DOGGER BANK D WIND FARM

Preliminary Environmental Information Report

Volume 2

Appendix 24.6 Onshore Geoarchaeological Desk-Based Assessment (Part 1 of 2)

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Executive Summary

1. A geoarchaeological desk-based deposit model was undertaken for the onshore elements of the Dogger Bank D Offshore Wind Farm Project (hereafter 'the Project' or 'DBD'). The onshore elements of the Project are located within the Onshore Development Area and include the landfall, onshore export cable corridor (ECC), Onshore Converter Station (OCS) and Energy Storage and Balancing Infrastructure (ESBI). The route for the onshore export cables extends from the landfall south-east of Skipsea (National Grid Reference (NGR): 507149, 444996) and makes its way south-west to the OCS zones south of Beverley, (NGR: 503270, 436938 and 501011, 435853). The work was undertaken by AOC Archaeology Group for Royal HaskoningDHV on behalf of the Applicant.

2. This document summarises the stratigraphic sequence of potential geoarchaeological remains and discusses the results in relation to their archaeological and palaeoenvironmental potential. The principal objective of this report is to present the results, refine the research objectives of the Project in light of the findings, and make recommendations concerning any subsequent archaeological investigations in order to address these research objectives.

3. The geoarchaeological desk-based deposit model comprised the review of recent and historic geotechnical and BGS (British Geological Society) boreholes records. No core samples from boreholes were directly viewed and interpretations are based on the records alone. Geoarchaeological and geotechnical deposit data can be used to identify areas of archaeological potential by characterising the probable nature and depth of sub-surface deposits.

4. The deposit sequence recorded across the Onshore Development Area included an initial deposit of chalk bedrock (Burnham, Flamborough, and Rowe Formations). A sharp incline in elevation in the south-west of the Onshore Development Area is recorded to the west of Beverley, which may indicate the extent of the North Sea Ice Lobe and its erosion of the underlying bedrock (University of Sheffield, 2024).

5. A lower deposit of glacial till (Glacial Till 1) is identified by its position beneath glaciolacustrine deposits. It is representative of a cold phase within warm-cold cycles. Glaciolacustrine deposits are recorded overlying this till unit (Glacial Till 1), and represent a warm phase of the climatic cycle, and the melting and retreat of glaciers responsible for the deposition of Glacial Till 1.

6. A further phase of glaciation is represented by an upper unit of till (Glacial Till 2), which overlies the glaciolacustrine deposits. Where there is an absence of glaciolacustrine deposits, the default unit is this upper till (Glacial Till 2) to allow for topographic modelling. It is not possible to determine the boundary between the two units where glaciolacustrine deposits are absent. The surface of the youngest till (Glacial Till 2) represents the probable land surface topography at the beginning of the Holocene (*c*. 12,000 years ago) across much of the modelled area.

7. Glaciofluvial sands and gravels representative of glacial meltwater routes are mapped. Lacustrine deposits representative of lakes which formed in depressions on the surface of the till persisted from the Late Pleistocene into the Holocene. These are mapped towards the north-east of the site. Lower alluvium is defined by its position underlying archaeology or organic deposits. The deposits are often recorded in association with (overlying) glaciofluvial deposits, where channels are already established. Organic sequences formed in low-flow channels or in low lying floodplain environments are often recorded underlying or interbedded with alluvial or lacustrine deposits.

8. Archaeology is recorded within three data points and includes cut features of one pit and two linear features. An upper alluvium or warp unit is present overlying various deposits across the site. Warp is an anthropogenically introduced minerogenic material from intentional flooding of land, in order to decrease flood risk in future. Due to the nature of warping practices, it is not possible to differentiate between natural flood deposits and those intentionally introduced for ground raising. Topsoil / subsoil and made ground rarely exceed *c*. 1m in thickness, although in some isolated locations made ground reaches up to approximately 7m. These thicker deposits may represent truncation or disturbance of underlying geology.

9. The Project's impacts from the currently proposed Onshore Development Area will include intrusive groundworks. Particularly within the landfall and OCS zones, disturbances could potentially be deep and result in the truncation of the underlying geology.

10. It is recommended that the impact on deposits of interest may be mitigated by a programme of archaeological evaluation trenching where the underlying till or bedrock surface is identified to be within *c*. 1m of the ground surface and potential is identified. Purposive geoarchaeological boreholes could be carried out to target known organic and alluvial sequences where they will be impacted in order to characterise the deposits and identify their extent and potential for palaeoenvironmental and archaeological preservation.

11. There are large gaps between the datapoints along the proposed onshore ECC. In order to determine and characterise the underlying geology, it is recommended to investigate these areas either through a geoarchaeological watching brief on future geotechnical works or through additional geoarchaeological interventions.

12. The appropriate mitigation strategy for the Project will be discussed and agreed with the Expert Topic Group (ETG7) (Onshore Archaeology).

13. An OASIS form (OASIS ID: aocarcha1-528990, **Annex 24.6.2**) has been completed and an electronic copy of all reports will be deposited with the Archaeological Data Service (ADS). The site archive will be prepared in accordance with local and national guidance and will be deposited with a local museum.

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Glossary

Term	Definition
Effect	An effect is the consequence of an impact when considered in combination with the receptor's sensitivity / value / importance, defined in terms of significance.
Energy Storage and Balancing Infrastructure (ESBI)	A range of technologies such as battery banks to be co-located with the Onshore Converter Station, which provide valuable services to the electrical grid such as storing energy to meet periods of peak demand and improving overall reliability.
Environmental Impact Assessment (EIA)	A process by which certain planned projects must be assessed before a formal decision to proceed can be made. It involves the collection and consideration of environmental information and includes the publication of an Environmental Statement.
Environmental Statement (ES)	A document reporting the findings of the EIA which describes the measures proposed to mitigate any likely significant effects.
Evidence Plan Process (EPP)	A voluntary consultation process with technical stakeholders which includes a Steering Group and Expert Topic Group (ETG) meetings to encourage upfront agreement on the nature, volume and range of supporting evidence required to inform the EIA and HRA process.
Expert Topic Group (ETG)	A forum for targeted technical engagement with relevant stakeholders through the EPP.
Geoarchaeology	The application of earth science principles and techniques to the understanding of the archaeological record. Includes the study of soils and sediments and of natural physical processes that affect archaeological sites such as geomorphology, the formation of sites through geological processes and the effects on buried sites and artefacts.
Glacial / Interglacial	A glacial period is a period of time within an ice age that is marked by colder temperatures and glacier advances. Interglacial correspond to periods of warmer climate between glacial periods. There are three main periods of glaciation within the last 1 million years, the Elsterian, the Saalian and the Weichselian which ended about 12,000 years ago. The Holocene period corresponds to the current interglacial.
Holocene	The last 10,000 years of earth history.
Impact	A change resulting from an activity associated with the Project, defined in terms of magnitude.
Landfall	The area on the coastline, south-east of Skipsea, at which the offshore export cables are brought ashore, connecting to the onshore export cables at the transition joint bay above Mean High Water Springs.

Term	Definition
Mesolithic	10000 to 4000 BC The Middle Stone Age, falling between the Palaeolithic and Neolithic and marking the beginning of a move from a hunter gatherer society towards a food producing society.
Mitigation	Any action or process designed to avoid, prevent, reduce or, if possible, offset potentially significant adverse effects of a development. All mitigation measures adopted by the Project are provided in the Commitments Register.
Monitoring	Measures to ensure the systematic and ongoing collection, analysis and evaluation of data related to the implementation and performance of a development. Monitoring can be undertaken to monitor conditions in the future to verify any environmental effects identified by the EIA, the effectiveness of mitigation or enhancement measures or ensure remedial action are taken should adverse effects above a set threshold occur. All monitoring measures adopted by the Project are provided in the Commitments Register.
Onshore Converter Station (OCS)	A compound containing electrical equipment required to stabilise and convert electricity generated by the wind turbines and transmitted by the export cables into a more suitable voltage for grid connection into Birkhill Wood Substation.
Onshore Converter Station (OCS) Zone	The area within which the Onshore Converter Station and Energy Storage and Balancing Infrastructure will be located in vicinity of Birkhill Wood Substation.
Onshore Development Area	The area in which all onshore infrastructure associated with the Project will be located, including any temporary works area required during construction and permanent land required for mitigation and enhancement areas, which extends landward of Mean Low Water Springs. There is an overlap with the Offshore Development Area in the intertidal zone.
Onshore Export Cable Corridor (ECC)	The area within which the onshore export cables will be located, extending from the landfall to the Onshore Converter Station zone and onwards to Birkhill Wood Substation.
Palaeoenvironmental Analysis	The study of sediments and the organic remains of plants and animals to reconstruct the environment of a past geological age.
Palaeolithic	500000 to 10000 BC The Old Stone Age defined by the practice of hunting and gathering and the use of chipped flint tools. This period is usually divided into Lower, Middle and Upper Palaeolithic.
Pleistocene	An epoch of the Quaternary Period (between about 2 million and 10,000 years ago) characterised by several glacial ages.
Prehistoric Period	Broad term encompassing the Palaeolithic, Mesolithic, Neolithic, Bronze Age and Iron Age.
Quaternary Period	The last 2 million years of earth history incorporating the Pleistocene ice ages and the post-glacial (Holocene) Period.

Term	Definition
Study Areas	A geographical area and / or temporal limit defined for each EIA topic to identify sensitive receptors and assess the relevant likely significant effects.
The Applicant	SSE Renewables and Equinor acting through 'Doggerbank Offshore Wind Farm Project 4 Projco Limited'.
The Project	Dogger Bank D (DBD) Offshore Wind Farm Project, also referred to as DBD in this PEIR.
Transition Joint Bay (TJB)	An underground structure at the landfall that houses the joints between the offshore and onshore export cables.
Trenching	Open cut method for cable or duct installation.

24.6 Geoarchaeological Desk-Based Assessment

24.6.1 Introduction

14. This appendix to the Dogger Bank D Offshore Wind Farm Project (hereafter 'the Project' or 'DBD') Preliminary Environmental Information Report (PEIR) supports **Volume 1, Chapter 24 Onshore Archaeology and Cultural Heritage.**

15. The purpose of this appendix is to outline the results of Geoarchaeological Desk-Based Assessment and deposit modelling as part of the onshore development of the Project. The onshore elements of the Project are located within the Onshore Development Area and include the landfall, onshore export cable corridor (ECC), the onshore converter station (OCS) and Energy Storage and Balancing Infrastructure (ESBI), which will be co-located within an OCS zone. The route of the onshore ECC extends from the landfall south-east of Skipsea (NGR: 507149, 444996) and makes its way south-west to the OCS zones south of Beverley, (NGR: 503270, 436938 and 501011, 435853: **Figure 24.6-1**). A full description of the Project is provided in **Volume 1, Chapter 4 Project Description.**

16. This appendix consists of a Stage one style Geoarchaeological Desk-Based Assessment (GDBA) and deposit model report in order to investigate the potential of the Onshore Development Area to contain significant archaeological remains and to produce a report inclusive of a deposit model.

17. The geoarchaeological desk-based deposit model comprised the review of recent and historic geotechnical and British Geological Society (BGS) borehole records. No core samples from boreholes were directly viewed or retained for geoarchaeological purposes, as this stage of work includes only reference to written records. Geoarchaeological and geotechnical deposit data can be used to identify areas of archaeological potential by characterising the probable nature and depth of sub-surface deposits.

18. For the purposes of this investigation, the Onshore Development Area is set within an Onshore GDBA Study Area which is defined as the area within 1km of the boundary of the Onshore Development Area.

19. As such, this report will provide recommendations on how investigations pertaining to these works should proceed and how such work will be integrated into the wider findings from the area. Subsequent stages of investigation, as shown in **Table 24.6-1**, may be required dependant on the results of this report.

20. Please note that all figures are provided in **Annex 24.6.3** of this appendix.

Table 24.6-1 Generic Stages of Geoarchaeological Investigation for Guidance

Stage	Stage Number
Consultancy: Desk based and impact assessment	1
Fieldwork: Geotechnical monitoring	2
Fieldwork: Trench evaluation / borehole evaluation	3
Fieldwork: Watching brief / excavation / mitigation boreholes	4
Post-excavation: Specialist geoarchaeological / palaeoenvironmental assessment	5
Post-excavation: Specialist geoarchaeological / palaeoenvironmental analysis	6
Publication	7

24.6.2 Planning Background and Proposed Development

21. The planning background and details of the Project are presented in **Volume 1, Chapter 1 Introduction** and **Volume 1, Chapter 3 Policy and Legislative Context**.

22. The Project is regarded as a Nationally Significant Infrastructure Project under Section 15(3) of the Planning Act of 2008 (UK Government, 2008), as the offshore generating station is anticipated to exceed a capacity of 100MW. The Infrastructure Planning (Environmental Impact Assessment) Regulations (HM Government, 2017) require that where effects of a project may have significant effect on the environment, these must be taken into account for the decision making in that project.

23. For the purposes of this GDBA, the Onshore Development Area has been divided into five segments (**Figure 24.6-2**):

- Area A: Skipsea to A165 / Bridlington Road;
- Area B: A165 / Bridlington Road to Beverley Airfield;
- Area C: Beverley Airfield to Bealey’s Beck;
- Area D: Bealey’s Beck to The Avenue / Walkington; and
- Area E: The Avenue / Walkington to Beverley (OCS zones).

24.6.3 Geology and Topography

24. This section summarises the baseline geological information for the Onshore Development Area as presented by the BGS. Additional stratigraphy (such as glaciolacustrine) will be included as part of the deposit model in later sections but not discussed here. Underlying bedrock geology across the site is mapped by the BGS as comprising three units of chalk (BGS, 2024). Where the Project makes landfall in the north-east (Area A), the bedrock is of Rowe Chalk Formation. It consists of white, flinty chalk, with occasional and irregular bands of marl, which formed between approximately 83.7 and 66 million years ago (MA), within the Cretaceous period. The majority of the Onshore Development Area (Area A to Area E) is situated upon the older Flamborough Chalk Formation, dated to between *c*. 85.7 and 72.2MA. It is described as white, well-bedded, flint free chalk, with common seams of marl. The furthest inland (Area C to Area E), and oldest bedrock, is of Burnham Chalk Formation, formed between approximately 93.9 and 89.4MA. The Burnham Chalk comprises white, thinly bedded chalk with common tabular and discontinuous flint bands and marl bands.

25. Superficial deposits mapped by the BGS vary across the Onshore Development Area, and include units deposited during both the Pleistocene and Holocene. However, across almost the entire Onshore Development Area, Pleistocene glacial till is mapped, which is also the earliest superficial geology mapped. Deposited during the Devensian (*c*. 116,000 to 11,800 years ago (BGS, 2024)), the unit comprises very poorly sorted material including grain sizes from clay to boulders. Till was deposited beneath or adjacent to glaciers, as they dropped their sedimentary load or traversed the landscape transporting material.

26. Due to variability, superficial deposits overlying the till are discussed in more detail below and according to route segment.

24.6.3.1 Superficial Geology

24.6.3.1.1 Area A

27. Across the majority of the segment, no later superficial geology is mapped overlying the till. Other deposits are mapped in discrete areas, outlined below.

28. Glaciofluvial deposits, deposited by ice melt beneath or in the proximity of glaciers during warming phases, are mapped along the northern access route from the landfall and on the onshore ECC to the south-west of the landfall. The unit comprises sand and gravel and was deposited during the Devensian (*c*. 116,000 to 11,800 years ago). There are more significant deposits of glaciofluvial sands and gravels to the north of the Onshore Development Area.

29. Lacustrine deposits are present at landfall, to the north on the access route from the landfall, and within the onshore ECC to the south-west. These deposits comprise fine grained deposits, primarily of silt and clay, and may record extents of former meres, as mapped by Sheppard (1976). The sediment may have been brought to the lakes by small streams or by aeolian processes, and they present as well-sorted, bedded sediments. As outlined in a previous GDBA produced for this area carried out for Dogger Bank South Offshore Wind Farms (AOC, 2023), the deposits are likely to have accumulated in depressions in the surface of the pre-Holocene geology, and may represent deposits of the Skipsea Withow Mere studied by Gilbertson *et al*. (1984) and Dinnin and Lillie (1995). Although possibly originally formed towards the end of the Devensian, it is probable that the lakes (or meres) continued to exist into the Holocene.

30. Alluvium, deposited by fluvial processes over the course of the Holocene (up to *c*. 11,800 years ago), within channels or across floodplain environments is mapped within the landfall and the onshore ECC immediately south-west. The deposit is also mapped to the north or the northern access route from the landfall. The deposits comprise primarily fine-grained silt and clay, although coarser material representative of changes in energy is also likely.

24.6.3.1.2 Area B

31. In the north-east of this segment, no superficial geology is mapped overlying the glacial till.

32. Glaciofluvial sands and gravels are mapped across much of the onshore ECC within the south-west of this segment.

33. Holocene alluvium is mapped across a significant portion of the south-west of Area B.

24.6.3.1.3 Area C

34. Glaciofluvial deposits overlie the glacial till in small, isolated areas throughout this segment.

35. Holocene alluvium is widely mapped across Area C, in a broad area in the east and distributed more as channels in the west.

24.6.3.1.4 Area D

36. Few superficial deposits are mapped in this segment. Till is absent in the south-west.

37. Linear deposits of head are mapped in a south-west to north-east alignment through the onshore ECC. Head is a poorly sorted and poorly stratified unit, comprising angular rock debris and clayey soil creep material. It represents the downslope transport of sediment destabilised by solifluction and gelifluction, generally associated with the thawing of ground or thawing of frozen ground. It is most likely to be of Devensian origin (*c*. 116,000 to 11,800 years ago).

38. Glaciofluvial deposits extend into the onshore ECC in the north of the segment, in small, isolated areas.

39. Holocene alluvium is mapped here only in a very small area at the northern end of the segment.

24.6.3.1.5 Area E

40. An absence of till is mapped in the west of the segment.

41. Head is mapped in two small linear positions with a south-west to north-east alignment.

42. Glaciofluvial sand and gravels are mapped in two small, discrete deposits on the south-western edge of the Onshore Development Area, adjacent to OCS Zone 8, as well as a broader area to the south of OCS Zone 4.

43. Holocene alluvium is mapped in a west to east linear deposit through OCS Zone 4.

24.6.3.2 Summary of Geology

44. To summarise, the Onshore Development Area is underlain by solid bedrock of chalk. These are mapped by the BGS (2024) as follows (from oldest to youngest):

- Burnham Chalk Formation (Area C to Area E);
- Flamborough Chalk Formation (Area A to Area E); and
- Rowe Chalk Formation (Area A).

45. Superficial geology mapped by the BGS (2024) includes (from oldest to youngest):

- Glacial Till (Area A to Area E);
- Head (Area D and Area E);
- Glaciofluvial Deposits (Area A to Area E);
- Lacustrine Deposits (Area A); and
- Alluvium (Area A to Area E).

24.6.3.3 Topography

46. Much of the Onshore Development Area is relatively flat. In the west, however, elevation rapidly increases at the scarp of the Yorkshire Wolds, reaching up to *c.* 55m OD (ordnance datum) to the south-west of Beverley.

47. Between the Wolds and the coast, the Hull Valley runs roughly north to south with low elevations of approximately -1 to 3m OD, representing the lowermost elevations across the Onshore Development Area.

48. Eastwards, towards the coast, elevation is generally between approximately 10 and 25m OD.

24.6.4 Archaeological and Historical Background

49. The following background is summarised from **Appendix 24.2 Onshore Archaeological Desk-Based Assessment** (Onshore Archaeological Desk-Based Assessment (ADBA): Royal HaskoningDHV, 2025) and a previous GDBA carried out for Dogger Bank South Offshore Wind Farms (AOC, 2023). This previous project extends from the landfall site at Skipsea in the north-east, moving south-west to Level, and then wraps around Beverley to the north, west, and south. Passing through Routh, Risby, and Woodmansey on route to the substation south of Beverley. Much of this area correlates with that of DBD.

50. The Onshore ADBA Study Area extends 500m from the Onshore Development Area. The Onshore GDBA Study Area extends approximately 1km from the Onshore Development Area.

51. East Yorkshire has a diverse geographical and archaeological environment, with navigable rivers, floodplains, and hill-tops, as well as mineral resources, contributing to the regions' distinctive historic environment (Natural England, 2015; East Riding of Yorkshire Council, 2018).

24.6.4.1 Prehistoric Evidence (*c.* 500,000 BC to AD 43)

52. There are five records of Palaeolithic date recorded within 500m from the Onshore Development Area boundary, recorded in the Humber Historic Environment Record (HER) (Royal HaskoningDHV, 2025). Of these, one is situated within the onshore ECC to the north of Scorborough. A series of enclosures and ditches are identified on aerial photography (MHU6588), with features broadly dated from the Palaeolithic to medieval. The dates are most likely to be at the later end of this range.

53. Two findspots (MHU24122 and MHU24099) record artefacts of Palaeolithic to Mesolithic date within the Study Area. One is of a retouched tool recovered 97m from the access route around New Farm Alke Lane, east of Scorborough (MHU24122), and the other records a blade found along the coastline 203m from the landfall. A flint findspot (MHU17601) mapped 43m north of the onshore ECC.

54. A potential ditch / palaeochannel is mapped 68m to the south of the onshore ECC, and 33m to the west of the West Street access route near Leven. No dateable evidence was recovered. Evidence of Mesolithic occupation in Holderness has been recovered from Brandesburton, Hornsea, Gransmoor, and Skipsea. Such evidence includes barbed points of bone and antler, and a Mesolithic blade core acquired during a fieldwalking exercise at Ulrome (Brigham, 2014). Excavations at Weel have illustrated the potential for preservation of Mesolithic and early Neolithic sites beneath alluvium (Van de Noort and Ellis, 2000), and the earliest evidence of human occupation within the Holderness Plain is attributed to the Mesolithic period (Royal HaskoningDHV, 2025).

55. Finds of waterlogged wooden artefacts and items including quernstones were identified at Round Hill near Ulrome, as well as a Middle Bronze Age to Iron Age ‘lake dwelling’ (Brigham, 2014), indicating relatively continuous prehistoric occupation.

56. During archaeological investigation works associated with the Dogger Bank Wind Farm A and B programme one (Morris, 2021), no features pre-dating the Iron Age were identified. However, 746 residual struck and worked flints were recovered indicative of prehistoric presence in the vicinity of 53058_AOCBH01 (**Figure 24.6-3**), corresponding with other evidence of early prehistoric activity in the area. Numerous palaeochannels were also noted during this investigation.

24.6.4.2 Roman Evidence (AD 43 to 410)

57. Roman occupation is evidenced from various finds including pottery assemblages from parts of the Hull Valley (Van de Noort, 2004: 119), varied finds from the cliff and beach at Ulrome (Brigham, 2014), and two Romano-British farmsteads encountered during construction of the bypass at Leven (Brigham, 2014). An aerial photography survey within the Hull Valley (Oakley *et al.*, 2012) shows extensive Iron Age to Roman archaeological remains, particularly features of land division and enclosures. Managed travel through the landscape was indicated by the presence of trackways. Features were identified at 3m OD or higher within the valley, reflecting the probable range in water levels.

58. A network of Iron Age or Roman boundary ditches were identified during archaeological excavations associated with onshore works for Dogger Bank Wind Farm A and B (Morris, 2021), as well as evidence of a small settlement of the same age. This included a ring gully and enclosure ditched, north-east of the geoarchaeological intervention (AOCBH1) near Ulrome.

24.6.4.3 Early Medieval (AD 410 to 1066) to Medieval (AD 1066 to 1600)

59. Environmental evidence indicates a decline in occupation during the early medieval period, and that the area was recolonised in the later medieval (Van de Noort, 2004). Structures such as the motte and bailey castle at Skipsea, and religious houses such as Meaux Abbey and Watton Priory were constructed in the area during this period, indicative of reestablishment of settlement in the medieval. Additionally, moated sites are common in the Hull Valley and Holderness regions, generally constructed between AD 1250 and 1750.

60. The Domesday Survey of 1086 (Open Domesday, 2023) includes most villages within the ADBA Onshore Study Area – including Catfoss, Routh, Sigglesthorne, Skidby, and Skipsea. Beverley was not included in the Holderness area. Excavations at Sigglesthorne found traces of a 13th to 14th century cobbled trackway, which possibly leads from the village of Seaton to Sigglesthorne Church (Carrott, Hall and Jaques, 2003; AOC, 2023). Numerous 13th to 14th and 14th to 15th century field boundaries are also identified.

24.6.4.4 Post Medieval (AD 1600 to 1900)

61. During the post-medieval period, there was large-scale drainage of the area which by the 19th century had transformed the area from wetland to farmland (Van de Noort, 2004). This drainage process included the construction of drains such as the Holderness Drain and Beverley Barmston Drain, as well as the floodwarping of fields. Warping involves the intentional flooding of fields over several years, depositing silt to raise the land elevation and to reduce the risk of flooding (Van de Noort, 2004).

62. Within the 500m Study Area (Royal HaskoningDHV, 2025), there are 49 records of post-medieval date noted within the Humber HER. Of these, 15 are situated within the Onshore Development Area. The majority comprise structures dating to the post-medieval and spanning through the 19th century to modern periods. Full details are outlined in the Onshore Archaeological Desk Based Assessment (Royal HaskoningDHV, 2025).

24.6.4.5 General

63. Settlement overall is concentrated on high ground areas of hills and ridges, although low-lying areas present considerable palaeoenvironmental resource for the study of past environments and climatic conditions (Royal HaskoningDHV, 2025).

64. This wetland environment among low elevations may be the reason for a decline in prevalence of human occupation during the early medieval period. Settlements of medieval and earlier date were established upon higher drier ground, and areas of greater drainage overlying glaciofluvial sands and gravels. Periods of reduced relative sea level (RSL) allowed for regular cultivation and exploitation of the resource rich environment, which is evidenced by previous finds of tools and pottery (AOC, 2023).

65. Palaeoenvironmental surveys undertaken as part of the Humber Wetlands Survey (Dinnin and Lillie, 1995; Van de Noort and Ellis, 1995) suggest some wetland areas have become drier during the Mesolithic, allowing for a wider range of land use. There is also evidence for a transition to an agricultural society during the Bronze Age, in the form of woodland clearance (Van de Noort, 2004).

24.6.5 Geoarchaeological and Palaeoenvironmental Background

66. The following is adapted from the previous GDBA produced for Dogger Bank South Offshore Wind Farm (AOC, 2023).

67. During the latter stages of the last (Devensian) Ice Age, the Hull Valley and Holderness were covered by an ice lobe (North Sea Lobe) extending down the eastern margins of the North Sea Basin as far as North Norfolk, depositing extensive till and glaciofluvial sands and gravels across the region. During the colder Pleistocene periods, global sea levels were substantially lower than today and the Onshore Development Area occupied part of an important location on the western margins of 'Doggerland' now submerged beneath the southern North Sea but which formerly linked the Humber to north-west Europe (Gaffney, Thomson and Fitch, 2007). Following the final retreat of the ice sheet (<13 ka BC), there was a rapid incision of the river valleys down to contemporary sea-level, creating steep sided valleys up to 9m deep (Van de Noort and Ellis, 2000) now largely infilled with Holocene sediment. Large numbers of lakes formed in depressions left in the till (kettle holes and pingos). These water filled depressions are locally known as meres and many were sufficiently deep to ensure the survival of open water into the Holocene (Head *et al.*, 1995). While Hornsea Mere remains as the only larger surviving open water body, a significant number of former meres containing Late Glacial deposits of palaeoenvironmental importance survive across the landscape.

68. Following desk-based geoarchaeological reporting on geotechnical works (AOC Archaeology Group, 2019) which identified peat units (e.g. 51996_BH05-6), a purposive geoarchaeological borehole investigation was undertaken at Ulrome by AOC Archaeology Group in 2020. The investigation followed identification of peat deposits located in the vicinity of the Stream Dyke (Skipsea Drain) as part of geotechnical works for the Dogger Bank Creyke Beck Offshore Wind Farms (AOC Archaeology Group, 2020).

69. The boreholes (AOCBH1 and AOCBH3) revealed a basal sequence of sand deposits interpreted as glacio-fluvial activity from the end of the Devensian glaciation, as noted at Routh Quarry (Geary, 2008). In AOCBH2 this was overlain by over 2m of fine-grained organic silt indicative of low energy deposition, from low moving or standing water, and indicates wetland or marshy conditions. Peat was found to be over 2m in thickness in AOCBH1 and a thin Holocene alluvial silty sand was found to be sandwiched between the peat and underlying Pleistocene units.

70. The presence of organic silt and peat deposits in the boreholes in combination with organic deposits observed during previous phases of work allowed for modelling of the Stream Dyke which was shown to be somewhat wider than the narrow channel of the modern Stream Dyke thus indicating the presence of a wider palaeochannel or a kettle hole. The deeper central channel of the Stream Dyke has been infilled with peat and organic silt alluvium the thickness of which indicates that infilling of the channel / kettlehole was sustained and consistent beyond the early Holocene and thus may preserve palaeoenvironmental evidence for later landscape formation processes.

71. The Neolithic and Bronze Age site at West Furze (Fletcher and Van de Noort, 2007) is located in close proximity and although now a modern and straightened drainage channel, the Stream Dyke is evidently of some antiquity and is mentioned in association with Skipsea Castle in 1546 and in accounts of drainage in Skipsea Parish in 1765 (Allison *et al.*, 2002). Previous studies of kettlehole deposits from Skipsea Withow (Gilbertson, Briggs and Blackham, 1984), Barmston (Brigham and Jobling, 2015) and Hornsea (J. R. Flenley, 1990), have shown them to have Late Quaternary / Holocene origins with long lasting presence in the landscape (Bateman *et al.*, 2015).

72. Palaeoecological studies carried out at Skipsea Withow Mere, (Gilbertson, Briggs and Blackham, 1984), Barmston Mere (Dinnin and Lillie, 1995; Brigham and Jobling, 2015) and Brandesburton (Van de Noort and Ellis, 1995), in Holderness and at Routh Quarry (Geary, 2008) and Gransmoor Quarry (Walker, Coope and Lowe, 1993), in the Hull valley have provided key information about late glacial environments. Studies from Roos Bog Holderness (Beckett, 1981) and Starr Carr in the Vale of Pickering (Day and Mellars, 1996; Taylor and Allison, 2018; Taylor *et al.*, 2018) provide important data for the understanding of past environments in the wider area and in particular provide dated continuous sequences which are largely absent from the Holderness and Hull valley palynological record (Van de Noort and Ellis, 2000). These pollen records have allowed the development of the post-glacial environment in the area to be reconstructed as a series of 'Regional Pollen Assemblage Zones' (Beckett, 1981) that have been tentatively dated (J.R. Flenley, 1990; Lillie and Geary, 1995).

73. The earliest late glacial pollen records date from c. 13,000-12,400 BP and indicate an open landscape with few trees of birch, willow and juniper. Between 12,000 and 11,000 BP an expansion of birch woodland is evident although discrepancies between the records from Gransmoor (Walker, Coope and Lowe, 1993) and Roos Bog (Beckett, 1981) indicate local climatic variations. Between 11,000 and 10,200 BP the pollen records form Roos Bog, Gransmoor and Star Carr all indicate deterioration in climate evidenced by a decrease in tree species and an increase in open ground conditions with herbs suggestive of unleached and calcium-rich soils (e.g. Helianthemum), and woody taxa limited to isolated patches of birch or hazel scrub (Lillie and Geary, 1995).

74. Birch and Scots Pine dominated the area as the tundra-like conditions of the Loch Lomond Interstadial gave way to the early Holocene, with probably smaller areas of juniper and willow between 10,200-9,500 BP. As the climate ameliorated further, hazel and elm began to dominate around 9,500-9,000 BP, with alder also increasing, and ash, lime and oak also appearing, beginning to shade out hazel and some of the other ’pioneer’ species (Lillie and Geary, 1995).

75. Large-scale clearance of woodlands on the dry ground did not happen until the later Bronze Age and Iron Age by which time much of north-east Holderness and the Hull valley was dominated by eutrophic wetlands with transgression and encroachment of intertidal events. Alder dominated the marginal wetlands forming carr woodland, while pine and lime were more prevalent on free-draining soils. Following the elm decline (c. 3,800 cal BC), oak, hazel and lime dominated within woodlands until large-scale clearance from 1,000 cal BC (Van de Noort and Ellis, 1995). Although the earliest evidence for woodland clearance dates to c. 4,000 cal BC, these are typically small-scale and impermanent, being reflected in the archaeological record by evidence of temporary seasonal activity in the form of Mesolithic and Neolithic flint scatters. Investigations at Routh Quarry have shown that Mesolithic groups were exploiting the rich riparian environments of the region in a landscape that exhibited a mixed range of vegetation types (Lillie and Geary, 1995).

76. Palynological investigations at Brandesburton were undertaken following finds of a Maglemosian harpoon (Van de Noort and Ellis, 1995). The pollen diagram from this site is low resolution and focuses on organic material within the sequence. It is interpreted as representative of the Late Glacial, Post Glacial, Atlantic, Sub-boreal and modern periods. During the Late Glacial, birch is the dominant tree taxa accompanied by abundant herbaceous plants such as grasses and sedges. The Post Glacial begins with a dominance of birch, giving way to an expansion of pine and hazel in low frequencies. The Atlantic period is characterised by a sharp rise in alder. Higher up the sequence is a mixed oak forest taxa followed by pollen types associated with deforestation and animal husbandry with modern taxa represented in the final 20 cm of the record (Clark and Godwin, 1957).

77. Records of late Holocene environmental change within the palynological record are constrained due to the effects of post-medieval drainage, arable exploitation and urban and industrial development. Sea-level rise continued until c. 500 BC, followed by drier conditions and a phase of marine regression during the late Iron Age and Romano-British period. Palynological data are sparse for the Iron Age and Romano-British periods. However, the relatively thick sequences of peat recorded within the aforementioned AOCBH1 near Ulrome have been found to preserve palaeoenvironmental proxies, such as pollen.

78. The dates obtained from AOCBH1 span the period from the Mesolithic (7029BP / 5986 – 5842 cal BC) at 2.74m, through the Neolithic (4151BP / 2874 – 2655 cal BC) at 1.66m, to the Bronze Age to Iron Age transition (2464BP / 758 – 421 cal BC) at 0.61m with an estimated sedimentation accumulation rate of 0.06 per 10mm (approximately 16 years per 10mm) between 0.61 – 1.66m and 0.04 per 10mm (approximately 27 years per 10mm) between 1.66 – 2.74m. Although it is probable that sedimentation rates will have varied over time, in response to variations in environmental conditions, these rates provide a good indication that there has been ongoing accumulation of sediment with no evidence of significant hiatuses within the record. Further analysis of these deposits thus may help in establishing a more secure mid-late Holocene sequence for the Onshore Development Area which in turn would contribute to our understanding of local environments, landscape formation processes and anthropogenic activity, prior to its drainage for modern agriculture (Milburn and Robertson, 2022).

79. The landscape of the Onshore Development Area went through a transformation over the course of the post-medieval period, largely as a result of extensive drainage schemes (Sheppard, 1976) gradually reducing the impact and frequency of flooding in the lower lying carrs. Where previously these carrs had been underwater for much of the year, by the mid-19th century they were largely dry (Sheppard, 1976). The move to enclosure also effected a substantial change across north-east Holderness and within the Hull valley. It signified a shift away from the communal, open field methods of the medieval period and reflects an intensification of agriculture during this period. In the 20th century there was a further shift from mixed farming of arable and pastoral to primarily arable use with many former areas of meadow and permanent grassland drained and converted to arable (Middleton, 1995).

24.6.6 Research Aims and Objectives

80. Geoarchaeology is the application of earth science principles and techniques to the understanding of the archaeological record (Historic England, 2015b). It involves the examination of sub-surface deposit sequences, through coring or exposed sections, in order to identify site formation processes or landscape features of archaeological interest. Deposit models are often employed in geoarchaeology, these are conjectural maps and cross-sections used to investigate the archaeological significance, potential impact, or accessibility of buried deposits (Historic England, 2020). Geoarchaeological approaches often form part of a wider programme of archaeological investigation.

81. Archaeological investigations should enhance previous work and provide sufficient information upon which to base effective decisions concerning mitigation. Therefore, an investigation can highlight the need for further archaeological work to either inform planning decisions or fulfil planning conditions.

82. The overall objective for the geoarchaeological desk-based deposit model comprised the review of recent and historic geotechnical and BGS boreholes. Due to the nature of the investigation, assessing the records of historic interventions, no core samples were viewed or retained for geoarchaeological purposes. Geoarchaeological and geotechnical deposit data can be used to identify areas of archaeological potential by characterising the probable nature and depth of sub-surface deposits, so that the impact of the Project can be understood, and informed decisions made regarding appropriate mitigation. As part of this overarching objective and in order to fulfil the general aims, the specific objective of these works for the Project are defined as:

- To review historic or recent deposit records, in order to characterise and model the deposit sequence and its distribution across the Onshore Development Area, so that comment can be made on the archaeological / palaeoenvironmental potential of those sub-surface deposits.

83. The general research questions of the desk-based assessment for the Project are defined as:

- RQ1: What is the distribution, depth, character, date, condition, and significance of the deposit sequence?
- RQ2: What is the palaeoenvironmental potential of the deposits encountered?
- RQ3: What is the extent of archaeological remains and their potential survival across the site?
- RQ4: What is the depth of modern overburden?

84. The specific research questions of the desk-based assessment for the Project are defined as:

- RQ5: How can the deposits across the Onshore Development Area help to improve understanding of the environmental changes during the Mesolithic period, and how people were influenced by and influenced their environment? (SYHERF, 2024: Mesolithic)
- RQ6: What potential do the deposits across the Onshore Development Area present for establishing a higher resolution chronological framework for the Neolithic and Bronze Age? (SYHERF, 2024: Neolithic and Bronze Age)
- RQ7: What is the potential for the deposits to preserve archaeobotanical evidence reflecting changes in crop cultivation? (SYHERF, 2024)
- RQ8: How can the deposits across the Onshore Development Area contribute to the understanding of the distribution, character, and value of wetland and waterlogged archaeology? (HERA, 2024: HERA32)

- RQ9: Can the Project enhance understanding of past changes to the environment and to human activity and can this understanding contribute to the wider discussion about environmental change, particularly climate change? (HERA, 2024: HERA94)

24.6.7 Methodology

24.6.7.1 Origin and Purpose of Deposit Modelling in Archaeology

85. AOC's geoarchaeological methodology conforms to best professional practice as summarised in the appropriate Historic England guidelines for geoarchaeology (Historic England, 2015b, 2020).

86. The purpose of a geoarchaeological deposit model as outlined by Historic England (2020) is to:

- Identify areas of low or high archaeological potential;
- Avoid blanket evaluation coverage and inform appropriate mitigation strategies;
- Aid communication with construction professionals; and
- Facilitate palaeoenvironmental reconstruction.

87. The character and distribution of past human activity can be better understood through the consideration of the past landscape or environmental context. Such an approach is often required by archaeological advisors and the local authority on floodplains where the deposit sequence can vary from thin alluvium or peat, with shallowly exposed ancient land surfaces, to complex and thick sequences of interchanging alluvium and peat, covering deeply buried ancient land surfaces.

88. The topography and nature of the ancient land surface during the early Holocene, the current geological epoch and equivalent to the early Mesolithic (c. 11,500 BP or 10,000 BC), is dictated by and inferred from the surface of the Pleistocene superficial deposits (e.g. brickearth, gravel, and till from the previous epoch) and older solid geology (e.g. mudstone or chalk). Overlying the Pleistocene – or older – deposits, Holocene alluvium may preserve palaeoenvironmental evidence (e.g. pollen, diatoms, ostracods) of landscape development, from local channel migration and vegetation change to regional effects of climate and RSL change. In combination, likely preservation of palaeoenvironmental remains and deposit data (e.g. depth and character) provides a comparative framework to assess archaeological potential. Peat represents vegetated and waterlogged landscapes (e.g. marshland) which developed, within local or regional fluctuations of hydrology. The anaerobic and acidic conditions of the deposit are particularly conducive to organic preservation. Palaeoenvironmental remains from floodplain deposits, especially peat, provide information on the nature and timing of environmental change and the interplay with past human activity (Historic England, 2015a, 2015b).

89. Modelling software (Rockworks & ArcGIS) is often used to create two and three-dimensional deposit models of the buried topography and overlying strata on the site. The data used may be readily available BGS (BGS, 2024) geological information, recent geotechnical data from the client, or data from past archaeological investigations. The depth and distribution of the various deposits is mapped in schematic cross-sections (transects) or plan, showing the elevation (DEM) or thickness (Isopach), of deposits or stratigraphic units. The model often culminates in schematic maps showing areas of archaeological potential.

24.6.7.2 Deposit Model

90. In order to create the deposit model for the Project and Onshore GDBA Study Area (i.e. the Onshore Development Area and its immediate vicinity, up to *c*. 1km away), the geotechnical data was entered into a digital database (Rockworks 20). Any recent geotechnical logs supplied by the Applicant or previous archaeological work onsite were given the prefix ‘CP’ for cable percussion, ‘RT’ for rotary, ‘WS’ for window samples, ‘AH’ for auger holes, ‘TP’ for test pits, or ‘TR’ for trenches. BGS logs (BGS, 2024) added to the database were given a prefix relating to the two-letter grid square of its national grid reference e.g. TQ. A total of 659 sedimentary logs were included in the deposit model. The distribution of this data set is presented on **Figure 24.6-3** to **Figure 24.6-7** and the data references for the sedimentary logs are presented in **Annex 24.6.1**. The numbers of each type are:

- BGS historic deposit data (BGS, 2023): 322;
- GI / SI data: 127;

- AOC deposit data: 207; and
- Other (academic): 3.

91. Each lithology type (gravel, sand, silt, clay etc.) was given a unique colour (primary component) and pattern (secondary component) enabling visual correlation of the sediment components of deposits across the Onshore Development Area and wider Onshore GDBA Study Area. By examining the relationship of the lithology types (both horizontally and vertical) in preliminary and iterative transects, correlations can inform the Project-wide deposit groups. The grouping of these deposits is based on the lithological descriptions, which represent distinct depositional environments, coupled with a wider understanding of the local geological sequences. Thus, a sequence of stratigraphic units ('facies'), representing certain depositional environments, and / or landforms can be reconstructed both laterally and through time.

92. IDW (weighting = two, number of points =12), DEM, and Isopach plots were produced for key deposits (i.e. units defining major changes in the environment and modes of deposition) and surface horizons. These highlight major features of the topography through time. In this respect, the most common surface plot depicts the surface of the Pleistocene (or older) deposits (**Figure 24.6-26** to **Figure 24.6-30**) giving an approximation of the topography of the Onshore Development Area and wider Onshore GDBA Study Area as it existed at the beginning of the early Mesolithic period c 10,000 years ago. The development of the Holocene floodplain is likely to have been influenced by the topography inherited from the Pleistocene / Late glacial period. This surface would have dictated the course of later channels, with gravel high points forming areas of dry land within the wetlands, and lower lying areas forming the main threads of later channels. Many of the additional surface or thickness plots are more representative of deposit survival than time-specific landscapes.

93. The overlying deposit sequence across the Onshore Development Area and parts of the wider Onshore GDBA Study Area depicted by the stratigraphic units, as representative of specific depositional environments and / or landforms laterally and through time for the Onshore Development Area and immediate vicinity, is illustrated in profile or transect form (**Figure 4.6-8** to **Figure 24.6-12**). Such transects present a straight-line or modelled correlation between the data points, extrapolating the stratigraphic units identified within each borehole.

94. By examining the surface and thickness plots in combination with the vertical deposition shown in the transects, areas of archaeological potential can be mapped (**Figure 24.6-54** to **Figure 24.6-58**). These characterise the differing geoarchaeological and archaeological potential and significance of single stratigraphic units, deposit sequences containing multiple stratigraphic units, or specific landforms and depositional environments.

95. The reliability of the model is dependent upon the data upon which it is founded. The borehole logs used for the model within the Onshore Development Area and wider Onshore GDBA Study Area have been interpreted by a geoarchaeologist, but interpretations were limited to historic records and desk-based research. For interpretation of deposits from boreholes beyond the Onshore Development Area and wider Onshore GDBA Study Area, such sources rely upon the accuracy of the original observations.

24.6.8 Deposit Model Discussion

96. Eleven stratigraphic units have been identified across the Onshore Development Area. These units are summarised in **Table 24.6-2** below and listed in stratigraphic order from the oldest at the top to the most recent at the end. The vertical deposit succession is illustrated on the transect(s) drawn for the Project (**Figure 24.6-8** to **Figure 24.6-12**). The major stratigraphic units are also represented by surface and / or thickness plots (**Figure 24.6-13** to **Figure 24.6-53**).

97. The modelling is discussed in regard to the Onshore Development Area and the wider Onshore GDBA Study Area, which is approximately 1km external to the Onshore Development Area.

Table 24.6-2 Summary of Identified Stratigraphic Units (Subdivision of the Holocene Based on (Walker et al., 2012))

<table>
<tr><th>Stratigraphic Unit (facies)</th><th>Lithology / Description</th><th>Chronology</th><th>Environment of Deposition</th><th>Extent of Stratigraphic Unit (facies)</th></tr>
<tr><td>Burnham Chalk Formation, West (grouped as “tertiary bedrock - chalk” to improve deposit modelling)</td><td>White, thinly bedded chalk with common flint bands.</td><td>Turonian to Santonian Age (83.9 to 83.6 million years ago)</td><td>Marine bed deposit</td><td rowspan="2">Surface elevation:
c. -22.5 to 100m OD</td></tr>
<tr><td>Flamborough Chalk Formation, Central (grouped as “tertiary bedrock - chalk” to improve deposit modelling)</td><td>Chalk. White, well bedded, flint-free chalk with common marl seams.</td><td>Santonian to Campanian Age (86.3 to 72.1 million years ago)</td><td>Marine bed deposit</td></tr>
</table>

Stratigraphic Unit (facies)	Lithology / Description	Chronology	Environment of Deposition	Extent of Stratigraphic Unit (facies)
Rowe Chalk Formation, East (grouped as "tertiary bedrock - chalk" to improve deposit modelling)	White, flint-bearing chalk with sporadic marl bands.	Campanian to Maastrichtian Age (83.6 to 66.0 million years ago)	Marine bed deposit	
Pleistocene – Glacial Till 1	Stiff clay with sand, chalk, and gravel. Underlies glaciolacustrine deposits.	Late Pleistocene (*c.* 129,000 to 11,800 years ago)	Glacial conditions, deposited beneath or adjacent to active glaciers	Surface elevation: *c.* six to -five m OD Thickness: *c.* 1.2 to 17.2m
Pleistocene - Glaciolacustrine	Laminated clay, silt, and sand. Sealed beneath till.	Late Pleistocene (*c.* 129,000 to 11,800 years ago)	Lakebed deposits formed during period of glacial recession	Surface elevation: *c.* 13 to -4.5m OD Thickness: Up to *c.* seven m
Pleistocene – Glacial Till 2	Stiff clay with sand, chalk, and gravel.	Devensian (*c.* 116,000 to 11,800 years ago)	Glacial conditions, deposited beneath or adjacent to active glaciers	Surface elevation: *c.* -nine to 100m OD Thickness: up to *c.* 61m
Pleistocene - Glaciofluvial	Primarily sands and gravels.	Devensian (*c.* 116,000 to 11,800 years ago)	Deposited by glacial meltwaters in a warming climate	Surface elevation: *c.* -8.5 to 100m OD Thickness: up to *c.* 18m

Stratigraphic Unit (facies)	Lithology / Description	Chronology	Environment of Deposition	Extent of Stratigraphic Unit (facies)
Late Pleistocene to Early Holocene - Lacustrine	Laminated clay, silt, and sand overlying depressions in the till surface.	Late Devensian (*c.* 116,000 to 11,800 years ago) to Early Holocene / Greenlandian (c 11,650–8,276 BP/9,700–6326 BC)	Lakebed deposits formed in depressions on the surface of the underlying till, following climatic warming and ice melt	Surface elevation: *c.* 3.5 to 14.6m OD Thickness: up to *c.* 5.5m
Holocene - Lower Alluvium	Generally comprising well-sorted material of clay, silt, and sand grain size.	Early Holocene / Greenlandian (c 11,650–8,276 BP/ 9,700–6326 BC) to Mid Holocene / Northgrippian (c 8,276 – 4,200 BP/ 6,326 – 2,250 BC)	Sediments infilling low-lying channel areas or floodplains, deposited under fluvial conditions	Surface elevation: *c.* -3.9 to 7.5m OD Thickness: up to *c.* 5m
Holocene – Organic Deposits	Peat and organic rich clay, silt, and sand.	Mid Holocene / Northgrippian (c 8,276 – 4,200 BP/ 6,326 – 2,250 BC) to Late Holocene / Meghalayan (c 4200 BP/2250 BC onwards)	Wetland environments, low-lying land often comprising floodplain	Surface elevation: *c.* -8.5 to 100m OD Thickness: up to *c.* 6m
Archaeology - undefined	Cut features - undated	Uncertain Date – Holocene (up to *c.* 11,800 years ago)	Infilling of anthropogenic features, likely upon disuse	Surface elevation: *c.* 5.3 to 18.9m OD Thickness: up to *c.* 0.55m

Stratigraphic Unit (facies)	Lithology / Description	Chronology	Environment of Deposition	Extent of Stratigraphic Unit (facies)
Holocene - Upper Alluvium / Warp	Grey and yellow, sand / silt / clay, occasional gravel	Late Holocene / Meghalayan (c 4,200 BP/ 2,250 BC onwards)	Fluvial deposition within channel or floodplain settings; warp is an intentional deposit to raise land elevation	Surface elevation: c. -two to 100m OD Thickness: up to c. 14m
Topsoil and Made Ground	Topsoil: greyish brown, mixed clay to sand often with gravel, occasionally with CBM. Made Ground: concrete, redeposited sediment, anthropogenic material	Post-medieval to modern (19th Century AD onwards)	Reclamation / agriculture	Thickness: up to c. seven m

24.6.8.1 Chalk Bedrock

98. Of the 659 boreholes included in the deposit modelling, 332 recorded chalk bedrock across the Study Area. This provides a suitable dataset for modelling the surface of the chalk.

24.6.8.1.1 Area A

99. The surface of the chalk within the Onshore GDBA Study Area lies between approximately -17.5 and -10.5m OD. The majority of the onshore ECC lies between -15.5 and -13m OD (**Figure 24.6-13**) and is shown to be relatively level in Transect A (**Figure 24.6-8**).

100. The lowest values are located beneath the access route to the north of the landfall at Skipsea, on the coastline (AOC53087_BH001, AOC53087_BH004), as well as a further low area in the south-west of Area A. The lowest value of -18m OD is situated *c.* 1km to the south of the onshore ECC (TA14SW15), likely indicative of glacial erosion of the bedrock surface. The highest elevations are situated to the north of the landfall, external to the Onshore Development Area (AOC53087_BH101) at -3.5m OD.

24.6.8.1.2 Area B

101. Bedrock is recorded between approximately -14 and -9m OD within the onshore ECC and is relatively even throughout (**Figure 24.6-9** and **Figure 24.6-14**). Within the Onshore GDBA Study Area the surface of the bedrock falls to *c*. -15.5m OD to the west of the onshore ECC and rises to approximately -8m OD immediately north-east of this.

24.6.8.1.3 Area C

102. Surface topography of the chalk ranges from *c*. -10 to -12.5m OD (**Figure 24.6-15**), suggesting probable consistent glacial erosion across the area. Three discrete areas of lower surface elevation are evident, one of which is also illustrated in Transect C (**Figure 24.6-10**: TA04NW19).

24.6.8.1.4 Area D

103. Chalk rapidly rises towards the south, ranging from *c*. -10 in the north to 54m OD (**Figure 24.6-16**). This indicates the likely extent of the glacier, with the higher chalk in the south remaining as the glacier passed across the land to the north-east.

24.6.8.1.5 Area E

104. **Figure 24.6-17** illustrates the topography of the underlying chalk bedrock within Area E. It ranges in elevation between approximately 2 and 63.5m OD (**Figure 24.6-17**), with a sharp decline from west to east as illustrated in Transect E (**Figure 24.6-12**). The sharp change in elevation likely again illustrates the extent of glacial erosion of the chalk.

24.6.8.2 Pleistocene – Glacial Till 1

105. A lower, older till unit is identified within nine interventions to the north-west of Area A and Area B, underlying glaciolacustrine deposits. This till represents a period of glaciation prior to melting and re-glaciation. It is only identified with certainty where remains of glacial lakes overlie the till. All instances of this deposit are outside the Study Area.

24.6.8.3 Pleistocene – Glaciolacustrine Deposits

106. Glaciolacustrine deposits are recorded in 13 interventions. They represent lake deposits formed during a warming period of ice melt, when glaciers receded and meltwater inhabited depressions in the underlying surface.

107. The deposits are recorded up to 5.5m thick over 3km to the north-west and west of Area A (**Figure 24.6-18**) and are modelled to extend into the western end of the Onshore GDBA Study Area in Area A. Although this may be the case there are few data points to confirm the continuation of the deposits across this 3km distance and into the onshore ECC within Area A. Deposits of this nature are modelled extending into the north-east of Area B (**Figure 24.6-19**), and external to the Onshore GDBA Study Area to the north-west of Area B and Area C (**Figure 24.6-19** and **Figure 24.6-20**). However, similar caution concerning the deposits modelled in close proximity to the onshore ECC should be employed for Area B as proposed for Area A.

24.6.8.4 Pleistocene – Glacial Till 2

108. Glacial till of probable Devensian (*c*. 116,000 to 11,800 BP) origin is recorded among 571 interventions included within the modelling. It comprises stiff, gravelly clay, with sand and chalk. The deposit may also include the earlier deposit of Glacial Till 1, as it is difficult to distinguish between the two glacial till deposits unless they are separated by the glaciolacustrine deposits identified. As the full thickness of the till is recorded only in approximately half of the interventions where it is recorded, and the unit may include two separate till deposits with unknown boundary depth, thickness plots have not been produced to represent the unit.

109. The surface elevation of the till is represented across the Onshore Development Area in the Pleistocene surface plots (**Figure 24.6-26** to **Figure 24.6-30**). The plots illustrate surface elevation of all Pleistocene units, across most of the area is the till with the exception of areas in which glaciofluvial deposits are mapped.

24.6.8.4.1 Area A

110. The thickness of the till reaches up to approximately 40m, being thickest towards the south-west of the onshore ECC segment (TA15SW15), and *c*.200m to the south of the onshore ECC, external to the Study Area. Across the Onshore GDBA Study Area the majority of the till is recorded between *c*. 20 and 30m in thickness. Thinner deposits are recorded along the coastline.

111. The surface elevation of the till lies between *c*. 6.5 and 16m OD within this segment of the Onshore Development Area, with higher elevations corresponding with lower underlying bedrock surface, and thickest till deposits. This likely reflects the accumulation of sediment concurrent with the path of the glacier, whereby the ice eroded underlying chalk and upon melting deposited its load in the same position. The higher elevations are mapped at the south-western end of the onshore ECC segment. This trend is further illustrated in Transect A (**Figure 24.6-8**).

24.6.8.4.2 Area B

112. Thickness of till within this onshore ECC segment reaches up to *c*. 30m. The thickest deposits are situated in the north-east at the boundary with Area A. The thinnest deposits are approximately 5m thick, in irregularly spaced discrete areas in the centre and south-east of the Study Area.

113. The surface elevation of the till lies between *c*. -5.5 and 14.5m OD within the onshore ECC and reaches down to a minimum of -7.5m OD within the wider Onshore GDBA Study Area (TA15SW2). The highest elevations are in the north-east, illustrated in Transect B (**Figure 24.6-9**), correlating with thicker deposits and indicative of greater glacial activity.

24.6.8.4.3 Area C

114. Till is recorded between approximately five and 22.5m in thickness within this onshore ECC segment. Overall, the thickness is generally between *c*. 7.5 and 15m, suggesting lesser glacial deposition here than towards the coast. Thickness throughout the route within this segment varies based largely on depth of interventions.

115. The surface elevation of the till broadly reflects that of the underlying chalk. It is recorded between *c*. -4 and 10m OD and is relatively level throughout the Onshore GDBA Study Area in this segment of the onshore ECC (**Figure 24.6-10**).

24.6.8.4.4 Area D

116. Thick Pleistocene till deposits are recorded within Area D, reaching up to *c*. 50m towards the centre of the onshore ECC segment (SE94SE49). Thick deposits are also recorded in discrete deposits within the Study Area, within the onshore ECC and up to approximately 820m external to the onshore ECC, reaching up to *c*. 55m. Irregularity of the deposits in this area suggest less significant glacial activity compared with Area A and Area B.

117. Surface elevation rises rapidly within the Onshore GDBA Study Area towards the south-east, going from approximately 10m OD in the north-east to *c*. 96m OD at the south-eastern segment boundary (**Figure 24.6-11**: SE93NE8). This increase reflects that of the underlying bedrock, suggesting minimal glacial erosion. Within the onshore ECC, the maximum elevation is modelled to *c*. 64.5m OD in the south and the minimum elevation, in the north, is *c*. 9m OD.

24.6.8.4.5 Area E

118. The till deposits are generally thinner in this area, reaching up to 20m in thickness immediately east of OCS Zone 8 at a datapoint (TA03NW4) *c*. 120m from the Onshore Development Area boundary.

119. Surface elevation within the Onshore GDBA Study Area ranges between approximately 96m OD (SE93NE8) in the west and -1.5m OD in the east. The sharp decline in elevation from south-west to north-east is illustrated in Transect E (**Figure 24.6-12**).

24.6.8.5 Pleistocene – Glaciofluvial Deposits and Pre-Holocene Surface

120. Glaciofluvial sands and gravels represent the path of meltwater channels produced by declining ice mass upon climatic warming. These may have been beneath or downstream of glacial ice.

121. The unit is recorded among 144 interventions across the modelled area.

122. The glaciofluvial deposits also represent the final unit deposited during the Pleistocene period, and as such the surface topography represents the likely land surface at the beginning of the Holocene (*c*. 11,800 years ago).

24.6.8.5.1 Area A

123. Glaciofluvial deposits are mapped *c*. 340 to 3800m external to the Area A Study Area to a maximum thickness of *c*. 18m (**Figure 24.6-21**). These mapped deposits are modelled to extend into the Onshore GDBA Study Area for this segment from the north and south, and so may survive within the onshore ECC where existing data is lacking, as there is a gap between datapoints on the onshore ECC which aligns with the two areas of glaciofluvial deposits to the north and south. The deposits to the south of the onshore ECC are illustrated in Transect A (**Figure 24.6-8**).

124. The deposits are mapped overlying the lower surface elevations of the underlying till, reflecting probable erosion of this surface by the meltwater channels which led to the deposition of sand and gravel. This is evident in Transect A (**Figure 24.6-8**), which indicates a probable channel in the centre (TA15SE20).

125. The surface elevation of the glaciofluvial and earlier deposits is illustrated on **Figure 24.6-26**. It lies between *c*. 6.5 and 16m OD within the onshore ECC, with the same range in the wider Study Area. The highest elevations are mapped in the south-west of the Study Area, in a raised area extending from the south and *c*. 2km from the onshore ECC (e.g. TA15SW15). This is formed of Pleistocene till, as illustrated in Transect A (**Figure 24.6-8**).

24.6.8.5.2 Area B

126. Glaciofluvial sands and gravels are mapped within the onshore ECC in the south-west, to a maximum thickness of *c*. 3m (**Figure 24.6-22**). Deposits of up to 2.5m thickness are also mapped towards the centre of the segment, as an extension to the thick deposits in the south-west. Transect B (**Figure 24.6-4**) shows the distribution of glaciofluvial deposits in the centre and south-west of Area B, where the surface of the underlying till appears to have been eroded.

127. Surface elevation of the unit ranges between approximately -8.5 (TA15SW2) to 14m OD in the north-east of the Area onshore ECC in Area B (**Figure 24.6-27**). Towards the south-west end of the onshore ECC in Area B the elevation becomes more level, as glaciofluvial deposits overlie the lower till surfaces (**Figure 24.6-4**).

24.6.8.5.3 Area C

128. Within the Onshore GDBA Study Area the glaciofluvial deposits reach up to *c*. 3.5m (**Figure 24.6-23**: TA04NW17), *c*. 90m immediately north of the onshore ECC. The deposits are mapped within the east of the Onshore GDBA Study Area and towards the west in discrete positions. One such discrete glaciofluvial deposit is illustrated in Transect C (**Figure 24.6-10**). The northern access route extending from the onshore ECC passes adjacent to the thickest deposits of this unit mapped in the segment, which are situated *c*. 90m to the north of the onshore ECC boundary.

129. The surface elevation of the glaciofluvial and earlier deposits (**Figure 24.6-28**) is highest in the west of Area C, reaching up to *c*. 7.5m OD, and lowest in the east of Area C at *c*. -4m OD. This decline to the east is further illustrated in Transect C (**Figure 24.6-10**).

24.6.8.5.4 Area D

130. Glaciofluvial sand and gravel is recorded in three locations extending into the Onshore GDBA Area within segment Area D (**Figure 24.6-24**), one *c*. 550m to the north-west of the Onshore GDBA Study Area (SE94SE7, SE97SW57), one in the north-east *c*. 110m outside the Onshore GDBA Study Area (TA04SW167), and one in the south-east within the Study Area, approximately 600m from the onshore ECC (AEG23_BH28). The deposits are not mapped extending into the onshore ECC, although as the isolated incidences represent probable meltwater channels running downslope as linear accumulations, it is probable that similar deposits extend between these incidents and cross the onshore ECC within Area D.

131. Reflecting the topography of the underlying surface (**Figure 24.6-29**), the range in elevation lies between approximately 96m OD in the south (SE93NE8, *c*. 1km from the Development Area) and 7m OD in the north of the Study Area.

24.6.8.5.5 Area E

132. **Figure 24.6-25** illustrates the distribution and thickness of glaciofluvial deposits across Area E. The deposits reach up to 6m in thickness between the onshore ECC routes to the east of OCS Zone 8 (TA03NW420). Further glaciofluvial deposits are mapped to the east, extending into the Onshore GDBA Study Area and *c*. 1.3km from the Onshore Development Area, although closer interventions suggest survival does not extend into the Onshore Development Area.

133. The topography of the glaciofluvial and earlier deposits is represented on **Figure 24.6-30**. In the east it falls to *c*. 13.5m OD from 70.5m OD in the west.

24.6.8.6 Lacustrine Deposits

134. Lacustrine deposits formed within lake environments, locally called meres. These formed in depressions in the surface of the underlying geology, filling with water from melting ice as the climate warmed. These deposits are therefore likely to be of Late Devensian to Early Holocene date. The deposits are recorded within 14 interventions across the centre (Area B) to north-east (Area A) of the modelled area.

135. The deposits comprise primarily fine-grained, minerogenic material, such as clay, silt, and sand. Generally, these are laminated or varved, representative of changes to local depositional conditions.

24.6.8.6.1 Area A

136. Within the landfall, lacustrine deposits reach up to *c*. 5.5m in thickness (**Figure 24.6-31**: Marsters2008_S_Auger). These thick deposits are within the onshore ECC. Transect A (**Figure 24.6-8**) illustrates these deposits overlying till of low surface elevation in the east. The deposits are modelled to extend further inland, continuing towards the south-west (WX_55762_Tr1) with a thickness of approximately 1m.

24.6.8.6.2 Area B

137. The deposits are recorded within the Onshore GDBA Study Area and modelled to potentially extend into the onshore ECC (**Figure 24.6-32**), with a thickness of up to *c*. 5m. The deposits are recorded within nine interventions here in a clustered group, across an area of approximately 300 to 350m, and located *c*. 300m south of the onshore ECC.

24.6.8.7 Holocene – Lower Alluvium

138. Lower alluvium is defined as minerogenic alluvial deposits recorded underlying organic or archaeological deposits. The distinction is made primarily for function of modelling. It comprises sand, silt, and clay, and occasionally gravel where erosion of surrounding deposits has occurred.

24.6.8.7.1 Area A

139. Lower alluvium is not mapped within the Onshore GDBA Study Area in Area A but has been recorded externally to the west of the Onshore Study Area. It is possible that deposits of this nature survive within the Onshore Development Area within Area A, where there is a large void between existing datapoints to the south-west of the landfall.

24.6.8.7.2 Area B

140. The unit is modelled in the south of the onshore ECC segment (**Figure 24.6-33**), with thickness of up to *c*. 1.75m (51996_TP93). This record is situated approximately 100m east of the onshore ECC, and as such it is possible that these deposits continue west as numerous channels are mapped within this area.

141. Transect B (**Figure 24.6-9**) illustrates some of these deposits overlying glaciofluvial sands and gravels (52058_AOCBH5), indicative of continued fluvial activity from the late Pleistocene to the Early Holocene with declining velocity.

24.6.8.7.3 Area C

142. Lower alluvial deposits are modelled to extend into the east of the Onshore GDBA Study Area and onshore ECC, associated with records from Area B, with thickness of up to *c*. 1m (**Figure 24.6-34**). There is an absence of datapoints in this section of the Onshore Development Area, and as such the unit may continue further, corresponding with numerous drainage channels flowing towards the River Hull, which passes through this portion of the onshore ECC in a roughly north-south alignment.

24.6.8.7.4 Area D

143. There is an absence of lower alluvial deposits within the currently available records and deposit model for Area D.

24.6.8.7.5 Area E

144. The deposits are mapped to the north-east of the Onshore GDBA Study Area and modelled to extend within approximately 520m of OCS Zone 4 (**Figure 24.6-35**). These deposits reach up to *c*. 5m in thickness (TA03NE114) and are located adjacent to existing ponds and channels which likely overlie an early Holocene fluvial channel system.

24.6.8.8 Holocene – Organic Deposits

145. Organic deposits representative of wetland development are present among 24 sediment sequences included in the deposit modelling. The deposits comprise peat, and organic silt and clay. These seasonally waterlogged environments are still dry enough to allow vegetation to take hold (woodland or reeds etc).

24.6.8.8.1 Area A

146. Organic deposits are mapped within the landfall (Marsters2008_S_Auger) with a thickness of up to *c*. 1.25m (**Figure 24.6-36**). These are illustrated as well in Transect A (**Figure 24.6-8**), overlying lacustrine deposits in a low-lying position.

147. Thick deposits are also mapped external to the Study Area, and *c*. 1.5 to 2.5km from the onshore ECC, reaching up to approximately 6m in thickness (TA158563.03, TA15NE9, TA15NE1). Deposits may extend into the onshore ECC further but there is an absence of datapoints to the south-west of the landfall in order to confirm this.

148. The surface elevation of the organic and earlier deposits within Area A (**Figure 24.6-40**) lies between approximately 16 and 6m OD, the lowest elevation recorded within the landfall and the highest at the western end of the segment boundary.

24.6.8.8.2 Area B

149. Organic deposits are recorded in the south of this onshore ECC segment, with a thickness of up to *c*. 1.25m (**Figure 24.6-37**: 52058_AOCBH5). The deposits are also represented in Transect B (**Figure 24.6-9**), in the low-lying south-west adjacent to the lowest Pleistocene surface and thick alluvial deposits (51996_BH21, *c*. 400m from the onshore ECC).

150. Surface elevation falls from *c*. 16m OD in the north-east to -4m OD in the south (**Figure 24.6-41**). A depression in the surface is recorded *c*. 600m from the north-west of the onshore ECC (TA15SW2) reaching -8.5m OD, potentially indicating a former channel or similar environment.

24.6.8.8.3 Area C

151. The organic deposits mapped at the south of Area B are modelled to extend into the east of Area C (**Figure 24.6-38**). There are also two instances of organic deposits mapped within the wider Onshore GDBA Study Area to a thickness of *c*. 0.5m (TA04NE20, 51996_TP106).

152. In the east, the surface topography of the organic and earlier deposits fall as low as *c*. -3.5m OD (*c*. 500m from the onshore ECC) and remains relatively flat to the base of the Yorkshire Wolds in the west, lying between approximately 0 and 5m OD across much of the segment (**Figure 24.6-42**). Transect C (**Figure 24.6-10**) illustrates the relatively level surface of the deposit throughout this segment, although represented by till and glaciofluvial deposits. There is an ascent in the west to 7.5m OD.

24.6.8.8.4 Area D

153. There is an absence of organic deposits within the currently available records and deposit model for Area D.

24.6.8.8.5 Area E

154. Two discrete areas of organic sediment are mapped extending into the Onshore GDBA Study Area to the north-east (TA03NE114, *c*. 1.5km from OCS Zone 4) and south-east (TA03SE36/L, *c*. 1.3km from the onshore ECC; **Figure 24.6-39**). None are mapped within the onshore ECC or OCS zones.

155. Surface elevation falls rapidly from the west to the east within this segment, reflecting the underlying Pleistocene and bedrock geology (**Figure 24.6-43**). In the west of the Onshore Development Area, the surface reaches up to approximately 70m OD and falls rapidly to between *c*. 32 and 29m OD within OCS Zone 8. At the easternmost extent of the Onshore Development Area, the surface falls to approximately 10.5m OD (TA03NW117).

24.6.8.9 Archaeology

156. Archaeological remains have been identified in three interventions included in the modelling. These comprise infilled cut features which have been encountered during excavation of exploratory trial pits.

157. A pit feature was encountered external to the Onshore GDBA Study Area to the north-west of Area B. The intervention (AOC53152_TP013) records a pit feature with one fill, inclusions of which include shell fragments. The feature was encountered between 1.00 and 1.20m bgl (6.90 to 6.70m OD) overlying the lower alluvium and sealed by a unit of upper alluvium / warp.

158. Approximately 20m from the onshore ECC boundary in Area C, a linear feature was encountered (AOC53152_TP024) between 0.45 and 1.00m bgl (5.30 and 4.75m OD). The feature is situated between two deposits of alluvial material. The feature contains one fill, comprising soft, friable, mid blue-grey fine sandy clay with occasional orange mottling. This suggests the fill to have been deposited by water of changing level allowing for oxidation. As such, it may be that the feature represents a drainage ditch.

159. A further linear feature was encountered approximately 35m from the boundary of the onshore ECC in Area D (AOC53152_TP051). The feature is situated 0.40 to 0.50m bgl (18.49 to 18.39m OD) and contains one fill.

24.6.8.10 Holocene – Upper Alluvium / Warp

160. An upper unit of minerogenic alluvium or warp is recorded among 151 interventions across the modelled area. Due to the nature of deposition, it is not possible to make distinction between alluvium and anthropogenic warping. Alluvium represents more frequent seasonal or daily inundation and associated deposition of minerogenic material. Warp is late medieval and more commonly post-medieval intentional flooding of land as part of human agricultural activity, to increase the fertility of the soils. Both deposits form as silt and clay units, differentiation between natural alluvium and warp can sometimes be indicated by colour and compaction.

24.6.8.10.1 Area A

161. **Figure 24.6-44** illustrates the thickness and distribution of the upper alluvium / warp across Area A. Within the onshore ECC segment the deposits are predominantly less than 0.25m in thickness, with the exception of the landfall where the deposits reach up to *c*. 1.75m (AOC53087_BH004). The deposits extend into the Onshore GDBA Area from the south as well, where they reach up to *c*. 5.5m thick (TA15SE25, *c*. 2.6km from the onshore ECC).

162. The surface of the unit (and earlier geology) lies between approximately 6.5 and 16m OD, following the surface of underlying deposits but infilling the lowest lying areas and flatting out the topography.

24.6.8.10.2 Area B

163. The unit reaches up to *c*. 14 m in thickness within the Onshore GDBA Study Area of Area B (**Figure 24.6-45**: TA15SW2, *c*. 400m north of the onshore ECC). This corresponds with the depression in the underlying surface topography and indicates the existence of a channel here to be likely. The intervention lies among numerous drainage ditches and channels, and as such it is probable that frequent flooding or water flow occurred prior to the instigation of drainage practices.

164. Towards the south of the onshore ECC section, the deposits are recorded at *c*. 4.75m thickness (531996_BH21) illustrated in Transect B (**Figure 24.6-9**). The thickness of the minerogenic material here, overlying glaciofluvial sands and gravels, suggests a possible channel to have persisted here throughout the Late Pleistocene to Early Holocene. Organic deposits adjacent to this position overlying higher till may represent a floodplain environment associated with the channel (52058_AOCBH5). Given the profile of this possible channel, it is probable that it may continue towards the west and into the onshore ECC.

165. Surface elevation of the alluvium / warp within this onshore ECC section is similar to that of the underlying organic deposits, with an overall levelling caused by infilling of lower-lying areas such as those in the south and the depression to the north-west of the onshore ECC boundary (TA15SW2, *c*. 400m from the onshore ECC) which has been infilled with *c*. 14m of minerogenic material. The surface elevation ranges between approximately -1 and 16m OD.

24.6.8.10.3 Area C

166. Within the Onshore GDBA Study Area of Area C, the unit reaches up to *c*. 8m in thickness (**Figure 24.6-46**: TA04SW28) to the south of the onshore ECC, approximately 12m to the east of the access route leading south (TA04SE33 and TA04SE8/A), and *c*. 7.75m to the north of the northern access route (AEG23_BH15). The deposits are modelled between approximately 1.0 and 2.5m thickness across the majority of the Area C Study Area.

167. Within the onshore ECC, the surface elevation of this unit and those beneath ranges from approximately -1m OD in the east, rising gradually to *c*. 8.5m OD in the west. The topography is relatively level across the onshore ECC segment, as with those below. Transect C (**Figure 24.6-10**) illustrates further levelling led by deposition of this unit in areas of lower underlying surface elevations.

24.6.8.10.4 Area D

168. Upper alluvium / warp is absent across much of Area D (**Figure 24.6-47**). In the centre of the segment, to the west of the onshore ECC, the deposits are recorded in proximity of a minor channel mapped passing through Bishop Burton. The deposits here reach up to c. 4.75m in thickness (SE94SE55). In the north of the segment lesser sediments of a thickness of up to c. 2m are recorded (e.g. SE94SE45), illustrated in Transect D (**Figure 24.6-11**).

169. The surface of the upper alluvium / warp and underlying geology shows little change, lying between *c*. 8.5m OD in the north and *c*. 69m OD in the south.

24.6.8.10.5 Area E

170. At the eastern extent of the onshore ECC within Area E, upper alluvium / warp is recorded to reach up to *c*. 4.25m in thickness (**Figure 24.6-48**: TA03NW177, TA03NW3, TA03NW150) in proximity of a minor channel passing Poplar Farm. To the south of the Onshore GDBA Study Area and *c*. 1.5km of the onshore ECC, the unit reaches up to *c*. 5m in thickness (TA03SE159), and the deposits are modelled to extend into the Onshore GDBA Study Area from this position.

171. Surface elevation falls from approximately 71m OD in the west to *c*. 13m OD in the east of the Onshore Development Area.

24.6.8.11 Topsoil and Made Ground

172. A total of 545 records include topsoil or made ground across the modelled area. Of these, 42 record Victorian to modern made ground deposits. These are categorised by their inclusions of recent waste and building material. Thick made ground deposits may also indicate significant disturbance or truncation of underlying geology.

24.6.8.11.1 Area A

173. The thickness and distribution of topsoil and made ground deposits is illustrated on **Figure 24.6-49**. Within the onshore ECC, one intervention records topsoil of *c*. 2m thickness (AOC53087_BH102), which may represent a raising deposit or colluvium. This is also shown immediately south of the onshore ECC (WX_55762_Tr1). Each of these indicate probable deposition of overlying deposits rather than truncation. Thicker deposits are recorded to the west of the northern access route from the landfall (TA15NE7), representative of a former well and thus an isolated truncation feature.

24.6.8.11.2 Area B

174. Within the onshore ECC, topsoil and made ground remain below *c*. 1m in thickness across Area B (**Figure 24.6-50**).

24.6.8.11.3 Area C

175. **Figure 24.6-51** illustrates topsoil and made ground to be of thickness less than 0.5m across the majority of Area C and reaching up to *c*. 1m in the east, *c*. 300m from the onshore ECC.

24.6.8.11.4 Area D

176. The unit exceeds 1m in thickness across much of the central region of Area D (**Figure 24.6-52**). Due to the low frequency of datapoints within this part of the onshore ECC, modelling may not be representative in this area. Datapoints such as SE94SE28, where made ground is *c*. 5m thick and undefined, influence a large portion of the model. However, numerous other datapoints also record topsoil and made ground in excess of 1m and thus potential truncation or disturbance is likely in this segment.

24.6.8.11.5 Area E

177. The majority of the segment is sealed with up to 0.5m of topsoil or made ground (**Figure 24.6-53**). However, heavy truncation is indicated to the west of OCS Zone 4, where deposits are recorded at up to *c*. 4m thickness among seven interventions. In the east, a group of datapoints external to the Onshore Development Area record topsoil or made ground of up to *c*. 0.75m thickness.

24.6.8.12 Deposit Model Reliability and Limitations

178. Although there is a large quantity of datapoints available across the modelled area, there are portions of the Onshore Development Area where data is not available. For example, within Area A, there is a gap of approximately 4km between datapoints where there are no others within proximity external to the boundary. There are also voids in the dataset elsewhere, such as the east of Area C, parts of Area D, and the west of Area E. Modelling across these areas is therefore unlikely to be of a high accuracy.

179. BGS data often lacks detail information, and although interpretation is often possible based on key features, many descriptions are very brief and contain only a few words. For example, many descriptions cite ‘clay’ which may describe alluvium or till.

180. To support the validity of the model there are also many records from recent geotechnical and geoarchaeological investigations which provide accurate measurements and detailed descriptions.

181. Overall, the models can be considered moderately reliable for interpreting deposits and illustrating their distribution where frequency of data points is high. However, their reliability reduces in areas with fewer data points.

24.6.9 Archaeological and Palaeoenvironmental Potential

24.6.9.1 Wider Context

182. The impacts of the North Sea Lobe are evident across the Onshore Development Area and Onshore Study Area. The North Sea Lobe is part of the wider ice sheet which was present across the North Sea during the Devensian and extended into north-eastern England. Within Area A to Area C and Area E, low chalk surface elevations and thick overlying glacial till indicate glacial scouring of the landscape. Area D retains high elevations, marking the probable western extent of the glacier. This correlates with the extent of ice locked lakes to the west and moraines to the east as mapped by Britice (University of Sheffield, 2024). In the north (Area A and B) there is evidence for two phases of glaciation separated by warming which resulted in the formation of lakes within depressions on the surface of the earlier till. These deposits may present potential for preservation of palaeoenvironmental remains pertaining to this warming period, providing opportunity for investigation of Pleistocene environmental conditions and changes.

183. Final retreat of the ice sheet (<13 ka BC) led to the incision of river valleys with continental uplift as ice weight on the land decreased, which formed deep, steep-sided valleys up to 9m in depth (Van de Noort and Ellis, 2000). Depressions in the surface of the till once again infilled with water forming lakes, or meres, many of which survived into the Holocene (Head *et al.*, 1995). Such features are evidenced towards the north-east of the Onshore Development Area, between Area A and Area C. Accumulation of sediment within these environments provides stratified remains representative of development in the landscape and environment.

184. As outlined in section 24.6.5, previous studies at Skipsea Withow Mere (Gilbertson, Briggs and Blackham, 1984), Barmston Mere (Brigham and Jobling, 2015) and Hornsea Mere (J. R. Flenley, 1990), have recovered palaeoenvironmental and palaeoecological remains associated with the Late Pleistocene and persisting into the Holocene (Bateman *et al., 2015)*. Studies from Roos Bog Holderness (Beckett, 1981) and Starr Carr in the Vale of Pickering (Day and Mellars, 1996; Taylor and Allison, 2018; Taylor *et al.*, 2018) provide context from the wider environment, and notably include continuous, dated sequences. These pollen records have allowed the development of the post-glacial environment in the area to be reconstructed as a series of 'Regional Pollen Assemblage Zones' (Beckett, 1981) that have been tentatively dated (J.R. Flenley, 1990; Lillie and Geary, 1995).

185. The ongoing Skipsea Landscape project, which focuses on the ancient lakes of Skipsea, including the Skipsea Bail Mere lies within the landfall. This is an ongoing research project exploring an area of ancient lakes at Skipsea, East Yorkshire, conducted by the University of York. Investigations associated with the project, including sampling for paleoenvironmental remains from this area as well as other nearby lacustrine sequences identified, presents potential for enhancing the findings of this study with wider context for localised variation. Any data made available from the Skipsea Landscape Project can be added to the deposit model when it is updated.

186. Palaeoecological studies have identified the earliest Late Glacial pollen to indicate an open landscape with few trees of birch, willow, and juniper, between *c*. 13,000 to 12,400 BP. From 12,000 to 11,000 BP there is evidence for an expansion of birch woodland, although local variation is suggested from differences in records from Gransmoor (Walker, Coope and Lowe, 1993) and Roos Bog (Beckett, 1981). Evidence from the Onshore Development Area could be compared with these to enhance the spatial resolution of localised variation and potentially identify landscape features which correlate with these variations, due to the breadth of the Project. Pollen records from Roos Bog, Gransmoor, and Star Carr all indicate deterioration in climate with a decline in arboreal taxa and increase in open ground conditions between 11,000 and 10,200 BP. It is probable that any well preserved palaeoenvironmental remains from organic and lacustrine sequences, sampled as part of future investigations for the Project, would be an invaluable modern update and contribution to the important regional narrative for landscape development that already exists. Such comparisons can be applied to records relating to sediments throughout the Holocene.

187. River valleys are indicated by deposit records across all segments of the Onshore Development Area, generally showing continuation of activity from late glacial meltwater to Holocene fluvial systems.

24.6.9.2 Realisation of the Research Aims

188. Drawing on the results presented in section 24.6.8, the following is concluded in relation to the evaluation aims, objectives and research questions detailed in section 24.6.6:

189. The general research questions of this assessment for the Project are defined as:

- RQ1: What is the distribution, depth, character, date, condition, and significance of the deposit sequence?
  - The deposit sequence across the modelled area includes a basal unit of three chalks with a combined elevation between approximately -22.5 and 100m OD, with higher elevations generally recorded in the west (Area D) and lower elevations towards the centre (Area B and Area C). The unit itself presents little archaeological or palaeoenvironmental potential, however archaeological remains may survive on its surface;
  - An earlier glacial till deposit (glacial till 1) is recorded with a surface between approximately six and five m OD, and a thickness of up to *c*. 17.2m. The deposits present very low potential for archaeological and palaeoenvironmental remains, but as with the chalk, archaeological remains may survive on its surface. As this unit is distinguished as underlying glaciolacustrine deposits, remains are unlikely to be in situ and date to the Palaeolithic;
  - Glaciolacustrine deposits are recorded between approximately 13 and -4.5m OD with a thickness of up to *c* 7m. The unit presents potential for reconstruction of environmental conditions during a warm period between glaciations and may also contain remains of Palaeolithic origin.
  - The main unit of glacial till (glacial till 2) underlies the majority of the Onshore Development Area. It presents very low preservation potential although its surface may present archaeological remains of any date from the end of the Devensian to the present;
  - Glaciofluvial deposits of sand and gravel are present in the Onshore Development Area with thickness of up to *c*. 18m, and surface elevation between approximately -8.5 and 100m OD, based on models across the full area. The deposits present potential for preservation of archaeological remains of late Upper Palaeolithic to Early Mesolithic, although not in situ. Additionally, such deposits provided well drained and oftentimes higher ground compared with surrounding wetland, and therefore provide suitable locations for settlement or continuous human activity;

  - Late Pleistocene to Early Holocene lacustrine deposits are recorded with surface elevation between *c*. 3.5 and 14.6m OD, and thickness of up to approximately 5.5m. The deposits present potential for recovery of stratified palaeoenvironmental remains representative of landscape and environment conditions during the Pleistocene to Holocene transition, as well as possible archaeological remains associated with acquisition of associated resources;
  - Lower alluvium is defined as Holocene minerogenic alluvial material recorded beneath archaeological remains or organic deposits. These deposits are recorded at up to *c*. 5m thick, and with surface elevation between *c*. -3.9 and 7.5m OD. The deposits present potential for preservation of palaeoenvironmental remains, as well as sealing earlier archaeological remains or containing contemporary remains;
  - Holocene organic deposits comprising peat, organic silt, and organic clay are present with thickness of up to *c*. 6m and surface elevation between approximately -8.5 and 100m OD based on the full modelled area. Organic deposits represent former wetland environments and have high potential for preservation of organic material such as wood. They therefore present high potential for palaeoenvironmental reconstruction as well as presenting potential for the recovery of archaeological remains associated with wetland resource gathering and processing;
  - Archaeological features were encountered in three previous interventions, including cut features. Potential for further archaeological remains in proximity to these is high, and the fills of such features may contain evidence for land use associated with the period in which the feature infilled;
  - Upper Holocene alluvium or warp is present across the modelled area with thickness of up to *c*. 14m and surface elevation modelled to between *c*. -2 and 100m OD. The deposits may seal earlier archaeological remains, contain contemporary remains, and preserve palaeoenvironmental material;
  - Topsoil and made ground are combined in one unit and recorded at up to 7m thick. Deposits in excess of 1m are uncommonly recorded across the modelled area. These deposits present low potential for preservation of remains, and thick deposits suggest probable truncation or disturbance of underlying geology;
- RQ2: What is the palaeoenvironmental potential of the deposits encountered?
  - Holocene organic deposits present greatest potential for preservation of palaeoenvironmental remains, in particular plant macrofossils and pollen;

    - Minerogenic material from fluvial and lacustrine settings is likely to preserve palaeoenvironmental remains, particularly diatoms and ostracods;
    - It is probable that any well preserved palaeoenvironmental sequences, identified within the Onshore Development Area, would be an invaluable modern update to the important regional narrative for landscape development that already exist;
- RQ3: What is the extent of archaeological remains and their potential survival across the site?
    - Archaeological remains are identified in three interventions included in the deposit modelling for the Onshore Development Area, which includes cut features unlikely to occur in isolation. There are also numerous archaeological remains known in the wider region and as such there is potential for further remains to be encountered.
- RQ4: What is the depth of modern overburden?
    - Modern overburden reaches up to *c*. 7m in thickness across the Onshore Development Area, with the majority of thick modern deposits indicated to lie within Area D in the west. Across the majority of the modelled area these deposits do not exceed 1m in thickness.

190. The specific research questions of this assessment for the Project are defined as:

- RQ5: How can the deposits across the Onshore Development Area help to improve understanding of the environmental changes during the Mesolithic period, and how people were influenced by and influenced their environment? (SYHERF, 2024: Mesolithic):
    - Deposits such as the lacustrine, alluvial, and organic units present potential for recovery of evidence pertaining to environmental conditions and changes during the Mesolithic period. Lacustrine deposits especially present potential for this as their accretion likely began prior to the onset of the Mesolithic and as such capture the earliest changes during the time period.
- RQ6: What potential do the deposits across the Onshore Development Area present for establishing a higher resolution chronological framework for the Neolithic and Bronze Age? (SYHERF, 2024: Neolithic and Bronze Age):
    - Increasing sedimentation and flow in fluvial environments associated with agriculture result in formation of both minerogenic flood deposits and organic wetland deposits. These deposits likely preserve remains of organic material suitable for radiocarbon dating to place changes into chronological context and improve understanding of landscape chronology for the period.

- RQ7: What is the potential for the deposits to preserve archaeobotanical evidence reflecting changes in crop cultivation? (SYHERF, 2024):
  - Archaeobotanical evidence of crop cultivation, such as plant macrofossils or pollen, may be preserved in Holocene deposits such as peat or alluvium. Such deposits are mapped in various places along the Onshore Development Area as highlighted by the Areas of Potential (AoPs) discussed below;
- RQ8: How can the deposits across the Onshore Development Area contribute to the understanding of the distribution, character, and value of wetland and waterlogged archaeology? (HERA, 2024: HERA32);
  - Organic deposits along the Onshore Development Area present potential for understanding the distribution and nature of wetland and waterlogged archaeology. Their spatial interaction with other units such as alluvium may indicate the extent of flooding for example and indicate the areas which presented as dry in the past and where related archaeological remains may survive;
- RQ9: Can the Project enhance understanding of past changes to the environment and to human activity and can this understanding contribute to the wider discussion about environmental change, particularly climate change? (HERA, 2024: HERA94);
  - Evidence of the influence of humans on their environment through woodland clearance and agriculture is likely reflected in the sedimentary record, and the subsequent impact of changes to the landscape on human activity and settlement may be represented by archaeology buried by alluvium, for example; and
  - It is probable that any well preserved palaeoenvironmental sequences, identified within the Onshore Development Area, would be an invaluable modern update to the important regional narrative for landscape development that already exists.

24.6.9.3 Archaeological Potential and Significance

191. Archaeological and palaeoenvironmental potential is strongly linked to depositional environment and the types of deposits present. The potential of each deposit is outlined in **Table 24.6- 3** below.

Table 24.6-3 Archaeological and Palaeoenvironmental Potential of Deposits Within the Onshore Development Area

Stratigraphy	Archaeological Potential	Palaeoenvironmental Potential
Tertiary Bedrock – Chalk (Burnham, Flamborough, and Rowe	Archaeological remains are not expected within this unit but where not deeply buried may be cut into its surface (see Glacial Till 2). Low Significance × Low Probability = Low Potential	Palaeoenvironmental remains of archaeological interest are not expected within this unit. Low Significance × Low Probability = Low Potential
Pleistocene – Glacial Till 1	Archaeological remains are not expected within this unit but may survive on / within its surface (see Glacial Till 2). Probability is lower as this unit is deeper and earlier. Low Significance × Very Low Probability = Low Potential	Palaeoenvironmental remains of archaeological interest are not expected within this unit. Low Significance × Low Probability = Low Potential
Pleistocene – Glaciolacustrine Deposits	Archaeological remains of Palaeolithic date (e.g. worked lithics, faunal remains) may survive in these deposits, although not likely to be in situ. These deposits are likely to be deep enough to be unaffected by works where they have been mapped within the Onshore Development Area. Low Significance × Low Probability = Low Potential	Palaeoenvironmental remains associated with a period of warming during the Pleistocene may survive within this unit. Moderate Significance × Low Probability = Low to Moderate Potential
Pleistocene – Glacial Till 2	Archaeological remains are not expected within this unit, but at higher elevations there is potential for drier land surfaces directly adjacent to the coast or inlet channels. Easy access to the nearby and rich wetland resource may have promoted longer term human activity and potentially settlement at this location. Archaeological remains associated with the prehistoric onwards may survive on (e.g . worked flint scatters, remains of burning or resource processing), or cut into (e.g . pits, linear features, structures), the surface of the Pleistocene till, sealed by overlying deposits and potentially protected from modern disturbance. Moderate Significance × Moderate Probability = Moderate Potential	Palaeoenvironmental remains of archaeological interest are not expected within this unit. Low Significance × Low Probability = Low Potential

Stratigraphy	Archaeological Potential	Palaeoenvironmental Potential
Pleistocene – Glaciofluvial	Rare palaeolithic archaeological remains (e.g. worked lithics, faunal remains) may be found within this unit but would be ex-situ and likely abridged. Later features may be cut into its surface (see below). The deposits were also preferable for settlement, particularly during the medieval, due to their superior drainage. Higher Palaeolithic significance could potentially result if rare types of worked lithics are found or are associated with contemporary faunal remains. Such association may remain if the material has not undergone erosion and transport over long distances, for example. High to Moderate Significance × Very Low to Moderate Probability = Moderate Potential	The nature of the deposits (coarse grained and aerated) indicates very little palaeoenvironmental potential in these areas due to poor preservation. Although rare evidence of soil formation may be apparent in the surface of these deposits. Moderate Significance × Very Low Probability = Low Potential
Lacustrine Deposits	These deposits may contain archaeological remains associated with acquisition of lake resources or may bury earlier archaeological remains. Due to the lacustrine and wet environment, archaeological remains are anticipated to be rare. However, if they do occur, they may be deeply buried, predating lake development or expansion, or be limited to marginal areas and associated with acquisition of lake resources (e.g. trackways, fish traps, processing tools). Due to the waterlogged depositional environment, remains of organic artefacts or structures may be well preserved even if rare, and as such may raise the significance. Moderate Significance × Very Low Probability = Low Potential	These deposits likely comprise fine grained sediment of clay to sand particle size. The sediments are likely to be laminated with small changes in lithology representative of changes to the local environment. The deposits likely illustrate the environmental changes of the Pleistocene to Holocene transition. Moderate Significance × Moderate Probability = Moderate Potential
Holocene – Lower Alluvium	Earlier prehistoric archaeological remains may be sealed within or beneath these deposits.	Palaeoenvironmental remains may be preserved within alluvial deposits, though with a lower quality and quantity than those within organic deposits due to the energy of deposition and nature of preservation.

Stratigraphy	Archaeological Potential	Palaeoenvironmental Potential
	Any remains will be associated with short-term activity by past people including cut features, tools, and structures, potentially associated with the exploitation of rivers or wetlands. Archaeological remains preserved within the deposits would be unlikely to be in situ considering the alluvial nature. Low to Moderate Significance × Low to Moderate Probability = Low to Moderate Potential	However, these remains may still be sufficient for producing a reconstruction of the hydrological or environmental conditions. Moderate Significance × Moderate Probability = Moderate Potential
Holocene – Organic Deposits	In-situ archaeological remains may be preserved upon or within the organic deposits themselves (e.g. trackways, fish traps), or earlier remains may be sealed beneath them (e.g. cut features, flint tools) from the period prior to wetland development. Due to the wetland nature of the landscape represented, any archaeological activity will reflect short-term or seasonal activity and not long-term permanent activity. The organic deposits have formed on the margins of rivers, across their floodplains, or within abandoned channels, and would have provided a valuable wetland resource for prehistoric hunter-gatherer communities due to the rich habitat (e.g. fish, fowl, reeds etc). Archaeology associated with its exploitation may be present (e.g. trackways, jetties, fish traps). These remains may date to the prehistoric onwards. High Significance x Low Probability = Moderate Potential	Organic deposits have a high potential for preserving palaeoenvironmental remains including plant macrofossils, pollen, diatoms, and ostracods for the reconstruction of past climate and environment. This includes identifying human influences on the environment through agriculture or forest clearance. Material suitable to radiocarbon dating is also likely to be preserved within these deposits, which can be used to place palaeoenvironmental reconstructions within a local and regional chronological framework. Moderate Significance x High Probability = Moderate to High Potential
Holocene – Upper Alluvium / Warp	Later prehistoric and onwards archaeological remains may be sealed within or earlier archaeology beneath these deposits.	Palaeoenvironmental remains may be preserved within alluvial deposits, though with a lower quality and quantity than those within organic deposits due to the energy of deposition and nature of preservation.

Stratigraphy	Archaeological Potential	Palaeoenvironmental Potential
	Any remains will be associated with short-term activity by past people including cut features, tools, and structures, potentially associated with the exploitation of rivers or wetlands, or wider agriculture. Archaeological remains preserved within the deposits would be unlikely to be located in situ considering the alluvial nature. Low to Moderate Significance × Low to Moderate Probability = Low to Moderate Potential	However, these remains may still be sufficient for producing a reconstruction of the hydrological or environmental conditions. Moderate Significance × Moderate Probability = Moderate Potential
Made Ground / Topsoil – Victorian to Modern	Remains are likely to be Victorian to modern and be related to the recent agriculture or industrial development. Very Low Significance × High Probability = Low Potential	Palaeoenvironmental remains of archaeological interest are not expected within this unit. Low Significance × Low Probability = Low Potential

192. Based on distribution and character of the deposit sequence, as identified above, areas of archaeological and palaeoenvironmental potential have been mapped for the Project. These are shown on **Figure 24.6-54** to **Figure 24.6-58** and the differing character and potential of each area is outlined in **Table 24.6-3** and **Table 24.6-4**.

Table 24.6-4 Archaeological and Palaeoenvironmental Potential of Areas Within the Onshore Development Area

AoP	Character of Area	Extent of Area
1	Holocene organic, alluvial, and Pleistocene to Holocene lacustrine deposits. Likely preservation of palaeoenvironmental remains, and possible archaeological remains within or beneath the deposits. Area also includes: Topsoil and Made Ground Pleistocene - Glaciofluvial Deposits Pleistocene – Glacial Till Pleistocene – Glaciolacustrine Deposits Tertiary Bedrock - Chalk	Within the landfall (Area A), the onshore ECC (Area B, Area C), and within the wider Onshore GDBA Study Area of all areas except for Area D.

AoP	Character of Area	Extent of Area
2	Glaciofluvial sands and gravels. Potential favourable positions for continuous human activity and settlement due to drainage. Often higher ground compared with surrounding wetland. Also includes: Topsoil and Made Ground Pleistocene - Glacial Till Pleistocene – Glaciolacustrine Deposits Tertiary Bedrock - Chalk	Most prevalent within Area B, although extends into the Onshore Development Area within Area C and Area E. External to the Onshore Development Area in Area A and Area D.
3	Near-surface till and chalk. Potential for archaeological remains near to the current ground surface, with low probability for existing heavy truncation. Also includes: Topsoil and Made Ground	Most prominent mapped area of potential throughout the Onshore GDBA Study Area.
4	Deep topsoil and made ground deposits, indicative of possible truncation and disturbance of underlying geology. Also includes: Pleistocene – Glacial Till Tertiary Bedrock – Chalk	Primarily mapped in Area D. Small, isolated areas within Onshore GDBA Study Area of Area A, B, C, and E.

24.6.10 Conclusions and Recommendations

193. The following section reviews the significance of the results of the geoarchaeological desk-based deposit model in relation to the Project and makes recommendations for an appropriate investigation strategy.

194. The currently proposed onshore components of the Project will include deep intrusive groundworks within the landfall at Skipsea (Area A) and proposed converter stations to the south of Beverley (OCS Zone 4 and Zone 8, Area E), as well as shallower intrusive groundworks of *c.* 1.5m depth on the route of the onshore ECC. The Project is expected to have most significant impacts on the underlying geology in the landfall and onshore converter station areas.

195. Although it is difficult to ascertain with certainty the potential of the deposits to contain archaeological remains, the characteristics of the observed deposits suggest that any archaeological remains are likely to be present in low frequency although they are likely to be found near known archaeological remains and be associated with all periods from the Palaeolithic onwards. Where the surface of chalk or glacial till is at a lesser depth (within the extent of the intrusive groundworks) below ground level (AoP3), it is more probable that cut features or structures would be encountered. The impact on these could be adequately mitigated by a programme of archaeological evaluation trenching, targeting these confirmed shallow surfaces.

196. The nature of the deposits observed suggests any palaeoenvironmental remains will be of greatest frequency in the lower lying areas of Area A and B and associated with fluvial valleys and lakes represented by alluvium, peat, and lacustrine deposits (AoP1). The impact on these deposits could be adequately mitigated by a programme of purposive geoarchaeological borehole evaluation, to identify the extent, depth, and quality of such deposits. Palaeoenvironmental assessment should be carried out on these samples where necessary, to clarify their preservation quality and identify their potential for full reconstruction.

197. It would also be pertinent to carry out investigation where large voids in the data are present, for example the onshore ECC route within Area A is presently placed within AoP3 due to an absence of data along approximately 4km of the route.

198. The appropriate mitigation strategy for the Project should be discussed and agreed with the ETG7 (Onshore Archaeology) as part of the Evidence Plan Process. Recommendations should be reviewed upon completion of each phase of investigation.

199. The following section makes more specific recommendations for appropriate mitigation strategy based on identified and modelled deposits throughout the proposed Onshore Development Area, and the identified reliability and limitations of the dataset and deposit models.

24.6.10.1 Area of Potential One – Holocene Alluvium, Organic, and Lacustrine Deposits

200. AoP1 is mapped within Area A to Area C and Area E. The greatest potential within AoP1 is for preservation of archaeological and palaeoenvironmental remains within or beneath the alluvial, organic, or lacustrine deposits. The sediment sequences present high potential for the preservation of palaeoenvironmental remains which can be utilised in the interpretation of past environmental conditions, such as hydrology and vegetation of the immediate and wider area. Environmental change can be reconstructed using these remains, including the impact of human activity on the environment through, for example, woodland clearance and crop cultivation.

201. To form a greater understanding of the nature and potential of the deposits, a staged approach is suggested for investigation within AoP1.

- A watching brief or monitoring exercise should be carried out on any geotechnical investigations within the vicinity of AoP1. Findings from this exercise may enable the scope for any purposive geoarchaeological boreholes; and
- Purposive geoarchaeological boreholes could be carried out in areas where the Project will disturb deposits of archaeological or palaeoenvironmental potential to target the deposits and to determine their presence, extent, and potential for preservation for palaeoenvironmental and archaeological remains. Investigation of these deposits subsequent to any monitoring of GI interventions, should involve purposive boreholes and sampling. Recommendations for placement of the purposive boreholes are displayed on **Figure 24.6-54** to **Figure 24.6-58** (Arch_BH1 to Arch_BH29):
    - One borehole (Arch_BH1) is recommended in the landfall between previous boreholes. Where a *c*. 4km gap between datapoints is shown throughout the onshore ECC to the south-west of the landfall, monitoring of GI interventions should be carried out to identify and characterise sediments and determine any requirement for any additional purposive geoarchaeological boreholes;
    - Arch_BH2 to Arch_BH5 are placed targeting positions where Holocene alluvium and lacustrine deposits are modelled within the onshore ECC and in proximity of current watercourses;
    - Arch_BH6 to Arch_BH8 aim to determine the width of mapped alluvial and organic deposits across the valley;
    - Arch_BH9 and Arch_BH10 are proposed to the north of AoP1 where datapoints are absent to determine presence or absence of Holocene alluvium and organic deposits; and

- Within OCS Zone 8, boreholes Arch_BH11 to Arch_BH23 are proposed with a grid distribution to determine the character of underlying geology where large scale, deep impacts are expected and current datapoints are absent. Arch_BH25 to Arch_BH29 are distributed across the north-west of OCS Zone 4 for the same purpose.

24.6.10.2 Area of Potential Two – Glaciofluvial Deposits

202. Glaciofluvial deposits, characterising AoP2, are mapped within the Onshore Development Area in Area B, C, and E. The main potential of these deposits includes the preservation of palaeolithic archaeological and macrofauna remains within them, as well as the potential for later archaeological remains on their surface:

- Where these deposits are near-surface and may be investigated within archaeological evaluation trenches, sondages should be implemented as part of those investigations. However, where this is not the case it may be necessary to conduct a palaeolithic trial pit exercise to a depth of *c*. 1.2m bgl in order to obtain optically stimulated luminescence samples to date the glaciofluvial deposits and determine their archaeological potential. A representative sample of excavated glaciofluvial material should also be sieved for artefacts and macrofauna remains; and
- Such approaches should be considered at the boundary of Area B and Area C where glaciofluvial deposits are modelled across a valley, as well as to the north-west of proposed borehole points Arch_BH3 to 5. It should also be considered for Area E where glaciofluvial deposits are mapped on the border of the onshore ECC route and may survive within areas where there is an absence of datapoints.

24.6.10.3 Area of Potential Three – Near-Surface Till

203. Large portions of the Onshore Development Area lie within AoP3 where till is mapped immediately beneath shallow topsoil or made ground deposits. The main potential of this AoP is the preservation of archaeological remains on the surface, which could date from prehistoric times or later. Within this area, such remains are likely to be less deeply buried, making them more likely to be found during excavation or other intrusive works:

- The surface of the till is within *c*. 1.0m of the ground surface across the majority of Area A, parts of the north and centre of Area B, the majority of Area C, the north and south of Area D, and most of Area E across the west, centre, and north; and
- These areas likely remained as dry land during the Holocene, and as such near surface archaeology is expected. Therefore, investigation is recommended to entail initial geophysical survey and standard archaeological evaluation trenching.

24.6.10.4 Area of Potential Four – Thick Topsoil and Made Ground Deposits

204. Overall, AoP4 is characterised by thick topsoil or made ground deposits which may indicate modern truncation or disturbance of underlying geology, and as such a low potential for the survival of archaeological and palaeoenvironmental remains:

- AoP4 is mapped in Area A, reflecting thick overlying topsoil of *c*. 2m. This may represent reworking of the surface, although records indicate survival of Holocene geology beneath the unit; and
- Elsewhere, these thick modern deposits are modelled widely across Area D, and to the north-west of OCS Zone 4 on the southern outskirts of Beverley.

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List of Acronyms

Term	Definition
ADBA	Archaeological Desk-Based Assessment
AEG	Allied Exploration & Geotechnics
AoPs	Areas of Potential
BC	Before Christ (used to indicate that a date is before the Christian era)
BGL	Below Ground Level
BGS	British Geological Survey
BP	Before Present
DBA	Desk Based Assessment
DBD	Dogger Bank D
ECC	Export Cable Corridor
EIA Report	Environmental Impact Assessment Report (note that the new EIA Directive refers to an EIA Report and not an Environmental Statement)
EPP	Evidence Plan Process

Term	Definition
ETG	Expert Topic Group
GDBA	Geoarchaeological Desk Based Assessment
HER	Historic Environment Record
HERA	Historic England Research Agenda
KA	Thousand Years Ago
MA	Million Years Ago
NGR	National Grid Reference
NMP	National Mapping Programme
OCS	Onshore Converter Station
OD (m OD)	Ordnance Datum (meters above Ordnance Datum)
OS	Ordnance Survey
PEIR	Preliminary Environmental Information Report
RSL	Relative Sea Level

Annex 24.6.1 Deposit Model Data References

Deposit Log	Easting	Northing	Elevation (m OD)	Source
51996_BH01	517163	458062.4	8.05	AOC
51996_BH02	517074.2	458103.2	10.271	AOC
51996_BH03	517109.3	457980.5	9.398	AOC
51996_BH04	516977.4	458008.8	10.772	AOC
51996_BH05	515347.1	456352	3.107	AOC
51996_BH06	515327.3	456331	3.022	AOC
51996_BH07	514217.1	455354.6	9.88	AOC
51996_BH08	514184.6	455337.1	9.576	AOC
51996_BH09	513705.3	454398	12.797	AOC
51996_BH10	513709.3	454350.8	13.289	AOC
51996_BH11	513298.1	452591.7	16.725	AOC
51996_BH12	513248.2	452597.9	16.34	AOC
51996_BH13	512267.6	451346.2	9.978	AOC
51996_BH14	512245.6	451303.4	9.685	AOC
51996_BH15	512068.3	450929	9.627	AOC
51996_BH16	511997.2	450854.4	10.451	AOC
51996_BH17	511938.1	450728.6	11.328	AOC
51996_BH18	511814.3	450626.8	10.041	AOC
51996_BH19	508645.2	447207.1	0.522	AOC
51996_BH20	508645	447177.7	0.142	AOC
51996_BH21	508568.6	445000.9	-0.254	AOC
51996_BH22	508554.1	444925.1	-0.059	AOC
51996_BH24	507888.9	442129.1	4.082	AOC
51996_BH25	507423.8	441053.7	0.71	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
51996_BH26	507359.3	441043.9	0.998	AOC
51996_BH27	507099.3	440981.2	0.141	AOC
51996_BH28	507085.2	440947.3	0.607	AOC
51996_BH29	506649.1	438158.8	1.062	AOC
51996_BH30	506532	438160.2	0.844	AOC
51996_BH31	506453.3	438103.9	1.094	AOC
51996_BH32	506337.7	438102.8	1.074	AOC
51996_BH33	506260.2	438010.2	1.679	AOC
51996_BH34	506155.1	437984.2	1.725	AOC
51996_BH35	505803.4	437673.9	3.075	AOC
51996_BH36	505758.5	437599.1	2.243	AOC
51996_BH37	504762.7	436193.7	6.805	AOC
51996_BH39	503949	435956	12.613	AOC
51996_BHCS01	504100.5	436252	12.056	AOC
51996_BHCS02	504009.4	436250.3	12.86	AOC
51996_BHCS03	503916.3	436249.6	14.077	AOC
51996_BHCS04	503916.3	436153.8	14.222	AOC
51996_BHCS05	504019	436157.3	12.704	AOC
51996_BHCS06	504105.2	436154.1	12.231	AOC
51996_BHCS07	503913.5	436058.2	13.94	AOC
51996_BHCS08	504015.4	436083.4	13.118	AOC
51996_BHCS09	504109.2	436067	12.833	AOC
51996_BHCS10	503993.8	436017.7	13.148	AOC
51996_BHCS11	504073.3	435985.2	12.959	AOC
51996_BHCS12	504154.1	435943.7	12.613	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
51996_TP01	517137.1	458150.6	9.156	AOC
51996_TP02	517189.2	457972.5	5.313	AOC
51996_TP03	517093.5	458042	9.483	AOC
51996_TP04	517028.1	458070.2	10.21	AOC
51996_TP05	517047.3	457975.3	10.133	AOC
51996_TP06	516952.1	458020.6	11.491	AOC
51996_TP07	516966.1	457981.9	10.783	AOC
51996_TP103	508618.4	444344.5	0.227	AOC
51996_TP104	508605.3	444047.4	0.197	AOC
51996_TP105	508613.8	443996.9	0.434	AOC
51996_TP106	508758.4	443761.6	0.899	AOC
51996_TP107	508767.9	443728.9	1.737	AOC
51996_TP108	508645.8	443602.6	3.826	AOC
51996_TP109	508637.1	443587.9	3.611	AOC
51996_TP11	516355.7	457247.3	12.161	AOC
51996_TP12	516171.2	457127.4	12.169	AOC
51996_TP13	516144.5	457110	11.771	AOC
51996_TP14	515866.8	456903.7	10.091	AOC
51996_TP21	515132.8	456155.6	9.054	AOC
51996_TP22	514955.1	455990.8	11.821	AOC
51996_TP23	514939.9	455949.2	12.601	AOC
51996_TP24	514791.8	455711.8	16.663	AOC
51996_TP27	514476.3	455524.7	12.444	AOC
51996_TP28	514235.3	455371	10.247	AOC
51996_TP29	514165	455323.4	9.473	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
51996_TP30	514058.4	455039.6	11.213	AOC
51996_TP31	514032.5	455006.9	12.11	AOC
51996_TP32	513913.1	454878.1	14.465	AOC
51996_TP33	513895.1	454855.1	15.102	AOC
51996_TP34	513709.9	454687.2	14.45	AOC
51996_TP34(A)	513709.9	454687.2	14.45	AOC
51996_TP35	513695.8	454419.6	12.932	AOC
51996_TP36	513711.3	454327.7	13.429	AOC
51996_TP37	513729.3	454028.3	13.197	AOC
51996_TP38	513747.8	453724	12.749	AOC
51996_TP39	513750.4	453678.4	12.496	AOC
51996_TP40	513774.6	453291.3	12.013	AOC
51996_TP41	513765	453235.4	12.071	AOC
51996_TP42	513718.2	453193.5	12.606	AOC
51996_TP43	513699.1	452907.1	15.595	AOC
51996_TP44	513698.5	452869.1	16.305	AOC
51996_TP45	513705.5	452600.5	16.018	AOC
51996_TP46	513335.4	452596.8	17.367	AOC
51996_TP55	512282.2	451369.4	10.408	AOC
51996_TP56	512237.4	451282.9	9.649	AOC
51996_TP57	512079.1	450950	9.283	AOC
51996_TP84	508688.7	447810.2	2.33	AOC
51996_TP87	508642.6	447229.1	0.073	AOC
51996_TP88	508664.6	447171.9	0.288	AOC
51996_TP89	508672.7	446660.8	1.614	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
51996_TP90	508688.9	446637.3	1.288	AOC
51996_TP91	508753.4	446513.4	2.593	AOC
51996_TP92	508746.5	446479	3.68	AOC
51996_TP93	508738.7	446181.4	-0.359	AOC
51996_TP94	508725.2	445874.4	-0.077	AOC
51996_TP95	508722.9	445824.9	-0.297	AOC
51996_TP96	508660.2	445512.1	-0.257	AOC
51996_TP97	508644.5	445464.9	-0.349	AOC
51996_TP98	508570.3	445027.2	-0.151	AOC
51996_TPCS01	504181.7	436265.7	11.214	AOC
51996_TPCS02	504068.4	436263.7	12.76	AOC
51996_TPCS03	503967.6	436262.6	13.314	AOC
51996_TPCS04	503916.9	436208.1	14.057	AOC
51996_TPCS05	504038.9	436178.9	12.705	AOC
51996_TPCS06	504103.1	436210.5	11.814	AOC
51996_TPCS07	503969.5	436153.2	13.597	AOC
51996_TPCS08	503920.2	436103.9	13.555	AOC
51996_TPCS09	503966.1	436071.1	13.174	AOC
51996_TPCS10	504117.2	436123.8	12.587	AOC
51996_TPCS11	503958.3	436022.6	13.738	AOC
51996_TPCS12	504036.6	435985.3	12.46	AOC
51996_TPCS13	504073	436031.5	13.246	AOC
51996_TPCS14	504118	435997.4	12.972	AOC
52058_AOCBH1	515317	456325	3	AOC
52058_AOCBH10	508660	447488	2.5	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
52058_AOCBH11	508647	447293	1.3	AOC
52058_AOCBH12	505432	437424	3.8	AOC
52058_AOCBH13	505285	437362	4.2	AOC
52058_AOCBH2	515214	456239	6.4	AOC
52058_AOCBH3	515447	456483	6.3	AOC
52058_AOCBH4	508730	446025	-0.1	AOC
52058_AOCBH5	508695	445664	-0.2	AOC
52058_AOCBH6	507049	440549	-1	AOC
52058_AOCBH7	511175	449367	7.9	AOC
52058_AOCBH8	510931	449230	5.9	AOC
52058_AOCBH9	508686	447634	2.7	AOC
AEG23_BH01	515278.1	459553.1	7.41	AEG
AEG23_BH02	515313.9	459606.2	7.291	AEG
AEG23_BH03	513706.1	457503.8	5.598	AEG
AEG23_BH04	513614.8	457298.2	5.382	AEG
AEG23_BH11	505371	449987.2	2.426	AEG
AEG23_BH15	502540.7	447486.9	5.238	AEG
AEG23_BH16	502609.7	447527.9	4.875	AEG
AEG23_BH17	502603.5	447475.7	5.214	AEG
AEG23_BH18	502539.1	447551.7	5.331	AEG
AEG23_BH21	500624	441139	30.855	AEG
AEG23_BH22	500688	441178.9	30.324	AEG
AEG23_BH23	500513.9	439722.1	41.555	AEG
AEG23_BH24	500496	439653.1	42.679	AEG
AEG23_BH25	502117.6	435385.3	34.644	AEG

Deposit Log	Easting	Northing	Elevation (m OD)	Source
AEG23_BH26	502171	435324	36.084	AEG
AEG23_BH27	516609.3	461022	5.816	AEG
AEG23_BH27A	516609.4	461021.9	5.968	AEG
AEG23_BH28	500585.9	438982.6	51.392	AEG
AOC53087_BH001	517973.6	455579.1	11.9	AOC
AOC53087_BH002	517732.5	455514.3	8.9	AOC
AOC53087_BH003	517861.5	455538.4	10.49	AOC
AOC53087_BH004	518406	454284.2	10.83	AOC
AOC53087_BH101	517520	455119.1	8.61	AOC
AOC53087_BH102	517654.4	454262.1	8.96	AOC
AOC53087_BH1503	503693.6	436093.9	15.88	AOC
AOC53087_BH301	514510.2	446421.7	13.88	AOC
AOC53087_BH302	514568.6	446123	7.44	AOC
AOC53087_BH501	513733	444760.1	5.53	AOC
AOC53087_BH502	513655.1	444680.4	7.74	AOC
AOC53087_BH503	511433.7	443229	4.35	AOC
AOC53087_BH504	511064.4	442973.8	3.151	AOC
AOC53087_BH505	510855.9	442839.6	4	AOC
AOC53087_BH601	510516.5	442629.4	1.33	AOC
AOC53087_BH602	510424.5	442572.3	0.71	AOC
AOC53087_BH603	510175.6	442461.1	1.79	AOC
AOC53087_BH606	508356.7	442457.8	3	AOC
AOC53087_BH607	508188.2	442620.8	2.32	AOC
AOC53087_BH701	505401.7	442734.9	0	AOC
AOC53087_BH802	505231.6	442727.6	1	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
AOC53087_BH804	503701.4	441711.3	4.25	AOC
AOC53087_BH902	503666.3	441705	4.33	AOC
AOC53087_TP3401	503244.9	436701.1	17.97	AOC
AOC53087_TP3402	503400.2	436676.1	16.62	AOC
AOC53087_TP3403	503389.9	436828.6	15.28	AOC
AOC53087_TP3404	503498.4	436689.1	15.96	AOC
AOC53087_TP3405	503521.1	436737	15.73	AOC
AOC53087_TP3406	503594.2	436816.6	14.85	AOC
AOC53087_TP3407	503649.3	436674.8	13.44	AOC
AOC53087_TP3408	503610.3	436890.1	13.9	AOC
AOC53087_TP3409	503591.7	436962.4	13.26	AOC
AOC53087_TP3410	503739.1	436746.8	12.14	AOC
AOC53087_TP3410A	503735.9	436746.3	12.17	AOC
AOC53087_TP3411	503484.1	437006.9	12.18	AOC
AOC53087_TP3501	501715	436686.7	33.83	AOC
AOC53152_BH10	506634.8	452846.8	2.983	AOC
AOC53152_BH12	504822.1	449533	2.018	AOC
AOC53152_BH13	504485.8	448695.8	1.715	AOC
AOC53152_BH14	504508.3	448988.5	2.383	AOC
AOC53152_BH19	501532.3	446645.6	6.912	AOC
AOC53152_BH20	501446.3	446655.2	7.665	AOC
AOC53152_BH5	511312.2	456420.5	6.887	AOC
AOC53152_BH6	511465.8	456525.6	5.877	AOC
AOC53152_BH7	507380.7	454425.5	3.191	AOC
AOC53152_BH8	507418.9	454496.5	3.275	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
AOC53152_BH9	506605.8	452938.2	1.693	AOC
AOC53152_TP01	516518.4	461217.9	5.648	AOC
AOC53152_TP013	507851.5	454789.5	7.898	AOC
AOC53152_TP017	506048.7	451736.2	3.238	AOC
AOC53152_TP020	504497.4	449344	2.223	AOC
AOC53152_TP023	502848.6	447517	4.892	AOC
AOC53152_TP024	501719.2	446804.2	5.745	AOC
AOC53152_TP025	500954.2	445974	8.12	AOC
AOC53152_TP027	500376.4	444579.2	12.997	AOC
AOC53152_TP028	500460.9	443366	21.881	AOC
AOC53152_TP029	500275.1	442932.6	16.847	AOC
AOC53152_TP03	515728.5	459848	8.333	AOC
AOC53152_TP036	501206.9	436231.8	28.224	AOC
AOC53152_TP039	503478.9	434750.6	14.226	AOC
AOC53152_TP040	503970	434862.5	10.831	AOC
AOC53152_TP044	509401.1	455708.3	8.317	AOC
AOC53152_TP046	505940.3	451213.5	4.438	AOC
AOC53152_TP047	504355.7	448646.2	3.386	AOC
AOC53152_TP048	502071.7	447043.7	6.849	AOC
AOC53152_TP05	513878.6	458322.8	7.746	AOC
AOC53152_TP050	500366.9	443999.4	16.773	AOC
AOC53152_TP051	500253.6	442842.1	18.894	AOC
AOC53152_TP053	501199	436742	40.595	AOC
AOC53152_TP056	500531.3	439597.2	44.709	AOC
AOC53152_TP06	513725.4	457535.8	5.884	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
AOC53152_TP06A	513824.5	457693.8	6.294	AOC
CA23_BH1401	502557.4	436552.9	20.49	CA
CA23_BH1502	503615.6	436130.7	15.93	CA
CA23_BH1504	503898.1	435677.5	12.52	CA
CA23_BH1505	503801.1	435825.1	11.46	CA
CA23_BH1506	503759.8	436033.2	14.6	CA
CA23_BH1601	501832.9	438085.8	50.78	CA
CA23_BH1603	501905.6	437888.2	49.82	CA
CA23_BH1604	502616	437058.2	22.29	CA
CA23_BH1701	502881.2	437024.2	20.3	CA
CA23_BH3401	503328.7	436812.5	15.56	CA
CA23_BH3402	503530.2	436799.8	15.28	CA
CA23_BH3501	501715.4	436686.1	33.83	CA
CA23_BH3502	501980.1	436520.2	29.4	CA
CA23_BH404	513951.6	444961.5	10.05	CA
CA23_BH405	513842.9	444831.9	6.52	CA
CA23_BH604	508508	442293.7	3.24	CA
CA23_BH605	508976.2	442090.6	4	CA
CA23_BH803	503682.5	442112	3.42	CA
CA23_BH901	503648.5	442108.7	4	CA
CA23_TP3501	501770.2	436743.7	33.48	CA
CA23_TP3502	501657	436602.7	33.63	CA
CA23_TP3503	501932.8	436474.3	30.21	CA
CA23_TP3504	501881.5	436729.1	31.62	CA
CA23_TP3505	501658.3	436751.6	34.48	CA

Deposit Log	Easting	Northing	Elevation (m OD)	Source
CA23_TP3506	501741	436506.1	31.7	CA
CA23_TP3508	501922	436659.3	29.69	CA
CA23_TP3510	502264.8	436449.7	26.4	CA
CA23_WS701	505513.6	442692.6	1	CA
CA23_WS702	505496.1	442792.5	1	CA
CA23_WS801	505201	442681.3	0	CA
CA23_WS802	505190	442787.8	1	CA
CA23_WS803	503775.2	442120.5	3.03	CA
CA23_WS804	503794.4	441675.4	4.33	CA
CA23_WS901	503482.7	442102.2	5	CA
CA23_WS902	503550.1	441702.6	4.405	CA
Dennison2011_Tr1_W	516543	454985.8	8.94	Dennison (2011)
HOW04-BH001	503621.4	435234.8	13.698	AOC
HOW04-BH002	503923.8	435225.8	10.461	AOC
HOW04-BH003	503856	435197.8	11.419	AOC
HOW04-BH004	503612	435176.2	13.69	AOC
HOW04-BH005	503879.2	435141.9	11.844	AOC
HOW04-BH006	504019.9	435118.9	11.668	AOC
HOW04-BH007	503595	435088.9	14.353	AOC
HOW04-BH008	503726	435133.6	11.529	AOC
HOW04-BH009	503941	435098	11.859	AOC
HOW04-BH010	503838	435071.8	12.811	AOC
HOW04-BH011	503994.8	435036.3	10.998	AOC
HOW04-BH012	503713.7	435038	13.67	AOC
HOW04-BH013	503857.3	435011.9	12.395	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
HOW04-BH014	504041.1	435043	10.801	AOC
HOW04-BH015	504003.9	434967.7	11.474	AOC
HOW04-CPT001	503666.5	435222.3	13.607	AOC
HOW04-CPT003	503808.1	435197.2	12.284	AOC
HOW04-CPT006	503722.3	435167.1	12.353	AOC
HOW04-CPT013	503637.4	435071.1	14.022	AOC
HOW04-CPT021	503568.1	435125.5	14.704	AOC
HOW04-TP001	503557.4	435216.5	13.766	AOC
HOW04-TP003	503688.2	435190.2	13.116	AOC
HOW04-TP004	503757.8	435193.7	12.465	AOC
HOW04-TP005	503838.6	435181.4	11.881	AOC
HOW04-TP006	503919.2	435203.8	10.548	AOC
HOW04-TP007	503945.5	435160.9	11.388	AOC
HOW04-TP008	504055.5	435110	11.396	AOC
HOW04-TP009	503972	435129.6	11.975	AOC
HOW04-TP010	503852.1	435136.2	12.488	AOC
HOW04-TP011	503748.6	435155.9	12.394	AOC
HOW04-TP012	503703.2	435142.3	12.127	AOC
HOW04-TP013	503544.6	435120.6	15.337	AOC
HOW04-TP014	503597.1	435110.7	14.391	AOC
HOW04-TP015	503669.6	435103.7	13.471	AOC
HOW04-TP016	503748.1	435061.8	14.259	AOC
HOW04-TP018	503905.4	435043	12.003	AOC
HOW04-TP019	503986.7	435026.3	11.145	AOC
HOW04-TP020	504077.1	435033.9	10.803	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
HOW04-TP021	503690.6	435030.3	13.675	AOC
HOW04-TP022	503769.1	435017.7	13.504	AOC
HOW04-TP023	503849.8	434997.3	12.525	AOC
HOW04-TP024	503998.2	434962.3	11.436	AOC
HOW04-TP025	504108.9	434971.8	10.48	AOC
HOW04-TP028	504024.9	435066.4	11.044	AOC
HOW04-TP029	504051	435051.3	11.034	AOC
HOW04-TP101	503442.5	435131.1	16.263	AOC
HOW04-TP102	503379.2	435118.7	16.906	AOC
HOW04-TP103	503303.4	435172.1	17.563	AOC
HOW04-TP104	503285.1	435262.8	17.225	AOC
HOW04-TP105	503325.7	435359.6	16.573	AOC
HOW04-TP106	503337.7	435468.8	17.128	AOC
HOW04-TP107	503349.8	435585.2	18.337	AOC
HOW04-TP108	503404	435690.8	16.048	AOC
HOW04-TP109	503498.2	435786.7	14.867	AOC
HOW04-TP110	503522.1	435897.1	14.865	AOC
HOW04-TP111	503540	435980.1	13.056	AOC
HOW04-TP112	503570.2	436090.7	14.715	AOC
HOW04-TP113	503561.8	436163.3	16.519	AOC
HOW04-TP114	503520.8	436225.4	17.093	AOC
HOW04-TP115	503445.7	436281.9	17.813	AOC
HOW04-TP116	503330	436319.5	18.571	AOC
HOW04-TP117	503291.9	436386.3	15.906	AOC
HOW04-TP201	503042.8	434972.4	19.838	AOC

Deposit Log	Easting	Northing	Elevation (m OD)	Source
HOW04-TP202	503138	434997.2	18.267	AOC
HOW04-TP203	503235.8	435070.7	18.456	AOC
HOW04-TP204	503249.2	434983.2	17.589	AOC
HOW04-TP205	503319.9	435083.9	17.292	AOC
HOW04-TP206	503345.8	434997.5	17.246	AOC
HOW04-TP207	503398.4	435068.9	17.024	AOC
HOW04-TP208	503459.4	435027.3	16.403	AOC
HOW04-TP210	503093.5	434783.7	22.193	AOC
HOW04-TP212	503200.1	434790	19.979	AOC
HOW04-TP213	503278.8	434882.9	17.52	AOC
HOW04-TP214	503296.9	434824.1	18.402	AOC
Marsters2008_S_Auger	518366.2	454612.7	6	Marsters (2008)
SE93NE1	499712	438503	58.52	BGS
SE93NE10	499300	439300	55	BGS
SE93NE11	498600	438400	0	BGS
SE93NE14	497726	437743	0	BGS
SE93NE2	498584	439781	45.72	BGS
SE93NE5	499574	437033	68	BGS
SE93NE8	497600	436300	97	BGS
SE93NE9	499560	439260	52	BGS
SE93NW13	494300	439200	109	BGS
SE93SE7	497430	433780	97.54	BGS
SE93SE8/A	498830	433845	69.19	BGS
SE93SE82	499700	433900	89	BGS
SE94NE11	498872	445256	22.25	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
SE94SE13	498584	441930	35.53	BGS
SE94SE15	498737	442069	32	BGS
SE94SE17	498730	442110	35	BGS
SE94SE18	498488	441879	38.1	BGS
SE94SE19	499339	441942	21.03	BGS
SE94SE2	498553	442326	27.13	BGS
SE94SE20/A	499347	442087	32	BGS
SE94SE20/B	499367	442038	32	BGS
SE94SE22	498607	441992	35.96	BGS
SE94SE23	498833	442025	32	BGS
SE94SE24	498787	441836	30.48	BGS
SE94SE26/B	498539	440164	51.82	BGS
SE94SE28	498945	440057	7.32	BGS
SE94SE3	497406	441691	51.82	BGS
SE94SE33	497133	440683	52.04	BGS
SE94SE35	499620	443190	30	BGS
SE94SE43	499700	443900	0	BGS
SE94SE45	499950	444130	4.1	BGS
SE94SE47	499250	441210	30	BGS
SE94SE48	499270	441190	26	BGS
SE94SE49	498240	442480	39	BGS
SE94SE51	498400	441900	38	BGS
SE94SE55	498750	440350	44	BGS
SE94SE57	496580	444260	36.57	BGS
SE94SE7	496580	443453	36.57	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
SE94SE8	498219	443626	29.87	BGS
TA03NE114	505000	438300	2.5	BGS
TA03NE118	505000	435300	6	BGS
TA03NE119	507260	436650	2.5	BGS
TA03NE14	507885	436929	5	BGS
TA03NE150	503630	435660	16	BGS
TA03NE152	507900	436930	5	BGS
TA03NE157	506660	437050	2.13	BGS
TA03NE166	505500	437980	4.57	BGS
TA03NE169	506280	437420	4	BGS
TA03NE17	506678	437039	2.13	BGS
TA03NE175	509400	439800	5	BGS
TA03NE184	507100	436700	4	BGS
TA03NE194	506700	437500	4	BGS
TA03NE198	509100	437500	6	BGS
TA03NE203	507550	437580	3	BGS
TA03NE207	505100	435100	5	BGS
TA03NE214	507570	437620	3	BGS
TA03NE220	507590	437540	4	BGS
TA03NE221	507600	437470	3	BGS
TA03NE222	507610	437600	4	BGS
TA03NE223	507620	437490	4	BGS
TA03NE227	507900	436900	5	BGS
TA03NE24	505496	437966	4.57	BGS
TA03NE38	505446	436798	3.048	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA03NE41	507114	436921	2.13	BGS
TA03NE413	501600	437800	55	BGS
TA03NE49	506302	437574	4.57	BGS
TA03NE51	507688	436857	3.05	BGS
TA03NE6	509401	439846	6	BGS
TA03NE87	506276	437430	3	BGS
TA03NW1	500092	437722	59.44	BGS
TA03NW12	502636	437414	25.6	BGS
TA03NW126	502500	437630	34	BGS
TA03NW129	502310	437870	42.67	BGS
TA03NW130	502030	438000	50	BGS
TA03NW142/B	501590	437710	54	BGS
TA03NW149	501340	439650	46	BGS
TA03NW150	503630	435660	16	BGS
TA03NW157	502040	435980	30.48	BGS
TA03NW162	504840	436680	8.23	BGS
TA03NW177	503640	435600	15	BGS
TA03NW178	502100	438120	45	BGS
TA03NW2	502038	435986	30.48	BGS
TA03NW20/B	501330	439650	46	BGS
TA03NW282	502680	437130	0	BGS
TA03NW283	502780	436840	0	BGS
TA03NW284	502740	436860	0	BGS
TA03NW285	502720	436810	0	BGS
TA03NW286	502770	436770	0	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA03NW287	502790	436790	0	BGS
TA03NW290	503000	436710	0	BGS
TA03NW292	502780	437590	0	BGS
TA03NW293	502780	437580	0	BGS
TA03NW297	503070	437540	0	BGS
TA03NW3	503619	435653	15	BGS
TA03NW302	503280	437510	0	BGS
TA03NW307	503530	437520	0	BGS
TA03NW312	503759	437660	0	BGS
TA03NW316	503944	437760	0	BGS
TA03NW34	504758	435103	6.1	BGS
TA03NW368	502710	437420	0	BGS
TA03NW370	502690	437220	0	BGS
TA03NW371	502680	437150	0	BGS
TA03NW372	502670	436990	0	BGS
TA03NW373	502710	436890	0	BGS
TA03NW374	502960	436710	0	BGS
TA03NW375	503050	436590	0	BGS
TA03NW376	502780	436720	0	BGS
TA03NW377	502630	436640	0	BGS
TA03NW382	502610	436940	0	BGS
TA03NW383	502602	437456	25.34	BGS
TA03NW384	502560	437439	28.5	BGS
TA03NW385	502536	437437	29.8	BGS
TA03NW386	502559	437471	29.8	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA03NW387	502547	437390	28.8	BGS
TA03NW395	504930	437070	7	BGS
TA03NW4	501889	435925	32.61	BGS
TA03NW410	501600	437800	55.64	BGS
TA03NW420	502100	435800	27	BGS
TA03NW427	501416	439691	43	BGS
TA03NW428	501390	439651	44	BGS
TA03NW429	501409	439678	43	BGS
TA03NW443	503518	435975	0	BGS
TA03NW444	503518	435974	0	BGS
TA03NW445	503518	435973	0	BGS
TA03NW446	503473	435991	0	BGS
TA03NW447	503519	435991	0	BGS
TA03NW452	504041	436151	15	BGS
TA03NW6/B	501590	437710	53.34	BGS
TA03NW67	504825	436678	8.23	BGS
TA03NW7	502030	437990	50	BGS
TA03NW81	504934	437262	6.1	BGS
TA03NW94	502800	437800	27.5	BGS
TA03SE72	505016	434716	7	BGS
TA03SW105	502300	434340	35.8	BGS
TA03SW107	503020	433500	33.53	BGS
TA03SW108	502800	433820	42.26	BGS
TA03SW109	502870	433830	39.11	BGS
TA03SW110	502950	433870	32.199	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA03SW111	503000	433880	34.04	BGS
TA03SW112	502960	433870	33.85	BGS
TA03SW113	503010	433880	33.53	BGS
TA03SW114	503030	433880	32.95	BGS
TA03SW115	503060	433890	31.99	BGS
TA03SW116	503120	433900	29.02	BGS
TA03SW134	501720	433990	33.7	BGS
TA03SW135	501760	434000	33.6	BGS
TA03SW136	501770	433980	34.1	BGS
TA03SW159	503900	433900	13	BGS
TA03SW16	504419	434918	9	BGS
TA03SW168	502600	433240	38	BGS
TA03SW172	502600	433270	39	BGS
TA03SW175	502600	433150	35	BGS
TA03SW177	502600	433400	46	BGS
TA03SW179	502600	433200	37	BGS
TA03SW18	504527	434875	8.5	BGS
TA03SW19	504422	434870	9	BGS
TA03SW20	504658	434944	7.5	BGS
TA03SW36/E	504718	434240	11	BGS
TA03SW36/G	504630	434430	7.62	BGS
TA03SW36/H	504656	434472	7.62	BGS
TA03SW36/I	504830	434580	7.62	BGS
TA03SW36/J	504821	434599	7.32	BGS
TA03SW36/K	504865	434661	7.62	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA03SW36/L	504581	434473	7.62	BGS
TA03SW36/R	504660	434480	7.62	BGS
TA03SW36/S	504730	434530	7.77	BGS
TA03SW36/W	504690	434330	9	BGS
TA03SW36/X	504880	434650	7.62	BGS
TA03SW36/Y	504420	434590	10	BGS
TA03SW47	504145	433898	12.19	BGS
TA03SW48	503940	433850	13.72	BGS
TA03SW54	503016	433506	33.53	BGS
TA03SW56	502564	433792	45.77	BGS
TA03SW70	504249	433628	9.14	BGS
TA03SW98	503940	433850	13.72	BGS
TA03SW99	504250	433630	11	BGS
TA04NE11	506510	448400	2	BGS
TA04NE12	507938	447559	4	BGS
TA04NE18	505674	446085	1.5	BGS
TA04NE20	505080	447840	7	BGS
TA04NE21	506510	449760	10.91	BGS
TA04NE29	508920	447930	3	BGS
TA04NE35	509500	449460	1.58	BGS
TA04NE37	505500	445600	1	BGS
TA04NE64	509980	448300	4	BGS
TA04NE67	505100	445700	1	BGS
TA04NE73	509960	448480	5	BGS
TA04NE78	508944	449823	4	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA04NE79	505462	446069	3	BGS
TA04NW1	501697	445238	7.62	BGS
TA04NW10	501134	445458	7.9	BGS
TA04NW11/A	504970	445760	6	BGS
TA04NW11/B	504970	445750	2.74	BGS
TA04NW13	503003	445985	3.86	BGS
TA04NW14	503080	445574	2.83	BGS
TA04NW15	503211	445045	3.23	BGS
TA04NW17	503300	447070	4	BGS
TA04NW19	503650	446050	6.1	BGS
TA04NW2	504827	445981	4.57	BGS
TA04NW24	501440	446700	9	BGS
TA04NW26	504960	445760	2.4	BGS
TA04NW27	504960	445750	2.74	BGS
TA04NW3	502585	448625	7.62	BGS
TA04NW30	502640	448600	8	BGS
TA04NW31	501710	445240	7.62	BGS
TA04NW32	502800	446200	6.58	BGS
TA04NW33	502850	446620	3.29	BGS
TA04NW36	502900	445100	3	BGS
TA04NW37	502900	445200	3	BGS
TA04NW38	502910	446290	4.69	BGS
TA04NW39	502910	446620	3.45	BGS
TA04NW40	503700	446200	5	BGS
TA04NW41	503180	445130	3.02	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA04NW43	502500	445200	3	BGS
TA04NW44	502700	446400	4.87	BGS
TA04NW45	502700	446600	4	BGS
TA04NW47	502700	446700	6.86	BGS
TA04NW48	502790	446570	4.43	BGS
TA04NW5	504888	445861	4.57	BGS
TA04NW6	501499	446531	7.62	BGS
TA04NW65	510080	448380	4	BGS
TA04NW8/A	503640	446050	6.1	BGS
TA04NW8/B	503650	446070	6.1	BGS
TA04SE15	509611	440541	5	BGS
TA04SE2	505332	442639	2.13	BGS
TA04SE21	506808	442321	5	BGS
TA04SE23	509686	440449	5	BGS
TA04SE3	506548	442842	7.62	BGS
TA04SE33	508910	442820	5	BGS
TA04SE37	506540	442850	7.62	BGS
TA04SE48	509100	442400	5	BGS
TA04SE49	509670	440660	5	BGS
TA04SE51	509600	440600	6	BGS
TA04SE6/C	505920	443510	10.97	BGS
TA04SE7	509160	442265	4.88	BGS
TA04SE76	507400	442400	4	BGS
TA04SE8/A	508910	442820	4.88	BGS
TA04SW100	504030	441270	6	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA04SW111	503040	441180	8	BGS
TA04SW112	503310	441160	6.5	BGS
TA04SW113	503420	441270	6	BGS
TA04SW114	503230	441060	7	BGS
TA04SW115	503370	441270	7	BGS
TA04SW116	503300	441230	8	BGS
TA04SW117	503170	441120	8	BGS
TA04SW118	503240	441150	8	BGS
TA04SW119	503340	441090	10	BGS
TA04SW120	503110	441160	9	BGS
TA04SW131	500060	442920	19	BGS
TA04SW134	501000	441920	23	BGS
TA04SW142	503580	441080	6.096	BGS
TA04SW15	501987	441604	23.73	BGS
TA04SW152	501000	442100	21	BGS
TA04SW16/A	502740	441350	11	BGS
TA04SW16/B	502810	441370	10	BGS
TA04SW167	501210	443500	13	BGS
TA04SW17/A	502652	441540	7.86	BGS
TA04SW17/B	502654	441540	8.01	BGS
TA04SW17/C	502677	441521	8.11	BGS
TA04SW17/D	502618	441531	7.96	BGS
TA04SW17/E	502704	441509	8.53	BGS
TA04SW17/F	502591	441596	7.99	BGS
TA04SW19/A	502948	444954	7.62	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA04SW198	500119	443445	24	BGS
TA04SW199	500129	443444	25	BGS
TA04SW21/A	504838	443438	6.1	BGS
TA04SW21/B	504864	443386	6.1	BGS
TA04SW22	501018	441824	24.38	BGS
TA04SW23	502066	440812	24.38	BGS
TA04SW28	503219	444960	4.87	BGS
TA04SW29	503922	441496	5.83	BGS
TA04SW29/A	503934	441454	5.83	BGS
TA04SW29/B	503922	441496	5.83	BGS
TA04SW29/C	503915	441513	5.83	BGS
TA04SW29/D	503926	441474	5.83	BGS
TA04SW30	503581	441079	6.096	BGS
TA04SW37	500938	443819	6.43	BGS
TA04SW46	500700	442694	21.95	BGS
TA04SW47	500089	441165	31.69	BGS
TA04SW48/A	500563	444754	10.36	BGS
TA04SW48/B	500531	444768	10.36	BGS
TA04SW59	500066	442918	19	BGS
TA04SW72	501010	441930	22	BGS
TA04SW73	502900	440900	11	BGS
TA04SW90	503980	441110	7	BGS
TA04SW93	503760	441070	8	BGS
TA04SW94	503770	441170	8	BGS
TA04SW95	503780	441300	8	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA04SW96	503740	441360	8	BGS
TA04SW97	503890	441330	7	BGS
TA04SW98	503860	441170	7	BGS
TA04SW99	503950	441220	7	BGS
TA05NE25	508800	455580	9	BGS
TA05SE1	506440	451790	6.1	BGS
TA05SE28	506440	451780	12	BGS
TA05SE3	505874	454063	7.62	BGS
TA05SE34	505100	450000	5	BGS
TA05SE40	507410	453770	7	BGS
TA05SE44	507800	451500	11.55	BGS
TA05SE55	508490	454080	4	BGS
TA05SW7	504698	450748	5	BGS
TA14NE14	518500	448400	18.28	BGS
TA14NE4	518540	448360	18.29	BGS
TA14NE5	515330	445350	21	BGS
TA14NE6	518320	448810	18.28	BGS
TA14NW10	514500	448300	16.15	BGS
TA14NW12	511200	445370	8.23	BGS
TA14NW17	511150	445300	6.1	BGS
TA14NW21	513720	445990	15	BGS
TA14NW31	511150	445300	6.1	BGS
TA14NW35	514400	449240	20	BGS
TA14NW59	513550	446220	9.74	BGS
TA14NW60	510000	448400	6	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA14NW61	513560	446310	14.09	BGS
TA14NW62	510000	448500	4	BGS
TA14NW63	513640	445860	12	BGS
TA14NW64	510070	448290	4	BGS
TA14NW66	513720	446250	8.73	BGS
TA14NW67	510100	448480	5	BGS
TA14NW69	510240	448460	5	BGS
TA14NW70	513740	446370	8.91	BGS
TA14NW71	510250	448350	5	BGS
TA14NW72	514000	445900	14	BGS
TA14NW77	511300	445300	8	BGS
TA14NW83	514430	449240	20	BGS
TA14NW84	514460	446500	14	BGS
TA14NW85	514530	446070	14	BGS
TA14NW9/A	514330	446990	14.33	BGS
TA14NW9/B	514250	446980	14.33	BGS
TA14NW90	513490	446360	6.6	BGS
TA14SW13	511270	443530	6.71	BGS
TA14SW20	511290	443520	6.71	BGS
TA14SW22	510700	443100	3	BGS
TA14SW24	512740	444610	7	BGS
TA14SW5	511344	443524	6.71	BGS
TA158558.14	515800	455800	11	BGS
TA158563.03	515800	456300	9	BGS
TA15NE1	516622	459158	9.14	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA15NE12	515300	457800	9	BGS
TA15NE14	517350	456030	9	BGS
TA15NE2	516957	457068	12.19	BGS
TA15NE3	516775	455010	7	BGS
TA15NE7	516960	457070	12.19	BGS
TA15NE9	516600	459140	9.14	BGS
TA15NW10	510018	455654	18.29	BGS
TA15NW11	510000	455800	18	BGS
TA15NW14	510990	457100	7.62	BGS
TA15NW24	512120	457920	5.06	BGS
TA15NW25	512230	457780	11.07	BGS
TA15NW26	512270	457840	10.97	BGS
TA15NW3	510907	457066	7.62	BGS
TA15SE11	517260	451770	0	BGS
TA15SE17	517850	451063	0	BGS
TA15SE18	517860	451100	0	BGS
TA15SE20	517490	451830	14	BGS
TA15SE22	517490	451830	13	BGS
TA15SE25	517700	451490	13	BGS
TA15SE27	517670	451390	10.99	BGS
TA15SE40	517860	451080	10	BGS
TA15SE41	517870	451060	10	BGS
TA15SE42	517850	451040	10	BGS
TA15SW15	514556	451074	19	BGS
TA15SW2	510272	450707	4.57	BGS

Deposit Log	Easting	Northing	Elevation (m OD)	Source
TA16SE29	516700	460600	6	BGS
TA16SW9	514530	460370	10.67	BGS
WX_55762_Tr1	517249.4	453891.4	16.6	Wessex Archaeology

Annex 24.6.2 OASIS Form

OASIS ID (UID): aocarcha1-528990
Project Name: Dogger Bank D Wind Farm Preliminary Environmental Information Report Volume 2. Appendix 24.6 Geoarchaeological Desk-Based Assessment. Document Reference No: PC6250-RHD-XX-ON-RP-EV-0093
Activity type: Desk Based Assessment
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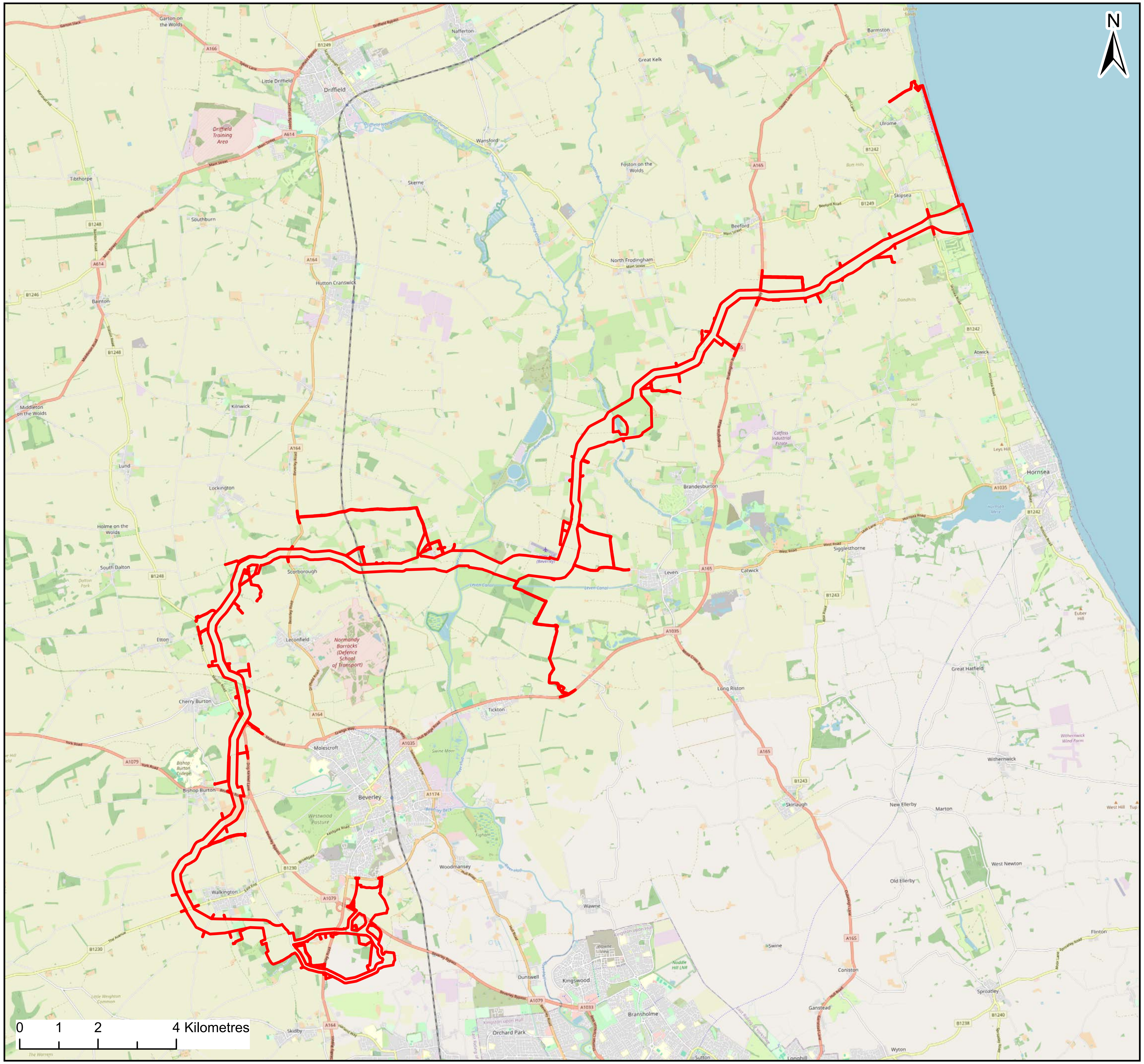
Planning Id: [no data]
Reason for Investigation: Planning requirement
Organisation Responsible for work: AOC Archaeology Group
Project Dates: 23-Oct-2024 - 23-Oct-2024
HER: Historic England review 23 Apr 2025
HER Identifiers: [no data]
Project Methodology: A geoarchaeological desk-based deposit model was undertaken for the site of the Dogger Bank D Wind farm Development. The onshore elements of the Project will include onshore export cables and the onshore converter station(s) (OCS(s)), the route of which (ECC2) extends from the landfall site at Skipsea (NGR: 507149, 444996) and makes its way south-west to the OCS(s) south of Beverley, (NGR: 503270, 436938 and 501011, 435853. The work was undertaken by AOC Archaeology Group for Royal HaskoningDHV. This document summarises the stratigraphic sequence of potential geoarchaeological remains and discusses the results in relation to their archaeological and palaeoenvironmental potential. The principal objective of this report is to present the results, refine the research objectives of the project in light of the findings, and make recommendations concerning any subsequent archaeological investigations in order to address these research objectives. The geoarchaeological desk-based deposit model comprised the review of recent and historic geotechnical and BGS boreholes records. No core samples were viewed or retained for geoarchaeological purposes. Geoarchaeological and geotechnical deposit data can be used to identify areas of archaeological potential by characterising the probable nature and depth of sub-surface deposits.
Project Results: The deposit sequence recorded across the site included an initial deposit of tertiary bedrock of chalk (Burnham, Flamborough, and Rowe Formations), which was encountered between approximately -22.5 and 100m OD. Sharp incline in the south-west indicates the erosional boundary of the North Sea Ice Lobe. An early deposit of glacial till is identified by its position beneath glaciolacustrine deposits, which highlight it as an earlier phase of glaciation than those overlying glaciolacustrine deposits. This earlier till is recorded between c. six and -five m OD. Glaciolacustrine deposits indicative of warming between glacial periods and are recorded with thickness of up to c. 7m and with surface elevation between c. 13 and -4.5m OD. The majority of till is placed within the second, upper group due to an inability to distinguish the two depositional periods within the records. This till seals the glaciolacustrine deposits and is recorded between approximately -9 and 100m OD. Across much of the modelled area this represents the surface at the beginning of the Holocene c. 12,000 years ago. Glaciofluvial sands and gravels representative of glacial meltwater routes are mapped with thickness of up to c. 18m. Lacustrine deposits representative of lakes which formed in depressions on the surface of the till are recorded with up to approximately 5.5m thickness and persisted from the Late Pleistocene into the Holocene. These are mapped towards the north-east of the site. Lower alluvium is defined by its position underlying archaeology or organic deposits and is recorded at up to c. 5m thickness. The deposits often correlate with glaciofluvial deposits, where channels are already established. Organic sequences formed in low-flow channels or in low lying floodplain environments reach up to c. 6m in thickness, and often correlate with alluvial or lacustrine deposits. Archaeology is recorded among three interventions and includes cut features of one pit and two linear features. An upper alluvium or warp unit is present overlying various deposits across the site. Due to the nature of warping practices, it is not possible to

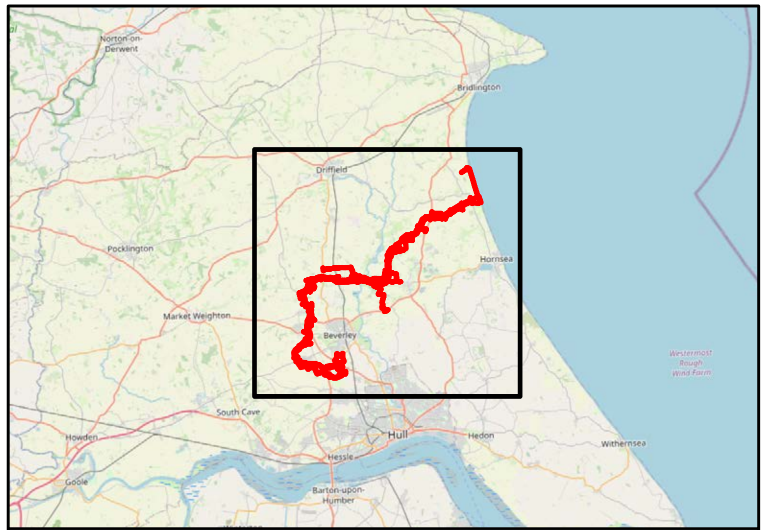
differentiate between natural flood deposits and those intentionally introduced for ground raising. The deposits reach up to c. 14m in thickness and have surface elevation between approximately -2 and 100 m, the higher of which are represented by the Yorkshire Wolds in the south-west. Topsoil and made ground rarely exceed c. 1m in thickness, although in some isolated locations made ground reaches up to approximately 7m. Where the unit is recorded to be that thick it is probable that truncation or disturbance of underlying geology has occurred. Development impacts from the currently proposed landfall, ECC route, and converter stations (Zone 4 and Zone 8) will include excavations. Particularly within the landfall and converter station areas, disturbances are likely to be deep. Underlying geology in these areas are likely to be truncated. It is recommended that the impact on deposits of interest may be mitigated by a programme of archaeological evaluation trenching where the underlying till or bedrock surface is identified to be within c. 1m of the ground surface and potential is identified. Purposive geoarchaeological boreholes should be carried out to target known organic and alluvial sequences in order to characterise the deposits and identify their extent and potential for palaeoenvironmental and archaeological preservation. It is also recommended to infill large voids in the data along the proposed ECC route in order to determine and characterise the underlying geology. The appropriate mitigation strategy for the site will be decided by and agreed with the Local Authority and their archaeological advisors.

Keywords:
Subject/Period: Palaeochannel: UNCERTAIN
FISH Thesaurus of Monument Types
Subject/Period: Lake: UNCERTAIN
FISH Thesaurus of Monument Types
Archive:
Reports in OASIS:

Taylor, J., (2025). *Dogger Bank D Wind Farm Preliminary Environmental Information Report Volume 2. Appendix 24.6 Geoarchaeological Desk-Based Assessment. Document Reference No: PC6250-RHD-XX-ON-RP-EV-0093*. Twickenham: AOC Archaeology. Embargo ends: 23/10/2025

Annex 24.6.3 Figures





Legend

Onshore Development Area

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Project: Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM
Title: Onshore Development Area Location Map	
Figure: 24.6-1	Drawing No: PC6250-AOC-XX-ON-DR-GS-0386

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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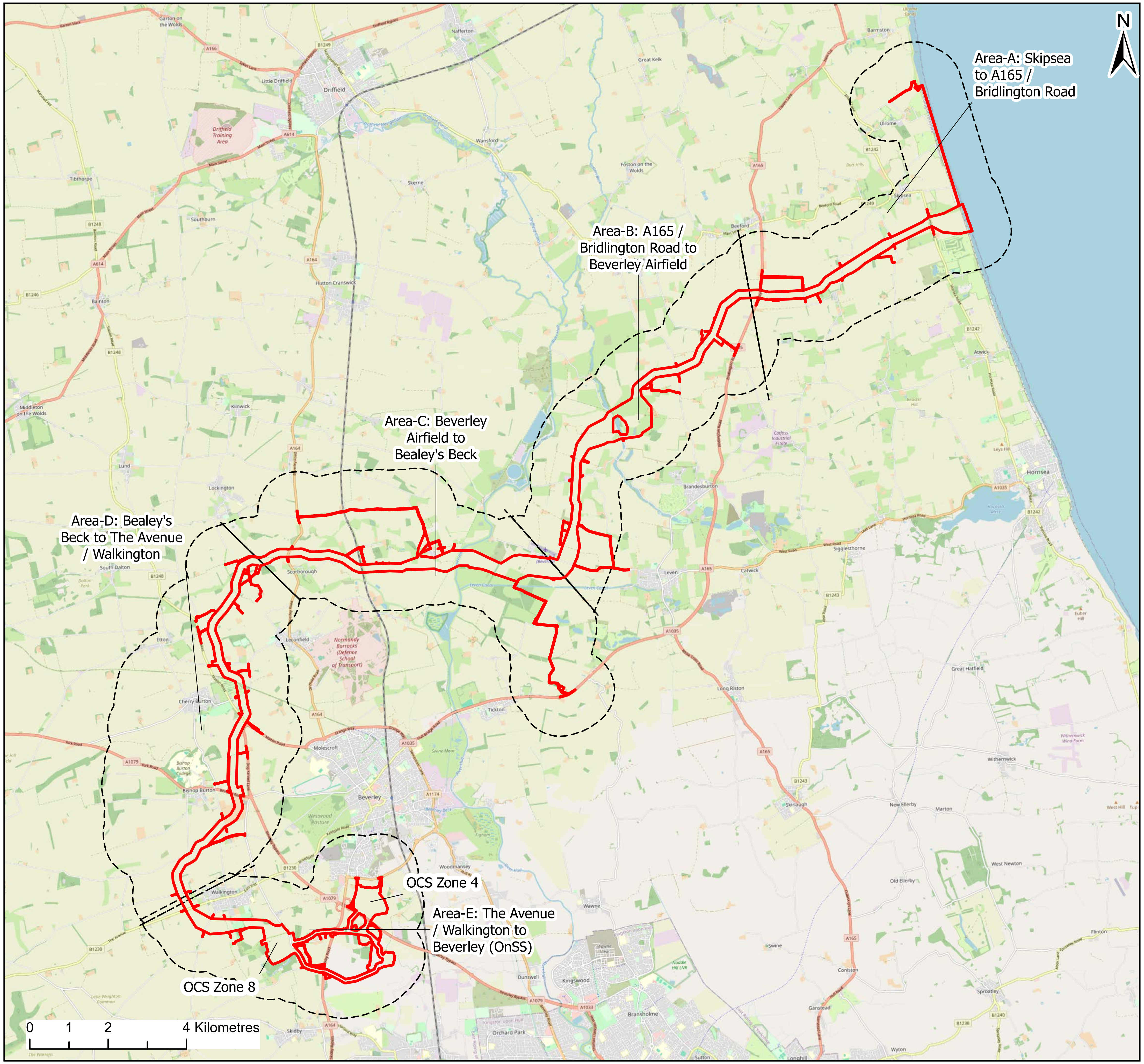

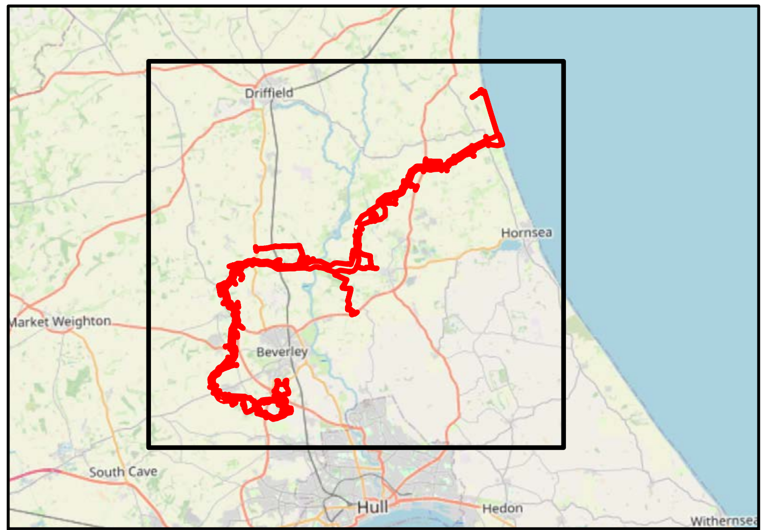

Legend

- Onshore Development Area
- Study Area (1km)
- Route Divisions (GDBA)

Source: © Haskoning DHV UK Ltd, 2024.
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Project: Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM
Title: Route divisions and Study Area	
Figure: 24.6-2	Drawing No: PC6250-AOC-XX-ON-DR-GS-0387

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:100,000

Co-ordinate system: British National Grid

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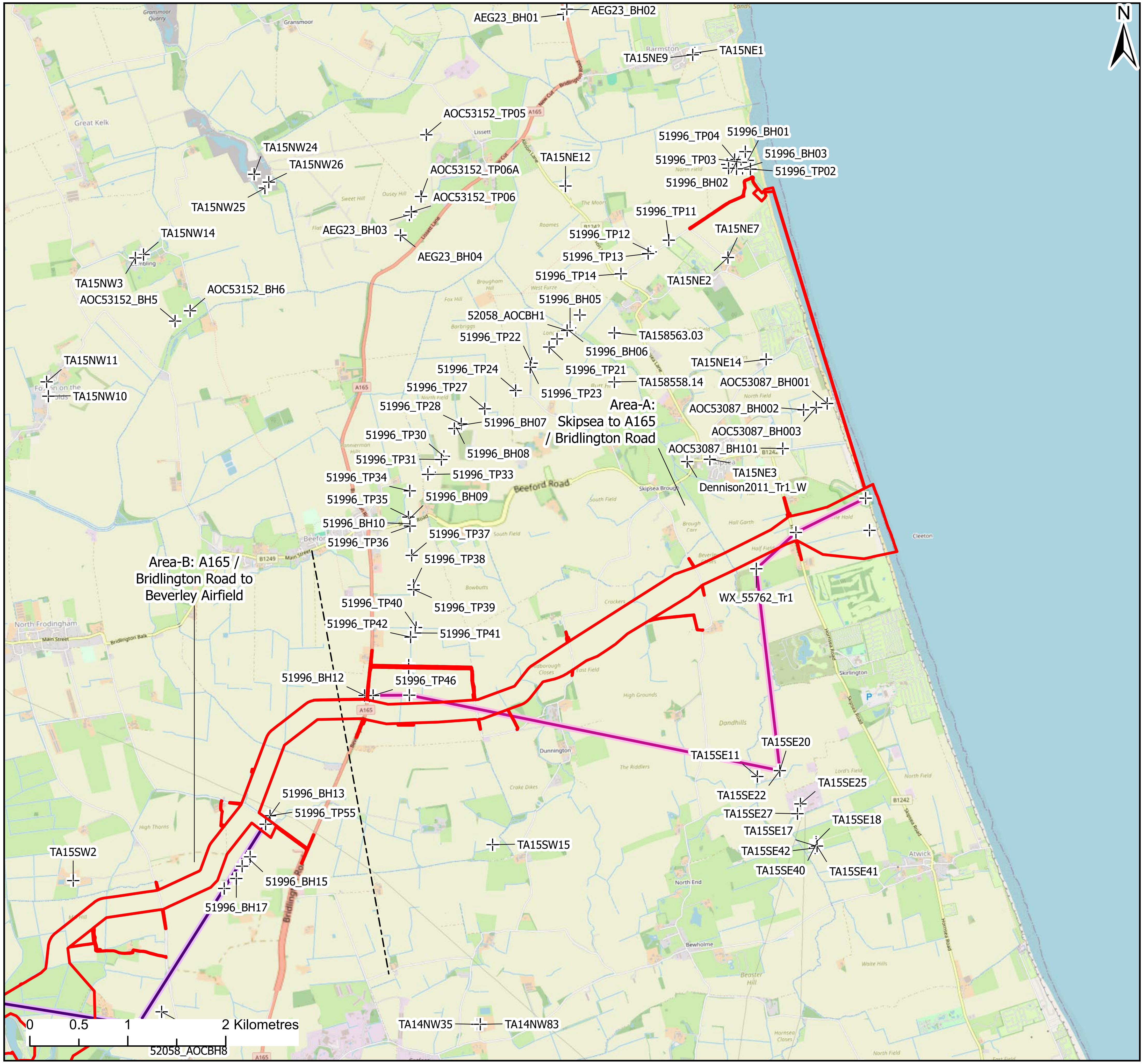

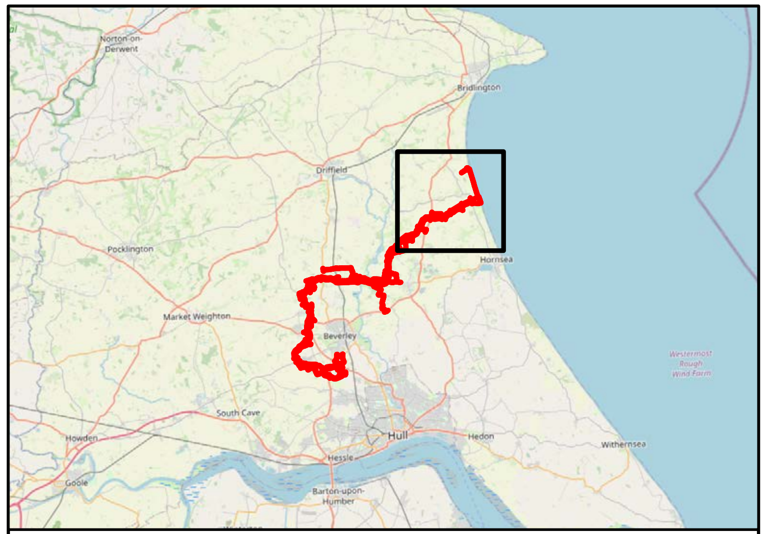

Legend

- Onshore Development Area
- Datapoints
- Transect A
- Transect B
- Route Divisions (GDBA)

Source: © Haskoning DHV UK Ltd, 2024.
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Project: Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM
Title: Datapoints and transect locations (Area-A)	
Figure: 24.6-3	Drawing No: PC6250-AOC-XX-ON-DR-GS-0388

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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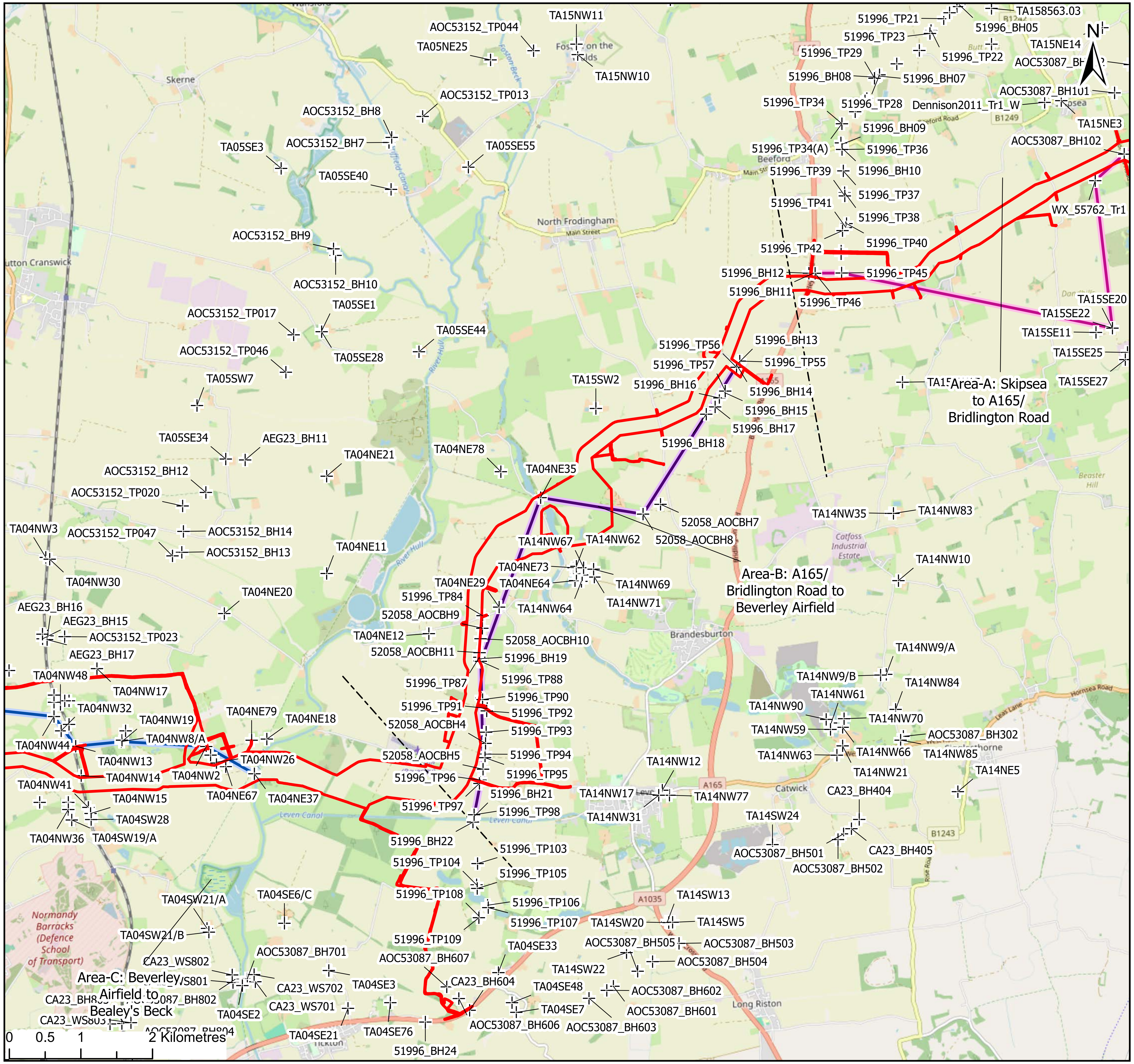

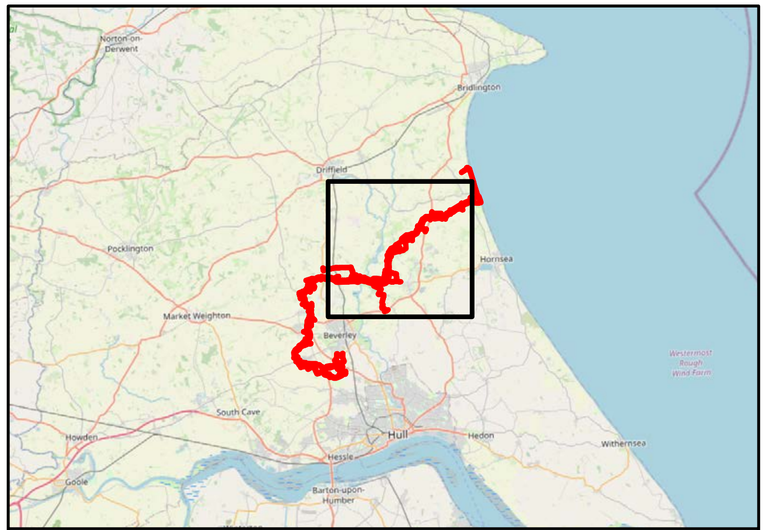

Legend

- Onshore Development Area
- Datapoints
- Transect A
- Transect B
- Transect C
- Route Divisions (GDBA)

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Datapoints and transect locations (Area-B)

Figure:	24.6-4	Drawing No:	PC6250-AOC-XX-ON-DR-GS-0389		
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Co-ordinate system: British National Grid

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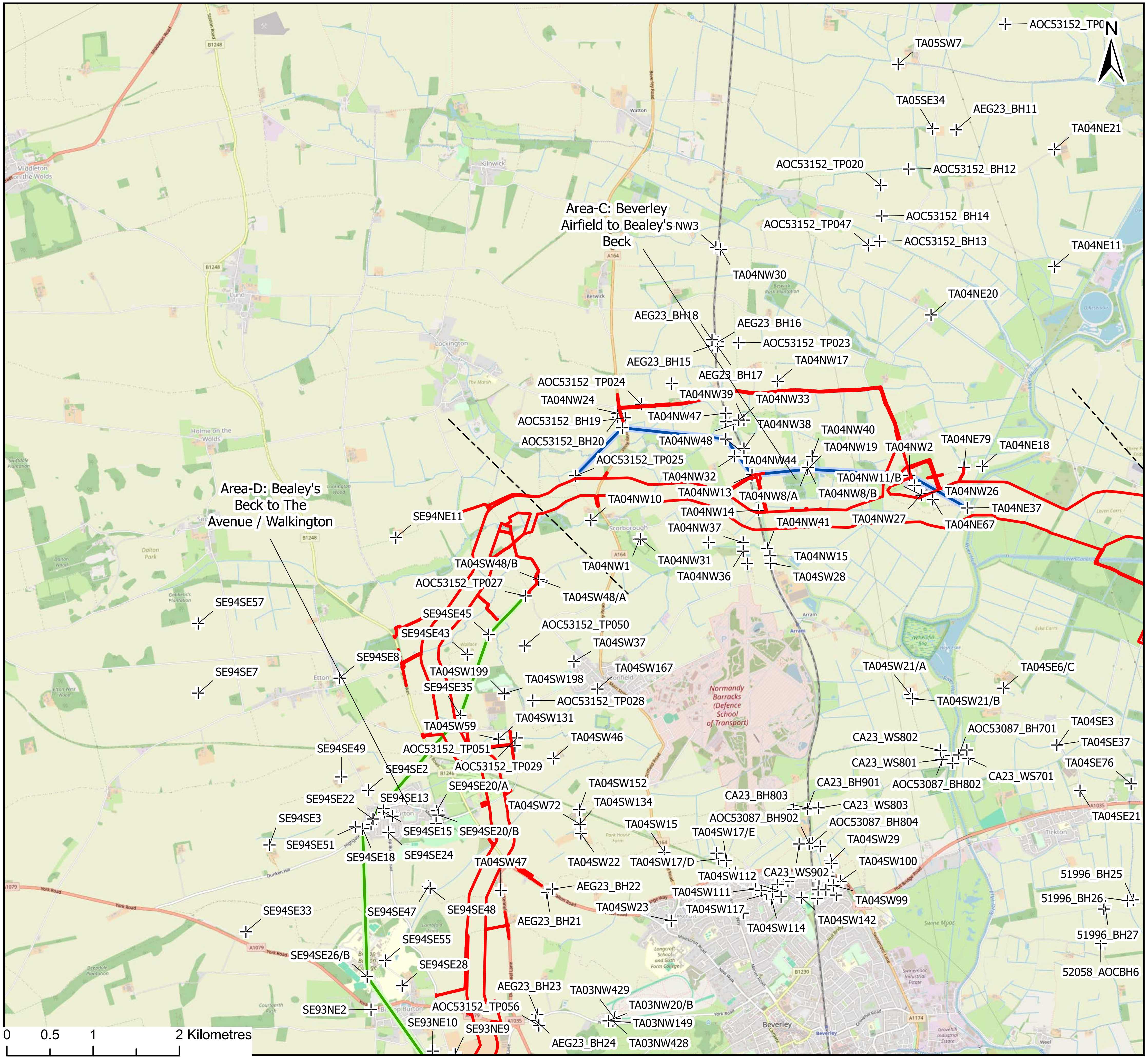

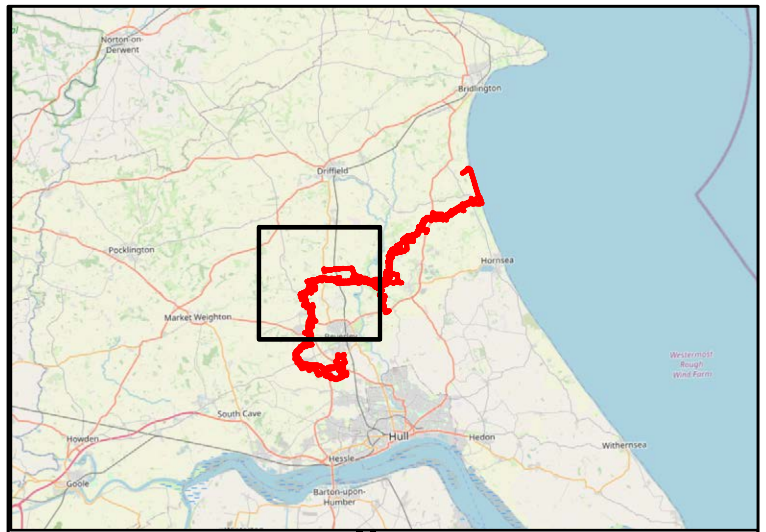

Legend

- Onshore Development Area
- Datapoints
- Transect C
- Transect D
- Route Divisions (GDBA)

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Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Datapoints and transect locations (Area-C)

Figure: 24.6-5	Drawing No: PC6250-AOC-XX-ON-DR-GS-0390				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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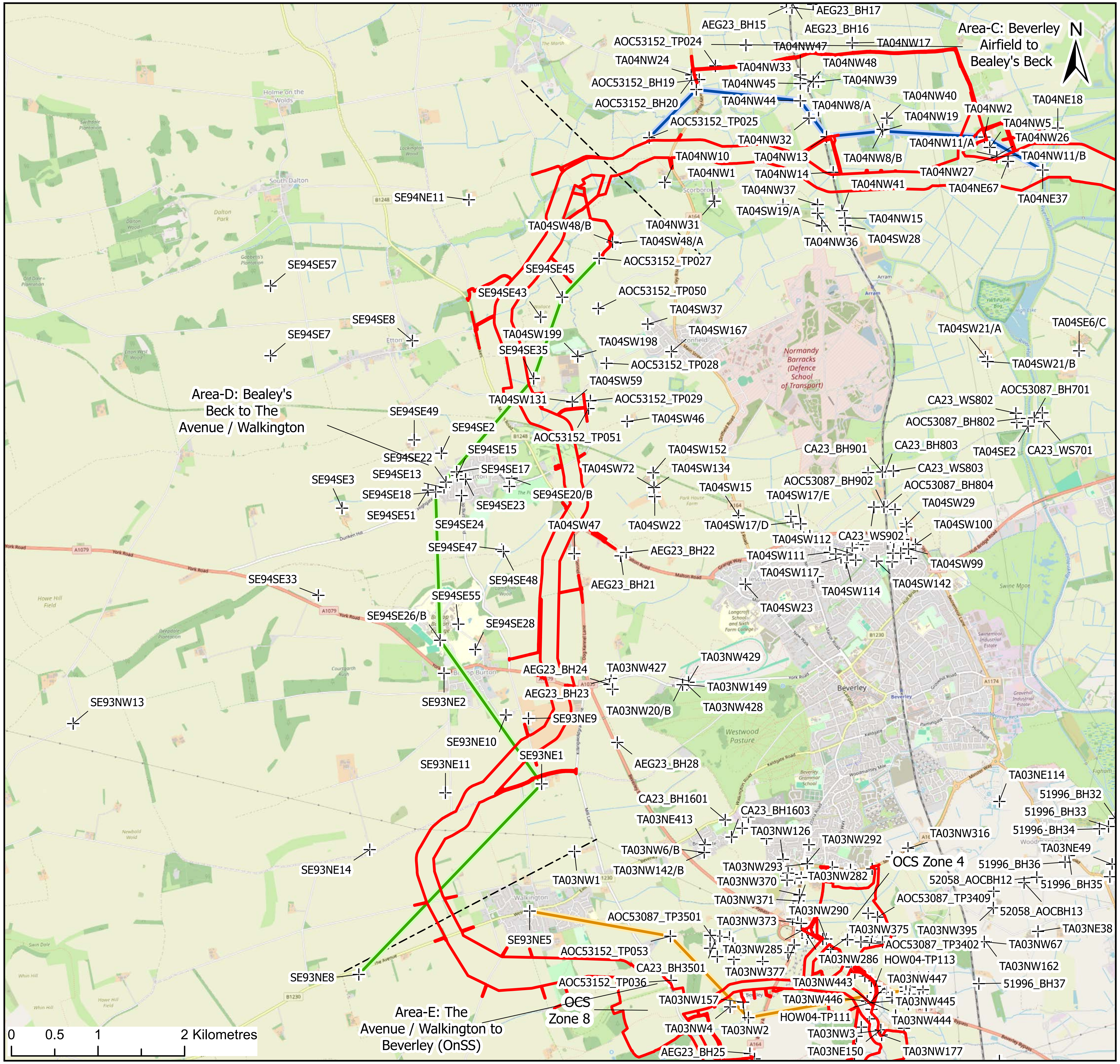

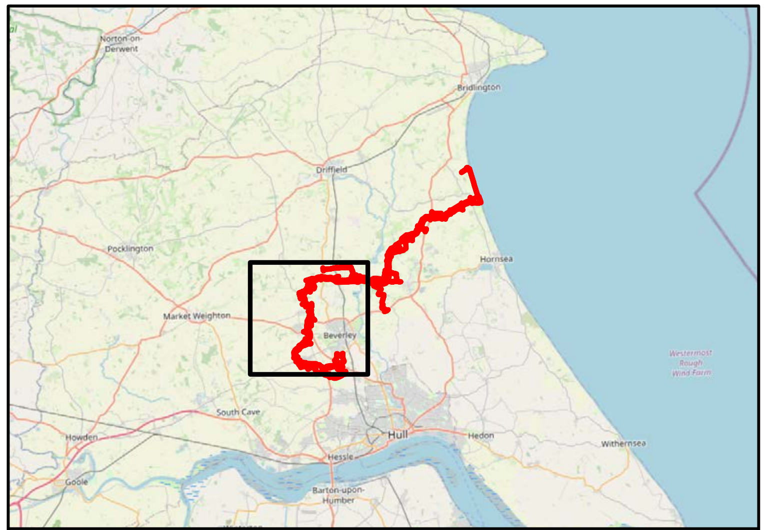

Legend

- Onshore Development Area
- Datapoints
- Transect C
- Transect D
- Transect E
- Route Divisions (GDBA)

Source: © Haskoning DHV UK Ltd, 2024.
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Project: Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM
Title: Datapoints and transect locations (Area-D)	
Figure: 24.6-6	Drawing No:PC6250-AOC-XX-ON-DR-GS-0391

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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Co-ordinate system: British National Grid

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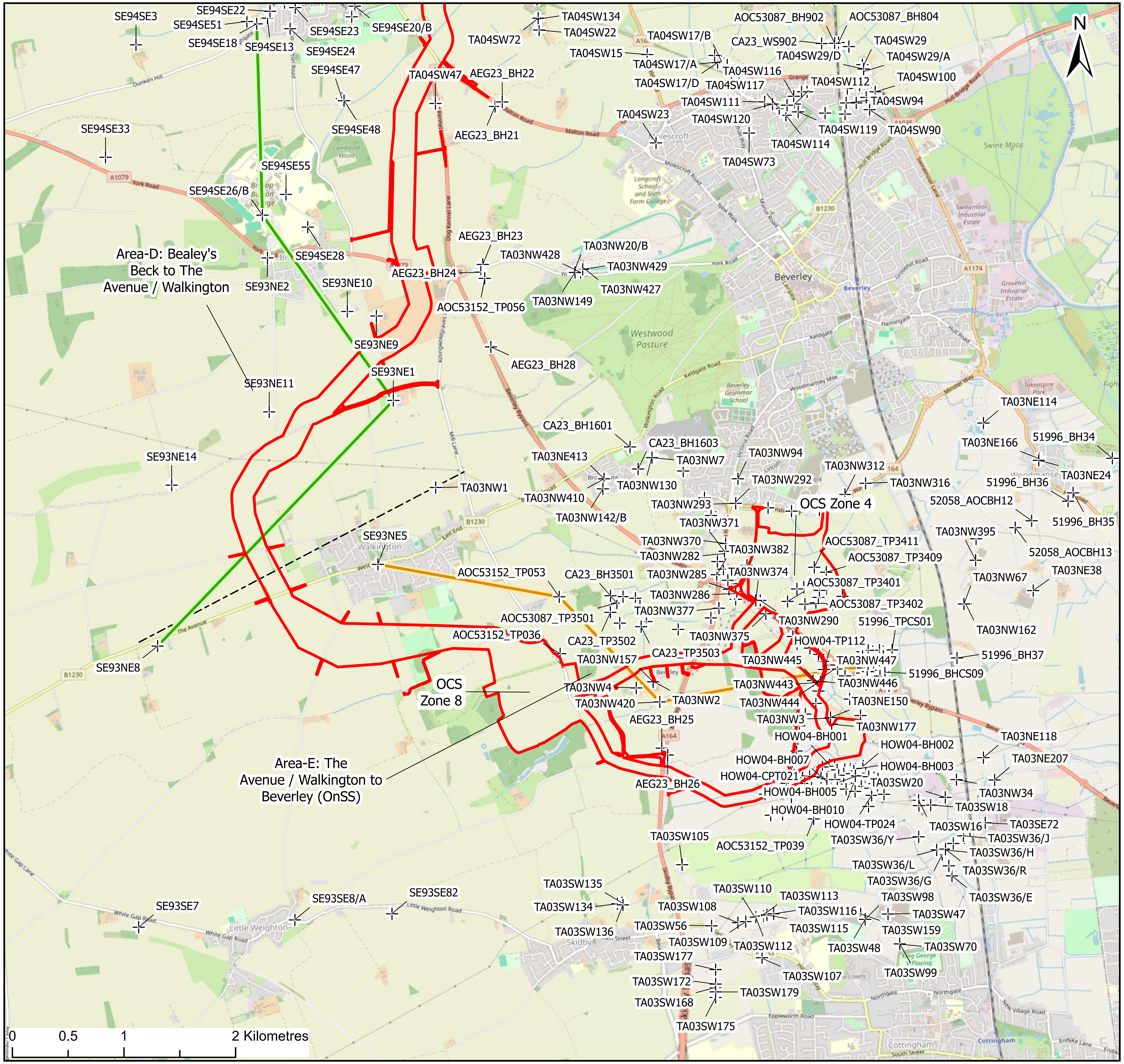

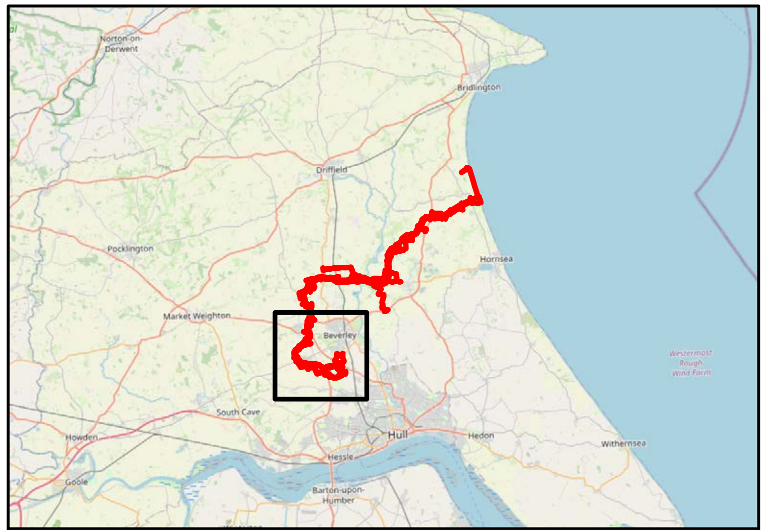

Legend

- Onshore Development Area
- Datapoints
- Transect D
- Transect E
- Route Divisions (GDBA)

Source: © Haskoning DHV UK Ltd, 2024.
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Project: Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM
Title: Datapoints and transect locations (Area-D)	

Figure: 24.6-7	Drawing No: PC6250-AOC-XX-ON-DR-GS-0392			
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Co-ordinate system: British National Grid

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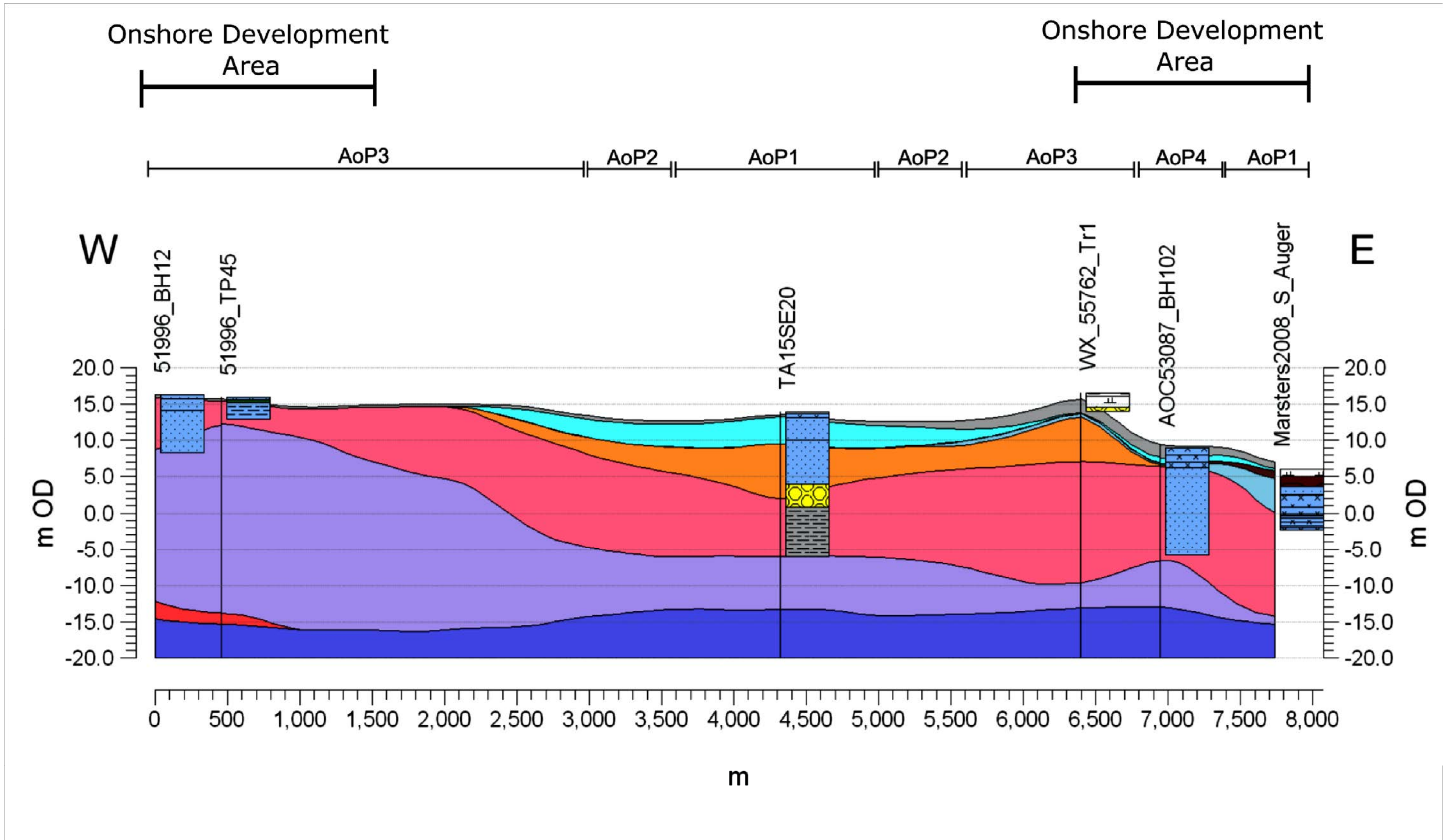

Legend:

Stratigraphy

- Topsoil / Made Ground - Victorian to modern
- Holocene - upper alluvium/warp
- Archaeology - undefined
- Holocene - organic deposits
- Holocene - lower alluvium
- Holocene - lacustrine
- Pleistocene - glaciofluvial
- Pleistocene - glacial till 2
- Pleistocene - Glaciolacustrine
- Pleistocene - glacial till 1
- Tertiary bedrock - chalk

Lithology

- CLAY, stiff
- CLAY
- CLAY, silty
- CLAY, organic
- CLAY, sandy
- CLAY, shelly
- CLAY, stiff + gravel
- CLAY, stiff + chalk
- CLAY, gravelly
- SILT, clayey
- SILT
- SILT, organic
- SILT, sandy
- SILT, gravelly
- PEAT, clayey
- PEAT, silty
- PEAT, humified
- PEAT, herbaceous
- PEAT
- PEAT, woody
- SAND, clayey
- SAND, silty
- SAND
- SAND, chalky
- SAND, shelly
- SAND, gravelly
- MADE GROUND, topsoil
- MADE GROUND, victorian to modern
- MADE GROUND, archaeology
- MADE GROUND, redeposited alluvium
- MADE GROUND, victorian to modern construction
- GRAVEL, clayey
- GRAVEL, clayey + chalk
- GRAVEL, silty
- GRAVEL, sandy
- GRAVEL, chalky
- GRAVEL + quartz
- GRAVEL
- MARL
- SANDSTONE
- CHALK

Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Transect A, west to east across the Onshore Development Areas showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

Figure: 24.6-8	Drawing No: PC6250-AOC-XX-ON-DR-GS-0393

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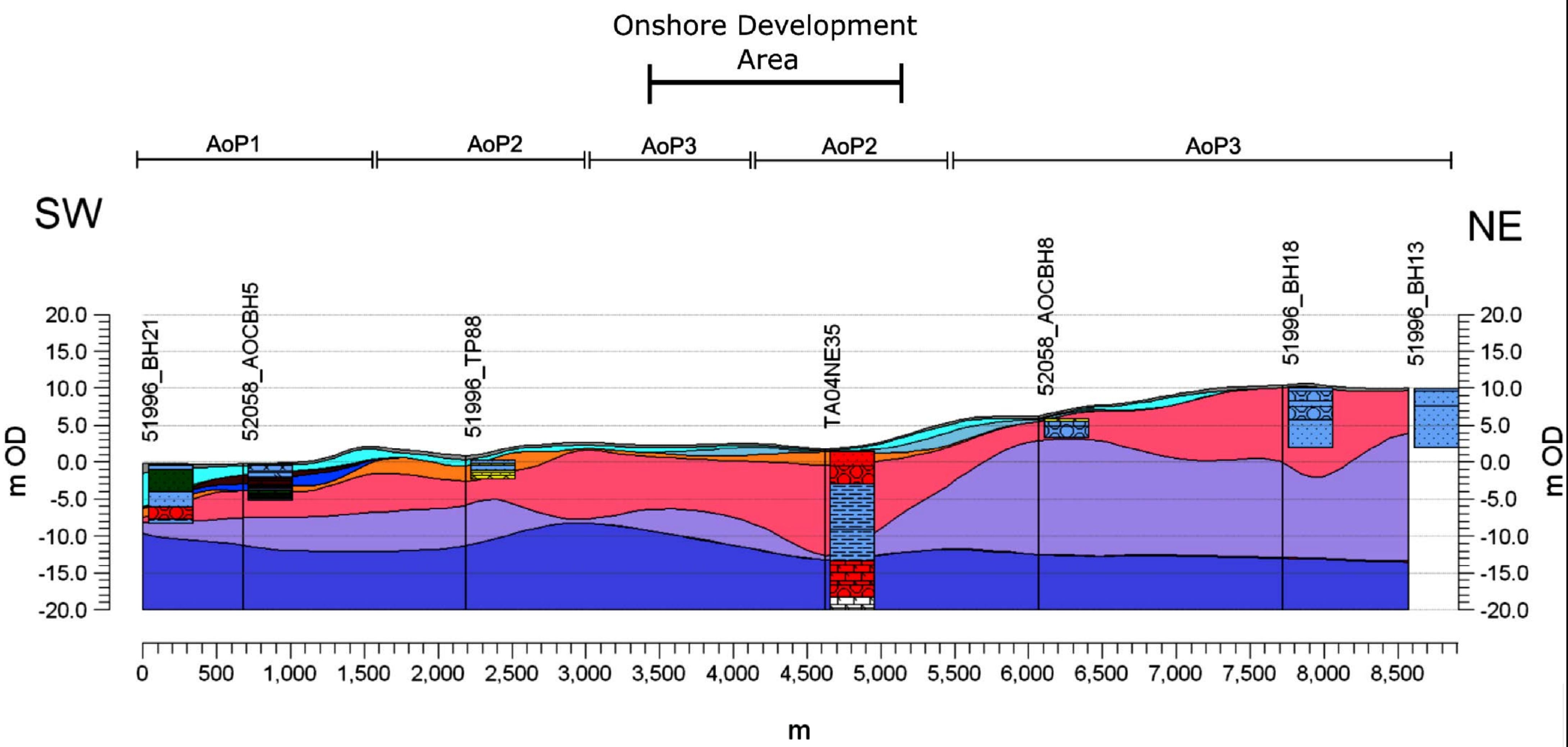

Legend:

Stratigraphy

- Topsoil / Made Ground - Victorian to modern
- Holocene - upper alluvium/warp
- Archaeology - undefined
- Holocene - organic deposits
- Holocene - lower alluvium
- Holocene - lacustrine
- Pleistocene - glaciofluvial
- Pleistocene - glacial till 2
- Pleistocene - Glaciolacustrine
- Pleistocene - glacial till 1
- Tertiary bedrock - chalk

Lithology

- CLAY, stiff
- CLAY
- CLAY, silty
- CLAY, organic
- CLAY, sandy
- CLAY, shelly
- CLAY, stiff + gravel
- CLAY, stiff + chalk
- CLAY, gravelly
- SILT, clayey
- SILT
- SILT, organic
- SILT, sandy
- SILT, gravelly
- PEAT, clayey
- PEAT, silty
- PEAT, humified
- PEAT, herbaceous
- PEAT
- PEAT, woody
- SAND, clayey
- SAND, silty
- SAND
- SAND, chalky
- SAND, shelly
- SAND, gravelly
- MADE GROUND, topsoil
- MADE GROUND, victorian to modern
- MADE GROUND, archaeology
- MADE GROUND, redeposited alluvium
- MADE GROUND, victorian to modern construction
- GRAVEL, clayey
- GRAVEL, clayey + chalk
- GRAVEL, silty
- GRAVEL, sandy
- GRAVEL, chalky
- GRAVEL + quartz
- GRAVEL
- MARL
- SANDSTONE
- CHALK

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Transect B, south-west to north-east across the Onshore Development Areas showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

Figure: 24.6-9 | Drawing No: PC6250-AOC-XX-ON-DR-GS-0394

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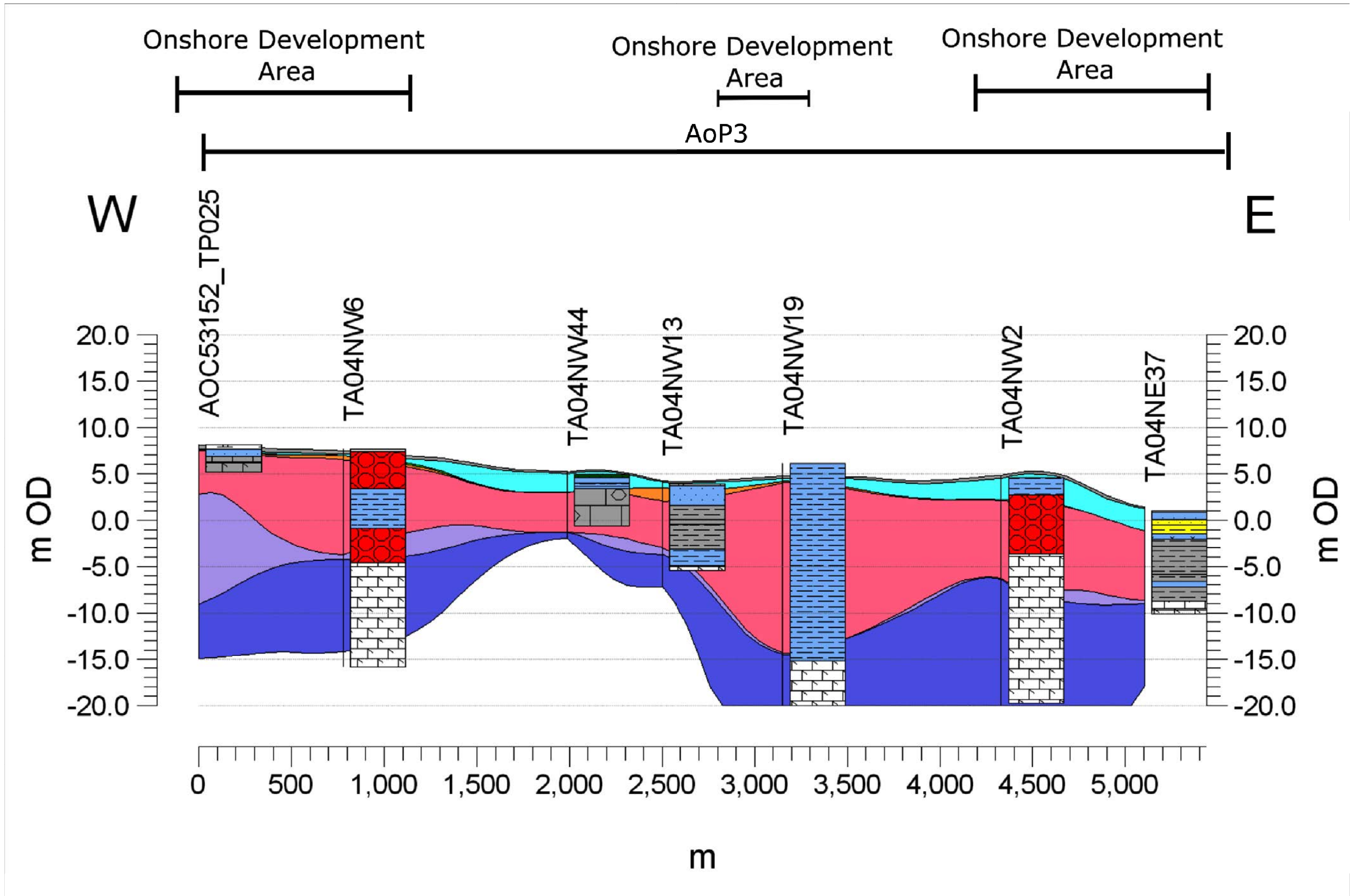

Legend:

Stratigraphy

- Topsoil / Made Ground - Victorian to modern
- Holocene - upper alluvium/warp
- Archaeology - undefined
- Holocene - organic deposits
- Holocene - lower alluvium
- Holocene - lacustrine
- Pleistocene - glaciofluvial
- Pleistocene - glacial till 2
- Pleistocene - Glaciolacustrine
- Pleistocene - glacial till 1
- Tertiary bedrock - chalk

Lithology

- CLAY, stiff
- CLAY
- CLAY, silty
- CLAY, organic
- CLAY, sandy
- CLAY, shelly
- CLAY, stiff + gravel
- CLAY, stiff + chalk
- CLAY, gravelly
- SILT, clayey
- SILT
- SILT, organic
- SILT, sandy
- SILT, gravelly
- PEAT, clayey
- PEAT, silty
- PEAT, humified
- PEAT, herbaceous
- PEAT
- PEAT, woody
- SAND, clayey
- SAND, silty
- SAND
- SAND, chalky
- SAND, shelly
- SAND, gravelly
- MADE GROUND, topsoil
- MADE GROUND, victorian to modern
- MADE GROUND, archaeology
- MADE GROUND, redeposited alluvium
- MADE GROUND, victorian to modern construction
- GRAVEL, clayey
- GRAVEL, clayey + chalk
- GRAVEL, silty
- GRAVEL, sandy
- GRAVEL, chalky
- GRAVEL + quartz
- GRAVEL
- MARL
- SANDSTONE
- CHALK

Project:
Dogger Bank D Offshore Wind Farm

Title:
Transect C, west to east across the Onshore Development Area showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

Figure: 24.6-10 | Drawing No: PC6250-AOC-XX-ON-DR-GS-0395

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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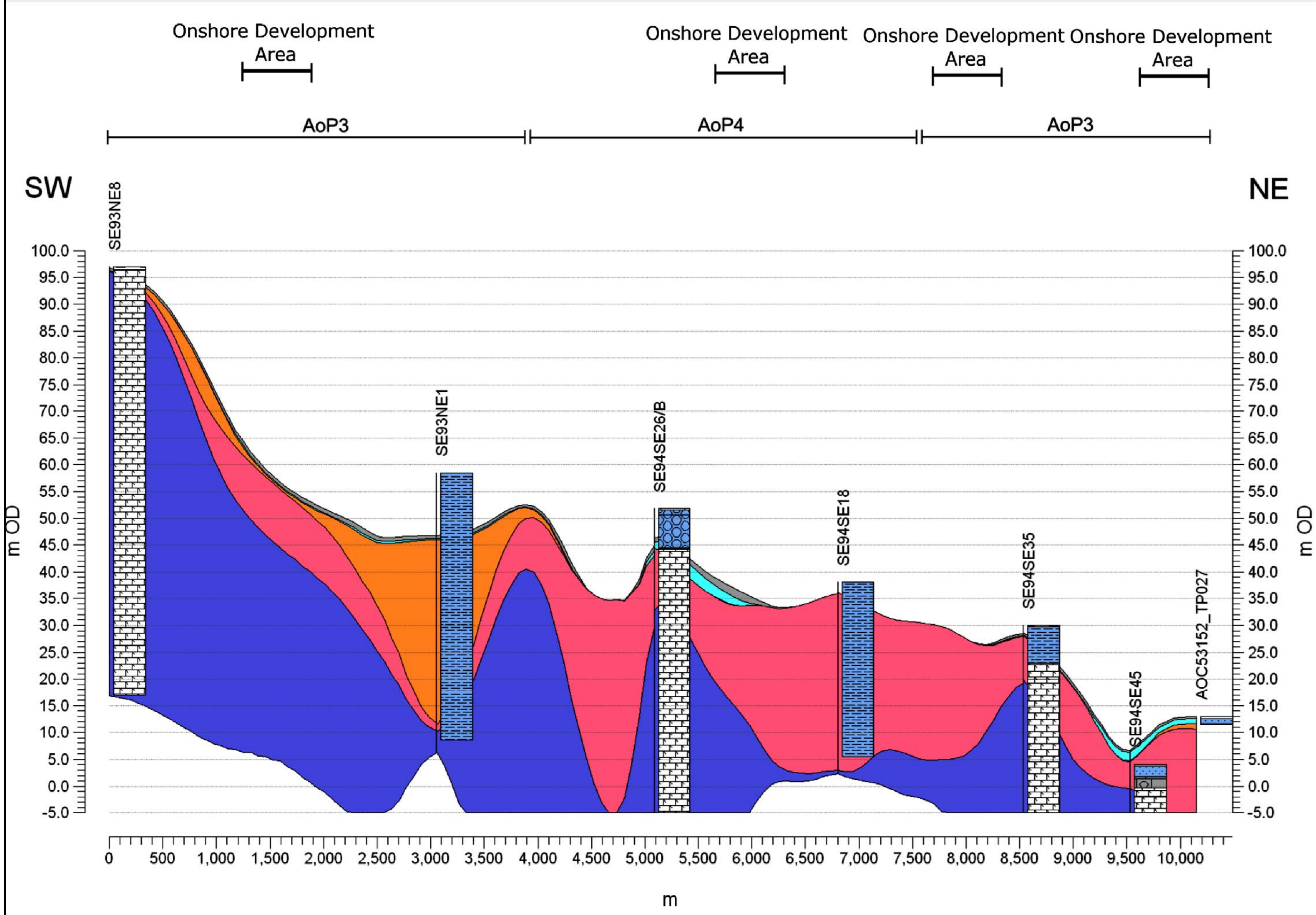

Legend:

Stratigraphy

- Topsoil / Made Ground - Victorian to modern
- Holocene - upper alluvium/warp
- Archaeology - undefined
- Holocene - organic deposits
- Holocene - lower alluvium
- Holocene - lacustrine
- Pleistocene - glaciofluvial
- Pleistocene - glacial till 2
- Pleistocene - Glaciolacustrine
- Pleistocene - glacial till 1
- Tertiary bedrock - chalk

Lithology

- CLAY, stiff
- CLAY
- CLAY, silty
- CLAY, organic
- CLAY, sandy
- CLAY, shelly
- CLAY, stiff + gravel
- CLAY, stiff + chalk
- CLAY, gravelly
- SILT, clayey
- SILT
- SILT, organic
- SILT, sandy
- SILT, gravelly
- PEAT, clayey
- PEAT, silty
- PEAT, humified
- PEAT, herbaceous
- PEAT
- PEAT, woody
- SAND, clayey
- SAND, silty
- SAND
- SAND, chalky
- SAND, shelly
- SAND, gravelly
- MADE GROUND, topsoil
- MADE GROUND, victorian to modern
- MADE GROUND, archaeology
- MADE GROUND, redeposited alluvium
- MADE GROUND, victorian to modern construction
- GRAVEL, clayey
- GRAVEL, clayey + chalk
- GRAVEL, silty
- GRAVEL, sandy
- GRAVEL, chalky
- GRAVEL + quartz
- GRAVEL
- MARL
- SANDSTONE
- CHALK

Project:
Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title:
Transect D, south-west to north-east across the Onshore Development Area showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

Figure: 24.6-11

Drawing No: PC6250-AOC-XX-ON-DR-GS-0396

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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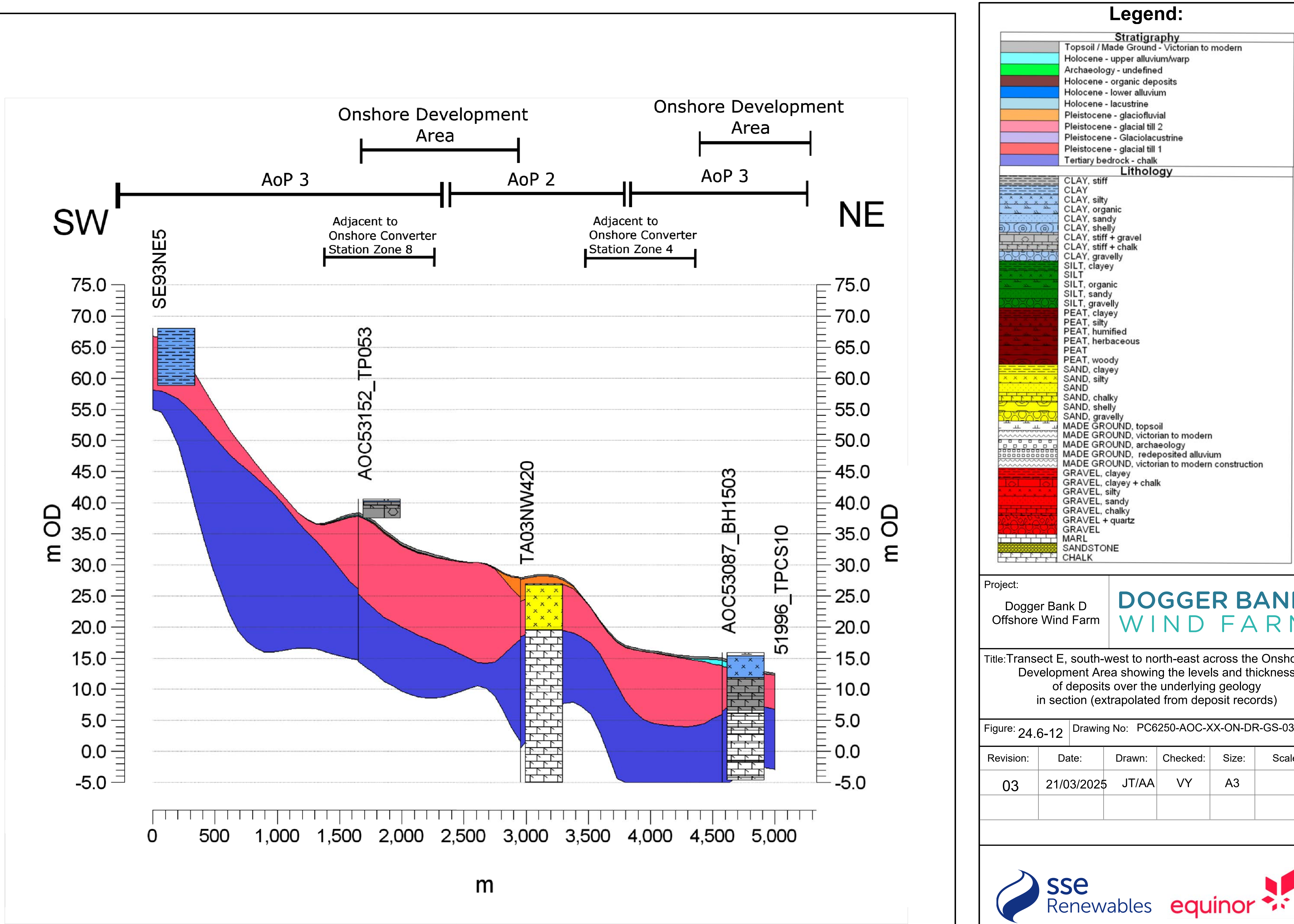

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Transect E, south-west to north-east across the Onshore Development Area showing the levels and thickness of deposits over the underlying geology in section (extrapolated from deposit records)

Figure: 24.6-12 | Drawing No: PC6250-AOC-XX-ON-DR-GS-0397

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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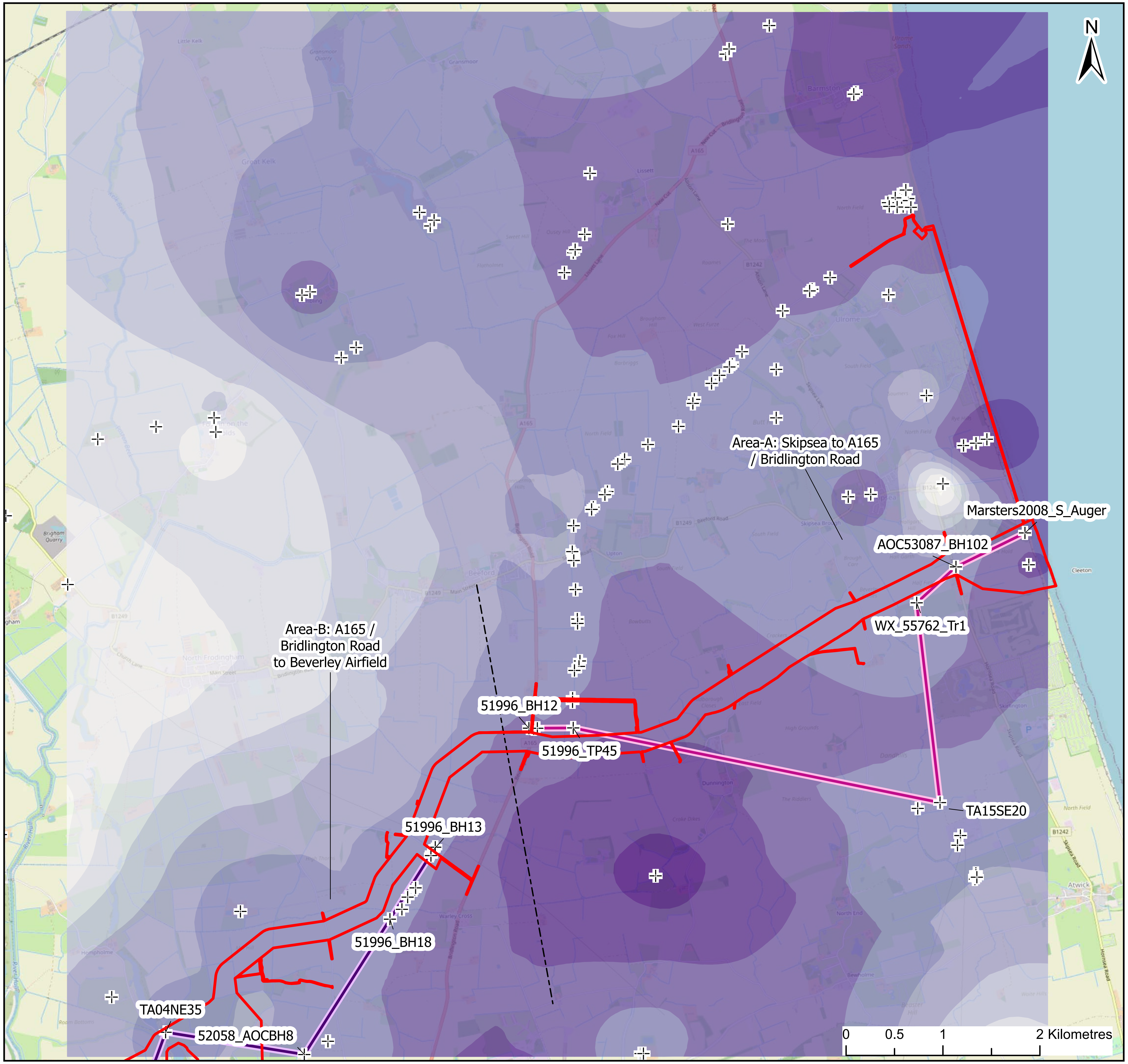

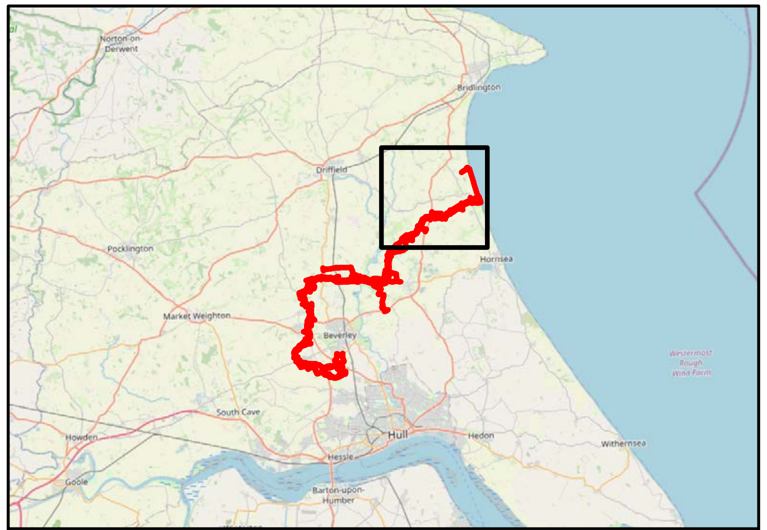

Legend

- Onshore Development Area
- Datapoints
- Transect A
- Transect B
- Route Divisions (GDBA)

Chalk Surface Area-A
m OD

- -3.99 - -2.00
- -5.99 - -4.00
- -7.99 - -6.00
- -9.99 - -8.00
- -11.99 - -10.00
- -13.99 - -12.00
- -15.99 - -14.00
- -17.99 - -16.00
- -18.00

Project: Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM
Title:	Topographic plot of the surface of the below-ground solid bedrock geology (extrapolated from deposit records) – Area-A
Figure: 24.6-13	Drawing No: PC6250-AOC-XX-ON-DR-GS-0398

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
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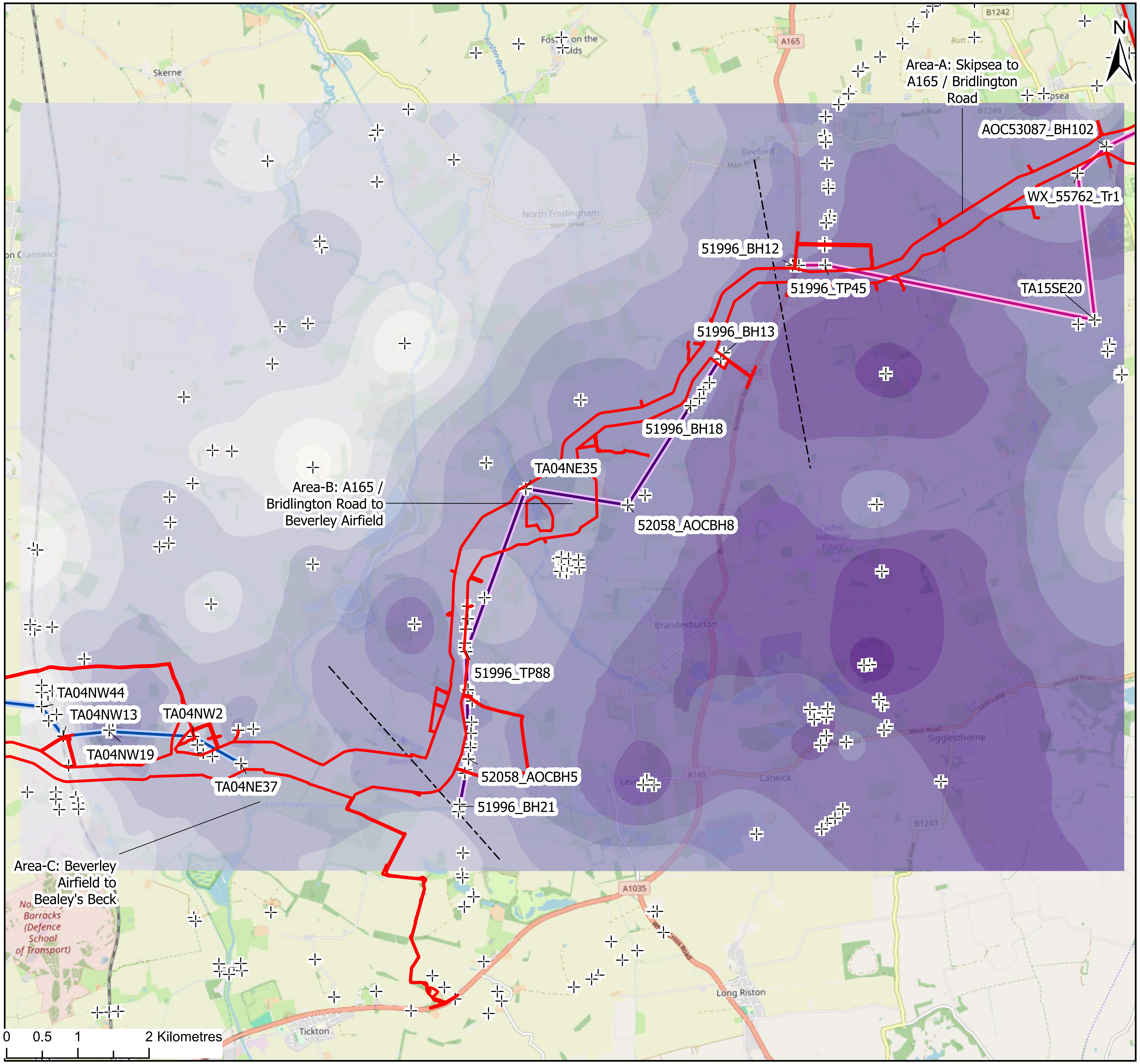
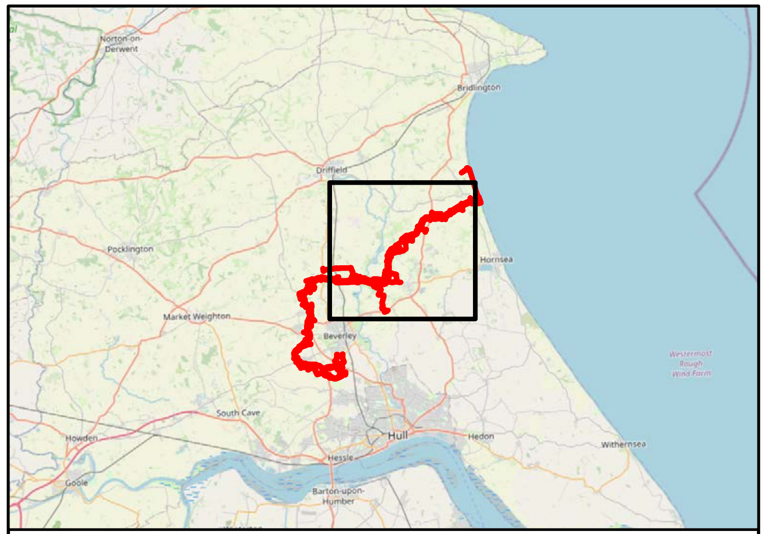
Co-ordinate system: British National Grid

sse Renewables equinor





Legend

- Onshore Development Area
- Datapoints
- Transect A
- Transect B
- Transect C
- Route Divisions (GDBA)

Chalk Surface Area-B
m OD

- 0.01 - 2.00
- -1.99 - 0.00
- -3.99 - -2.00
- -5.99 - -4.00
- -7.99 - -6.00
- -9.99 - -8.00
- -11.99 - -10.00
- -13.99 - -12.00
- -15.99 - -14.00
- -17.99 - -16.00
- -19.99 - -18.00
- -21.50 - -20.00

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

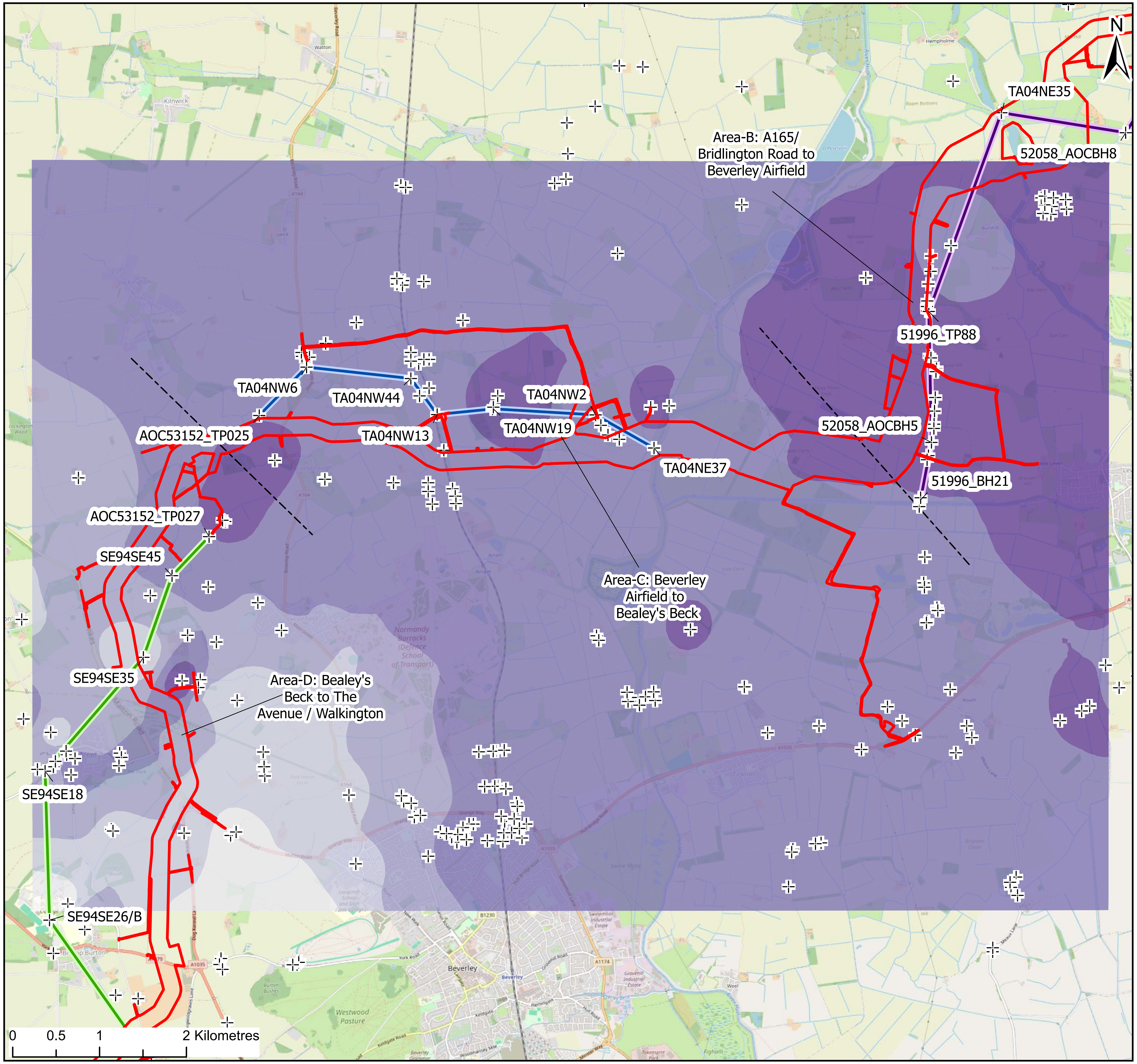
Title: Topographic plot of the surface of the below-ground solid bedrock geology (extrapolated from deposit records) – Area-B

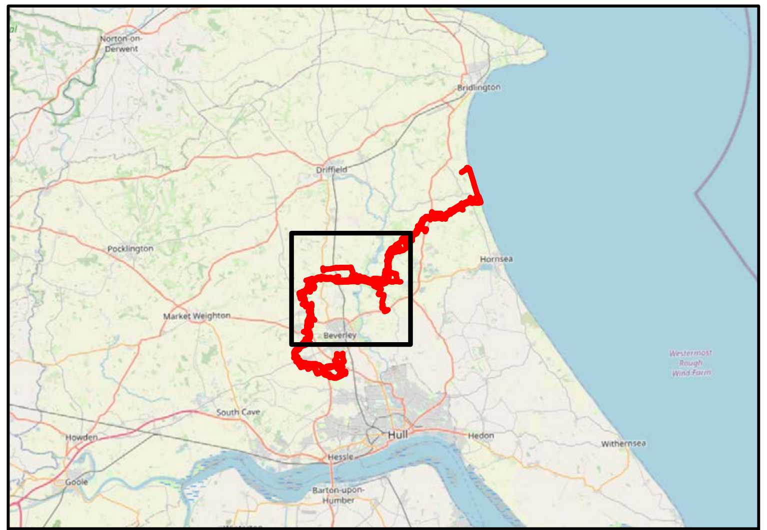
Figure: 24.6-14 | Drawing No: PC6250-AOC-XX-ON-DR-GS-0399

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:55,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

Onshore Development Area	Chalk Surface Area-C m OD
Datapoints	30.01 - 40.00
Transect B	20.01 - 30.00
Transect C	10.01 - 20.00
Transect D	0.01 - 10.00
Route Divisions (GDBA)	-9.99 - 0.00
	-19.99 - -10.00
	-22.50 - -20.00

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

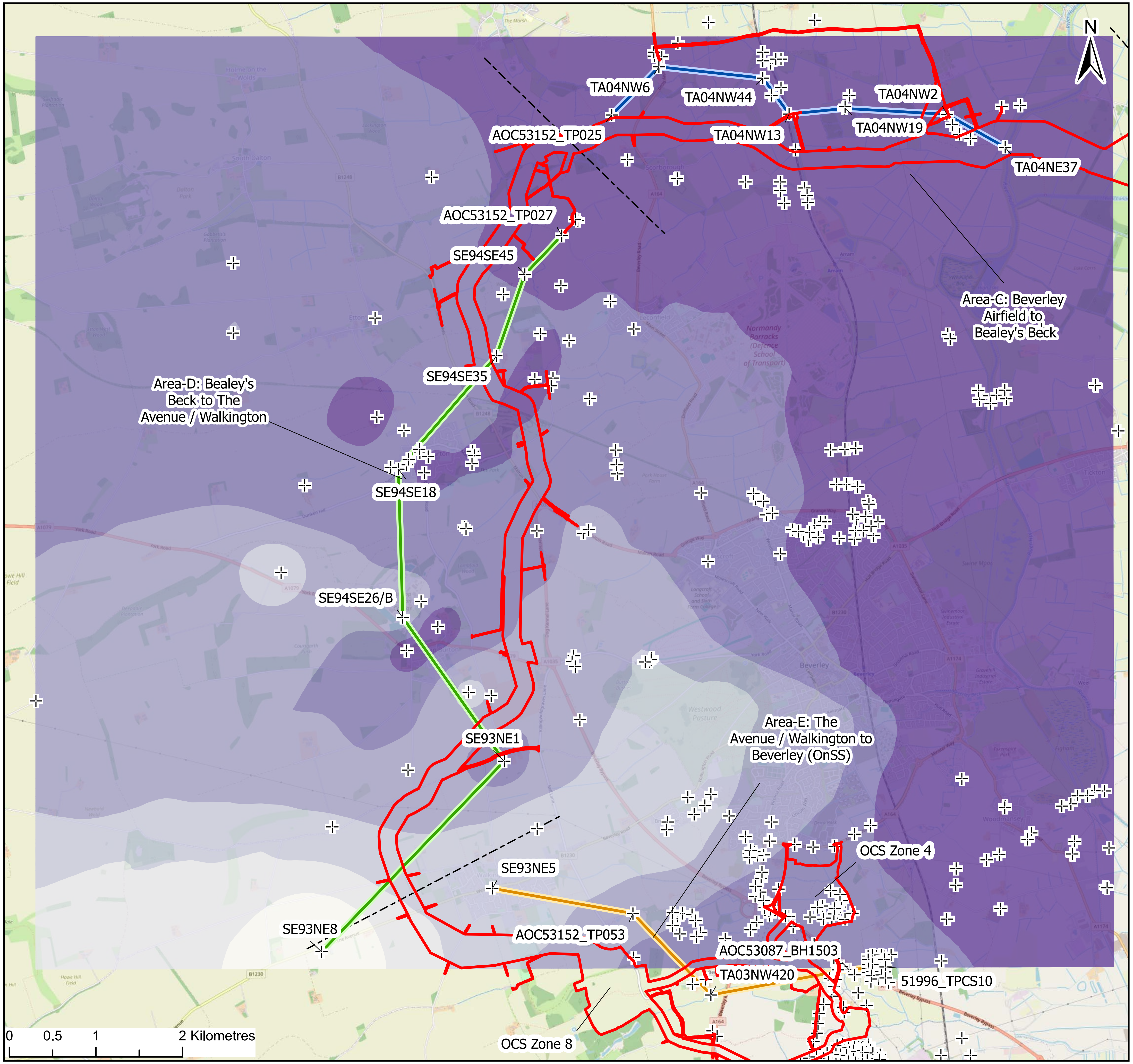
Title: Topographic plot of the surface of the below-ground solid bedrock geology (extrapolated from deposit records) – Area-C

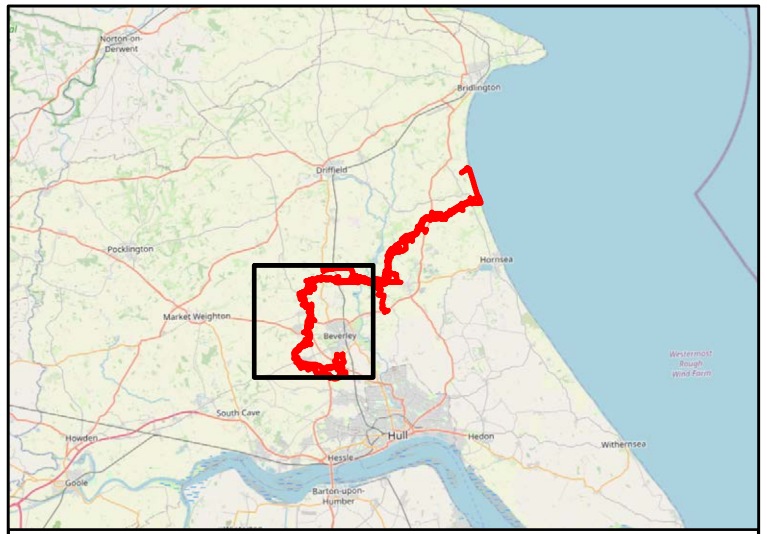
Figure:	Drawing No:
24.6-15	PC6250-AOC-XX-ON-DR-GS-0400

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:45,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

- Onshore Development Area
- Datapoints
- Transect C
- Transect D
- Transect E
- Route Divisions (GDBA)

Chalk Surface Area-D
m OD

- 80.01 - 100.00
- 60.01 - 80.00
- 40.01 - 60.00
- 20.01 - 40.00
- 0.01 - 20.00
- -19.99 - 0.00
- -22.50 - -20.00

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

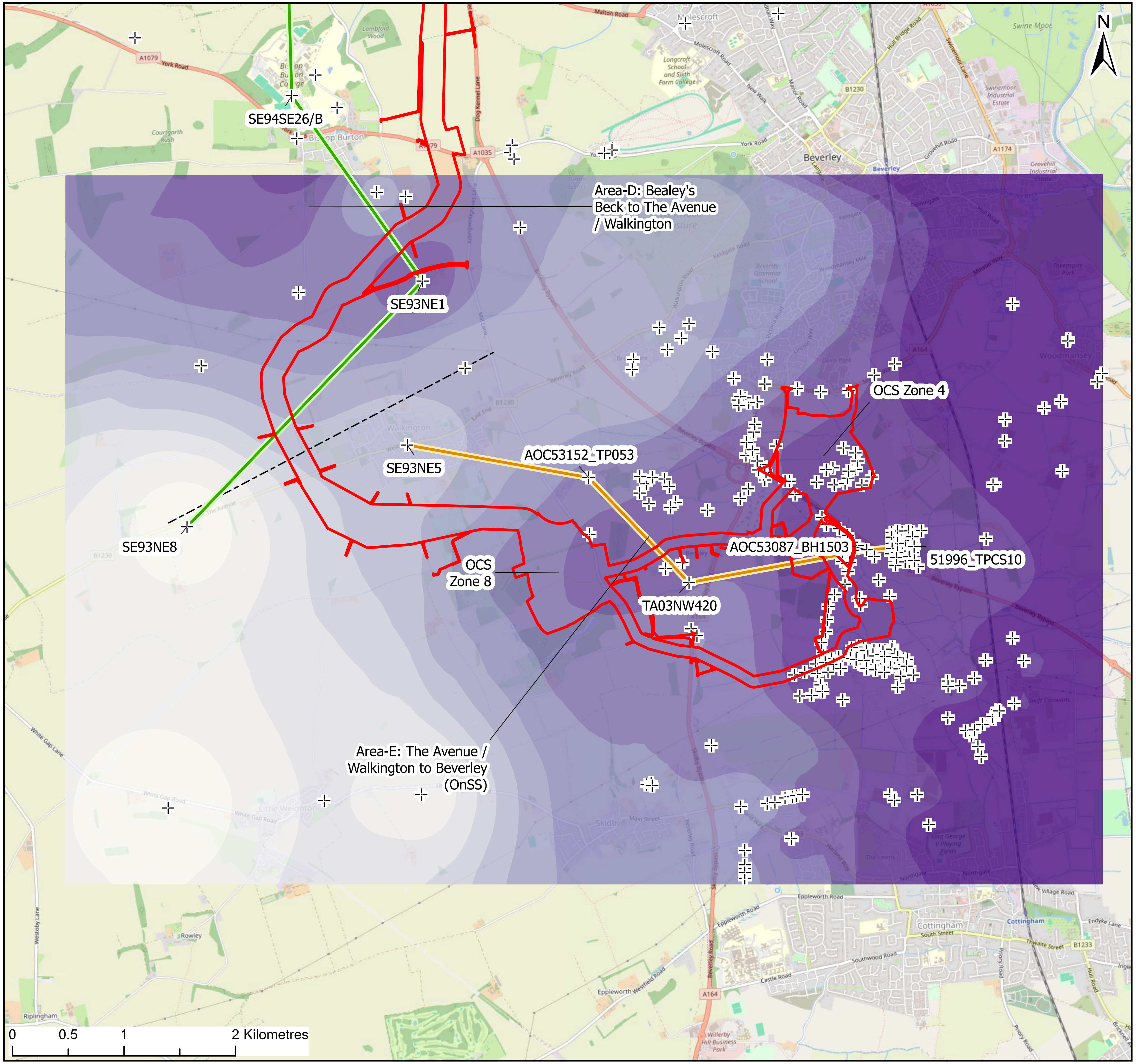
Title: Topographic plot of the surface of the below-ground solid bedrock geology (extrapolated from deposit records) – Area-D

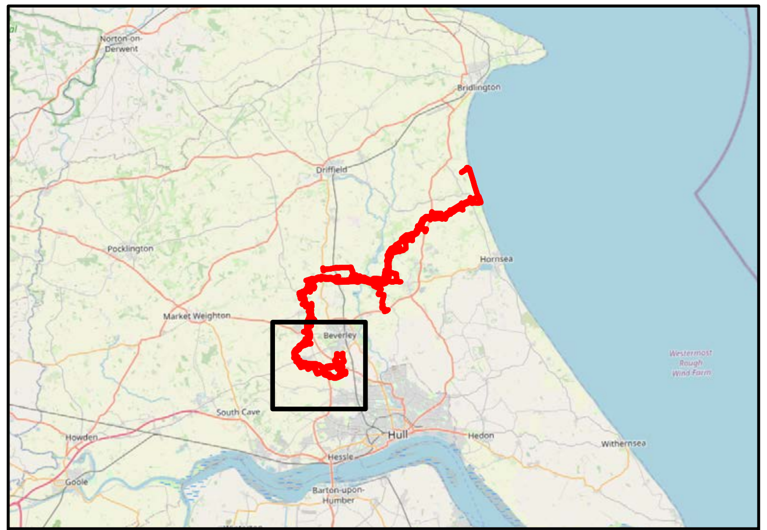
Figure:	24.6-16	Drawing No:	PC6250-AOC-XX-ON-DR-GS-0401

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:45,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

- Onshore Development Area
- Datapoints
- Transect D
- Transect E
- Route Divisions (GDBA)

Chalk Surface Area-E
m OD

- 90.01 - 100.00
- 80.01 - 90.00
- 70.01 - 80.00
- 60.01 - 70.00
- 50.01 - 60.00
- 40.01 - 50.00
- 30.01 - 40.00
- 20.01 - 30.00
- 10.01 - 20.00
- 0.01 - 10.00
- -6.50 - 0.00

Project:
Dogger Bank D
Offshore Wind Farm

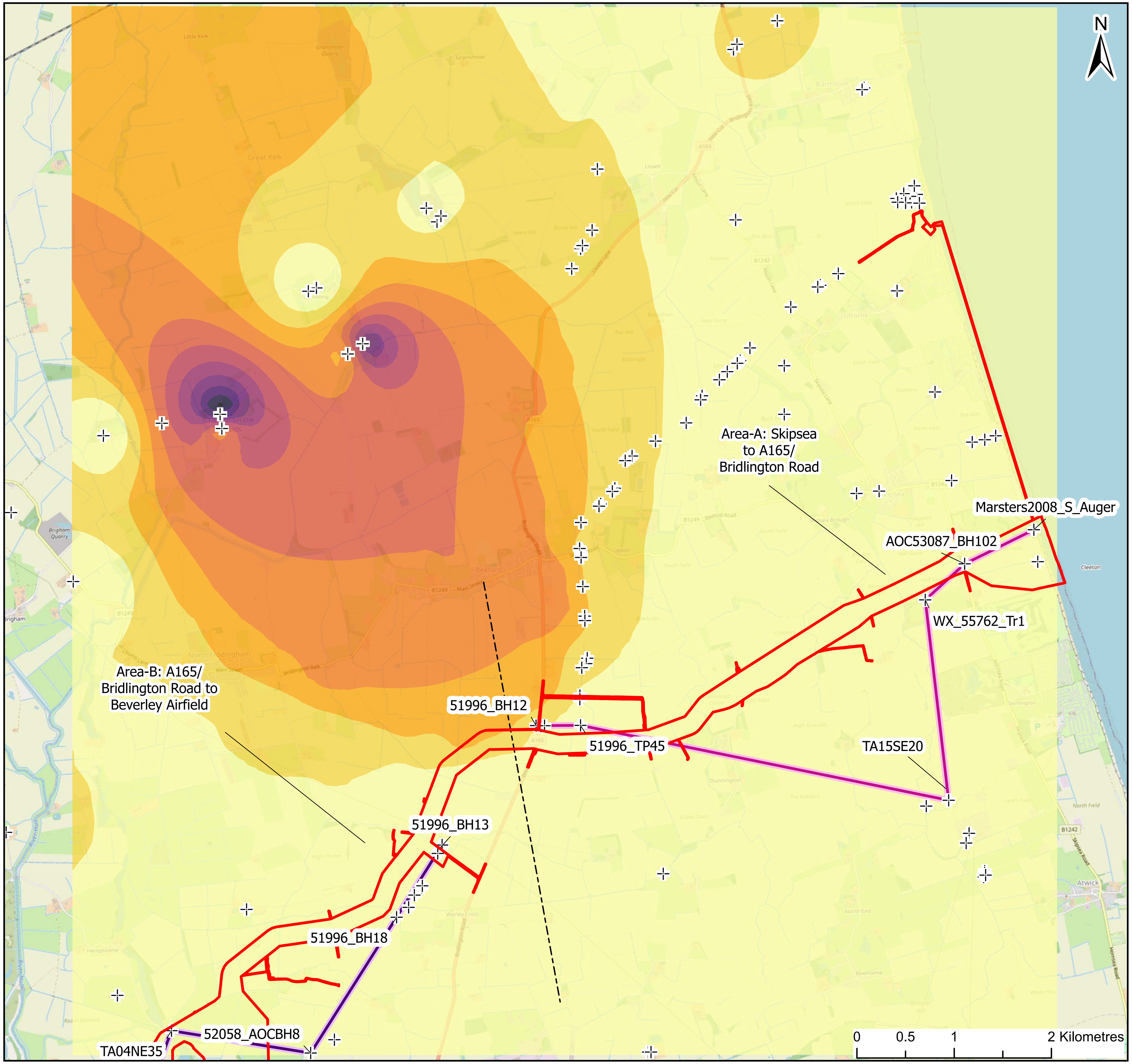
DOGGER BANK
WIND FARM

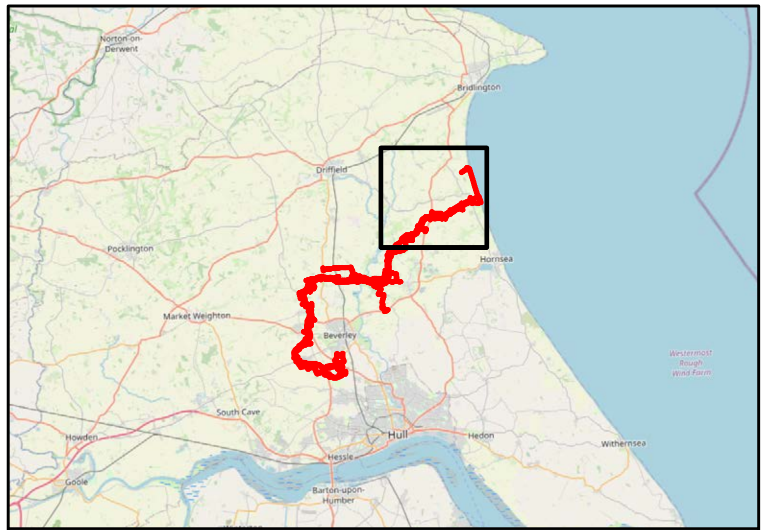
Title:
Topographic plot of the surface of the below-ground solid bedrock geology (extrapolated from deposit records) – Area-E

Figure: 24.6-17	Drawing No: PC6250-AOC-XX-ON-DR-GS-0402				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:35,000

Co-ordinate system: British National Grid

sse Renewables
equinor





Legend

Onshore Development Area

Datapoints

Transect A

Transect B

Route Divisions (GDBA)

Glaciolacustrine Thickness Area-A

m

- 5.01 - 5.50
- 4.51 - 5.00
- 4.01 - 4.50
- 3.51 - 4.00
- 3.01 - 3.50
- 2.51 - 3.00
- 2.01 - 2.50
- 1.51 - 2.00
- 1.01 - 1.50
- 0.51 - 1.00
- 0.00 - 0.50

Project: Dogger Bank D Offshore Wind Farm

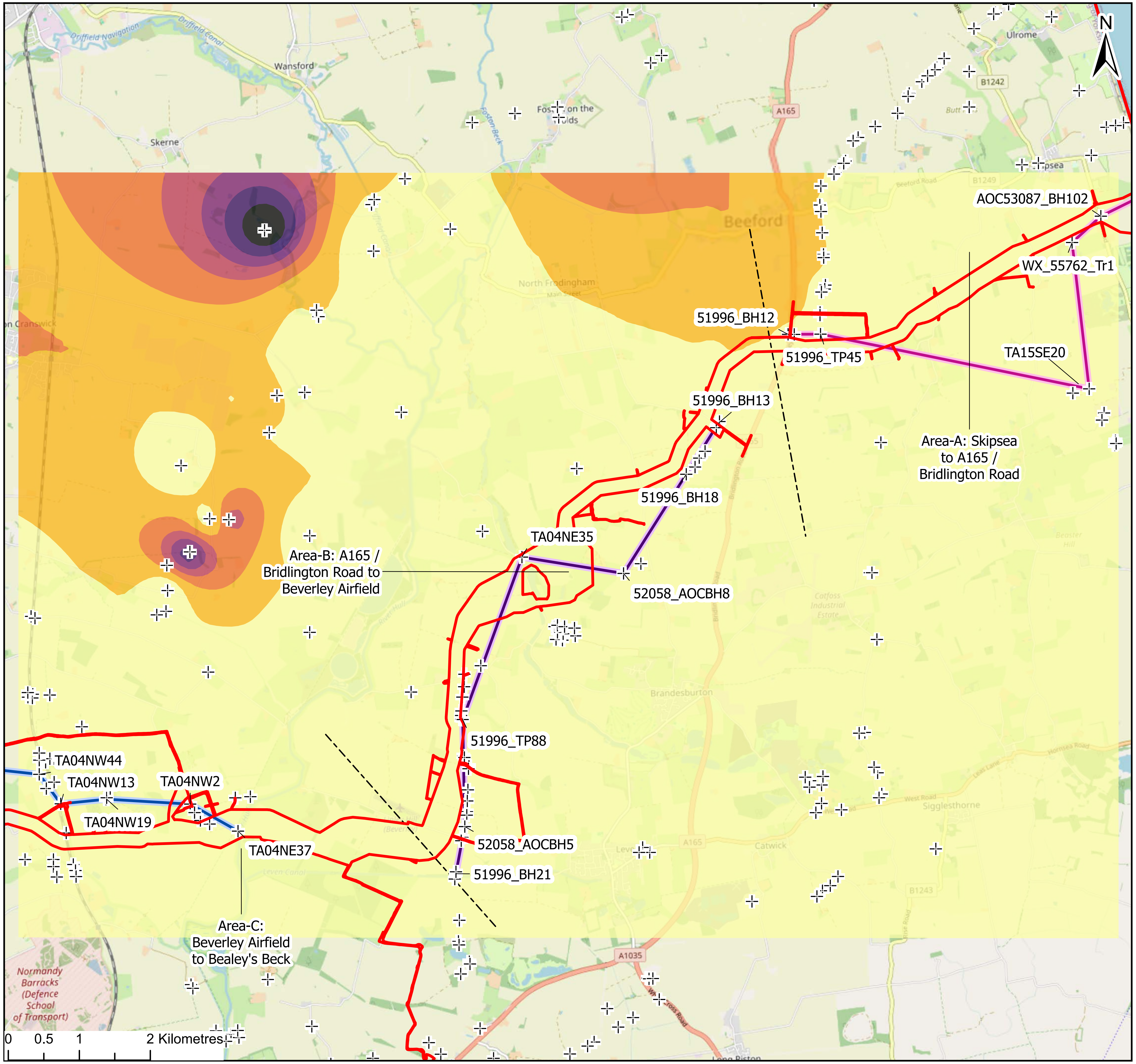
DOGGER BANK WIND FARM

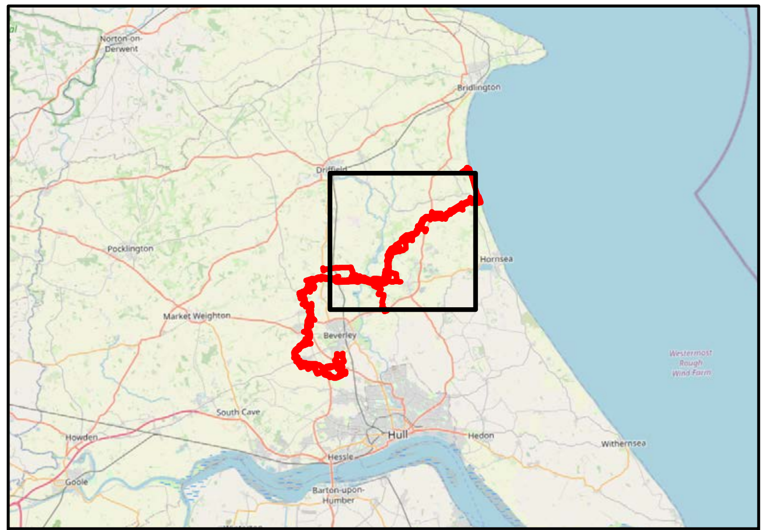
Title: Thickness plot of the below-ground glaciolacustrine deposits (extrapolated from deposit records), representing deposit survival – Area A

Figure: 24.6-18	Drawing No: PC6250-AOC-XX-ON-DR-GS-0403				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:40,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

Onshore Development Area		Glaciolacustrine Thickness Area-B	
Datapoints		m	
Transect A		6.01 - 7.00	
Transect B		5.01 - 6.00	
Transect C		4.01 - 5.00	
Route Divisions (GDBA)		3.01 - 4.00	
		2.01 - 3.00	
		1.01 - 2.00	
		0.00 - 1.00	

Project: Dogger Bank D Offshore Wind Farm

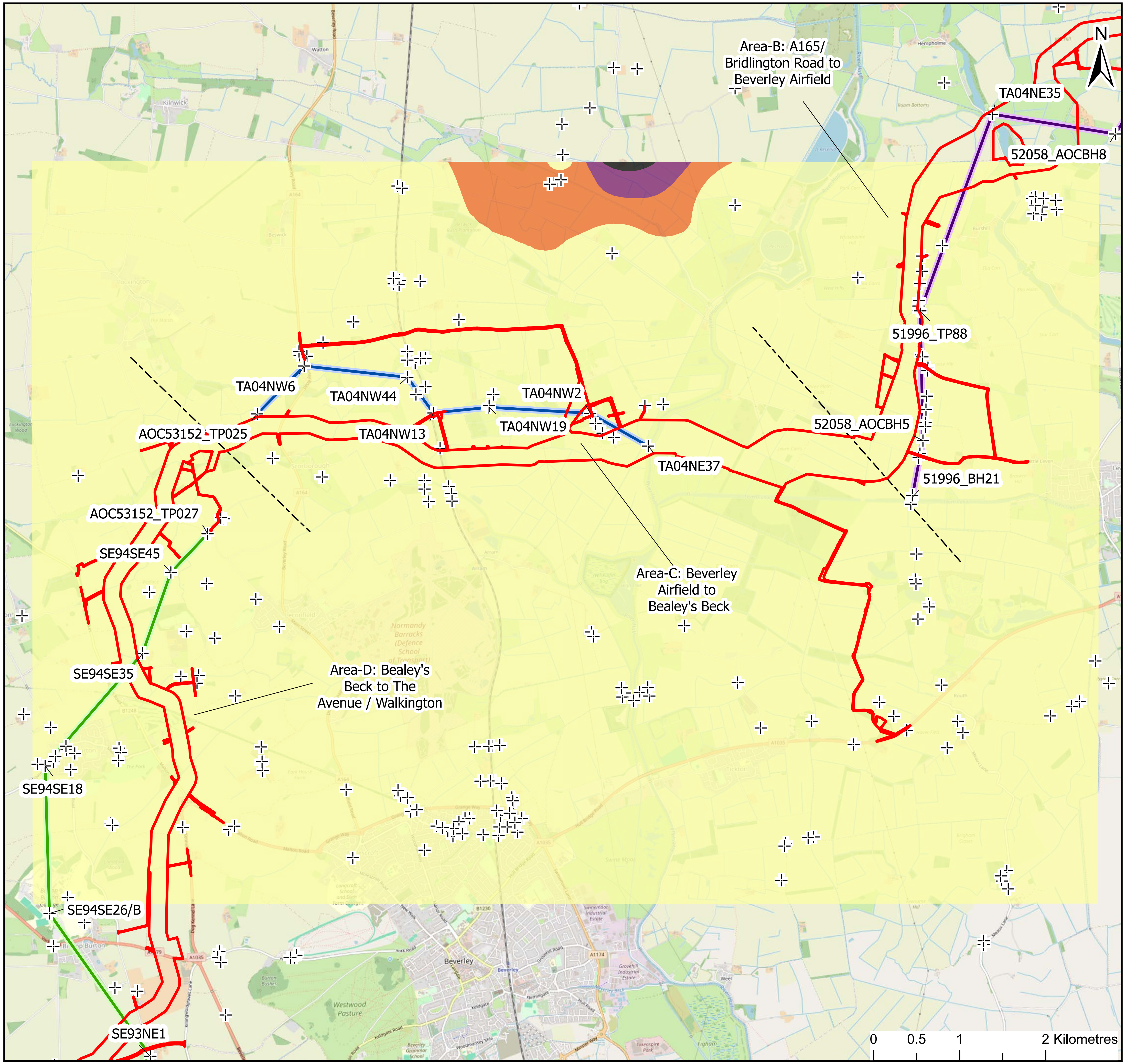
DOGGER BANK WIND FARM

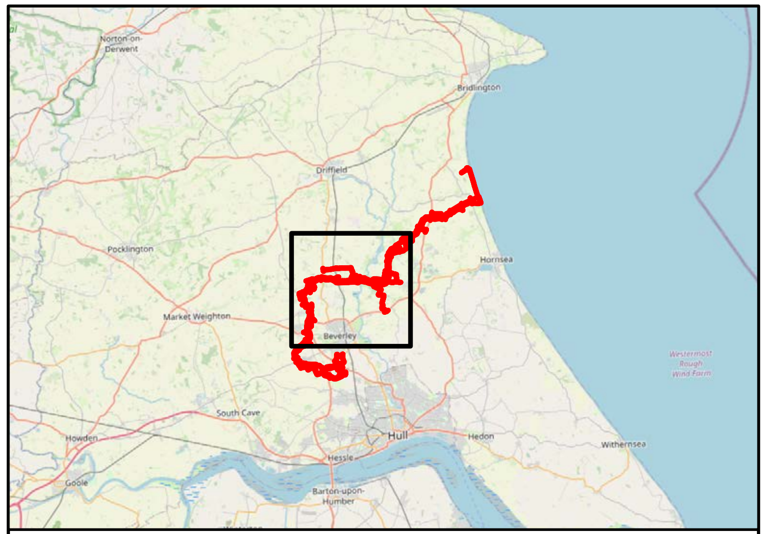
Title: Thickness plot of the below-ground glaciolacustrine deposits (extrapolated from deposit records), representing deposit survival – Area B

Figure: 24.6-19	Drawing No: PC6250-AOC-XX-ON-DR-GS-0404				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:55,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

- Onshore Development Area
- Datapoints
- Transect B
- Transect C
- Transect D
- Route Divisions (GDBA)

Glaciolacustrine Thickness Area-C

m

- 1.51 - 2.00
- 1.01 - 1.50
- 0.51 - 1.00
- 0.00 - 0.50

Project: Dogger Bank D Offshore Wind Farm

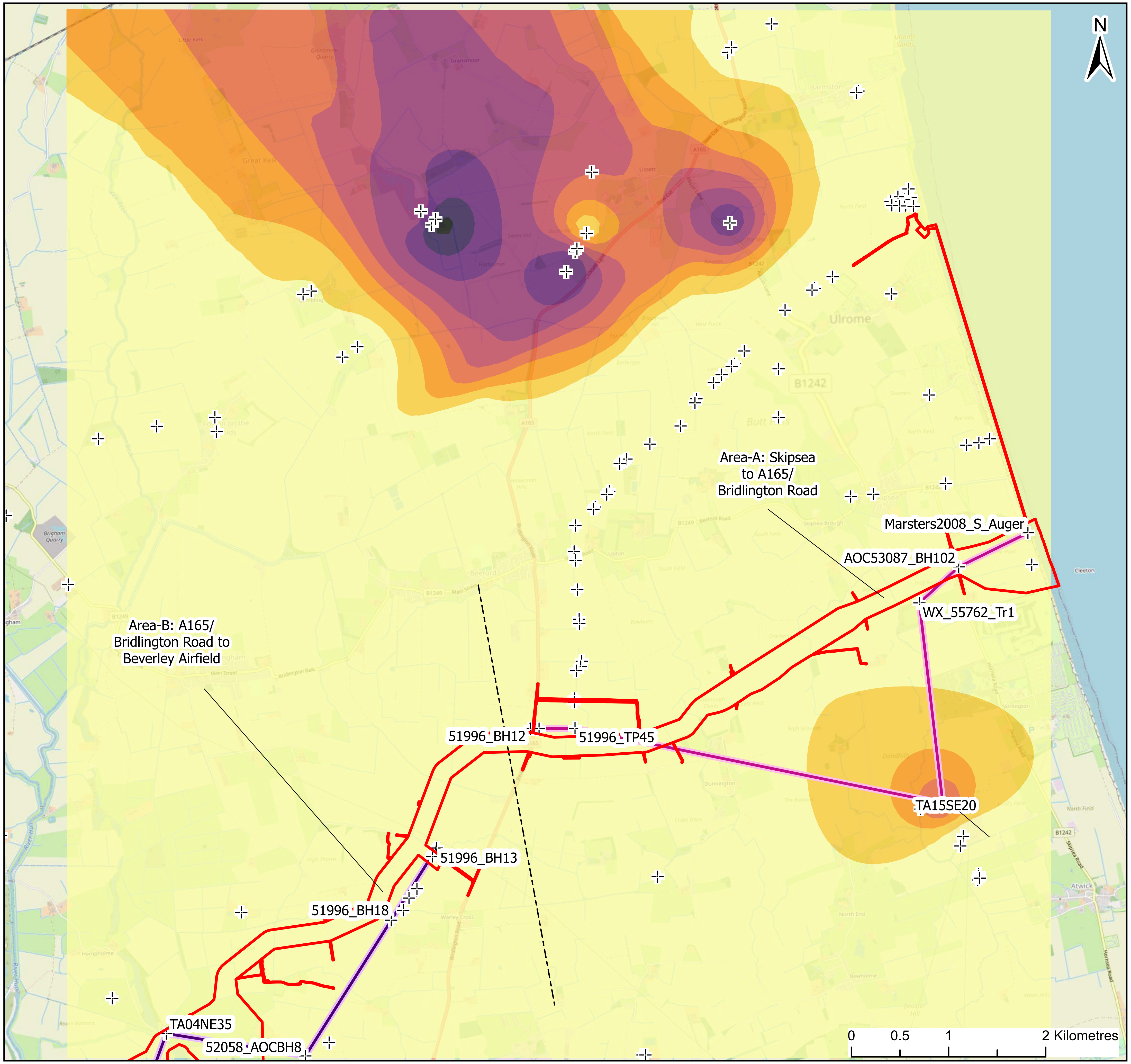
DOGGER BANK WIND FARM

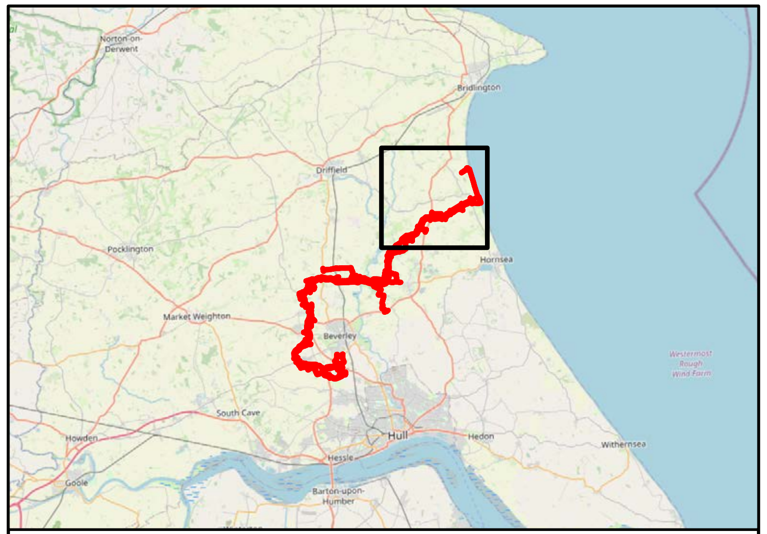
Title: Thickness plot of the below-ground glaciolacustrine deposits (extrapolated from deposit records), representing deposit survival – Area C

Figure: 24.6-20	Drawing No: PC6250-AOC-XX-ON-DR-GS-0405				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:45,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

Onshore Development Area	Glaciofluvial Thickness Area-A
Datapoints	m
Transect A	16.01 - 18.00
Transect B	14.01 - 16.00
Route Divisions (GDBA)	12.01 - 14.00
	10.01 - 12.00
	8.01 - 10.00
	6.01 - 8.00
	4.01 - 6.00
	2.01 - 4.00
	0.00 - 2.00

Project: Dogger Bank D Offshore Wind Farm

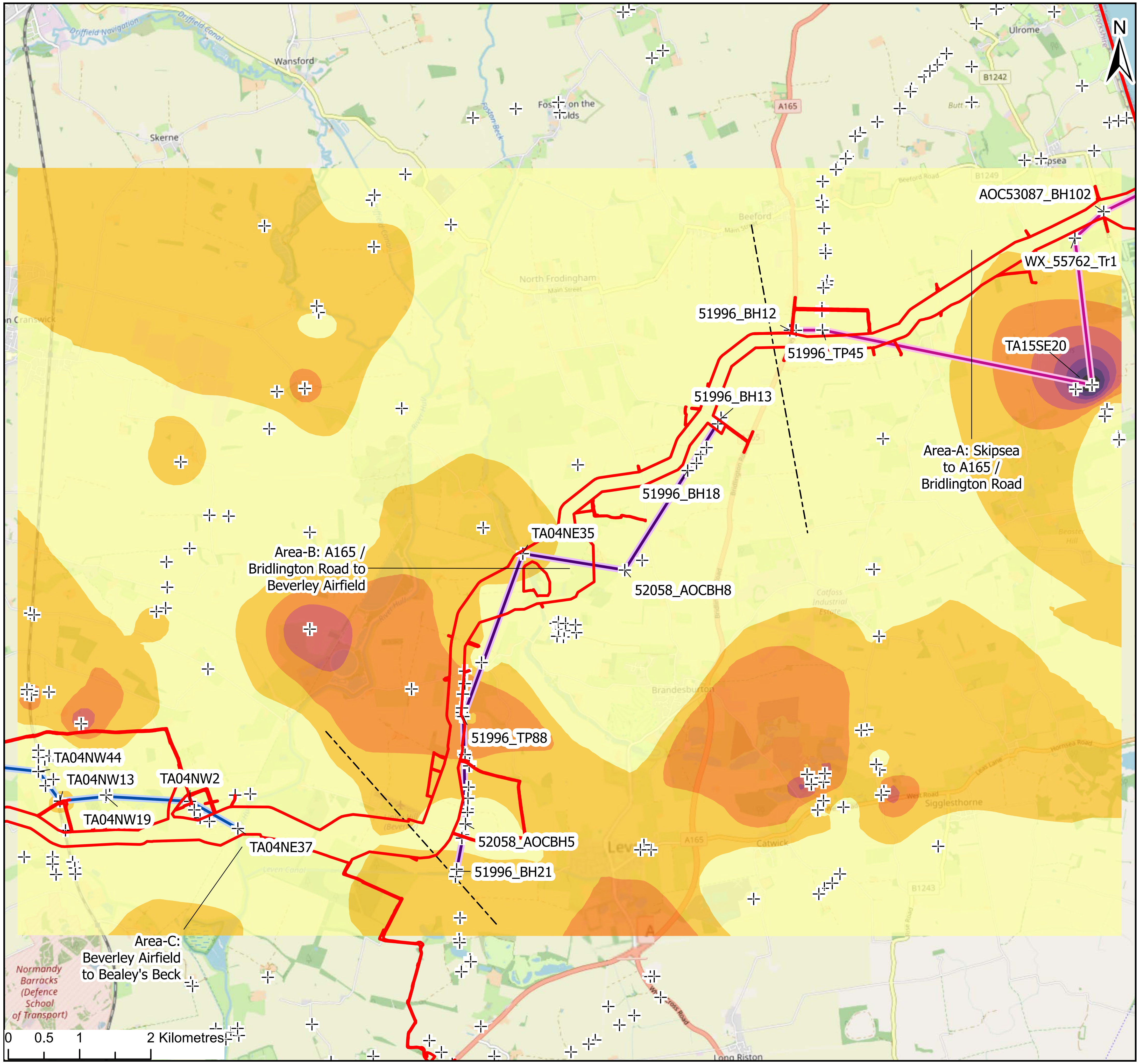
DOGGER BANK WIND FARM

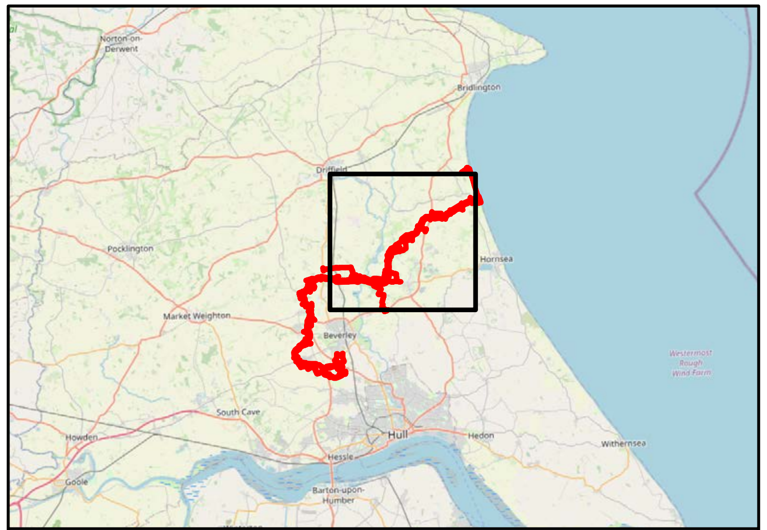
Title: Thickness plot of the below-ground glaciofluvial deposits (extrapolated from deposit records), representing deposit survival – Area A

Figure: 24.6-21	Drawing No: PC6250-AOC-XX-ON-DR-GS-0406				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:40,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

Onshore Development Area

Datapoints

Transect A

Transect B

Transect C

Route Divisions (GDBA)

Glaciofluvial Thickness Area-B

m

7.01 - 8.00

6.01 - 7.00

5.01 - 6.00

4.01 - 5.00

3.01 - 4.00

2.01 - 3.00

1.01 - 2.00

0.00 - 1.00

Source: © Haskoning DHV UK Ltd, 2024.

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

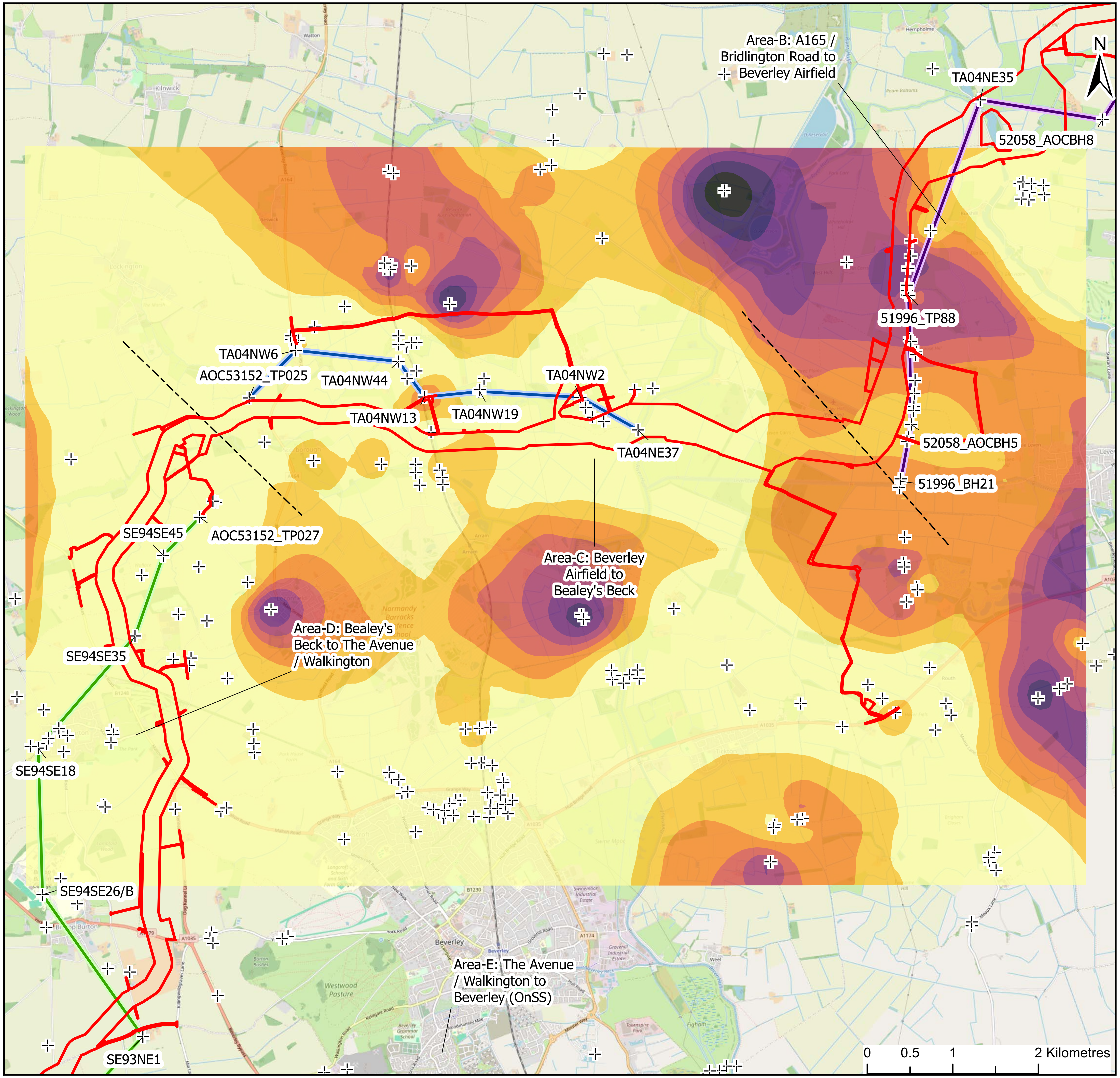
Title: Thickness plot of the below-ground glaciofluvial deposits (extrapolated from deposit records), representing deposit survival – Area B

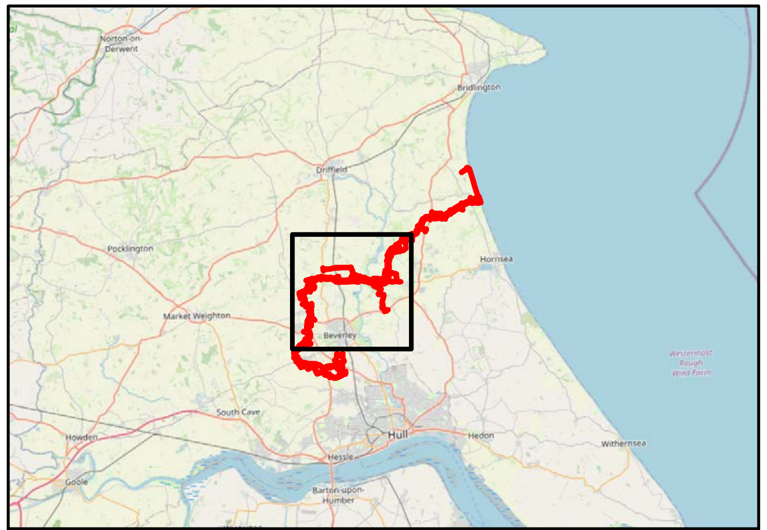
Figure 24.6-22	Drawing No: PC6250-AOC-XX-ON-DR-GS-0407				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:55,000

Co-ordinate system: British National Grid

sse Renewables

equinor





Legend

- Onshore Development Area
- Datapoints
- Transect B
- Transect C
- Transect D
- Route Divisions (GDBA)

Glaciofluvial Thickness Area-C
m

- 3.51 - 4.00
- 3.01 - 3.50
- 2.51 - 3.00
- 2.01 - 2.50
- 1.51 - 2.00
- 1.01 - 1.50
- 0.51 - 1.00
- 0.00 - 0.50

Project: Dogger Bank D Offshore Wind Farm

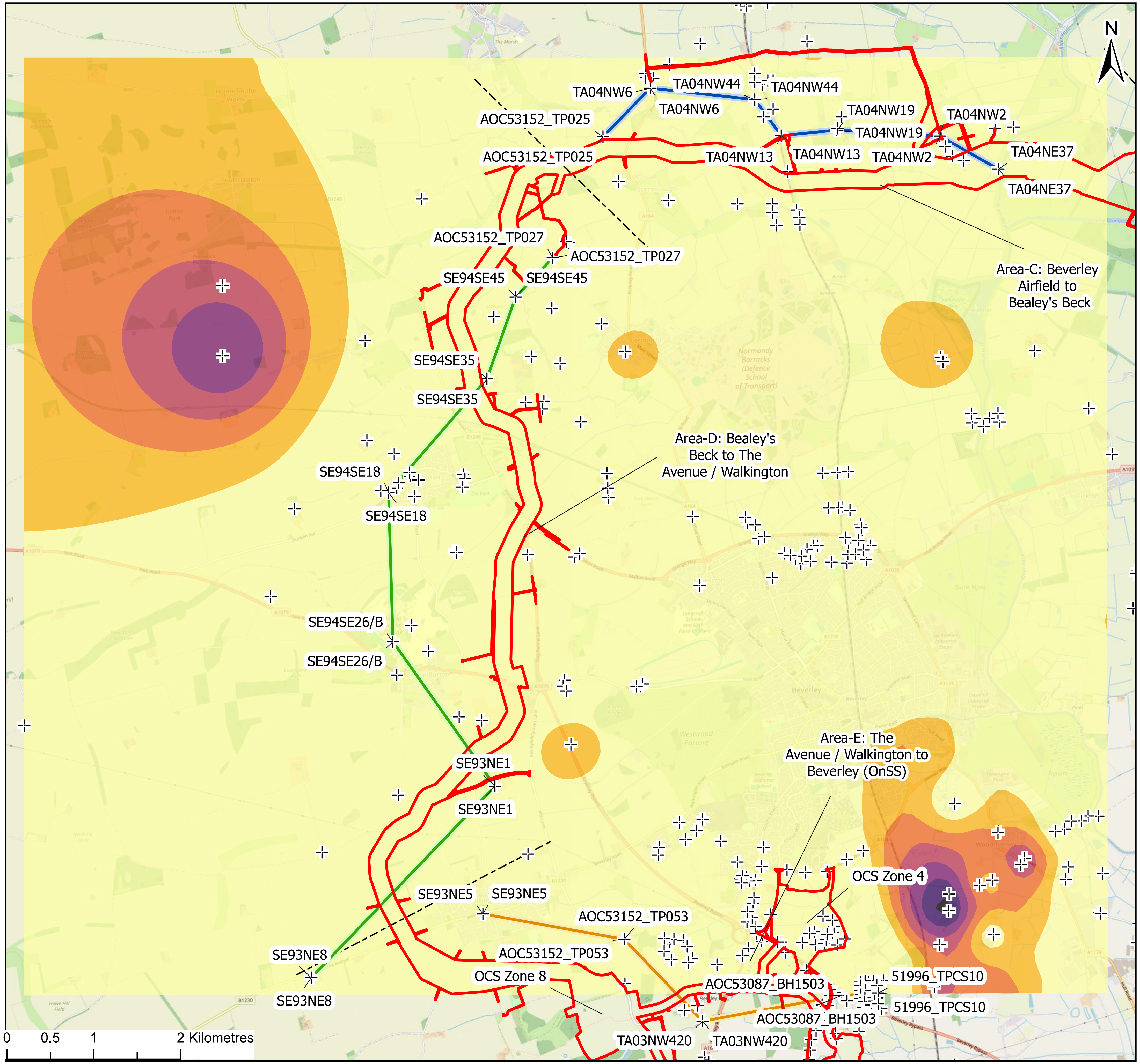
DOGGER BANK WIND FARM

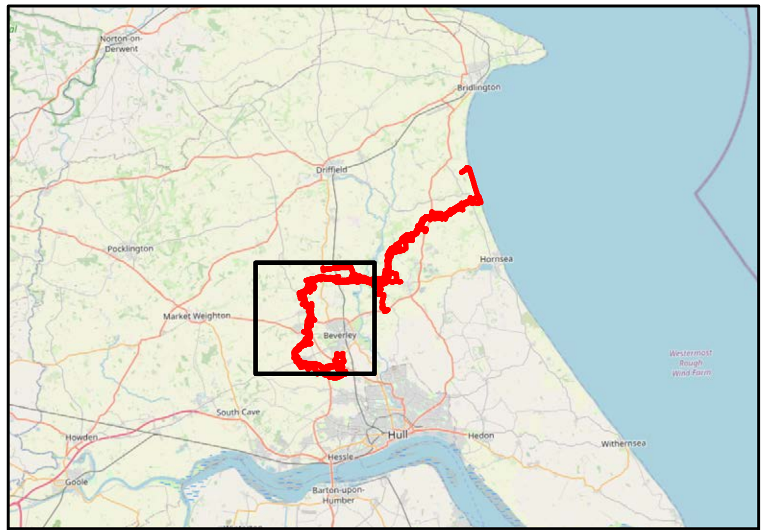
Title: Thickness plot of the below-ground glaciofluvial deposits (extrapolated from deposit records), representing deposit survival – Area C

Figure:	Drawing No:				
24.6-23	PC6250-AOC-XX-ON-DR-GS-0408				
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:45,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

- Onshore Development Area
- Datapoints
- Transect C
- Transect D
- Transect E
- Route Divisions (GDBA)

Glaciofluvial Thickness Area-D

m

- 12.01 - 14.00
- 10.01 - 12.00
- 8.01 - 10.00
- 6.01 - 8.00
- 4.01 - 6.00
- 2.01 - 4.00
- 0.00 - 2.00

Project: Dogger Bank D Offshore Wind Farm

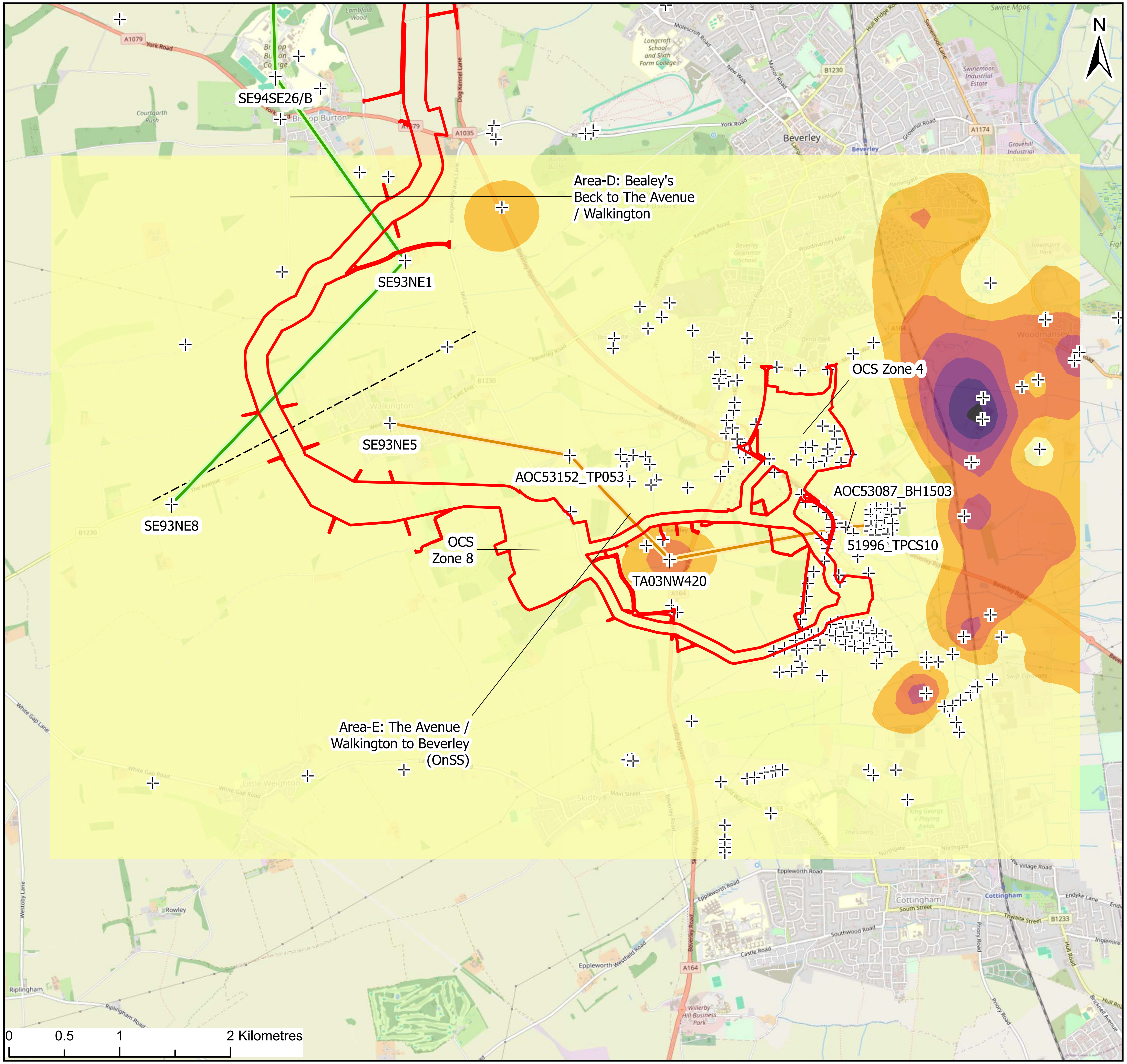
DOGGER BANK WIND FARM

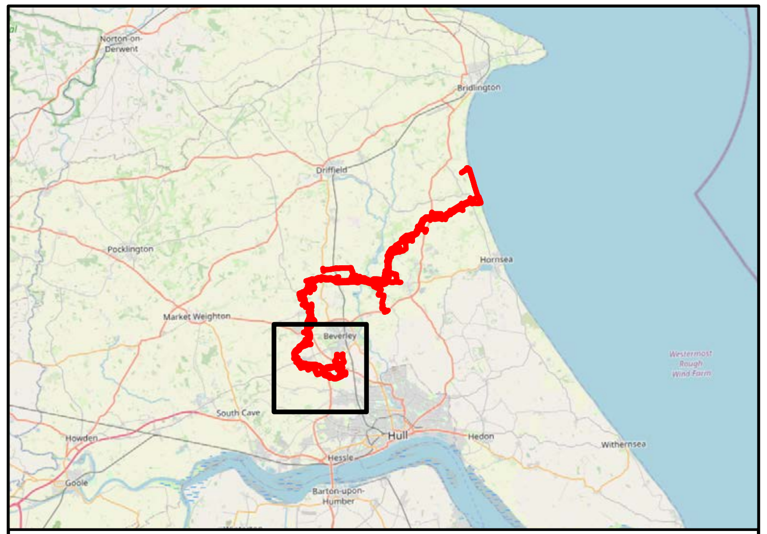
Title: Thickness plot of the below-ground glaciofluvial deposits (extrapolated from deposit records), representing deposit survival – Area D

Figure:	24.6-24	Drawing No:	PC6250-AOC-XX-ON-DR-GS-0409		
Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:45,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

- Onshore Development Area
- Datapoints
- Transect D
- Transect E
- Route Divisions (GDBA)

Glaciofluvial Thickness Area-E

m

- 12.01 - 14.00
- 10.01 - 12.00
- 8.01 - 10.00
- 6.01 - 8.00
- 4.01 - 6.00
- 2.01 - 4.00
- 0.00 - 2.00

Project: Dogger Bank D Offshore Wind Farm

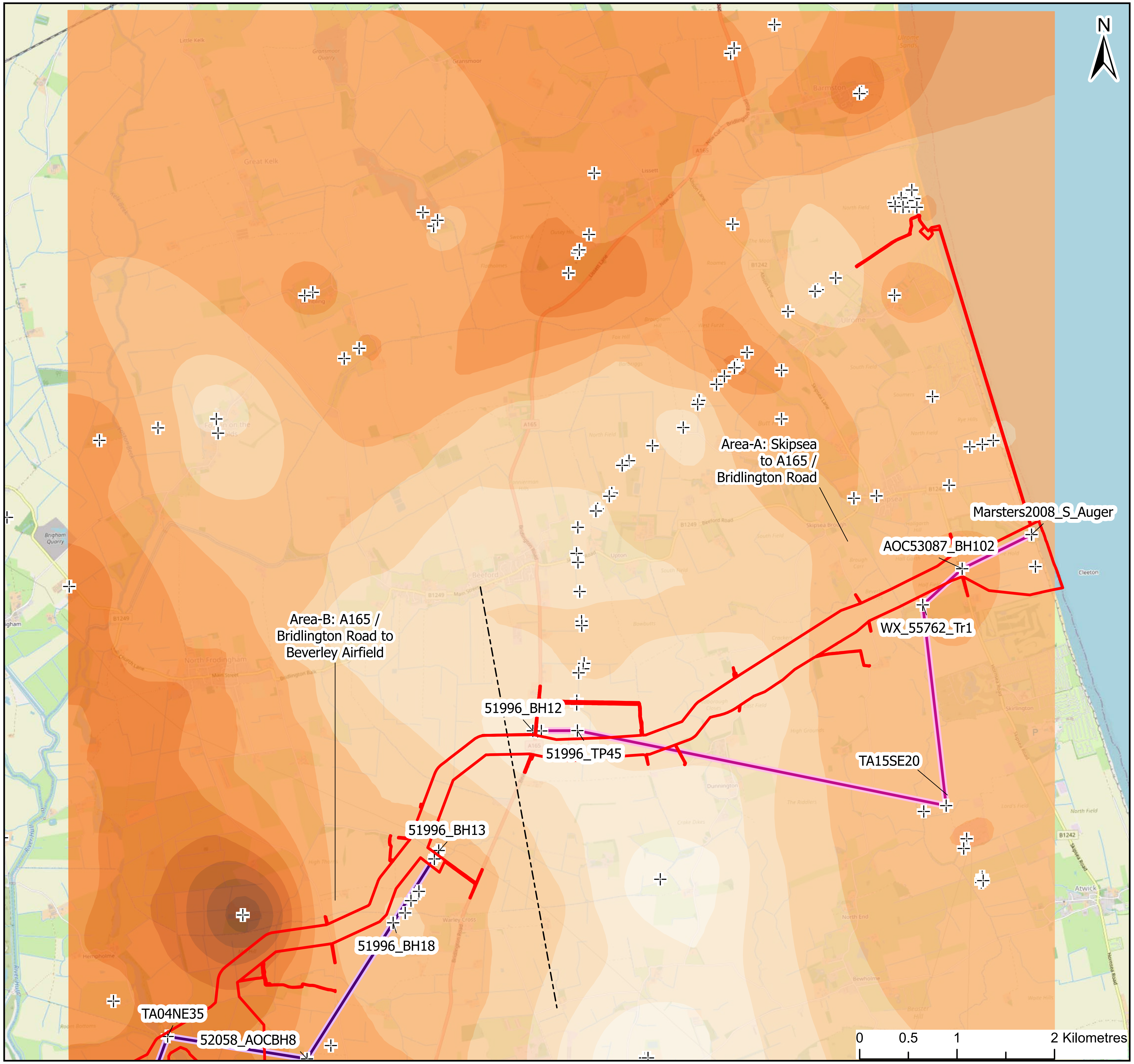
DOGGER BANK WIND FARM

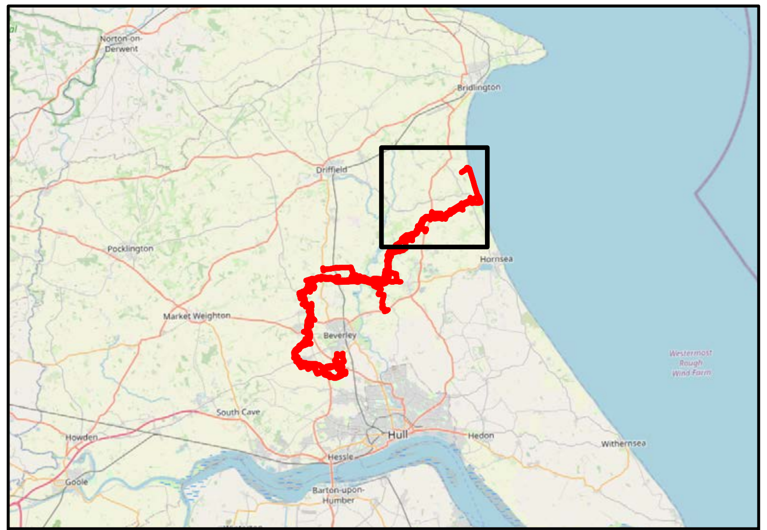
Title: Thickness plot of the below-ground glaciofluvial deposits (extrapolated from deposit records), representing deposit survival – Area E

Figure:	Drawing No:				
24.6-25	PC6250-AOC-XX-ON-DR-GS-0410				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
03	21/03/2025	JT/AA	VY	A3	1:35,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

Onshore Development Area
Datapoints
Transect A
Transect B
Route Divisions (GDBA)

Glaciofluvial Surface Area-A
m OD

- 17.51 - 20.00
- 15.01 - 17.50
- 12.51 - 15.00
- 10.01 - 12.50
- 7.51 - 10.00
- 5.01 - 7.50
- 2.51 - 5.00
- 0.01 - 2.50
- -2.49 - 0.00
- -4.99 - -2.50
- -7.49 - -5.00
- -8.50 - -7.50

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Project: Dogger Bank D Offshore Wind Farm	DOGGER BANK WIND FARM

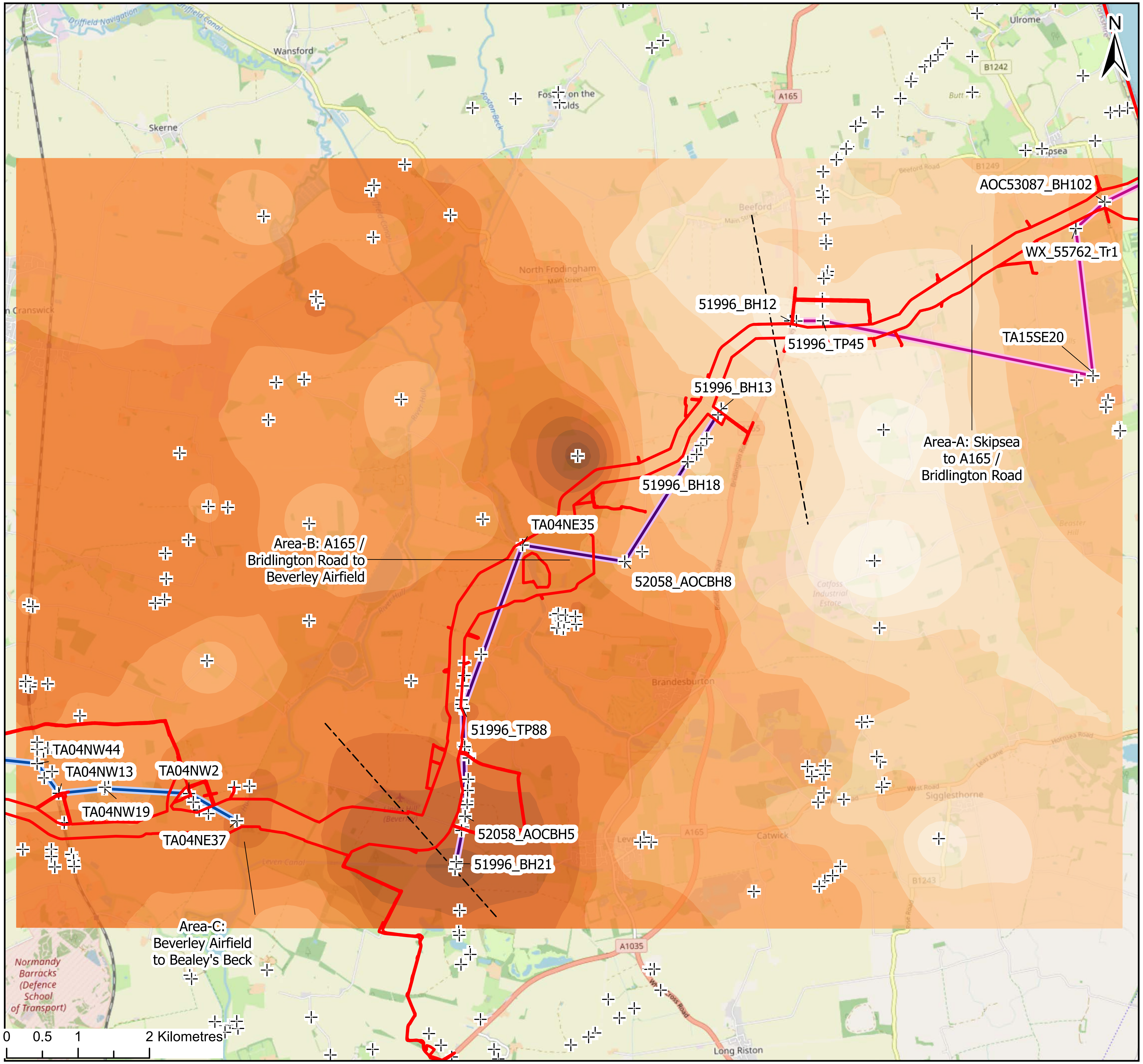
Title: Topographic plot of the surface of the below-ground Pleistocene and earlier geology (extrapolated from deposit records), suggesting the form of the ancient land surface at c. 10,000 BC – Area A

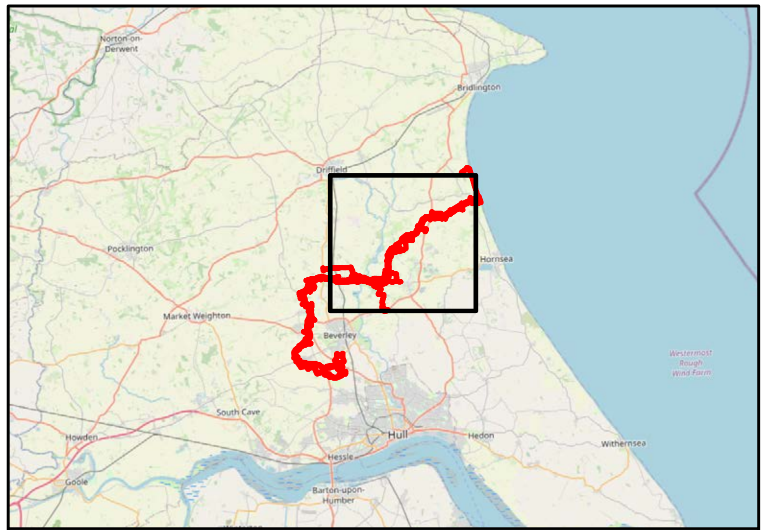
Figure: 24.6-26	Drawing No: PC6250-AOC-XX-ON-DR-GS-0411

Revision:	Date:	Drawn:	Checked:	Size:	Scale:
03	21/03/2025	JT/AA	VY	A3	1:40,000

Co-ordinate system: British National Grid

sse Renewables equinor





Legend

- Onshore Development Area
- Datapoints
- Transect A
- Transect B
- Transect C
- Route Divisions (GDBA)

Glaciofluvial Surface Area-B

m OD

- 17.51 - 20.00
- 15.01 - 17.50
- 12.51 - 15.00
- 10.01 - 12.50
- 7.51 - 10.00
- 5.01 - 7.50
- 2.51 - 5.00
- 0.01 - 2.50
- -2.49 - 0.00
- -4.99 - -2.50
- -7.49 - -5.00
- -8.50 - -7.50

Project: Dogger Bank D Offshore Wind Farm

DOGGER BANK WIND FARM

Title: Topographic plot of the surface of the below-ground Pleistocene and earlier geology (extrapolated from deposit records), suggesting the form of the ancient land surface at c. 10,000 BC – Area B

Figure:	Drawing No:				
24.6-27	PC6250-AOC-XX-ON-DR-GS-0412				
Revision:	**Date:**	**Drawn:**	**Checked:**	**Size:**	**Scale:**
03	21/03/2025	JT/AA	VY	A3	1:55,000

Co-ordinate system: British National Grid

sse Renewables equinor