MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 3, Annex 6.1: Published agricultural land classification and soils data

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Glossary

Term	Meaning
Accumulated Temperature	Unit of measurement used to describe the cumulative effect of temperature over time.
Agricultural Land Classification	Agricultural Land Classification is a system used in England and Wales to grade the quality of land for agricultural use. The land is classified into five grades, with 1 being the best and 5 being the worst. The classification is based on the extent of limitations on agricultural use for food production, including climate, gradient, soil depth, wetness, droughtiness, and stoniness.
Baseline	The status of the environment without the Transmission Assets in place.
Best and Most Versatile	Agricultural land that is the best and most versatile for growing crops.
Field Capacity Duration	The amount of rain needed to bring the soil moisture content back to field capacity.
Maximum Climatic Grade	The highest quality of agricultural land according to an overall climatic limitation.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Moisture Deficit	The difference between the amount of water in the soil and the amount of water that the soil can hold.
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 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 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.
Parent material	Parent material refers to the underlying geological material, such as bedrock or superficial deposits, from which soil horizons develop. This material significantly influences the soil's properties and characteristics.
Soil Associations	Soil Associations are groups of soils that share similar characteristics and are often found together in the landscape. These associations are typically named after the dominant soil series or groups within them.

Term	Meaning
Soil Wetness Class	Soil Wetness Class is one of the criteria used in the assessment of Agricultural Land Classification (ALC). There are six distinct soil wetness classes ranging from I (least wet) to VI (most wet).
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.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above).
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
ALC	Agricultural Land Classification
AOD	Above Ordnance Datum
Aq’	Altcar complex
Co	Cottam series
Cu	Clifton series
D.S.	Dune sand
Defra	Department for Environment, Food & Rural Affairs
Dj3’	Douglas complex
Do’	Downholland complex
EIA	Environmental Impact Assessment
ES	Environmental Statement
Fm	Formby series
HS1, HS3	Hesketh complex
MAFF	Ministry of Agriculture, Fisheries and Food
MAGIC	Multi-Agency Geographic Information for the Countryside

Acronym	Meaning
MHWS	Mean High Water Springs
Na	Newport series
Oa	Oakland series
Sh	Salop series
So	Salwick series

Units

Unit	Description
cm	Centimetre
km	Kilometres
m	Metre
mm	Millimetre

1 Published agricultural land classification and soils data

1.1 Introduction

1.1.1.1 This document forms Volume 3, Annex 6.1: Published agricultural land classification and soils data of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as 'the Transmission Assets'). The ES presents the findings of the Environmental Impact Assessment (EIA) process for the Transmission Assets.

1.1.1.2 This report provides details of the published Agricultural Land Classification (ALC) and soils data within the Transmission Assets Order Limits: Onshore. This information has been used to inform relevant sections of Volume 3, Chapter 6: Land use and recreation of the ES.

1.2 Methodology

1.2.1 Study area

1.2.1.1 The land use and recreation study area (referred to hereafter as the 'study area') comprises all land within the Transmission Assets Order Limits: Onshore, landward of Mean High Water Springs (MHWS). The following aspects of the environment have been considered within the study area.

- Soil types and patterns of soils, including relevant topographic and climatic data.
- The quality of agricultural land within the study area, in accordance with the Ministry of Agriculture, Fisheries and Food (MAFF) Agricultural Land Classification of England and Wales Revised guidelines and criteria for grading the quality of agricultural land (MAFF, 1988), including 'best and most versatile' Grade 1, 2 and 3a ALC land.

1.2.1.2 Due to the permanent nature of impacts likely to occur, published ALC and soils data within the areas for the onshore substations and associated permanent access tracks are discussed separately in **section 1.4** of this report.

1.2.1.3 The location and geographic extent of the study area, including onshore substations and associated permanent access tracks is presented in **Figure 1.1** to **Figure 1.12** of this report below.

1.2.2 Desktop study

1.2.2.1 Information on ALC and soils within the study area was collected through a detailed desktop review of existing studies and datasets. These sources are summarised at **Table 1.1** below.

Table 1.1: Summary of key desktop sources

Title	Source	Year published	Author
Agricultural Land Classification (ALC) Grades - Post 1988 Survey online mapping data	Natural England	2023	Natural England
Agricultural Land Classification, Provisional Sheet 94 (Preston) 1:63,360 (1970) and accompanying Report	MAFF	1974	MAFF
British Geological Survey Geology Viewer, sheets 74 (Southport, 1989) and 75 (Preston, 2012)	British Geological Survey	2020	British Geological Survey
Meteorological Office Climatological Data for ALC. Grid point datasets of climatic variables, at 5 km intervals for England and Wales	The Meteorological Office	1989	The Meteorological Office Soil Survey and Land Research Centre
Provisional ALC online mapping data	Natural England	2023	Natural England
Soil Survey of England and Wales, National Soil Map of England and Wales, Sheet 1 (Northern England), 1:250,000 and accompanying Regional Bulletin	MAFF	1984	MAFF
Soil Survey of England and Wales, Soils of Lancashire, 1:250,000 and accompanying Bulletin No. 5	MAFF	1970	MAFF
Soil Survey of Great Britain, Soils of the Preston District of Lancashire, Sheet 75, 1:63,360 and accompanying Memoir	MAFF	1966	MAFF
Soil Survey of Great Britain, Soils of the South-West Lancashire Coastal Plain, Sheets 74 and 83, 1:63,360 and accompanying Memoir	MAFF	1967	MAFF

1.3 Published ALC information

1.3.1 Topography

1.3.1.1 The study area routes east of Blackpool Airport runs across relatively flat low-lying land, measuring approximately 10 metres (m) Above Ordnance Datum (AOD). The study area remains low-lying with a distinct micro-topography until the vicinity of Eastham Hall, beyond which higher land of up to approximately 20 m AOD is encountered. All the slopes encountered within the study area are gradual and pose no agricultural limitations.

1.3.2 Climate

1.3.2.1 Representative climatic data has been obtained from the Met Office's standard 5 kilometres (km) (Met Office, 1989) grid point data set for several representative points along the study area, as shown in **Table 1.2** below.

1.3.2.2 Location 1 is situated towards the western extent of the Onshore Order Limits, south of Great Marton Moss. Location 2 is situated centrally within the Onshore Order Limits, south of Moss Side. Location 3 is situated towards the western extent of the Onshore Order Limits, south east of Kirkham.

Table 1.2: Climatic data within the study area

Climate data	Location 1	Location 2	Location 3
Reference point	**SD 342 309**	**SD 378 293**	**SD 414 299**
Altitude (m)	10	4	15
Accumulated Temperature (day degrees)	1437	1437	1423
Average Annual Rainfall (millimetres (mm))	889	879	914
Maximum Climatic Grade	1	1	1
Field Capacity Duration (days)	200	199	205
Moisture Deficit for wheat (mm)	84	85	81
Moisture Deficit for potatoes (mm)	71	71	67

1.3.2.3 The climate data is typical of the mild, maritime climate of lowland areas of South West Lancashire with moderate rainfall and correspondingly relatively low summer moisture deficits, but a long Field Capacity Duration over the winter. The overall climate imposes no agricultural limitations.

1.3.3 Geology

1.3.3.1 The geology within the western extent of the study area comprises a coastal belt of Dune Sand and Blown Sand with finer textured former beach deposits arising further inland (now referred to as the Downholland Silt).

1.3.3.2 Further inland, older deposits of glacial till emerge from the covering of these later deposits, usually forming land at a slightly higher elevation

(AOD). Within each of these deposits, there is considerable variation, often linked to small differences in altitude.

1.3.3.3 Large areas of the Downholland Silt were formerly covered with thick peat, but much of this has disappeared due to drainage and agricultural use and only remnants remain in the lowest parts of the landscape. Their former extent is still apparent in the peaty or humose topsoil of the present-day soils. The extent of the peat shown on the geological maps, especially on the Southport Sheet (74) (MAFF, 1967) toward the west of the study area (last surveyed in 1936) and the MAFF soil maps surveyed in the 1960s (see **Table 1.1**), are likely to be less than when they were last surveyed as a result of continued peat wastage.

1.3.4 Soils

Published soils information

1.3.4.1 The area within the study area was the subject of soil surveys carried out by the Soil Survey of Great Britain with the results published as two maps (Sheets 74 and 75) at a scale of 1:63,360 and accompanying Memoirs in 1967 and 1966 respectively. Information from these two sheets was incorporated into the 1:250,000 scale map of the whole of Lancashire published with accompanying Bulletin in 1970. This map was an early version of the National Soil Map, which was published in 1984 at a scale of 1:250,000. Sheet 1 of this map, along with its accompanying Memoir, covers Northern England. Both these 1:250,000 scale maps use the broader concept of Soil Associations which are geographic groupings of soils on similar parent materials but whose other characteristics may vary considerably.

1.3.4.2 **Figure 1.1** to **Figure 1.3** below illustrates the distribution of the soil series within the study area. These soil series are described in the following sections of this report.

1.3.4.3 Where a mapping unit (i.e. the geographical extent of the soil type depicted in by the soil mapping data) is dominated by one soil series but with minor inclusions of related series, the map unit is referred to simply by the dominant series name (e.g. Formby, map symbol Fm). However, sometimes there is such an intricate pattern of related soils, separate areas of which cannot be delineated at the scale of the published map, that the surveyor has had to use the term soil ‘complex’ alongside the name of the dominant series. This indicated in **Figure 1.1** to **Figure 1.3** by adding an apostrophe to the map symbol (e.g. Do’ for Downholland Complex).

1.3.4.4 The soil mapping units within the study area are presented in **Table 1.3** below.

Table 1.3: Soil types within the study area

Map symbol	Soil series name	Parent material	Profile drainage	Wetness class after artificial drainage
D.S.	-	Dune sand	Well drained	-
Fm	Formby	Blown sand	Poorly drained	I or II
Aq'	Altcar Complex	Basin peat over blown sand or Downholland Silt	Poorly drained	I/II
Do'	Downholland Complex	Downholland Silt	Poorly drained	II & III
Cu	Clifton	Medium to fine textured glacial till	Poorly drained	IV
Oa	Oaklands	Fine textured till	Poorly Drained	IV
So	Salwick	Medium to fine textured glacial till	Imperfectly drained	III
Sh	Salop	Fine textured glacial till	Poorly drained	IV
Co	Cottam	Fine textured glacial till	Imperfectly drained	IV
Dj_3'	Douglas Complex	Recent river alluvium	Poorly drained	IV
Hs'³	Hesketh Complex	Recent estuarine alluvium (decalcified)	Poorly Drained	III
Hs'¹	Hesketh Complex	Recent estuarine alluvium (calcareous)	Poorly Drained	III
Na	Newport	Glacial sand with proportion of gravel and pebbles	Freely Drained	I

Location of soil series

1.3.4.5 The following sections of this report provide a description of the locations of the different soil series within the study area (from west to east) followed by a description of each of the characteristics of each series. **Figure 1.1** to **Figure 1.3** below illustrate the distribution of the soil series within the study area.

Dune sand (D.S.)

1.3.4.6 An area of current and former beach sand dunes, which now form part of the beach and non-agricultural land between the beach and Blackpool Airport.

Formby series (Fm)

1.3.4.7 This series is formed of blown sand and consequently has a very sandy texture throughout. A typical profile has a very dark greyish brown, stoneless, medium sand topsoil over a greyish brown to brown, mottled, stoneless, medium sand. The mottling is a sign of poor natural drainage caused by a high natural water table although drainage improvements mean they are now better drained than before so that at worst they are Moderately Well Drained (Wetness Class II) and may even be Well Drained (Wetness Class I).

1.3.4.8 This soil type underlies most of Blackpool Airport and extends a short way onto the land between the boundary of Blackpool Airport and Queensway.

Altcar complex (Aq')

1.3.4.9 This complex consists of a variety of soils whose main characteristic is their peaty textures, due to their original formation in swampy conditions. After drainage and cultivation, the topsoil becomes a black, stoneless, loamy peat, overlying reddish or yellowish brown, fibrous peat, with blue-grey silty clay (Downholland Silt) at depth. The areas of these soils are regarded as a soil complex due to the variations in the type of peat at depth and on the thickness of the peat over the mineral substrate.

1.3.4.10 Originally this complex was very poorly drained (Wetness Class VI) however it is now classified as Wetness Classes II to V depending on the effectiveness of the drainage improvements. It is known, however, that these soils, once drained and cultivated are subject to peat wastage such that the surface layers of peat are lost and soils become, effectively, similar to those of the Downholland Complex (see below).

Downholland complex (Do')

1.3.4.11 The soils of this complex can be divided into three varieties, linked to the micro-topography. The first consists of coarse to medium textured soils which occur on the low ridges found throughout the complex. A typical profile has a black, humose loamy fine sand or silt loam topsoil which can sometimes be slightly calcareous over a light grey, mottled, calcareous fine sandy loam with silty laminations with the light grey, mottled calcareous parent material (Downholland Silt) at depth consisting of sharply separated layers of silt and fine sand. The soils were originally formed under wet conditions with a fluctuating groundwater table. The soils remain wet long enough during the winter (during periods of natural high water tables) to be placed in Wetness Class II rather than being completely free draining (Wetness Class I). If profiles such as these have a calcareous topsoil, they would now be classed as the Chatteris series.

1.3.4.12 The second variant is found in hollows and on flat land with fine textured or silty alluvium. A typical profile of this variety has a black, peaty or humose silt loam or clay loam topsoil over a grey, mottled, silty

clay subsoil which passes down into Downholland Silt, like that for the first variety described above, but sometimes non-calcareous. Again, these were originally formed under wet conditions with a fluctuating groundwater table, but the profile drainage is also impeded by slow permeability within the finer textured subsoils. Thus, even after artificial drainage, both by open ditches and under-drainage, such soils are likely to be no better than Wetness Class III. Profiles like these are what are now generally regarded as belonging to the Downholland series per se. The implication from the Memoir accompanying the National Soil Map for Northern England, is that this variety can probably be regarded as the dominant soil type on areas shown on the more detailed maps as the Downholland Complex.

1.3.4.13 The third variant is confined to more pronounced hollows where a thin covering of peat still exists (or at least did when the area was surveyed in the 1960s). Profiles described then consisted of a black, peaty loam topsoil followed by a thin layer of black, amorphous peat. This directly overlies but is sharply separated from the underlying Downholland Silt which is usually non-calcareous. Due both to the topographic position and the occurrence of “raw” Downholland Silt near the surface it is unlikely that such a profile would be any better than Wetness Class IV. However, the writer of the 1967 Memoir comments “Whether or not it [i.e. the layer of amorphous peat below the cultivated topsoil] will remain as a distinct layer of undisturbed peat depends on the future depth of ploughing”. It is thought probable that most of this variety of Downholland soil has now disappeared and has effectively become a rather more poorly drained (Wetness Class IV) version of the second variant.

Clifton series (Cu)

1.3.4.14 The Clifton series is formed in medium to fine textured glacial till with slowly permeable subsoils which lead to poor natural profile drainage which can be only partially alleviated by the installation of underdrainage. A typical profile has a dark greyish brown, sandy loam or sandy silt loam topsoil, sometimes with brownish mottles, where situated below grassland. The subsoil is a poorly structured, brownish grey, mottled, sandy loam or sandy clay loam. At depth there is a thin, reddish brown, sandy clay loam to clay loam with distinct grey mottling passing down into reddish brown, mottled reddish brown sandy clay loam. In such a moist climate as here, with a Field Capacity Duration of around 200 days. Such soils would be classed as remaining in Wetness Class IV where, as is usually the case, the slowly permeable layer causing the impeded drainage is within 60 centimetres (cm) of the surface.

Oaklands series (Oa)

1.3.4.15 This series only coincides with a very small section of the study area (see **Figure 1.1**) and comprises poorly drained soils developed on fine-textured till. A typical profile comprises a humose clay loam overlying a

slowly permeable grey clay upper subsoil and a reddish brown clay or silty clay lower subsoil horizon.

Salwick series (So)

1.3.4.16 This is the better drained analogue of the Clifton series described above, also developed in medium to fine textured glacial till, but where the mottling indicative of periodic waterlogging does not occur until somewhat lower in the profile and the Slowly Permeable Layer also starts further from the surface. A typical profile comprises a dark brown, sandy loam or sandy silt loam topsoil over a similarly textured upper subsoil in which the mottling, if any, is not distinct. The mottling becomes more distinct below about 40 cm from the surface and the texture becomes a sandy clay loam before passing down into dark reddish brown clay loam. In their natural state, they would be described as poorly drained but with under-drainage they would now qualify in the climatic regime of the area for Wetness Class III.

Salop series (Sh)

1.3.4.17 This is a heavy textured, poorly drained soil developed in fine textured (clayey) glacial till. A typical profile has a dark greyish brown clay loam topsoil over a dull greyish brown, mottled clay or heavy clay loam upper subsoil passing down into a pale grey mottled clay or silty clay. Like the Clifton series, in such a moist climate as here, with a Field Capacity Duration of around 200 days, such soils would be classed as remaining in Wetness Class IV even after underdrainage.

Cottam series (Co)

1.3.4.18 This is the somewhat better drained analogue of the Salop series described above, also developed in fine textured glacial till and so also corresponds to being a heavier textured version of the Salwick series. The profile typically consists of a dark greyish brown, heavy clay loam topsoil over a yellowish brown, clay loam to clay with some pale grey mottling. Below about 60 cm from the surface this passes down into a mottled reddish brown clay. The heavier textures as compared to the Salwick series means that it too is unlikely to become any better than Wetness Class IV after underdrainage.

Douglas complex (Dj3')

1.3.4.19 A variety of poorly drained soils alongside or close to the watercourses crossing the areas of glacial till are grouped together as the Douglas Complex. Those, such as encountered along the cable route, which have a fine (clayey textures) being given the subscript "3" (i.e. the map symbol is Dj_3'), the 3 meaning fine textured and the apostrophe the complex nature of the soil pattern. A typical profile consists of a very dark grey clay or silty clay with rusty mottling, over a grey plastic clay or silty clay. Such soils are in Wetness Class IV with their low-lying topographic position making them difficult to drain effectively.

Hesketh complex (HS1, HS3)

1.3.4.20 This complex comprises soils that are formed on the estuarine deposits of the River Ribble. The variation of HS1 is calcareous in nature, whilst the HS1 variant is decalcified. Profile examples in artificially drained areas comprise sandy loam topsoils overly similar upper subsoils and fine sand or sand upper subsoils with silt laminae included in these horizons.

Newport series (Na)

1.3.4.21 This series comprises freely drained brown earth soils developed on glacial sand with a variable, but small proportion of gravel and pebbles. Typical profiles comprise a friable loamy sand or sandy loam overlying a loamy sand or sandy loam upper subsoil and a loose sand horizon beneath.

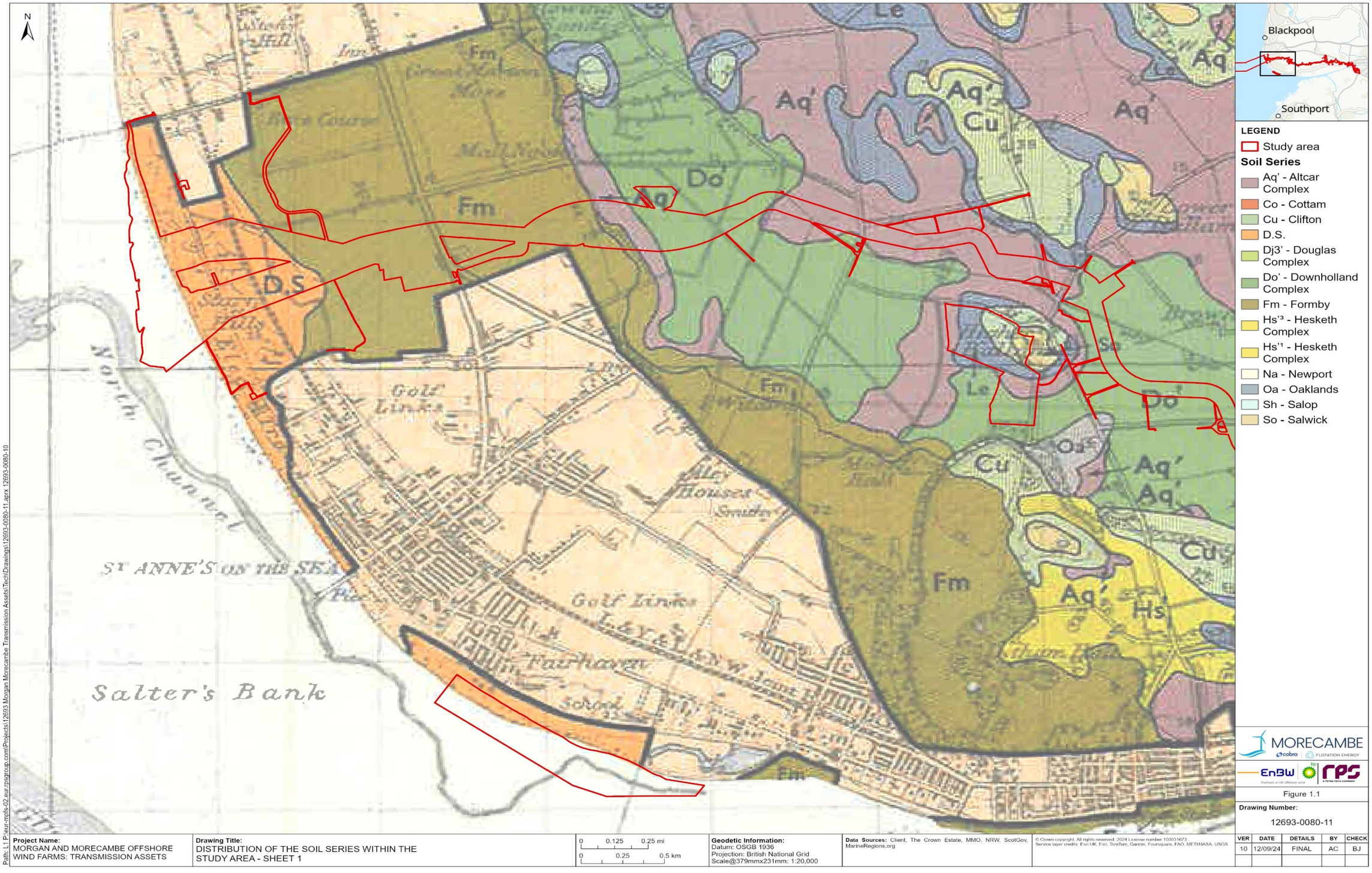

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Figure 1.1

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Figure 1.1: Distribution of the soil series within the study area (sheet 1)

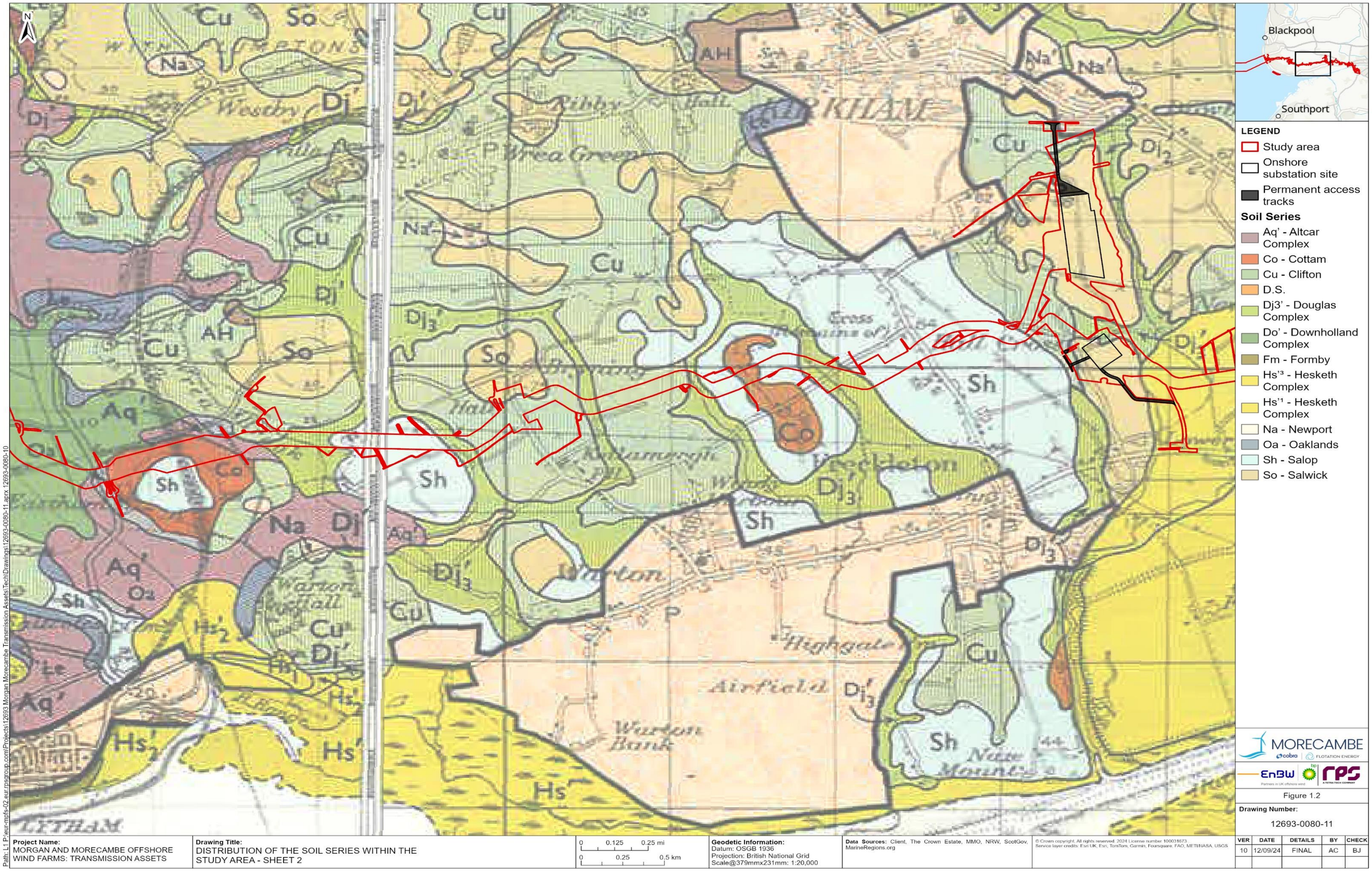

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Figure 1.2

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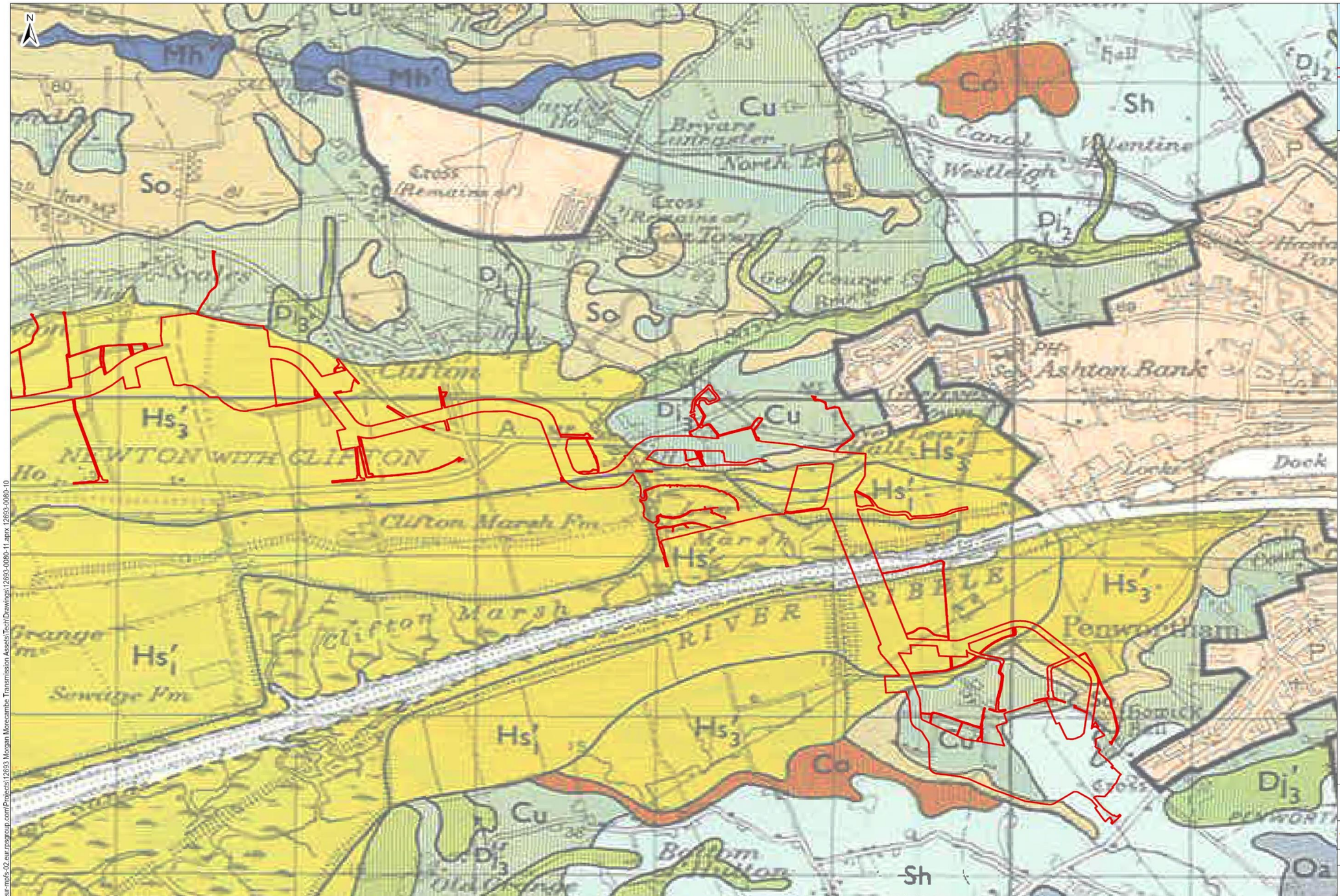
Figure 1.2: Distribution of the soil series within the study area (sheet 2)



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Project Name: MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS	**Drawing Title:** DISTRIBUTION OF THE SOIL SERIES WITHIN THE STUDY AREA - SHEET 3	0 0.125 0.25 mi / 0 0.25 0.5 km	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid Scale@379mmx231mm: 1:20,000	**Data Sources:** Client, The Crown Estate, MMO, NRW, ScotGov, MarineRegions.org	© Crown copyright. All rights reserved. 2024 License number 100031673. Service layer credits: Esri UK, Esri, TomTom, Garmin, Foursquare, FAO, METI/NASA, USGS.

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Figure 1.3

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Figure 1.3: Distribution of the soil series within the study area (sheet 3)

1.3.5 Agricultural Land Classification

Provisional ALC

1.3.5.1 The provisional ALC maps were originally published in the 1960s by MAFF (now Defra) to grade quality of land for England and Wales. These maps grade land quality according to the severity of environmental constraints on agricultural production, including factors such as soil, gradient, rainfall and altitude. There are five grades, with Grade 1 representing the best quality land (i.e. very minor limitations) and Grade 5 representing the lowest quality land (i.e. very major limitations). Grades 1, 2 and 3a are classified as 'best and most versatile lane' ALC land.

1.3.5.2 The provisional ALC maps were designed to help Local Planning Authorities, developers, surveyors, and land use managers make informed long-term decisions over the use of land in the planning system and to target survey work to the most appropriate locations.

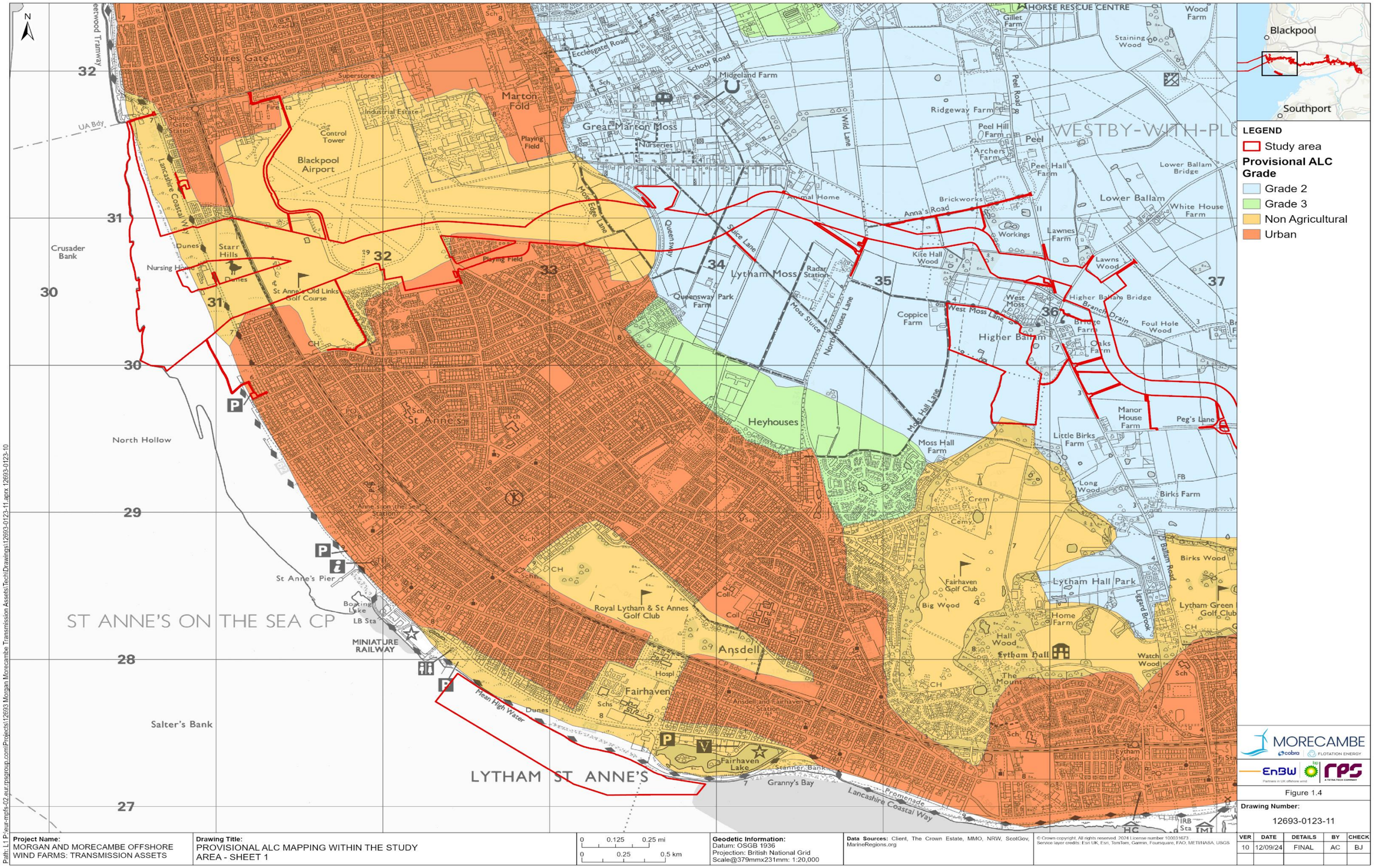
1.3.5.3 The study area falls within the Agricultural Land Classification, Provisional Sheet 94 (Preston) 1:63,360 (MAFF, 1970). However, it should be noted that the Provisional ALC mapping data for the study area presented online (Natural England, 2023) differs slightly from that shown on Provisional Sheet 94 (MAFF, 1970). This is primarily because the online Provisional ALC mapping data uses the more generalised Soil Associations Map of the Soils of Lancashire. For example, areas of Downholland Silt depicted in Provisional Sheet 94 are generally shown as Grade 2 by the Provisional ALC mapping data along with some of the lighter textured soils on glacial till (e.g. Clifton and Salwick series). In addition, in Provisional Sheet 94, the heavier textured soils found in till, such as the Cottam and Salop series, are classified as undifferentiated Grade 3. Similarly, the sandy soils, like the Formby series on Blown Sand, are also placed in undifferentiated Grade 3.

1.3.5.4 Since the Provisional ALC maps were produced there has been a comprehensive revision of the ALC guidelines and criteria for allocating land to particular grades, and the former Subgrades 3b and 3c have been amalgamated into a single Subgrade 3b. Therefore, whilst the provisional ALC mapping can be useful in providing a guide to the relative quality of different areas of land, it cannot be used to accurately define the quality of agricultural land according to the current ALC grading system.

1.3.5.5 Further soil surveys were undertaken in 2024 to assess the likely distribution of ALC grade of agricultural land and in what proportion within the different soil types identified. The likely ALC grade of agricultural land according to soils surveys is reported in Volume 3, Chapter 6: Land use and recreation of the ES, with further details of the soil surveys undertaken provided in Volume 3, Annex 6.2: Agricultural land classification survey results of the ES.

1.3.5.6 **Figure 1.4 to Figure 1.6** below illustrate the distribution of Provisional ALC grades within the study area according to the Provisional ALC

mapping data. In addition, there have been several detailed ALC surveys undertaken post-1988 within or in proximity to the study area. The ALC Grades - Post 1988 Survey online mapping data within the study area is shown in **Figure 1.7 to Figure 1.9** below.



Project Name: MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS	**Drawing Title:** PROVISIONAL ALC MAPPING WITHIN THE STUDY AREA - SHEET 1	0 0.125 0.25 mi / 0 0.25 0.5 km	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid Scale@379mmx231mm: 1:20,000	**Data Sources:** Client, The Crown Estate, MMO, NRW, ScotGov, MarineRegions.org	© Crown copyright. All rights reserved. 2024 License number 100031673. Service layer credits: Esri UK, Esri, TomTom, Garmin, Foursquare, FAO, METI/NASA, USGS.

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Figure 1.4

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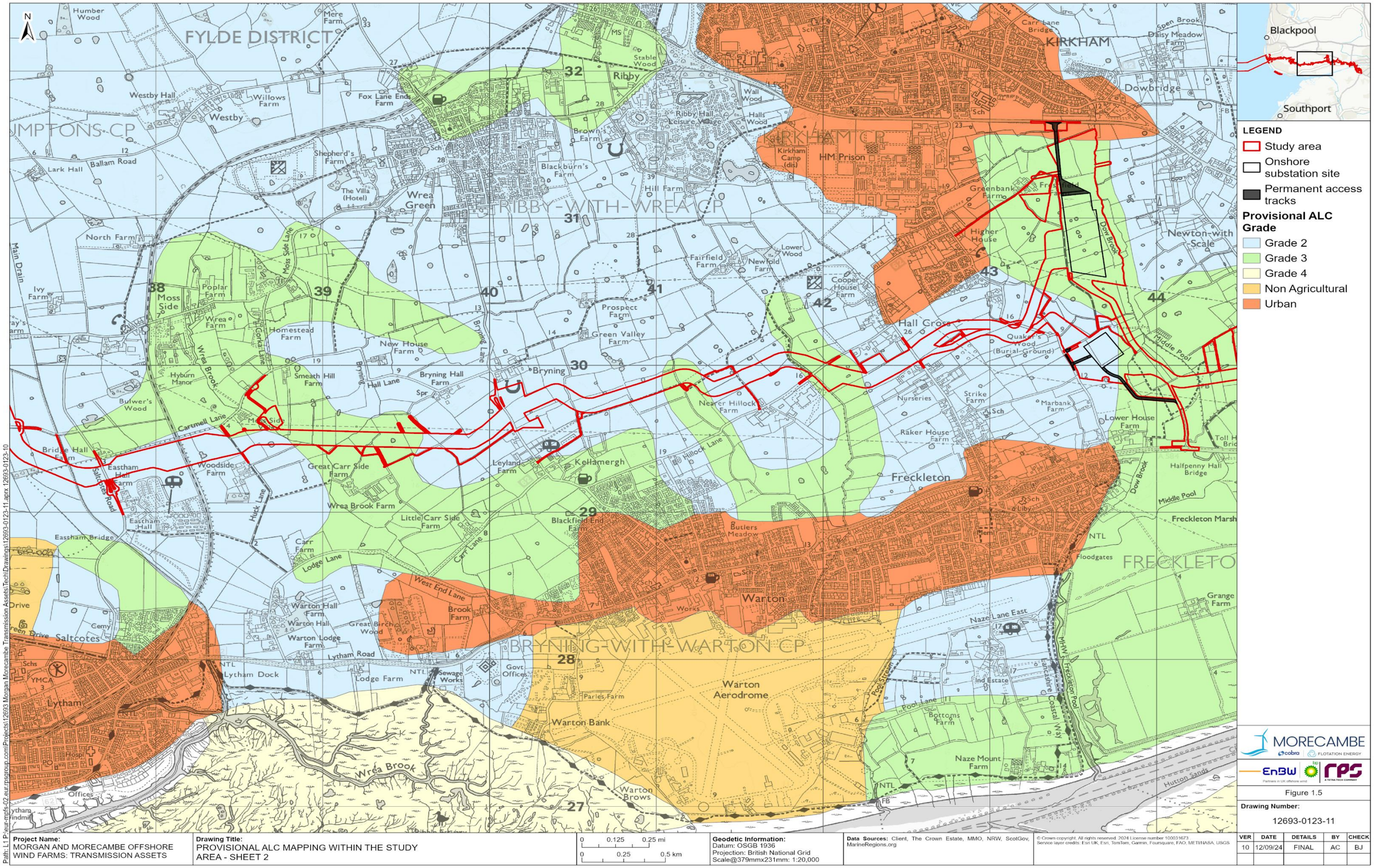
Figure 1.4: Provisional ALC mapping within the study area (sheet 1)



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Project Name: MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS	**Drawing Title:** PROVISIONAL ALC MAPPING WITHIN THE STUDY AREA - SHEET 2	0 0.125 0.25 mi / 0 0.25 0.5 km	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid Scale@379mmx231mm: 1:20,000	**Data Sources:** Client, The Crown Estate, MMO, NRW, ScotGov, MarineRegions.org

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Figure 1.5

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Figure 1.5: Provisional ALC mapping within the study area (sheet 2)

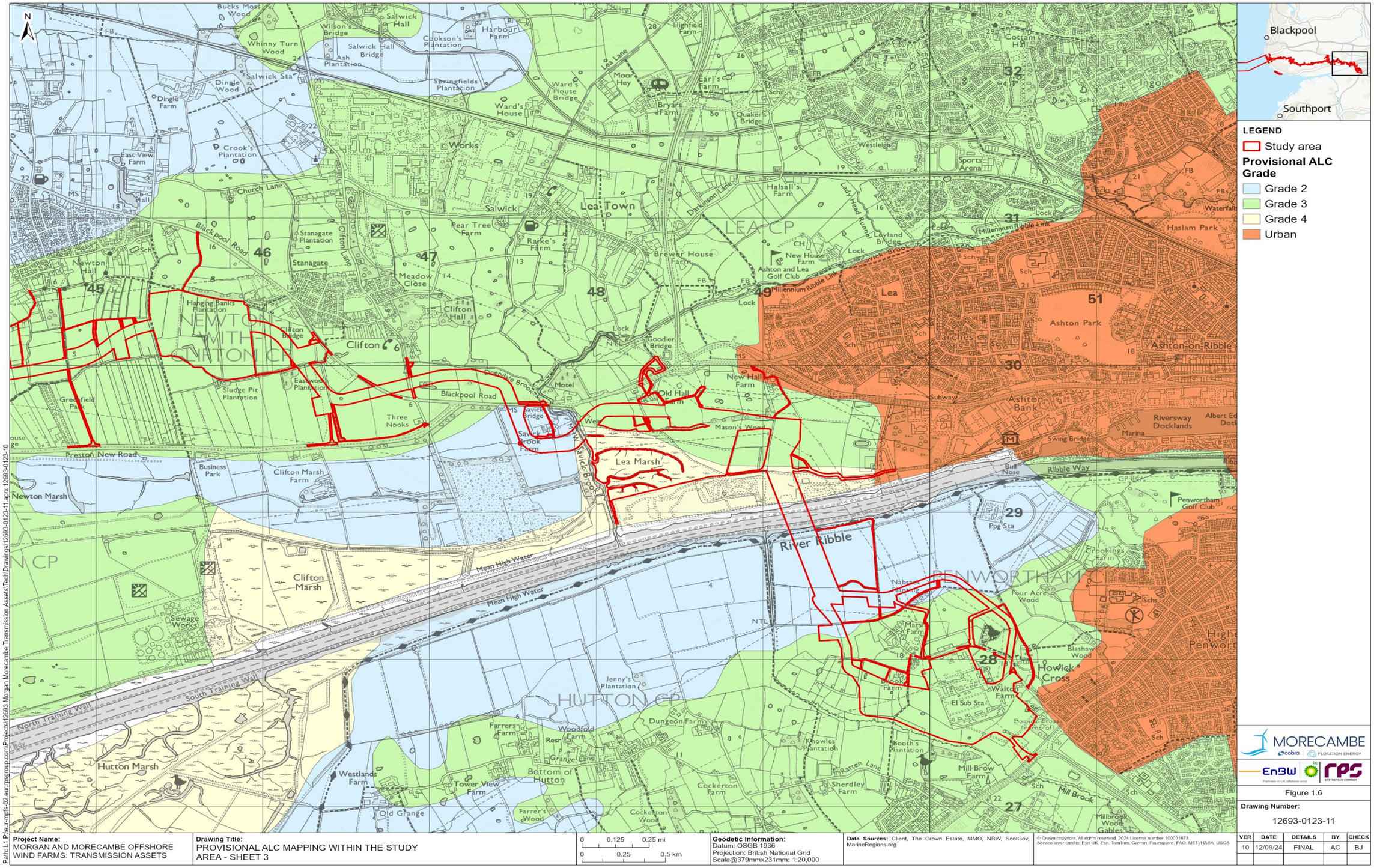
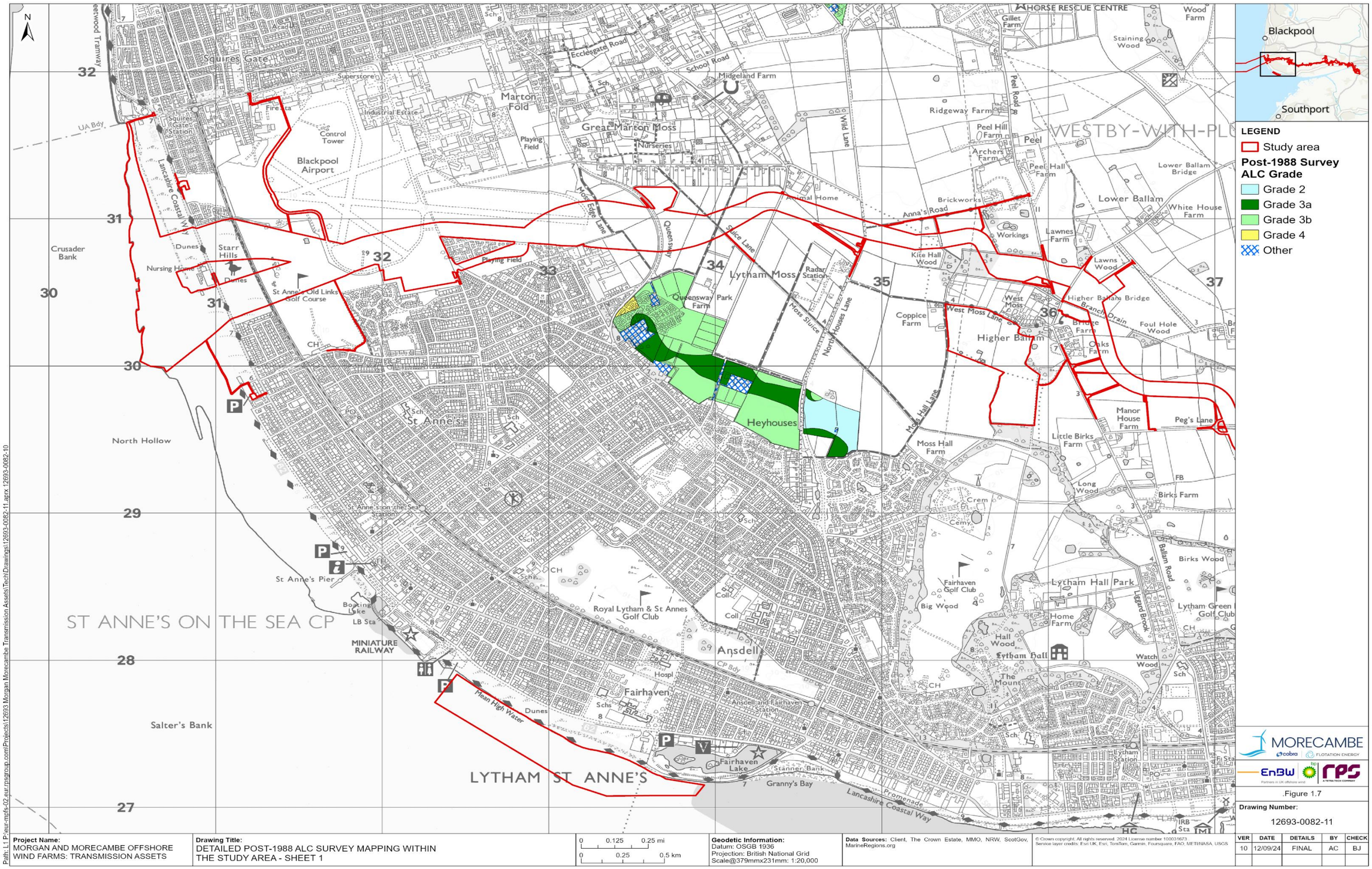


Figure 1.6: Provisional ALC mapping within the study area (sheet 3)



Project Name: MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS	**Drawing Title:** DETAILED POST-1988 ALC SURVEY MAPPING WITHIN THE STUDY AREA - SHEET 1	0 0.125 0.25 mi / 0 0.25 0.5 km	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid Scale@379mmx231mm: 1:20,000	**Data Sources:** Client, The Crown Estate, MMO, NRW, ScotGov, MarineRegions.org	© Crown copyright. All rights reserved. 2024 License number 100031673. Service layer credits: Esri UK, Esri, TomTom, Garmin, Foursquare, FAO, METI/NASA, USGS.

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.Figure 1.7

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Figure 1.7: Detailed post-1988 ALC survey mapping within the study area (sheet 1)

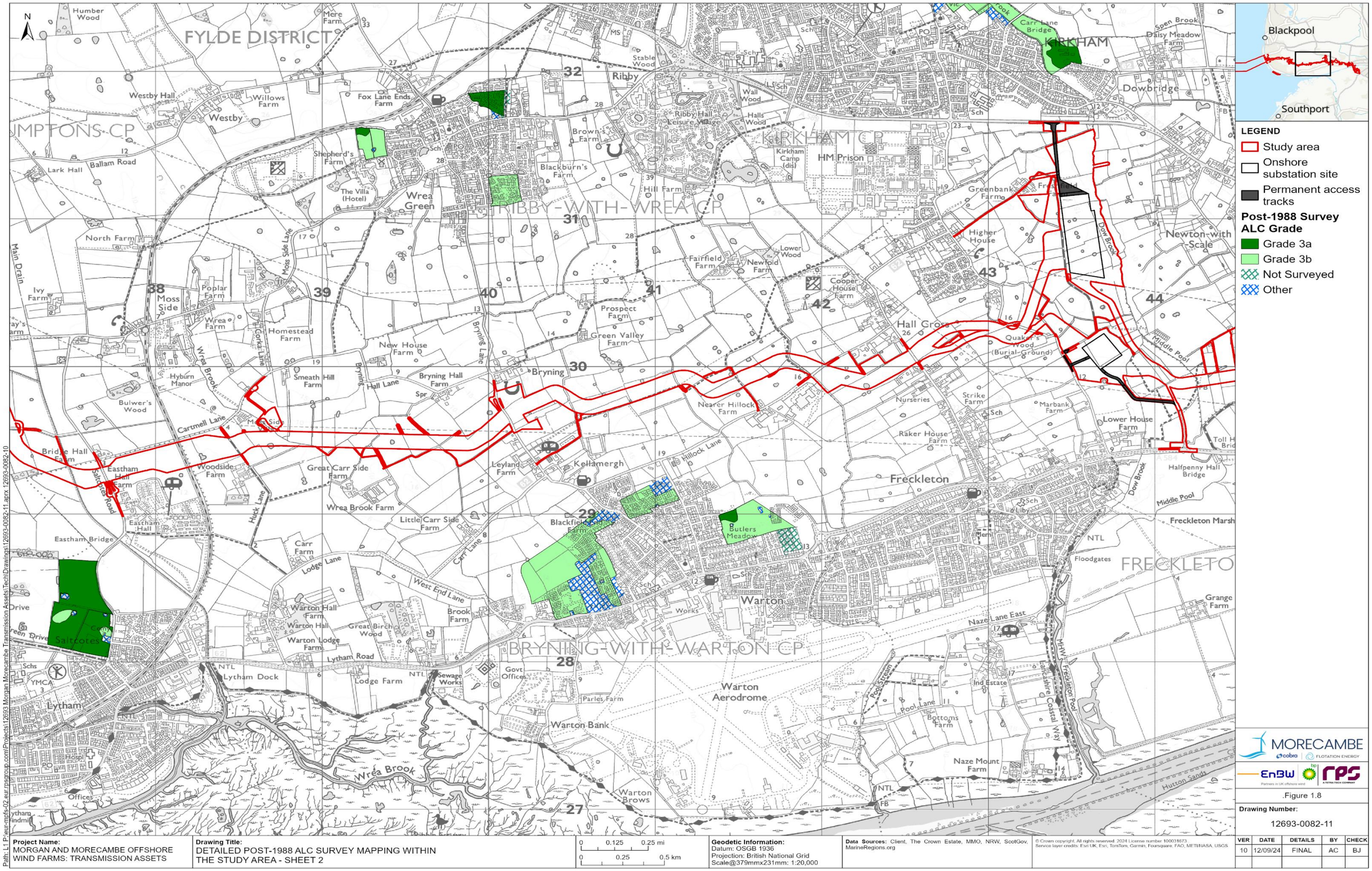


Figure 1.8: Detailed post-1988 ALC survey mapping within the study area (sheet 2)

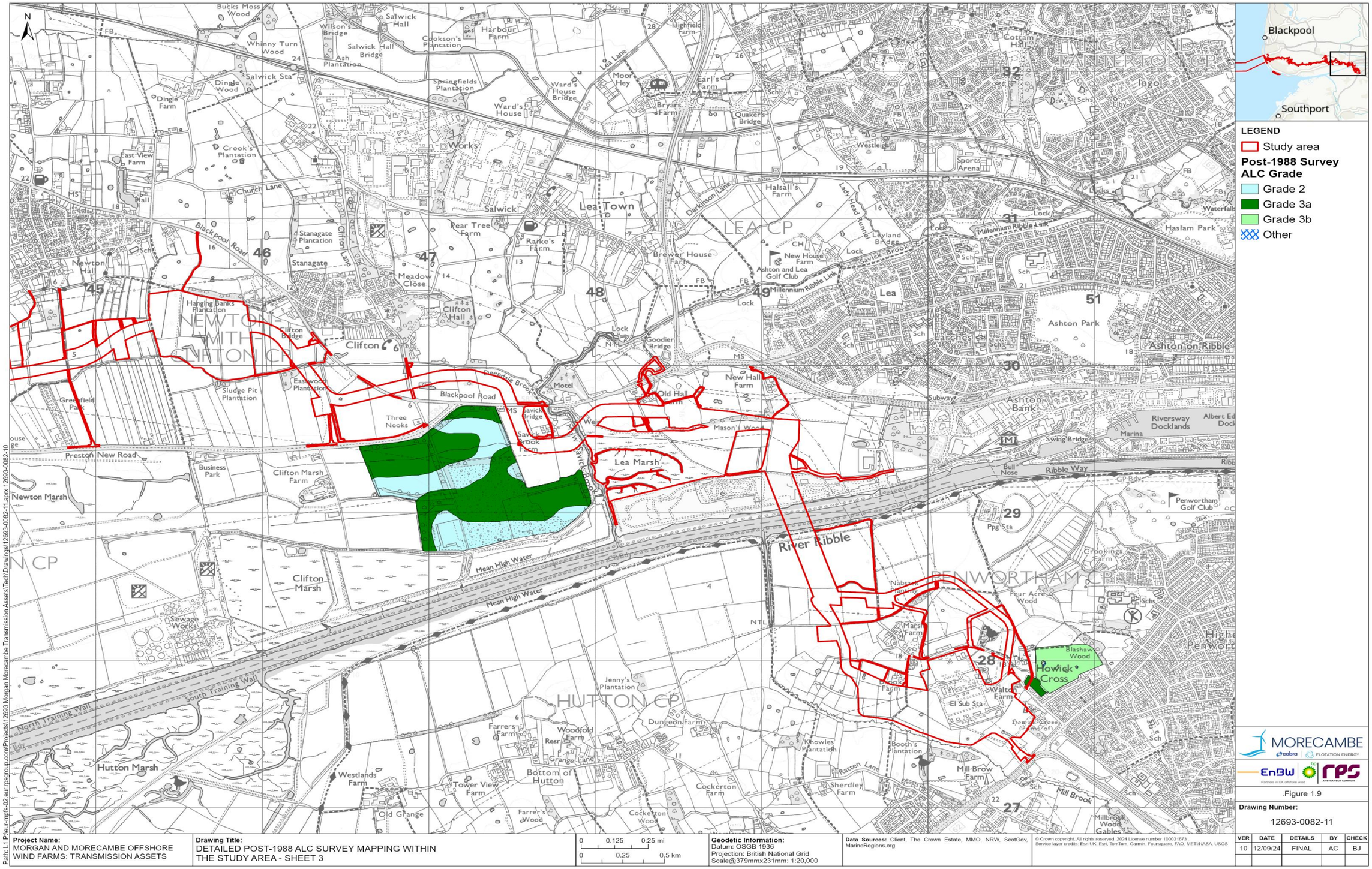


Figure 1.9: Detailed post-1988 ALC survey mapping within the study area (sheet 3)

1.3.5.7 The provisional ALC mapping indicates that the study area predominantly comprises Grade 2 (very good) and Grade 3 (good to moderate) agricultural land and non-agricultural land, with smaller areas of urban and Grade 4 (poor) agricultural land.

1.3.5.8 The quality of agricultural land identified in the provisional ALC mapping are generally supported by the Detailed post-1988 ALC survey mapping (i.e. present the same ALC grading), where these have been undertaken within or near the study area.

1.4 Onshore substations and associated permanent access tracks

1.4.1 Overview

1.4.1.1 As stated above, due to the permanent nature of impacts likely to occur, published ALC and soils data within the areas for the onshore substations and associated permanent access tracks are discussed separately below.

1.4.2 Onshore substations and associated permanent access tracks

Topography

1.4.2.1 Both onshore substations and associated permanent access tracks are situated on gently or moderately sloping land at altitudes of between about 10 m and 20 m AOD. None of the slopes pose any agricultural limitation. Due to their proximity, separate topographic data for the permanent access tracks has not been provided.

Climate

1.4.2.2 Climatic data has been obtained from the Met Office's standard 5 km grid point data set (Met Office, 1989) for a representative point on each onshore substation as site is shown in **Table 1.4** below. Due to their proximity, separate climatic data for the permanent access tracks for the onshore substations has not been provided.

Table 1.4: Onshore substations climate data

Climate data	Morgan onshore substation site	Morecambe onshore substation site
Reference Point	**SD 432 309**	**SD 436 300**
Altitude (m)	19	10
Accumulated Temperature (day degrees)	1417	1428
Average Annual Rainfall (mm)	955	938
Maximum Climatic Grade	1	1
Field Capacity Duration (days)	211	209

Climate data	Morgan onshore substation site	Morecambe onshore substation site
Moisture Deficit for wheat (mm)	78	79
Moisture Deficit for potatoes (mm)	66	65

1.4.2.3 The data is similar for the sites and are typical of the mild, maritime climate of lowland areas of South West Lancashire. There is a moderate rainfall and correspondingly relatively low summer moisture deficits, but a fairly long Field Capacity Duration over the winter. The overall climate imposes no agricultural limitations.

1.4.3 Geology and soils

Morgan onshore substation site and permanent access

1.4.3.1 The Morgan onshore substation site is underlain by medium to fine textured glacial till. This is cut by a watercourse, Dow Brook, which passes to the east of the onshore substation.

1.4.3.2 The Morgan onshore substation site entirely comprises soils from the Salwick (So) soil series. The permanent access track to the Morgan onshore substation site routes through soils from the Salwick (So) soil series and Clifton series (Cu) soil series.

1.4.3.3 The distribution of the soil series within the Morgan substation site and associated permanent access tracks is presented in **Figure 1.10** below.

Morecambe onshore substation site and permanent access

1.4.3.4 The Morecambe onshore substation site is underlain by medium to fine textured glacial till. This is cut by a watercourse, Dow Brook, which passes to the east of the onshore substation.

1.4.3.5 The Morecambe onshore substation site primarily comprises soils from the Salwick (So) soil series. However, a small section of the eastern extent of the Morecambe onshore substation site coincides with an soils from the 'Douglas complex (Dj3') soil series. The permanent access tracks to the Morecambe onshore substation site routes through soils from the Hesketh complex (HS^3) and Salwick (So) soil series.

1.4.3.6 The distribution of the soil series within the Morecambe substation site and associated permanent access tracks is presented in **Figure 1.10** below.

1.4.4 Agricultural Land Classification

Morgan onshore substation site and permanent access

1.4.4.1 The ALC grading for land located within the Morgan onshore substation site, according to Provisional ALC mapping, is Grade 3 agricultural land.

No detailed Post-1988 ALC surveys have been undertaken for the land located within the Morgan onshore substation site.

1.4.4.2 The permanent access track to the Morgan onshore substation site primarily comprises ALC Grade 3 land, with a smaller area of urban land.

1.4.4.3 The likely ALC grading of according to soil surveys within the Morgan onshore substation site and permanent access tracks is reported in Volume 3, Chapter 6: Land use and recreation of the ES.

1.4.4.4 The ALC grading for land located within the Morgan onshore substation site and permanent access according the Provisional ALC mapping data and Detailed Post-1988 ALC surveys are presented in **Figure 1.11** and **Figure 1.12** below respectively.

Morecambe onshore substation site and permanent access

1.4.4.5 The ALC grading for land located within the Morecambe onshore substation site, according to Provisional ALC mapping, is predominantly Grade 2 agricultural land, with a smaller area of Grade 3 land underlying the eastern extent. No detailed Post-1988 ALC surveys have been undertaken for the land located within the Morecambe onshore substation site.

1.4.4.6 The permanent access tracks to the Morecambe onshore substation site primarily comprises ALC Grade 2 and Grade 3 land.

1.4.4.7 The likely ALC grading of according to soil surveys within the Morecambe onshore substation site and permanent access tracks is reported in Volume 3, Chapter 6: Land use and recreation of the ES.

1.4.4.8 The ALC grading for land located within the Morecambe onshore substation site and permanent access according the Provisional ALC mapping data and Detailed Post-1988 ALC surveys are presented in **Figure 1.11** and **Figure 1.12** below respectively.

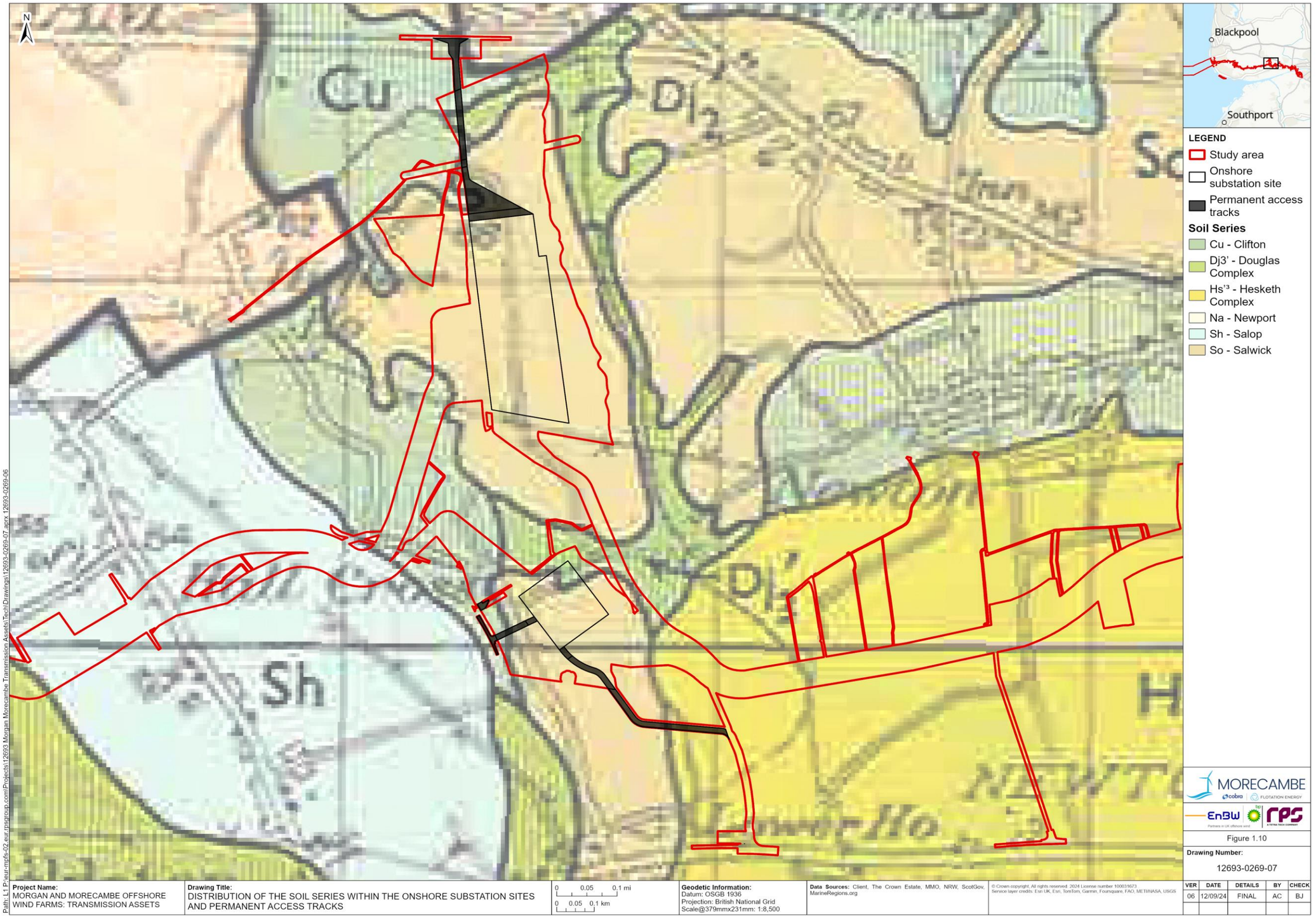
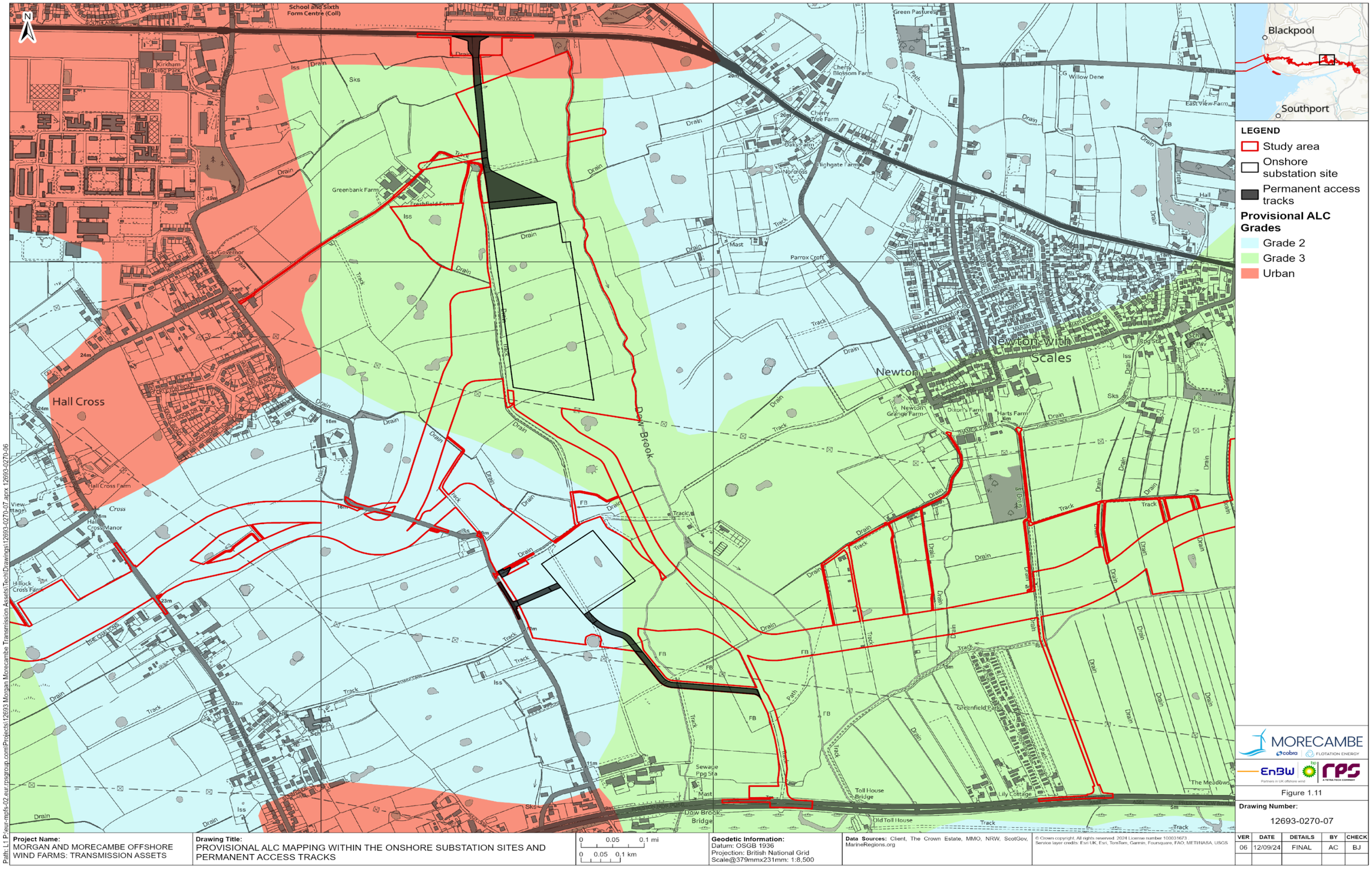


Figure 1.10: Distribution of the soil series within the onshore substation sites and associated permanent access tracks



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Project Name: MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS	**Drawing Title:** PROVISIONAL ALC MAPPING WITHIN THE ONSHORE SUBSTATION SITES AND PERMANENT ACCESS TRACKS	0 0.05 0.1 mi 0 0.05 0.1 km	**Geodetic Information:** Datum: OSGB 1936 Projection: British National Grid Scale@379mmx231mm: 1:8,500	**Data Sources:** Client, The Crown Estate, MMO, NRW, ScotGov, MarineRegions.org	© Crown copyright. All rights reserved. 2024 License number 100031673. Service layer credits: Esri UK, Esri, TomTom, Garmin, Foursquare, FAO, METI/NASA, USGS.

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Figure 1.11

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Figure 1.11: Provisional ALC mapping within the onshore substation sites and associated permanent access tracks

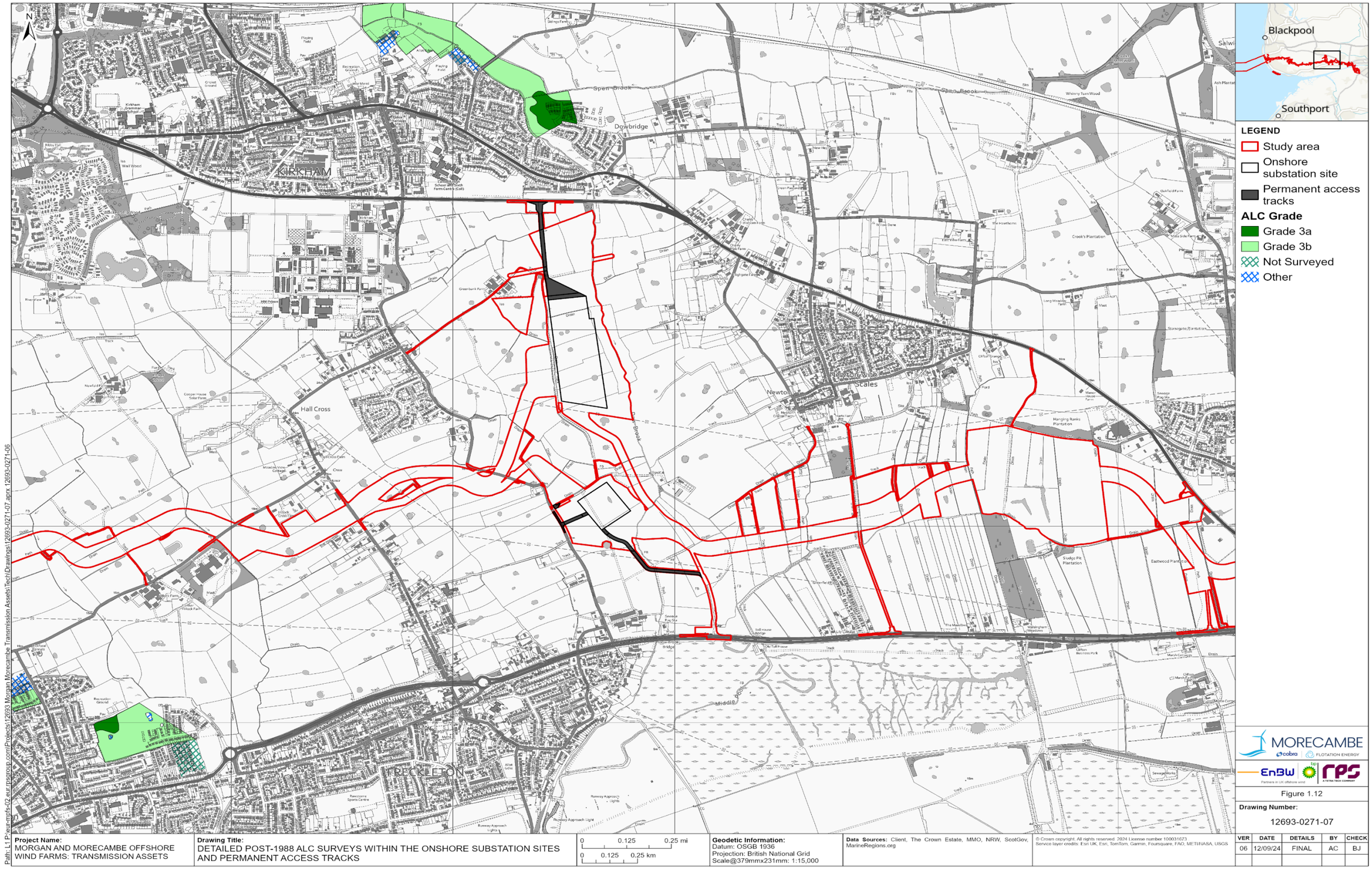

Figure 1.12: Detailed Post-1988 ALC surveys within the onshore substation sites and associated permanent access tracks

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