dog violet within SD8 fixed dune grassland

Plate 22: Peat formation within SD16/SD17 transitional dune slack

Plate 23: Unbranched bur-reed within pool bordering SD17 dune slack

Plate 24: Lesser spearwort with bog pondweed at the edge of SD17 dune slack

~~Appendix D~~Appendix E: St Anne's Old Links Golf Course & Blackpool South Rail Line BHS

MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 3, Annex 3.3, Appendix E: National Vegetation Survey of the St Anne's Old Links Golf Course Biological Heritage Site

Deadline: 5
Application Reference: EN020028

Document Numbers:
xxxxx
xxxxxx

Document Reference:

22 September 2025
F01

Document status					
Version	**Purpose of document**	**Approved by**	**Date**	**Approved by**	**Date**
F01	Submission at Deadline 5		September 2025		September 2025

Prepared by:

RPS

Prepared for:

Morgan Offshore Wind Limited, Morecambe Offshore Windfarm Ltd

Contents

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Glossary

Term	Meaning
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore export cables, landfall, and onshore infrastructure for the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm. This includes the offshore export cables, landfall site, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Onshore Order Limits	See Transmission Assets Order Limits: Onshore (below).
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning (such as construction compounds).

Acronyms

Acronym	Meaning
BHS	Biological Heritage Site
EcIA	Ecology Impact Assessment
Ha	Hectare
GIS	Geographic Information System
GWDTE	Ground water dependent terrestrial ecosystem
FISC	Field Identification Skills Certificate
HPI	Habitat of Principal Importance
LNR	Local Nature Reserve
MAVIS	Modular Analysis of Vegetation Information System
NVC	National Vegetation Classification

Units

Unit	Description
%	Percentage
m	Metres
m^2	Metres squared

1 National Vegetation Survey of St Anne's Old Links Golf Course Biological Heritage Site

1.1 Introduction

1.1.1.3 This document comprises the results of the National Vegetation Classification (NVC) survey of St Anne's Old Links Golf Course Biological Heritage Site. It forms Appendix E to Volume 3, Annex 3.3: Phase 1 habitat, national vegetation classification and hedgerow survey technical report of the Environmental Statement prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (hereafter referred to as the Transmission Assets) (document reference J3.3.3/F02).

1.1.2.3 This document has been prepared in response to comments from Natural England regarding the need to thoroughly assess the impacts on dune slack vegetation at St Anne's Old Links Golf Course Biological Heritage Site. Natural England also advised that detailed dune slack surveys should be undertaken during summer 2025 (refer to Appendix K4 - Natural England's Risk and Issues Log (REP4-139). This survey was required to characterise extant vegetation types across the site, whether they correspond to priority, Annex I or irreplaceable habitat or Ground Water Dependent Terrestrial Ecosystem (GWDTE) categories (the Outline Hydrogeological Risk Assessment for Lytham St Annes Dunes SSSI (S_D3_6/F02)).

1.1.3.3 The document presents and characterises the results of the summer 2025 NVC survey undertaken as part of Deadline 5 for the Transmission Assets. These results provide a basis for describing the extent, distribution, and ecological importance of vegetation communities within and in proximity to the Transmission Assets.

1.2 Scope

2.1.1.3 The aims of this survey and assessment report are summarised as follows:

- The provision of a National Vegetation Classification (NVC) habitat survey across the site to the standard established throughout the British Plant Communities series alongside a survey for important taxa in tandem;
- The analysis of raw field data using Modular Analysis of Vegetation Information System (MAVIS) software and subsequent identification of important habitats, including Habitats of Principal Importance (HPIs) (also known as 'priority habitats'), Annex I habitats, irreplaceable habitats and Ground Water Dependent Terrestrial Ecosystems (GWDTEs);
- A desk study with literature review, including exploration of MAGiC maps (DEFRA, 2025), open access data and other relevant literature and resources; and

- An outline of measures which are recommended to be adopted to enhance habitats and ensure impacts to important floristic features are avoided and/or minimised.

1.3 Survey Area

3.1.1.3 The survey area is defined as the area within which the survey has been undertaken and is based on species or site-specific guidance on the extent of survey required. The survey area for the NVC survey (hereafter referred to as the 'survey area') consists of fixed dune grassland at the St Anne's Old Links Golf Course Biological Heritage Site as shown in **Figure 1.1**.

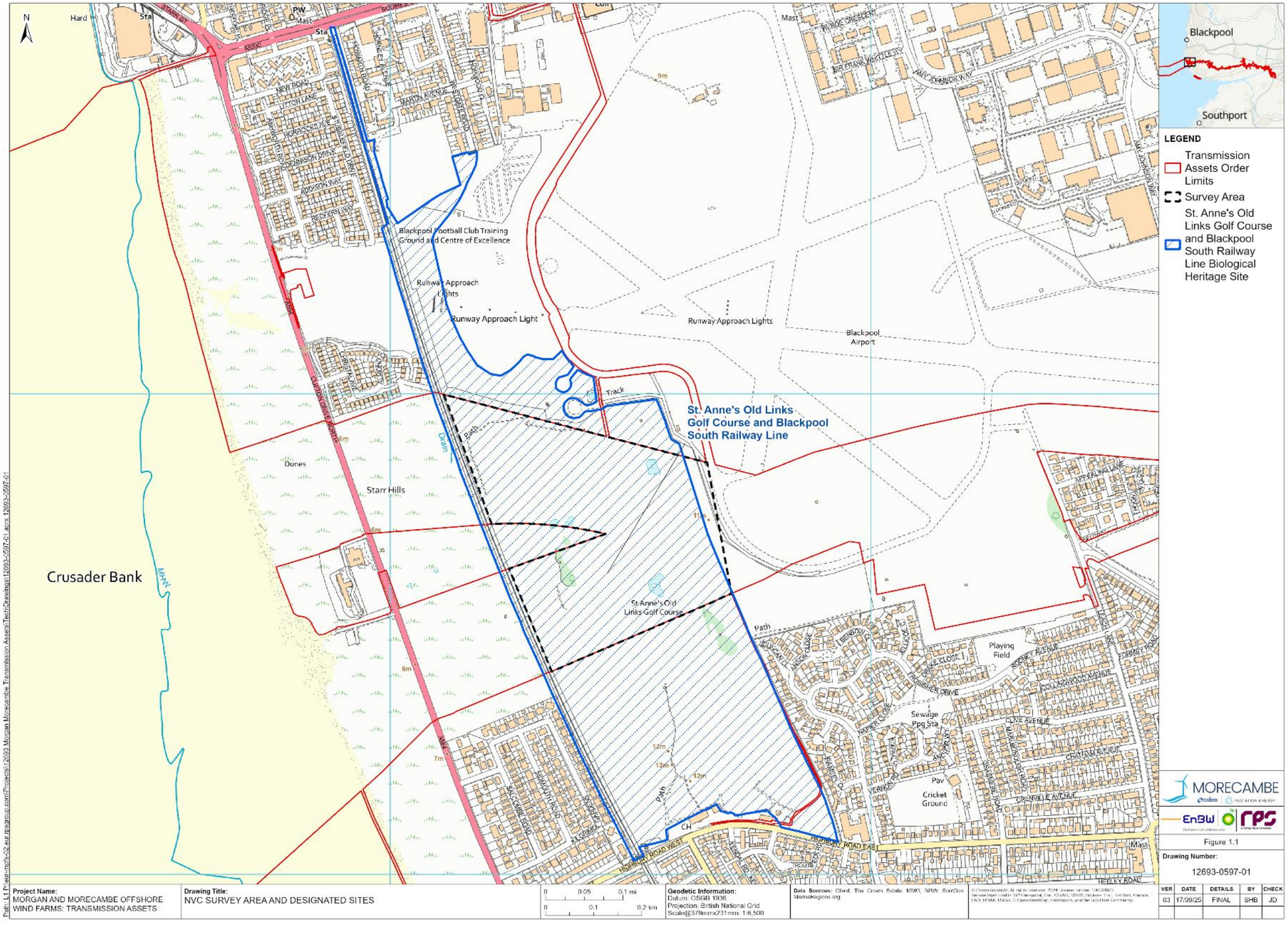

Figure 1.1: NVC survey area

1.4 Methodology

1.4.1 Desk study

4.1.1.3 A review of historic reporting alongside aerial imagery was undertaken prior to the survey of the site. This review was undertaken in tandem with a review of priority habitat data on MAGIC maps (including those habitats which are reliant upon groundwater regimes) to appraise the site and surrounding environment for areas which appear across relevant priority habitat and other inventories.

4.1.2.3 Botanical Society of Britain and Ireland (BSBI) distributional data was utilised where appropriate[1], in accompaniment with British Geological Society data available via Geology Viewer[2] and a range of other open-source data and available literature.

1.4.2 Field survey

4.2.3.3 An important plant survey was conducted in tandem with an NVC habitat survey to the survey of Rodwell (ed.) across the totality of the identified survey on 10 September 2025 in favourable weather conditions. Times and conditions recorded for surveys are given in **Table 1.1.**

Table 1.1: Conditions observed across survey visit

Date	10 September 2025
Times of survey	1200 – 1830
Visibility	Good visibility throughout survey
Rain	Dry with some light rain
Cloud cover	95% cloud cover
Wind	Calm – no wind

4.2.4.3 The survey employed methods consistent with the National Vegetation Classification: User's Handbook (Rodwell, 2006). The survey comprised community-level botanical surveys of sand dune and modified sand dune habitats at the St Anne's Old Links Golf Course Biological Heritage Site. The survey was used to categorise habitat types within both survey areas, at the community and, where possible, sub-community level.

4.2.5.3 Evidence was drawn from habitat descriptions and floristic tables (Rodwell et al., 1991-2000), supported by MAVIS analysis, as appropriate. Where homogeneous and species-poor stands of swamp and scrub vegetation were observed, these were simply described as a

[1] Botanical Society of Britain and Ireland: available at https://bsbi.org/maps

[2] Available at: https://geologyviewer.bgs.ac.uk/?_ga=2.138468471.51961822.1695285963-63978984.1695285963

whole stand, in the absence of MAVIS. Site photographs were taken and important plants were recorded and mapped within each quadrat.

4.2.6.3 Following the field-based survey, an assessment of communities identified was undertaken. This was informed by relevant conservation designations each community type may be associated with, and aimed to assign communities a level of conservation importance along a geographic scale, from local to international.

4.2.7.3 Where large, relatively homogeneous stands existed, a minimum of five targeted quadrat samples (relevés[3]) of an appropriate size for the habitat were deployed wherever possible. This is with the exception of species-poor swamp communities and scrub where descriptions were simply taken of stands and their constituent flora accordingly. Similarly, where stands occurred over small areas below a Minimum Mappable Area (MMA) of 10 m x 10 m, notes with descriptions of these stands were taken, while the stands themselves were taken as components of wider community areas. Sampling quadrat size broadly included 2 x 2 m for open habitats, as per standing guidance provided by Rodwell (2006).

4.2.8.3 The survey used qualitative methods as appropriate, including quadrat and stand sampling, to identify and categorise habitat types to NVC community or sub-community level. Quadrats were temporarily marked out using bamboo canes.

4.2.9.3 Where quadrat samples were obtained, measures for frequency were calculated using the Domin scale (see **Table 1.2** below) dependent upon abundance within any given sample. A constancy value of I-V was calculated for species in instances where five or more samples were obtained.

Table 1.2: Domin scale

Cover	Domin Value
91-100	10
76-90	9
51-75	8
34-50	7
26-33	6
11-25	5
4-10	4
<4 (many individuals)	3
<4 (several individuals)	2
<4 (few individuals)	1

[3] Representative samples within a stand

4.2.10.3 Floristic survey data (see **Appendix A**) was analysed with use of floristic tables and habitat descriptions across the Rodwell series 1 to evidence characterisation with stands mapped within **Figure 1.3** with the use of QGIS. MAVIS was used to add further support to habitat characterisation. It should be noted that MAVIS was purely used as a means of supplementary evidence and was not used as a sole means of identification. This conforms with the NVC User's handbook which, in point 7.2 states:

'The ecological interpretation of the results remains the responsibility of the surveyor. All that computer analysis can do is define sample groups on the basis of statistical similarities and differences: to characterise vegetation types from the end-groups produced by such analysis requires skill and experience. For comparison with NVC data, a first step is to construct floristic tables that summarise the frequency and abundance values of the constituent species among the samples.'

4.2.11.3 Following the identification of stand types to community and, where possible, sub-community level, NVC types were correlated to relevant priority, Annex I, irreplaceable habitat and GWDTE categories aligned with published guidance. A broad range of core best-practice guidance and legislation was used to support characterisation, which includes the following:

- Biodiversity Gain Requirements (Irreplaceable Habitats) Regulations 2024 (UK Government, 2024).
- Joint Nature Conservation Committee (JNCC) UK BAP Priority Habitat descriptions (JNCC, 2025a)
- Guidelines for the Selection of Biological Sites of Special Scientific Interest (SSSIs) (JNCC, 2025b).
- The Interpretation Manual of European Union Habitats (European Commission, 2013).
- JNCC supplementary advice on UK Annex I habitats (JNCC, 2025c).
- UK Technical Advisory Group guidance on the identification and risk assessment of GWDTEs.

4.2.12.3 In addition to NVC survey, information on particularly important taxa was captured during the survey, although it is acknowledged that this does not constitute a primary aim of this report. Transects over all habitats were undertaken which were a maximum distance of 20 m apart; where important species were identified, abundance and distributional data was captured. As a botanical survey is currently being conducted which maps rare dune flora, and the focus of this report is centred on the characterisation of important habitats, no maps of important flora are provided.

4.2.13.3 For the purposes of this document, important taxa are defined as any plant species, subspecies or hybrid which is:

- Red-listed in England or Great Britain (UK TAG, 2004 and Stroh, 2014);

- Occurring at fewer than 100 hectad[4] localities at country or GB level (country-scarce / nationally scarce);
- Occurring at fewer than 15 hectad localities at country or GB level (country-rare/nationally rare);
- Endemic;
- Scarce or rare at regional, county or local level[5];
- Listed under s.41 National Environment and Rural Communities Act 2006[6]; and/or
- Listed under Schedule 5 Conservation of Habitats and Species Regulations 2017 (as amended); and/or
- Listed under Schedule 8 Wildlife & Countryside Act 1981 (as amended).

4.2.14.3 This approach aligns with the characterisation of Important Ecological Features as defined by the Chartered Institute of Ecology and Environmental Management (CIEEM) within standing Ecological Impact Assessment (EcIA) guidelines (CIEEM, 2018).

4.2.15.3 Nomenclature for higher plants follows Stace (2019) and follows the British and Irish BBS checklist for bryophytes (Blockeel et al, 2020).

1.4.3 Assessment

4.3.16.3 Following the identification of sward types and important taxa, the relative importance of these along a geographic frame of reference was characterised. This was done with use of the below framework (**Table 1.3**), adapted from existing guidance including EcIA guidelines (CIEEM, 2022) and the Design Manual for Roads and Bridges: Sustainability & Environment Appraisal LA 108 Biodiversity (Highways England, 2020).

4.3.17.3 A frequency value for each species, depending on the number of quadrats in which it was recorded, was calculated for each group of quadrats in a sample of similar vegetation, as per **Table 1.3** below.

Table 1.3: Adopted evaluation framework for the assessment of conservation importance

Geographic scale application	Assessment criteria for habitats
International	European designated sites where identified habitats are a listed feature, e.g., Special Protection Areas.

[4] Hectad records include records within 10x10km squares. Also see www.bsbi.org/maps

[5] This was ascertained through review of BSBI and British Bryological Society mapped plant distributions.

[6] Including species which are a conservation priority within England

Geographic scale application	Assessment criteria for habitats
	All habitats listed within Annex I Habitats Directive (Interpretation manual of EU Habitats. Including any globally protected or noteworthy species.
National	Nationally designated sites where identified habitats are a listed feature, including SSSIs. All habitats which meet relevant criteria for a national designation but do not currently form part of such a designation (SSSI selection guidelines. All irreplaceable habitats which do not fall under Annex I habitat categories, including some examples of ancient woodland, saltmarsh and lowland fen for example. All species and/or species populations which are rare, scarce or otherwise notable at the national level.
Regional	All semi-natural national priority habitats which do not fulfil relevant criteria for a national designation and/or do not fall under defined irreplaceable habitat categories. Habitats which lie within regionally designated sites where those habitats are a listed feature. Habitats which meet published selection criteria for the designation of a regionally designated site. Species which may be rare or listed at regional level, although widespread elsewhere nationally.
County	Habitats which lie within county designated sites (e.g. Local Nature Reserves) where those habitats are a listed feature. Habitats which meet published county designated site criteria. Species which are rare or scarce at county level, although these may be more widespread within the region.
Local	All habitats which do not meet the above criteria such, excluding habitats of negligible value to wildlife (e.g. hardstanding with no colonising vegetation). This may include widespread habitats such as g3c Other neutral grassland, g4 Modified grassland, etc. All species which are important at local level which do not meet the above criteria. This may include species with conservation designations where they are widespread.

Geographic scale application	Assessment criteria for habitats
Negligible	Habitats which are unvegetated and associated with negligible wildlife interest (i.e. unvegetated hardstanding)

4.3.18.3 Although all forms of priority Coastal Sand Dune are regarded as irreplaceable habitats, sand dunes are highly variable ecosystems and contain a large range of habitats which are often subject to vastly different environmental sensitivities. For example, acidophilous habitats developed over coastal in-blown sand such as acid grassland and dune heath may take between 300-400 years to form whereby the top c.15cm of sand is leached (Salisbury, 1925). Acidophilous habitats are therefore subject to substantially greater sensitivity to disturbance when compared to embryonic and mobile dune. Similarly, humid dune slacks subject to specific hydrological regimes would be likely to exhibit greater sensitivity to changes in hydrology when compared to dry dune ridge.

4.3.19.3 In recognition of the range of specific environmental sensitivities which apply to habitats within dune systems, specific reference has been made within **Section 1.6** with respect to environmental context.

1.4.4 Limitations and assumptions

4.4.20.3 The field survey was completed within the optimal period for botanical survey, often regarded as May-September, although some species with particularly early or late phenologies may have been missed. Nonetheless, the survey was led by a highly experienced, Field Identification Skills Certificate (FISC) Level 6 botanist (Botanical Society of Britain & Ireland) who is familiar with vegetative plant ID across the full range of UK terrestrial habitats. Following field survey, seasonality is not considered to constitute a significant impediments to an assessment of existing habitats within the survey boundary.

4.4.21.3 Many cryptic taxa, namely including apomictic species under the genera Hieracium, Rubus and Taraxacum, could not always be identified to species-level due to seasonal constraints. Plants across these genera are only able to be identified in the presence of all relevant vegetative parts, flowers and/or fruits. Furthermore, most species within these genera may only reliably be identified by country experts, of which there are 3 for Hieracium, 6 for Rubus and 1 for Taraxacum[1]. It is unrealistic to identify all cryptic taxa on any site which were recorded to aggregate level where appropriate. This limitation has therefore been addressed as far as is reasonably practicable and is not considered to be a significant constraint for the purposes of this survey and assessment.

4.4.22.3 The surveyor is not a specialist bryologist and some taxa, particularly those which require microscopic identification, are likely to have been omitted from survey data. However, a reasonable effort was made to identify non-vascular plants wherever possible. This report does not constitute a specialist bryological assessment or an assessment for other visually similar groups, including lichenised or other macro fungi.

4.4.23.3 Measurements have been calculated utilising software such as 'QGIS' (a Geographic Information System or GIS), aerial imagery and third-party plans provided by the client, all of which may have varying levels of inaccuracy. To mitigate inaccuracy, alongside QGIS with aerial imagery, 'Coreo in-field mapping software' was utilised during field survey to ensure key points and boundaries are mapped as accurately as possible; this is therefore not considered to be a significant constraint.

1.5 Results

1.5.1 Desk results

5.1.1.3 The St. Anne's Old Links Golf Course Biological Heritage Site (BHS) is designated for a range of habitat and floristic features, which namely include:

- a mosaic of relict inland dune grassland, dune heath and sand dune habitats situated amidst the greens and fairways of St. Anne's Old Links Golf Course; and
- a range of especially notable flora, particularly including chaffweed (*Lysimachia minima*), yellow bartsia (*Parentucelia virosa*) and trailing St. John's wort (*Hypericum humifusum*) which are included on the Provisional Lancashire Red Data List of Vascular Plants.

5.1.2.3 A Phase 1 Habitat survey undertaken by the Applicants in 2023 identified the presence of amenity grassland in the form of golfing fairway, alongside semi-improved neutral grassland and dune grassland as the main habitats present across the golf course with several small ornamental ponds.

5.1.3.3 A review of Magic maps shows the none of the site to be included within the priority habitat inventory for Coastal Sand Dunes priority habitat, although areas contained within the adjacent Lytham Sand Dunes SSSI are included (see **Figure 1.2** below).

1.5.2 Field results

National Vegetation Classification: Results

5.2.4.3 Descriptions for NVC communities found across the site are given below. Further detail on qualitative survey data with species lists may be obtained from an overview of floristic tables available within Appendix A. A summary of NVC communities and their respective conservation designations have been provided within **Table 1.4** below and presented in **Figure 1.3**.

Table 1.4: Summary of NVC types found at the site and their respective conservation designations

NVC community	Priority habitat	Annex 1 habitat	Irreplaceable habitat
SD9a	Coastal Sand Dunes	-	Coastal Sand Dunes

NVC community	Priority habitat	Annex 1 habitat	Irreplaceable habitat
SD12	Coastal Sand Dunes	H2130 Fixed dunes with herbaceous vegetation ('grey dunes')	Coastal Sand Dunes
H11	Coastal Sand Dunes Lowland Heathland	H2150 * Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)	Coastal Sand Dunes
MG1/W23 transition	Coastal Sand Dunes	-	Coastal Sand Dunes
MG7	-	-	-
Sycamore woodland	Coastal Sand Dunes	-	Coastal Sand Dunes
W23b	Coastal Sand Dunes	-	Coastal Sand Dunes
Ponds with SD15	Coastal Sand Dunes	H2190 Humid dune slacks * *only relating to stands of NVC SD15	Coastal Sand Dunes

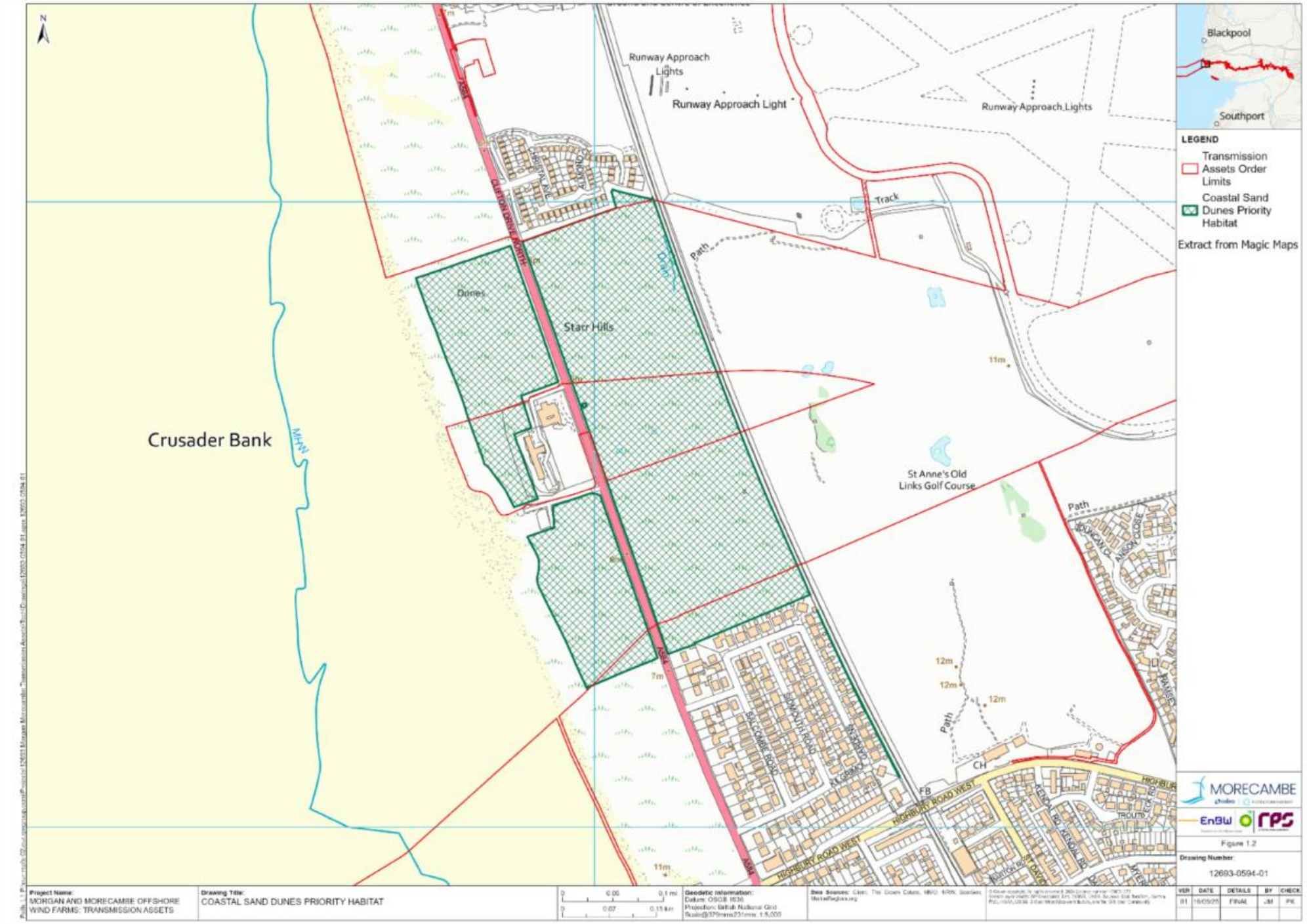

Figure 1.2: Coastal Sand Dunes priority habitat

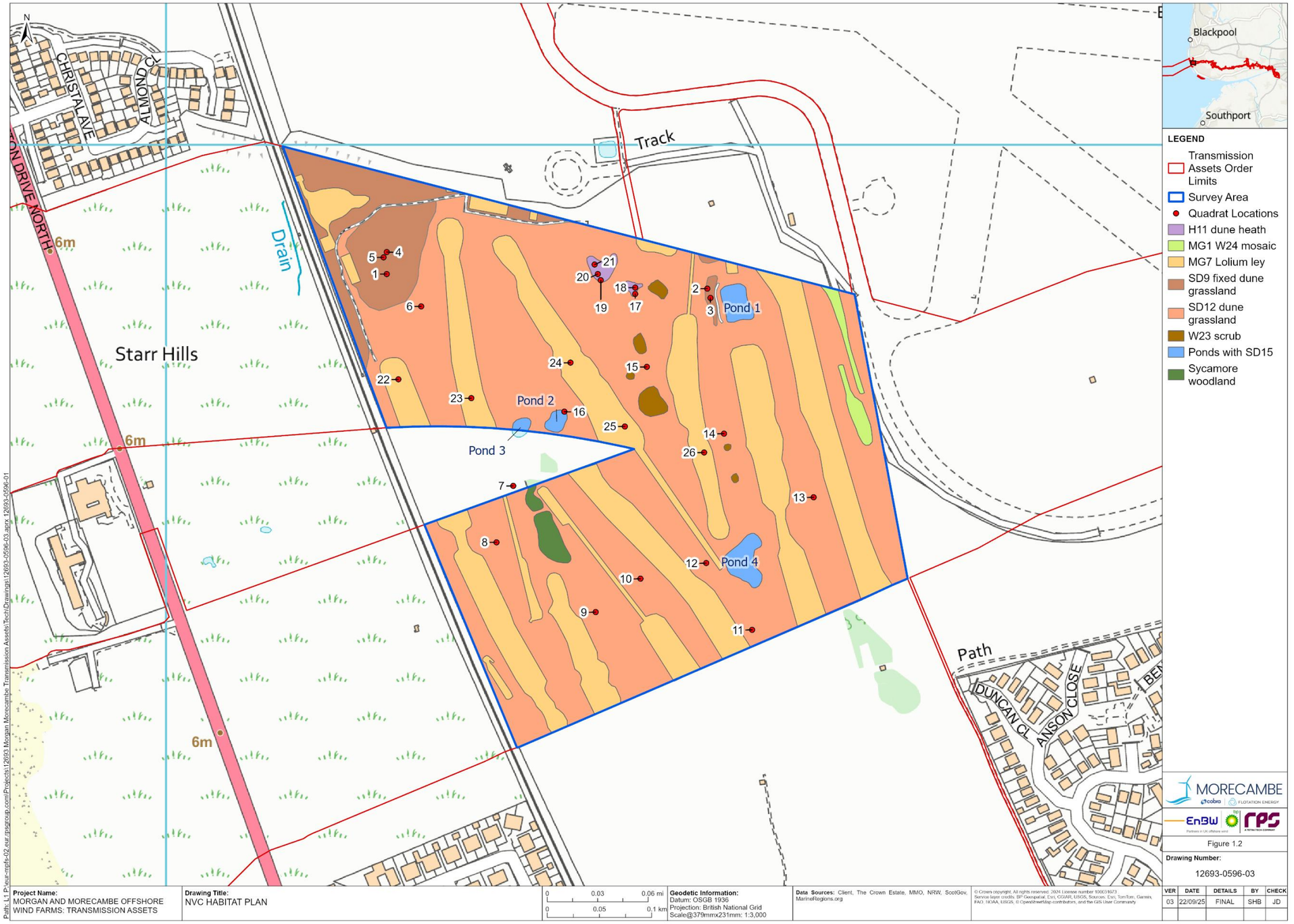

Figure 1.3: NVC habitat plan

SD9a *Ammophila arenaria – Arrhenatherum elatius* dune grassland, Typical sub-community

5.2.5.3 SD9 fixed dune is a generally scarce community type found most commonly in the far north-west of the survey area alongside one key area where disturbance had taken place to intermix decalcified and lower calcareous sand. Here, the community covers approximately 1.2ha (1 d.p) in extent and is characterised by the constancy of common bent (*Agrostis capillaris*), marram (*Ammophila arenaria*), false oat-grass (*Arrhenatherum elatius*), red fescue (*Festuca rubra* agg.) and creeping willow (*Salix repens*).

5.2.6.3 Areas of SD9, in similarity to those areas occupied by this community on the adjacent SSSI, best conform to an SD9a Typical sub-community in the absence of bloody crane's-bill (*Geranium sanguineum*). Average species richness of SD9a grassland here, however, was lower than that observed across the SSSI, averaging at 7.4 species, compared to an average of 8.6 within the SSSI. It is likely that this difference, however, may be derived from disturbance and eutrophication from ongoing golf course management. It may also be that slightly lower pH could have driven species richness to be lower – calcicolous forbs and dewberry (*Rubus caesius*) were less abundant within areas of SD9 within the BHS, while calicfugeous taxa including sheep's sorrel (*Rumex acetosella*) and common bent were widespread.

5.2.7.3 MAVIS analysis identified a reasonable confidence interval of 51.95 associated with characterisation of this stand as SD9a, which concurs with the assessment of the surveyor.

5.2.8.3 SD9 grasslands are widespread around the coasts of Britain over inblown coastal sands where dune grassland is neglected (Rodwell, 1991), while they are particularly well-represented in the north-east of Britain. Although SD9a grasslands conform to the priority and irreplaceable habitat category 'Coastal Sand Dunes', they do not correspond to any Annex I habitat category.

SD12 *Carex arenaria – Festuca ovina – Agrostis capillaris* dune grassland

5.2.9.3 Between most managed fairways included a less frequently mown, short grassland characterised by a range of acidophilous taxa such as common bent (*Agrostis capillaris*), sheep's fescue (*Festuca ovina* agg.) and sheep's sorrel (*Rumex acetosella*) occurred with sand sedge (*Carex arenaria*) as the only other constant. A range of other calcifuges also existed within this community as widespread species, albeit not as constants. These included heath plait-moss (*Hypnum jutlandicum*), juniper haircap (*Polytrichum juniperinum*), and matt-grass (*Nardus stricta*). This community was noted at the time of the survey to dominate a significant proportion of the site, equating to 12.5 ha (1 d.p).

5.2.10.3 The constancy of the above-named taxa are typical for stands of old, decalcified dune approximating to an NVC SD12 *Carex – Festuca – Agrostis* community. These grasslands often occur in association with

other, more acidophilous fixed dune grassland such as SD8b, later transitioning towards dune heath (H11 *Calluna vulgaris – Carex arenaria* heath). However, while the identification of key constants is good indication of classification to community-level, this community was noted to be consistently more species-poor than should generally be expected, while key components of both named sub-communities were either absent or recorded at low abundance. As such, this stand type was identified to community-level only.

5.2.11.3 The species-impoverished nature of this stand type is peculiar for SD12 with an average of 6.2 species recorded per sample. This compares with an average richness of 17 (range 5-28) typically expected for the community. It was noted at the time of the survey that SD12 grassland in almost all areas of occurrence appeared not only species-poor, but overwhelmingly dominated by graminoids. It is probable that a significant decline in species-richness across areas of SD12 dune grassland has been instigated by ongoing course management, particularly including from nutrient pollution via fertiliser application.

5.2.12.3 MAVIS analysis associated a reasonable confidence interval of 45.66 with characterisation of this stand as SD12 dune grassland, which concurs with the assessment of the surveyor.

5.2.13.3 All examples of SD12 where grey hair-grass (*Corynephorus canescens*) is absent conforms to both the priority and irreplaceable habitat category 'Coastal Sand Dunes', and the Annex I habitat H2130 Fixed dunes with herbaceous vegetation ('grey dunes'), of which there is an estimated 5,300ha remaining nationally (JNCC, 2019).

H11c *Calluna vulgaris – Carex arenaria* heath, Species-poor sub-community

5.2.14.3 A small area equating to approximately 0.06ha (2 d.p) of ancient dune heath is located within the survey boundary in the north where this area appears to have escaped the impact of widespread eutrophication. This area is characterised by the constancy of heather (*Calluna vulgaris*), sand sedge and field horsetail (*Equisetum arvense*), with heather occupying the majority of the area of cover. While other calcifuges were associated with this habitat, they were generally noted to occur at low abundance and sporadically throughout the sward, consistent with a H11c heath, species-poor sub-community.

5.2.15.3 H11 dune heaths are an exceptionally rare habitat in Britain and develop over the course of 300-400 years whereby most of the calcium across the top 15-25cm of surface sand is leached further down into the soil profile, acidifying surface sand and dropping pH over time from pH 8 to around pH 3.5-5. They are not only exceptionally rare habitats across the coasts of Britain, but are also exceptionally sensitive; any disturbance of surface sands carries significant risk of intermixing calcareous lower sand and decalcified upper horizons, near-permanently destroying the habitat. It was noted at the time that some disturbance with significant removal of surface sand had taken place within an area of dune heath, which may have covered a larger area prior to recent disturbance.

5.2.16.3 MAVIS analysis found a reasonably poor fit with H11c, providing a confidence interval of 32.74. This low confidence interval is likely related to a small degree of eutrophication coupled with an absence of grazing management which has allowed for heather dominance to the slight detriment of other associates.

5.2.17.3 All areas of H11c are covered by multiple conservation designations. This includes the priority and irreplaceable habitat type 'Coastal Sand Dunes', the priority habitat type 'Lowland Heathland' (JNCC, 2008) and the priority Annex I habitat category H2150 * Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), of which there is an estimated 1,600ha remaining nationally (JNCC, 2018).

MG1 *Arrhenatherum elatius* grassland / W24 *Rubus fruticosus* – *Holcus lanatus* scrub transition

5.2.18.3 A narrow portion of grassland and scrub admixture developed over piled sand and spoil exists in the far east of the site. Areas most affiliated with MG1 are exceptionally species-poor in character, being dominated entirely by false oat-grass (*Arrhenatherum elatius*) and cock's-foot with scattered creeping thistle (*Cirsium arvense*), sea raddish (*Raphanus raphanistrum maritimum*), common nettle (*Urtica dioica*), common bent and railway bramble (*Rubus tuberculatus*). Areas of dense bramble scrub are characterised by near-monocultures of bramble (*Rubus fruticosus* agg.), with few other associates.

5.2.19.3 Both MG1 and W24 stands are common and widespread across lowland Britain and develop across a range of different environmental contexts. As both constitute somewhat semi-natural habitats which are found principally overlying coastal in-blown sand, this transitory stand has been characterised to correspond to both the priority and irreplaceable habitat type 'Coastal Sand Dunes'. MG1/W24 stands do not conform to any Annex I habitat category.

MG7 *Lolium perenne* ley

5.2.20.3 Areas of heavily managed fairway are characterised by an exceptionally limited range of graminoids, largely in the absence of any forbs. This namely includes a sown cf. *Lolium*, alongside sporadic, occasional patches of common bent and red fescue (*Festuca rubra* agg.). Within these areas, the semi-natural dune vegetation has been entirely displaced by sown grasses, heavily chemically modified and polluted, particularly through the addition of persistent phosphates, and is managed by regular mowing. The poor species richness (averaging at 1.8 species per sample), coupled by dominance of cf. *Lolium*, is best affiliated with an example of MG7 *Lolium* ley. The absence of other species, however, does not show particularly good allegiance to any named sub-community. As such, this stand has been named to community-level only.

5.2.21.3 MAVIS analysis associated a reasonable confidence interval of 41.30 with characterisation of this stand as MG7, which concurs with the assessment of the surveyor.

5.2.22.3 As all semi-natural vegetation has been entirely displaced where MG7 occurs, while soils in these areas are heavily modified, no area which hosts NVC MG7 has been considered to correspond to any priority, Annex I or irreplaceable habitat category.

Sycamore woodland

5.2.23.3 Across one portion of the site in the south-west includes a block of sycamore (*Acer pseudoplatanus*) which dominates the canopy alongside scattered grey willow (*Salix cinerea*). Below this canopy of sycamore exists a field layer of false oat-grass with common bent and occasional dewberry and bramble, perhaps best ordinated to an MG1/W24 sward. Its existence within a wooded block, however, is not typical of MG1 or W24 stands, and so it has been characterised separately for the purposes of this report.

5.2.24.3 While areas of sycamore woodland do not show any clear affiliation to any Annex I habitat type, the presence of semi-natural vegetation beneath canopy trees overlying in-blown sand has allowed for characterisation of this stand as priority and irreplaceable 'Coastal Sand Dune'.

W23b *Ulex europaeus – Rubus fruticosus* scrub, *Rumex acetosella* sub-community

5.2.25.3 Where decalcified SD12 dune grassland has been left without mowing, scattered parcels of W23 scrub dominated by gorse (*Ulex europaeus*) exist, often in the absence of bramble. These scattered parcels exist primarily within central portions of the site and include associates at the edge which are consistent with SD12 dune grassland, especially inclusive of sheep's sorrel. The presence and apparent constancy of sheep's sorrel places these parcels most closely with the W23b *Rumex acetosella* sub-community.

5.2.26.3 Whilst W23 scrub is widespread across the lowlands and semi-uplands of Britain, its occurrence over decalcified sand results in its ordination with both the priority and irreplaceable habitat category 'Coastal Sand Dunes'. No Annex I habitat category is applicable.

Ponds (with SD15)

5.2.27.3 A total of four apparently artificial pools exist across the survey site which have been labelled ponds 1-4 (see **Appendix B** and on **Figure 1.3**). These pools are all similar in character and feature:

- Planted aquatic and/or marginal vegetation which features bulrush (Typha sp.), marsh marigold (Caltha sp.) and occasionally water lily (Nymphaea alba);
- Steep margins which include a typically very narrow zone of swamp and/or other wetland vegetation which could be ordinated with the NVC SD15 *Salix repens – Calliergon cuspidatum* dune slack community, in addition to scattered grey willow (S. cinerea).

5.2.28.3 As all pools heavily feature swamp vegetation, and very small quantities of other wetland vegetation, of which may be characterised as NVC SD15, these pools have simply been mapped as ponds, with no distinction made between swamp and other wetland vegetation.

5.2.29.3 A view of all ponds found only one topogenous wetland community type which did not include a swamp community in the form of SD15 *Salix – Calliergon* dune slack, characterised by an abundance of creeping willow (*S. repens*) with an established bryophyte layer made up of the moss *Calliergonella cuspidata*, alongside other floristic associates such as water mint (*Mentha aquatica*) and lesser spearwort (*Ranunculus flammula*). An estimation in square metres confirms that SD15 exists at each pond in the following abundance:

- Pond 1: <1sqm at one location with creeping willow on pool margins;
- Pond 2: c.12sqm predominantly across the western fringe of the pool;
- Pond 3: c.3sqm intermixed with *Eleocharis palustris* swamp; and
- Pond 4: c.8sqm intermixed with swamp vegetation.

5.2.30.3 While no MAVIS analysis has been completed due to the overall scarcity of SD15 dune slack vegetation at the site, a singular representative sample was obtained from Pond 2 where SD15 occurs in the highest abundance.

5.2.31.3 SD15 dune slacks are widespread across the British coast over low parts of dune systems overlying inblown sand, albeit rare. Estimates for England suggest that only an estimated 285ha of humid dune slack remains (JNCC, 2018), while SD15 vegetation on site covers an area of approximately 24sqm. All areas of SD15 and allied swamp vegetation correspond to the priority and irreplaceable habitat type 'Coastal Sand Dunes', while only NVC SD15 corresponds to the Annex I category H2190 Humid dune slacks.

Important Plant Survey: Results

5.2.32.3 Important Plant Survey revealed the presence of ten important taxa. These are summarised within Table 1.5below alongside notes on habitat association and abundance. Conservation designations which apply to important taxa may be summarised as:

- SCI – Species of Conservation Importance for north-west England
- NT – Near-Threatened in England
- VU – Vulnerable in England
- NS – Nationally Scarce
- NR – Nationally Rare
- Endemic – Endemic to the British Isles
- Scarce – Otherwise scarce at local, county or regional level

Table 1.5: Important plants identified during botanical survey of the site

Species	Habitat association	Range restricted (Y/N)	Conservation designations
Corn spurrey (*Spergula arvensis*)	SD9, SD12, MG1/W24	Y - very localised only to patches where there has been minor ground disturbance	VU, SCI
Creeping willow *(Salix repens)*	SD9, SD12, H11, Ponds	N - widespread across named habitats	NT, SCI
Harebell *(Campanula rotundifolia)*	SD9, SD12, H11	N - widespread across acidophilous grassland habitats	NT
Heather (*Calluna vulgaris*)	H11, Ponds	Y - restricted to small areas of dune heath and one area with SD15 at pond 2	NT
Lesser spearwort (*Ranunculus flammula*)	Ponds	N - widespread across poolsides, albeit somewhat localised	VU, SCI
Mare's-tail *(Hippuris vulgaris)*	Ponds	Y - restricted to pond 1	SCI
Matt-grass (*Nardus stricta*)	SD12, H11	N - widespread across acidophilous grassland habitats	NT
Sea radish (*Raphanus raphanistrum maritimum*)	SD9, MG1/W24	N - widespread across disturbed areas of MG1/W24 mosaic and local within SD9	SCI
Tormentil (*Potentilla erecta*)	SD12, H11	N - widespread across acidophilous grassland habitats	NT
Unbranched bur-reed (*Sparganium emersum*)	Ponds	Y - restricted to pond 3 only	Scarce, SCI

5.2.33.3 Of the important taxa identified, most are scarce at a local level only, although unbranched bur-reed (*S. emersum*) has not been recorded for the Fylde coast for an extended period except for one recent record during these surveys on the Lytham Sand Dunes SSSI. This is a species which has not been recorded prior to these surveys since 1998[7].

5.2.34.3 Whilst none of the especially important flora for which the BHS was partially designated for (yellow bartsia, chaffweed and/or trailing St. John's-wort) were located, it is the opinion of the surveyor that habitats contained within the survey area do not constitute optimal habitat for these taxa, with much of the total area exhibiting clear signs of nutrient pollution.

[7] Dates adapted from BSBI distributional data.

1.6 Interpretation and assessment

1.6.1 Overview

6.1.1.3 The site is dominated by dry, acidophilous dune grassland and scrub most often comprising degraded and somewhat enriched forms of SD12 *Carex – Festuca – Agrostis* dune grassland with W23 *Ulex europaeus – Rubus fruticosus* scruub, with one small area with ancient dune heath (NVC H11 *Calluna vulgaris – Carex arenaria* heath). Smaller areas of dry SD9 *Ammophila-Arrhenatherum* dune grassland, plus MG1 *Arrhenatherum* grassland and W24 *Rubus-Holcus* scrub also exist alongside these more calicfugeous habitats. In addition to these semi-natural vegetation types, golfing green also exists alongside these habitats which is best affiliated with the NVC community MG7 *Lolium* ley.

6.1.2.3 Whilst topogeneous wetland vegetation was observed, these were typically extremely limited in extent and confined to artificial ponds across the course. SD15 and SD16 dune slack vegetation with *Salix repens* exists across exceptionally restrictive outskirts of pool margins covering several square metres only, while swamp vegetation comprising planted *Typha* and *Caltha* typically dominate the expanse of pools. The overall scarcity in wetland vegetation appears peculiar for such a topographically varied stretch of dune and may be related to ongoing water abstraction across the golf course.

6.1.3.3 NVC survey of the site confirms much of the site is dominated by coastal sand dune priority and irreplaceable habitat, while a total of three distinct Annex I habitat types of international conservation importance have also been identified, including:

- H2130 Fixed dunes with herbaceous vegetation (‘grey dunes’);
- H2150 * Atlantic decalcified fixed dunes (Calluno-Ulicetea); and
- H2190 Humid dune slacks.

6.1.4.3 The extent of these habitats have been mapped within Appendix II excluding individual areas of SD15 which fall under the Annex I category H2190 Humid dune slacks due to small extent. Those stands which are likely to constitute GWDTEs (discussed further below) have been mapped individually within **Figure 1.3**.

6.1.5.3 Of the stands identified, many are recipient to distinct environmental sensitivities. This includes hydrologically sensitive wetlands, however, especially extends to more decalcified vegetation which exists throughout the site, particularly including SD12 dune grassland and areas of ancient H11 dune heath. Where significant disturbance of decalcified superficial deposits which have taken centuries to leach is undergone, calcium-rich sand is intermixed with surface deposits which is capable of near-permanently destroying decalcified habitats.

6.1.6.3 A total of ten important taxa were identified during survey of the site, most of which are notable at local level, while others such as branched bur-reed have not been recorded for the Fylde coast in extensive periods of time. Of the habitat affiliations identified, five important flora were

particularly affiliated with pools, with a greater degree of overlap between those found in dune grassland and other allied habitats verses those found within slack vegetation compared with important taxa located across the Lytham Sand Dunes SSSI. In total five of ten important taxa were affiliated with ponds, while seven were affiliated with other, drier dune vegetation.

6.1.7.3 At the time of the survey, it was noted that the course possesses a great deal of topographic variation largely as a result of the natural landform. However, naturally occurring hollows were characterised by dry grassland vegetation. While wetland vegetation on site was generally very scarce, it may be plausible that this scarcity has been instigated by ongoing water abstraction at the course.

1.6.2 Assessment of importance

6.2.8.3 An assessment of conservation importance of important floristic features has been broken down within Table 6.1 below.

Table 1.6:Assessment of importance for floristic features

Feature	Importance along a geographic scale	Comments
Habitats		
Fixed dune grassland (SD12)	International	Areas of SD12 dune grassland all correspond to the Annex I habitat H2130 Fixed dunes with herbaceous vegetation (‘grey dunes’). Of an estimated 5300ha remaining nationally, these habitats cover a substantial proportion of the site area which has been approximated at 12.5ha (1 d.p).
Fixed dune grassland (SD9)	National	Areas of SD9a do not correspond to any Annex I habitat category, although nonetheless correspond to the priority and irreplaceable habitat ‘Coastal Sand Dunes’.
Ponds (with SD15)	International	Areas of dune slack vegetation approximating to NVC SD15 cover a minimal area of the pond edges, equating to approximately 24sqm in total across the four ponds. Nonetheless, all areas of SD15 constitute irreplaceable and priority habitat, and correspond to the Annex I habitat category H2190 Humid dune slacks.
Ponds (swamp communities)	National	Areas of swamp vegetation do not correspond to any Annex I habitat category, although nonetheless correspond to the priority and irreplaceable habitat ‘Coastal Sand Dunes’, and so have been characterised to be of national importance for the purposes of this assessment.

Feature	Importance along a geographic scale	Comments
Dune heath (H11)	International	Areas of dune heath which occur over small areas in the north of the site are both ancient, taking onwards of 300-400 years to form and globally rare. All examples correspond to the priority Annex I habitat H2150 *Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), of which there is an estimated 1,600ha remaining. Furthermore, all areas of dune heath correspond to the priority and irreplaceable habitat category 'Coastal Sand Dunes'.
Dune scrub (W23, MG1/W24 transition)	National	Areas of W23 / MG1/W24 transitional vegetation do not align with any Annex I habitat category, although nonetheless correspond to the priority and irreplaceable habitat 'Coastal Sand Dunes', and so have been characterised to be of national importance for the purposes of this assessment.
Plants		
Corn spurrey *(Spergula arvensis)* Creeping willow *(Salix repens)* Harebell *(Campanula rotundifolia)* Heather *(Calluna vulgaris)* Lesser spearwort *(Ranunculus flammula)* Mare's-tail *(Hippuris vulgaris)* Matt-grass *(Nardus stricta)* Sea raddish *(Raphanus raphanistrum maritimum)* Tormentil *(Potentilla erecta)* Unbranched bur-reed *(Sparganium emersum)*	Local	Despite corresponding conservation designations, these plants may be found more widely on-site, along the coastline or elsewhere in the county across other habitat types. Therefore, their assessment of importance along a geographic scale remains at local level.

1.6.3 Ground water dependent terrestrial ecosystems

6.3.9.3 Of the community types identified, a range of topogenous wetlands were located. This includes swamp and dune slack communities which are entirely restricted to ponds 1-4.

6.3.10.3 No other wetland community types, or community types which are identified by the UK Technical Advisory Group to correspond to GWDTE categories were located on site.

6.3.11.3 In the absence of hydrological data or inputs from a specialist hydrogeologist, these communities have therefore been assigned as 'likely GWDTEs' for the purposes of this assessment and mapped accordingly within **Figure 1.3**.

6.3.12.3 Evidence from published UKTAG correspondence tables shows that, of the wetlands identified, most have a low dependence of groundwater, excluding small areas of SD15 dune slack vegetation which possess a high dependence on groundwater regimes (UKTAG, 2012). A summary of groundwater dependence is provided within **Table 6.2** below.

Table 1.7:List of likely GWDTEs and their respective UKTAG groundwater dependency score

NVC Community	UKTAG Groundwater dependency score	Comments
Swamp vegetation with *Typha* (S12)	3	Low groundwater dependency
Ponds (with SD15)	1	High groundwater dependency

1.7 Summary

7.1.1.3 This technical report presents the results of the National Vegetation Classification survey to expand on Volume 3, Annex 3.3: Phase 1 habitat, national vegetation classification and hedgerow survey technical report (document reference J3.3.3/F02). The document presents and characterises the results of the September 2025 NVC survey undertaken which identified a large number of important floristic features exist on site, ranging from local to national conservation importance.

7.1.2.3 The 2025 surveys confirmed the findings of the Phase 1 habitat survey undertaken by the Applicants that the BHS is dominated by grassland habitat. The predominant habitat type recorded was dry, acidophilous dune grassland and scrub most often comprising degraded and somewhat enriched forms of SD12 *Carex – Festuca – Agrostis* dune grassland with W23 *Ulex europaeus – Rubus fruticosus* scrub, with one small fragment of remaining dune heath (NVC H11 *Calluna vulgaris – Carex arenaria* heath). Smaller areas of dry SD9 *Ammophila-Arrhenatherum* dune grassland, MG1 *Arrhenatherum* grassland and W24 *Rubus-Holcus* scrub also existed alongside these more calicfugeous habitats. In addition to these semi-natural vegetation types, the remainder of the course comprised a series of heavily managed fairways, tees and greens that were found to be best affiliated with the NVC community MG7 *Lolium* ley.

7.1.3.3 Whilst topogeneous wetland vegetation was observed, this was typically extremely limited in extent and confined to a small number of artificial ponds within the course. SD15 and SD16 dune slack vegetation with *Salix repens* was recorded across the outskirts of pool margins covering several square metres only, while swamp vegetation comprising planted *Typha* and *Caltha* typically dominated the expanse of pools. A review of

aerial imagery indicates that Ponds 1 and 4 within the course were substantially modified approximately 20 years ago.

7.1.4.3 The baseline NVC survey and mapping of the St Anne's Old Links Golf Course BHS therefore confirmed previous assumptions within the assessment that the habitats within the golf course have been heavily influenced by substantial anthropogenic modifications (including groundwater abstraction) over the past 125 years since the golf course was established on the dunes in 1901. There are some very small areas of marginal pond vegetation (equating to c. 25 square metres in total across the four ponds within the golf course) with affinity to the dune slack community SD15, although the extent to which these small habitat fragments are groundwater dependent given the level of modifications to the surrounding land is unclear, and they are therefore considered to be a 'likely GWDTE'.

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A.1 Floristic tables

SD9 (Ammophila arenaria - Arrhenatherum elatius dune grassland)

Scientific Name	Common Name	Quadrat					Range	Constancy
		1	2	3	4	5		
Agrostis capillaris	Common bent	4	5	5	3	3	3-5	V
Ammophila arenaria	Marram	5	4	5	4	4	4-5	V
Arrhenatherum elatius	False oat-grass	7	6	5	7	7	5-7	V
Festuca rubra agg.	Red fescue agg.	2		3	3	3	2-3	IV
Salix repens	Creeping willow	4	3	3		2	2-4	IV
Carex arenaria	Sand sedge	3	3	1			1-3	III
Plantago lanceolata	Ribwort plantain	1	3		1		1-3	III
Achillea millefolium	Yarrow	2				1	1-2	II
Rubus caesius	Dewberry				1	3	1-3	II
Cerastium fontanum	Common mouse-ear				1		1	I
Dactylis glomerata	Cock's-foot					3	3	I
Hypochaeris radicata	Common cat's-ear					2	2	I
Rumex acetosella	Sheep's sorrel			2			2	I

SD12 (Carex arenaria - Festuca ovina - Agrostis capillaris dune grassland)

Scientific Name	Common Name	Quadrat										Range	Constancy
		6	7	8	9	10	11	12	13	14	15		
Agrostis capillaris	Common bent	8	8	10	9	10	8	8	9	8	9	8-10	V
Carex arenaria	Sand sedge	5	1				2	3	1	4	1	1-5	IV
Festuca ovina agg.	Sheep's fescue agg.	5	3			4	3	3	2	1	4	1-5	IV
Rumex acetosella	Sheep's sorrel	5	4	3	4	3	4		2		3	2-4	IV
Hypochaeris radicata	Common cat's-ear	3	1	1	1			1			1	1-3	III
Anthoxanthum odoratum	Sweet vernal-grass	4	3						2		1	1-4	II
Campanula rotundifolia	Harebell	1			1				2	1		1-2	II
Luzula campestris	Field wood-rush					1			1	2		1-2	II
Achillea millefolium	Yarrow						4					4	I
Ammophila arenaria	Marram							1			1	1	I
Hypnum jutlandicum	Heath plait moss		1				2					1-2	I
Leymus arenarius	Lyme-grass						3					3	I
Nardus stricta	Matt-grass				2				2			2	I
Plantago lanceolata	Ribwort plantain	2								1		1-2	I

Scientific Name	Common Name	Quadrat										Range	Constancy
		6	7	8	9	10	11	12	13	14	15		
Polytrichum juniperinum	Juniper haircap		2									2	I
Rubus caesius	Dewberry										1	1	I

SD15 (Salix repens - Calliergon cuspidatum dune-slack community)

Scientific Name	Common Name	Quadrat
		16
Salix repens	Creeping willow	8
Calliergonella cuspidata	Pointed spear-moss	5
Eleocharis palustris	Common spike-rush	4
Ranunculus flammula	Lesser spearwort	4
Festuca rubra agg.	Red fescue agg,	3
Hypochaeris radicata	Common cat's-ear	3
Mentha aquatica	Water mint	3
Rubus caesius	Dewberry	3
Salix cinerea	Grey willow	3
Carex hirta	Hairy sedge	1
Trifolium pratense	Red clover	1

H11 (Calluna vulgaris - Carex arenaris heath)

Scientific Name	Common Name	Quadrat					Range	Constancy
		17	18	19	20	21		
Calluna vulgaris	Heather	9	10	10	10	10	9-10	V
Carex arenaria	Sand sedge	4	3	3	4	4	3-4	V

Scientific Name	Common Name	Quadrat					Range	Constancy
		17	18	19	20	21		
Equisetum arvense	Field horsetail		1	2	3	2	1-3	IV
Agrostis capillaris	Common bent	4	3	3			3-4	III
Hypnum jutlandicum	Heath plait moss	4	1		1		1-4	III
Nardus stricta	Matt-grass	3	1	1			1-3	III
Rubus caesius	Dewberry			3	1		1-3	II
Achillea millefolium	Yarrow	1					1	I
Anthoxanthum odoratum	Sweet vernal-grass	3					3	I
Arrhenatherum elatius	False oat-grass		2				2	I
Dactylis glomerata	Cock's-foot			1			1	I
Festuca ovina agg.	Sheep's fescue agg.	3					3	I
Hieracium umbellatum	Umbellate hawkweed		2				2	I
Hypochaeris radicata	Common cat's-ear	1					1	I
Juncus acutiflorus	Sharp-flowered rush				1		1	I
Potentilla erecta	Tormentil				3		3	I
Rumex acetosella	Sheep's sorrel	3					3	I

MG7 (Lolium perenne leys and related grasslands Lolio-Plantaginion Sissingh 1969 p.p.)

Scientific Name	Common Name	Quadrat					Range	Constancy
		22	23	24	25	26		
cf. *Lolium* sp.	Rye-grass sp.	10	10	10	10	10	10	V
Agrostis capillaris	Common bent		3		4		3-4	II
Festuca rubra agg.	Red fescue agg.	1		1			1	II

B.1 Site Photographs

Plate 1: General character of transitional MG1/W24 vegetation

Plate 2: Creeping willow as a component of dry, SD12 dune grassland vegetation

Plate 3: SD12 short dune grassland vegetation dominating the course between areas of fairway

Plate 4: A general view of species-poor SD12 vegetation with matt-grass grading into H11 dune heath

Plate 5: H11 dune heath vegetation with heather

Plate 6: Disturbed bank with SD9 fixed dune grassland vegetation

Plate 7: Aerial view of SD12 vegetation showing overall graminoid dominance with sheep's sorrel and limited other forbs

Plate 8: Corn spurrey found at the edge of an area of SD12 dune grassland

Plate 9: Golfing fairway (NVC MG7)

Plate 10: Sycamore woodland block

Plate 11: Pond 1

Plate 12: Mare's-tail (Hippuris vulgaris) at the pond edge, pond 1

Plate 13: Pond 2 with creeping willow visible in foreground (western fringe of pond)

Plate 14: SD15 vegetation on edge of pond two with heather

Plate 15: Pond 3

Plate 16: Emergent unbranched bur-reed within pond 3

Plate 17: Pond 4

Plate 18: Localised pocket of SD15 dune slack vegetation on steep-sided edge of pond