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

~~Environmental Statement~~

~~Volume 3, Annex 2.3: Flood risk assessment~~



Deadline 4: 08 August ~~May~~ 2025
Rev: ~~F03~~F04

MOROO1-FLO-CON-ENV-RSA-0002
MRCNS-J3303-RPS-10127

PINS Reference: EN020028
APFP Regulations: 5(2)(a)
Document reference: F3.2.3/~~F03~~F04

MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 3, Annex 2.3: Flood risk assessment Part 1 of 3 - F04



Document status					
Version	Purpose of document	Approved by	Date	Approved by	Date
ES	For issue	AS	September 2024	IM	September 2024
F02	S51 advice update	AS	December 2024	IM	December 2024
F03	For submission at Deadline 1	HK	May 2025	IM	May 2025
F04	For submission at Deadline 4	HK	August 2025	IM	August 2025

The report has been prepared for the exclusive use and benefit of the Applicants and solely for the purpose for which it is provided. Unless otherwise agreed in writing by RPS Group Plc, any of its subsidiaries, or a related entity (collectively 'RPS') no part of this report should be reproduced, distributed or communicated to any third party. RPS does not accept any liability if this report is used for an alternative purpose from which it is intended, nor to any third party in respect of this report. The report does not account for any changes relating to the subject matter of the report, or any legislative or regulatory changes that have occurred since the report was produced and that may affect the report.

The report has been prepared using the information provided to RPS by its client, or others on behalf of its client. To the fullest extent permitted by law, RPS shall not be liable for any loss or damage suffered by the client arising from fraud, misrepresentation, withholding of information material relevant to the report or required by RPS, or other default relating to such information, whether on the client's part or that of the other information sources, unless such fraud, misrepresentation, withholding or such other default is evident to RPS without further enquiry. It is expressly stated that no independent verification of any documents or information supplied by the client or others on behalf of the client has been made. The report shall be used for general information only.

Prepared by:

RPS

Prepared for:

Morgan Offshore Wind Limited
Morecambe Offshore Windfarm Ltd

Contents

1 FLOOD RISK ASSESSMENT 1
1.1 Introduction 1
1.2 Methodology 2
1.2.1 Policy and guidance 2
1.2.2 Study area 3
1.2.3 Information sources 6
1.3 Consultation 11
1.4 Legislation and guidance 28
1.4.1 National policy legislation and guidance 28
1.4.2 National Planning Policy 43
1.4.3 Climate change 47
1.4.4 Local planning policy 51
1.5 Morgan onshore substation site flood risk assessment 61
1.5.1 Baseline conditions 61
1.5.2 Hydrological overview 63
1.5.3 Hydrogeological overview 67
1.5.4 Fluvial and tidal flood risk 72
1.5.5 Groundwater flood risk 113
1.5.6 Surface water flood risk 115
1.5.7 Reservoir flood risk 121
1.5.8 Flood risk from sewer and water main failure 121
1.5.9 Flood risk from artificial sources 123
1.5.10 Historic flooding 125
1.5.11 Summary of flood risk 125
1.6 Morecambe onshore substation site flood risk assessment 129
1.6.1 Baseline conditions 129
1.6.2 Hydrological overview 131
1.6.3 Hydrogeological overview 134
1.6.4 Fluvial and tidal flood risk 135
1.6.5 Groundwater flood risk 144
1.6.6 Surface water flood risk 146
1.6.7 Reservoir flood risk 152
1.6.8 Flood risk from sewer and water main failure 152
1.6.9 Flood risk from artificial sources 154
1.6.10 Historic flooding 156
1.6.11 Summary of flood risk 156
1.7 Landfall, onshore export cables and 400 kV grid connection cable corridor flood risk assessment 157
1.7.1 Baseline conditions 157
1.7.2 Hydrological overview 160
1.7.3 Hydrogeological overview 175
1.7.4 Fluvial and tidal flood risk 176
1.7.5 Groundwater flood risk 216
1.7.6 Surface water flood risk 218
1.7.7 Reservoir flood risk 221
1.7.8 Flood risk from sewer and water main failure 233
1.7.9 Flood risk from artificial sources 235
1.7.10 Historic flooding 236
1.7.11 Summary of flood risk 237
1.8 Flood Risk Management 238
1.8.1 Measures adopted as part of the Transmission Assets (Commitments) 238

1.9 Sequential test and exception test 244
1.9.1 Site Vulnerability 244
1.9.2 Sequential test 244
1.9.3 Exception test 245
1.10 Summary and conclusions 249
1.10.1 Summary 249
1.10.2 Fluvial and tidal flood risk 249
1.10.3 Groundwater flood risk 250
1.10.4 Surface water flood risk 250
1.10.5 Reservoir flood risk 251
1.10.6 Flood risk from sewers and water main failure 251
1.10.7 Flood risk from artificial sources 251
1.10.8 Sequential and exception tests 251
1.10.9 Surface water drainage 252
1.10.10 Conclusion 252
1.11 References 252

~~1 FLOOD RISK ASSESSMENT ..... 1~~
~~1.1 Introduction ..... 1~~
~~1.2 Methodology ..... 2~~
~~1.2.1 Policy and guidance ..... 2~~
~~1.2.2 Study area ..... 3~~
~~1.2.3 Information sources ..... 6~~
~~1.3 Consultation ..... 11~~
~~1.4 Legislation and guidance ..... 28~~
~~1.4.1 National policy legislation and guidance ..... 28~~
~~1.4.2 National Planning Policy ..... 43~~
~~1.4.3 Climate change ..... 47~~
~~1.4.4 Local planning policy ..... 51~~
~~1.5 Morgan onshore substation site flood risk assessment ..... 61~~
~~1.5.1 Baseline conditions ..... 61~~
~~1.5.2 Hydrological overview ..... 63~~
~~1.5.3 Hydrogeological overview ..... 67~~
~~1.5.4 Fluvial and tidal flood risk ..... 72~~
~~1.5.5 Groundwater flood risk ..... 113~~
~~1.5.6 Surface water flood risk ..... 115~~
~~1.5.7 Reservoir flood risk ..... 121~~
~~1.5.8 Flood risk from sewer and water main failure ..... 121~~
~~1.5.9 Flood risk from artificial sources ..... 123~~
~~1.5.10 Historic flooding ..... 125~~
~~1.5.11 Summary of flood risk ..... 125~~
~~1.6 Morecambe onshore substation site flood risk assessment ..... 129~~
~~1.6.1 Baseline conditions ..... 129~~
~~1.6.2 Hydrological overview ..... 131~~
~~1.6.3 Hydrogeological overview ..... 134~~
~~1.6.4 Fluvial and tidal flood risk ..... 135~~
~~1.6.5 Groundwater flood risk ..... 144~~
~~1.6.6 Surface water flood risk ..... 146~~
~~1.6.7 Reservoir flood risk ..... 152~~
~~1.6.8 Flood risk from sewer and water main failure ..... 152~~
~~1.6.9 Flood risk from artificial sources ..... 154~~
~~1.6.10 Historic flooding ..... 156~~
~~1.6.11 Summary of flood risk ..... 156~~

1.7 Landfall, onshore export cables and 400 kV grid connection cable corridor flood risk assessment 157
1.7.1 Baseline conditions 157
1.7.2 Hydrological overview 160
1.7.3 Hydrogeological overview 175
1.7.4 Fluvial and tidal flood risk 176
1.7.5 Groundwater flood risk 216
1.7.6 Surface water flood risk 218
1.7.7 Reservoir flood risk 221
1.7.8 Flood risk from sewer and water main failure 233
1.7.9 Flood risk from artificial sources 235
1.7.10 Historic flooding 236
1.7.11 Summary of flood risk 237
1.8 Flood Risk Management 238
1.8.1 Measures adopted as part of the Transmission Assets (Commitments) 238
1.9 Sequential test and exception test 244
1.9.1 Site Vulnerability 244
1.9.2 Sequential test 244
1.9.3 Exception test 245
1.10 Summary and conclusions 249
1.10.1 Summary 249
1.10.2 Fluvial and tidal flood risk 249
1.10.3 Groundwater flood risk 250
1.10.4 Surface water flood risk 250
1.10.5 Reservoir flood risk 251
1.10.6 Flood risk from sewers and water main failure 251
1.10.7 Flood risk from artificial sources 251
1.10.8 Sequential and exception tests 251
1.10.9 Surface water drainage 252
1.10.10 Conclusion 252
1.11 References 252

Tables

Table 1.1: Information sources consulted during preparation of the FRA 6
Table 1.2: Reports consulted during preparation of the FRA 9
Table 1.3: 2036 and 2071 sea level rise allowance applied to the 2014 Ribble Estuary model outputs 10
Table 1.4: 2017, 2036 and 2071 Coastal design sea levels 11
Table 1.5: Summary of key consultation comments raised during consultation activities undertaken for the Transmission Assets relevant to hydrology and flood risk. 11
Table 1.6: Summary of the NPS EN-1, NPS EN-3, NPS EN-5 requirements relevant to this FRA 28
Table 1.7: Summary of NPPF and PPG requirements and guidance relevant to this chapter 44
Table 1.8: Flood Map for Planning Flood Zones. 46
Table 1.9: Peak river flow allowances by management catchment 48
Table 1.10: Peak rainfall intensity allowance by Management Catchments 49
Table 1.11: Sea level allowances for each epoch in mm for each year (based on a 1981 to 2000 baseline) – the total sea level rise for each epoch is in brackets 50
Table 1.12: Cumulative projected sea levels used for each dataset within the FRA 51
Table 1.13: Summary of local planning policy relevant to this chapter 52

Table 1.14: SMP management approaches within the study area 60
Table 1.15: Morgan onshore substation MDS 62
Table 1.16: Flood defences within the Morgan onshore substation 64
Table 1.17: ReFH2 Peak flows for the Dow Brook 74
Table 1.18: Summary of CoT for fluvial flood risk for Morgan onshore substation 111
Table 1.19: Summary of CoT for groundwater flood risk for Morgan onshore substation 114
Table 1.20: Summary of CoT for surface water flood risk for Morgan onshore substation 119
Table 1.21: Summary of CoT for flood risk from sewers for Morgan onshore substation 122
Table 1.22: Summary of CoT for flood risk from artificial sources for Morgan onshore substation 124
Table 1.23: Morgan onshore substation flood risk summary 125
Table 1.24: Morecambe onshore substation MDS 129
Table 1.25: Flood defences within the Morecambe onshore substation 131
Table 1.26: ReFH2 Peak flows for the Dow Brook 139
Table 1.27: Summary of CoT for fluvial flood risk for Morecambe onshore substation 142
Table 1.28: Summary of CoT for groundwater flood risk for Morecambe onshore substation 145
Table 1.29: Summary of CoT for surface water flood risk for Morecambe onshore substation 150
Table 1.30: Summary of CoT for flood risk from sewers for Morecambe onshore substation 153
Table 1.31: Summary of CoT for flood risk from artificial sources for Morecambe onshore substation 155
Table 1.32: Morecambe onshore substation flood risk summary 156
Table 1.33: Flood Defences 168
Table 1.34: Lancashire County Council flood risk assets 174
Table 1.35: Flood Warnings 174
Table 1.36: Flood Alerts 174
Table 1.37: Superficial Deposits 175
Table 1.38: Summary of CoT for fluvial and tidal flood risk for landfall, the onshore export corridor and 400 kV grid connection cable corridor 181
Table 1.39: Summary of CoT for groundwater flood risk 217
Table 1.40: Summary of CoT for surface water flood risk for landfall, the onshore export corridor and 400 kV grid connection cable corridor 219
Table 1.41: Summary of CoT for flood risk from sewers for landfall, the onshore export corridor and 400 kV grid connection cable corridor 234
Table 1.42: Summary of CoT for flood risk from artificial sources for landfall, the onshore export corridor and 400 kV grid connection cable corridor 235
Table 1.43: Morecambe onshore substation flood risk summary 237
Table 1.44: Mitigation measures and commitments 239
~~Table 1.1: Information sources consulted during preparation of the FRA ....6~~
~~Table 1.2: Reports consulted during preparation of the FRA ....9~~
~~Table 1.3: 2036 and 2071 sea level rise allowance applied to the 2014 Ribble Estuary model outputs ....10~~
~~Table 1.4: 2017, 2036 and 2071 Coastal design sea levels ....11~~
~~Table 1.5: Summary of key consultation comments raised during consultation activities undertaken for the Transmission Assets relevant to hydrology and flood risk. ....11~~
~~Table 1.6: Summary of the NPS EN-1, NPS EN-3, NPS EN-5 requirements relevant to this FRA ....28~~
~~Table 1.7: Summary of NPPF and PPG requirements and guidance relevant to this chapter ....44~~
~~Table 1.8: Flood Map for Planning Flood Zones. ....46~~
~~Table 1.9: Peak river flow allowances by management catchment ....48~~
~~Table 1.10: Peak rainfall intensity allowance by Management Catchments ....49~~
~~Table 1.11: Sea level allowances for each epoch in mm for each year (based on a 1981 to 2000 baseline) – the total sea level rise for each epoch is in brackets ....50~~
~~Table 1.12: Cumulative projected sea levels used for each dataset within the FRA ....51~~
~~Table 1.13: Summary of local planning policy relevant to this chapter ....52~~

Table 1.14: SMP management approaches within the study area 60
Table 1.15: Morgan onshore substation MDS 62
Table 1.16: Flood defences within the Morgan onshore substation 64
Table 1.17: ReFH2 Peak flows for the Dow Brook 74
Table 1.18: Summary of CoT for fluvial flood risk for Morgan onshore substation 111
Table 1.19: Summary of CoT for groundwater flood risk for Morgan onshore substation 114
Table 1.20: Summary of CoT for surface water flood risk for Morgan onshore substation 119
Table 1.21: Summary of CoT for flood risk from sewers for Morgan onshore substation 122
Table 1.22: Summary of CoT for flood risk from artificial sources for Morgan onshore substation 124
Table 1.23: Morgan onshore substation flood risk summary 125
Table 1.24: Morecambe onshore substation MDS 129
Table 1.25: Flood defences within the Morecambe onshore substation 131
Table 1.26: ReFH2 Peak flows for the Dow Brook 139
Table 1.27: Summary of CoT for fluvial flood risk for Morecambe onshore substation 142
Table 1.28: Summary of CoT for groundwater flood risk for Morecambe onshore substation 145
Table 1.29: Summary of CoT for surface water flood risk for Morecambe onshore substation 150
Table 1.30: Summary of CoT for flood risk from sewers for Morecambe onshore substation 153
Table 1.31: Summary of CoT for flood risk from artificial sources for Morecambe onshore substation 155
Table 1.32: Morecambe onshore substation flood risk summary 156
Table 1.33: Flood Defences 168
Table 1.34: Lancashire County Council flood risk assets 174
Table 1.35: Flood Warnings 174
Table 1.36: Flood Alerts 174
Table 1.37: Superficial Deposits 175
Table 1.38: Summary of CoT for fluvial and tidal flood risk for landfall, the onshore export corridor and 400 kV grid connection cable corridor 181
Table 1.39: Summary of CoT for groundwater flood risk 217
Table 1.40: Summary of CoT for surface water flood risk for landfall, the onshore export corridor and 400 kV grid connection cable corridor 219
Table 1.41: Summary of CoT for flood risk from sewers for landfall, the onshore export corridor and 400 kV grid connection cable corridor 234
Table 1.42: Summary of CoT for flood risk from artificial sources for landfall, the onshore export corridor and 400 kV grid connection cable corridor 235
Table 1.43: Morecambe onshore substation flood risk summary 237
Table 1.44: Mitigation measures and commitments 239

Figures

Figure 1.1: Transmission Assets hydrology and flood risk study area 5
Figure 1.2: Morgan onshore substation - Watercourses, EA Flood Zones and EA Spatial Flood Defences 65
Figure 1.3: Flood Warning and Flood Alerts within the study area 66
Figure 1.4: Superficial deposits within the study area 69
Figure 1.5: Bedrock geology within the study area 70
Figure 1.6: Source protection zones within the study area 71
Figure 1.7: 0.5% AEP 2071 epoch undefended scenario flood depths and levels 94
Figure 1.8: Morgan onshore substation – Environment Agency long term flood risk from surface water flooding 117
Figure 1.9: Environment Agency long term flood risk from reservoir flooding within the study area 127
Figure 1.10: Environment Agency historical flood extents within the study area 128

Figure 1.11: Designated Sites within the study area 133
Figure 1.12: Morecambe onshore substation - Watercourses, EA Flood Zones and EA Spatial Flood Defences 137
Figure 1.13: Morecambe onshore substation - Environment Agency Long term flood risk from surface water flooding 148
Figure 1.14: Morecambe onshore substation - Environment Agency Long term flood risk from surface water flooding – climate change 149
Figure 1.15: Transmission Assets: landfall, onshore export cable corridor and 400 kV grid connection cable corridor - Watercourses, EA Flood Zones and EA Spatial Flood Defences 163
Figure 1.16: Transmission Assets: landfall, onshore export cable corridor and 400 kV grid connection cable corridor - Watercourses, EA Flood Zones and EA Spatial Flood Defences 164
Figure 1.17: Transmission Assets: landfall, onshore export cable corridor and 400 kV grid connection cable corridor - Watercourses, EA Flood Zones and EA Spatial Flood Defences 165
Figure 1.18: Transmission Assets: landfall, onshore export cable corridor and 400 kV grid connection cable corridor - Watercourses, EA Flood Zones and EA Spatial Flood Defences 166
Figure 1.19a: Defended 1% AEP fluvial event plus 20% climate change uplift 189
Figure 1.20: Defended 1% AEP fluvial event plus 20% climate change uplift 193
Figure 1.21: Defended 1% AEP fluvial event plus 20% climate change uplift 194
Figure 1.22a: Undefended 1% AEP fluvial event plus 20% climate change uplift 195
Figure 1.23: Undefended 1% AEP fluvial event plus 20% climate change uplift 199
Figure 1.24: Undefended 1% AEP fluvial event plus 20% climate change uplift 200
Figure 1.25a: Defended 1% AEP joint probability event plus 20% climate change uplift event 201
Figure 1.26: Defended 1% AEP joint probability event plus 20% climate change uplift event 205
Figure 1.27:Defended 1% AEP joint probability event plus 20% climate change uplift event 206
Figure 1.28a: Undefended 1% AEP joint probability event plus 20% climate change uplift event 207
Figure 1.29: Undefended 1% AEP joint probability event plus 20% climate change uplift event 212
Figure 1.30: Undefended 1% AEP joint probability event plus 20% climate change uplift event 213
Figure 1.31: Undefended 1% AEP joint probability event plus 20% climate change uplift event 214
Figure 1.32: Undefended 1% AEP joint probability event plus 20% climate change uplift event 215
Figure 1.33a: Environment Agency Long term flood risk from surface water flooding 222
Figure 1.34: Environment Agency Long term flood risk from surface water flooding 223
Figure 1.35: Environment Agency Long term flood risk from surface water flooding 224
Figure 1.36: Environment Agency Long term flood risk from surface water flooding 226
Figure 1.37: Environment Agency Long term flood risk from surface water flooding – climate change scenario 227
Figure 1.38: Environment Agency Long term flood risk from surface water flooding – climate change scenario 228
Figure 1.39: Environment Agency Long term flood risk from surface water flooding – climate change scenario 230
Figure 1.40: Environment Agency Long term flood risk from surface water flooding – climate change scenario 231
~~Figure 1.1: Transmission Assets hydrology and flood risk study area ..... 5~~
~~Figure 1.2: Morgan onshore substation - Watercourses, EA Flood Zones and EA Spatial Flood Defences ..... 65~~
~~Figure 1.3: Flood Warning and Flood Alerts within the study area ..... 66~~
~~Figure 1.4: Superficial deposits within the study area ..... 69~~
~~Figure 1.5: Bedrock geology within the study area ..... 70~~
~~Figure 1.6: Source protection zones within the study area ..... 71~~

Figure 1.7: 0.5% AEP 2036 epoch undefended scenario flood depths and levels Figure 1.7: 0.5% AEP 2036 epoch undefended scenario flood depths and levels 77
Figure 1.8: - 0.5% AEP 2071 epoch undefended scenario flood depths and levels 94
Figure 1.9: - Morgan onshore substation – Environment Agency long term flood risk from surface water flooding 117
Figure 1.10: Environment Agency long term flood risk from reservoir flooding within the study area 127
Figure 1.11: Environment Agency historical flood extents within the study area 128
Figure 1.12: Designated Sites within the study area 133
Figure 1.13: Morecambe onshore substation - Watercourses, EA Flood Zones and EA Spatial Flood Defences 137
Figure 1.14: Morecambe onshore substation - Environment Agency Long term flood risk from surface water flooding 148
Figure 1.15: Morecambe onshore substation - Environment Agency Long term flood risk from surface water flooding – climate change 149
Figure 1.16: Transmission Assets: landfall, onshore export cable corridor and 400 kV grid connection cable corridor - Watercourses, EA Flood Zones and EA Spatial Flood Defences 163
Figure 1.17: Transmission Assets: landfall, onshore export cable corridor and 400 kV grid connection cable corridor - Watercourses, EA Flood Zones and EA Spatial Flood Defences 164
Figure 1.18: Transmission Assets: landfall, onshore export cable corridor and 400 kV grid connection cable corridor - Watercourses, EA Flood Zones and EA Spatial Flood Defences 165
Figure 1.19: Transmission Assets: landfall, onshore export cable corridor and 400 kV grid connection cable corridor - Watercourses, EA Flood Zones and EA Spatial Flood Defences 166
Figure 1.20a: – Defended 1% AEP fluvial event plus 20% climate change uplift 189
Figure 1.21: Defended 1% AEP fluvial event plus 20% climate change uplift 193
Figure 1.22: Defended 1% AEP fluvial event plus 20% climate change uplift 194
Figure 1.23a: – Undefended 1% AEP fluvial event plus 20% climate change uplift 195
Figure 1.24: Undefended 1% AEP fluvial event plus 20% climate change uplift 199
Figure 1.25: Undefended 1% AEP fluvial event plus 20% climate change uplift 200
Figure 1.26a: – Defended 1% AEP joint probability event plus 20% climate change uplift event 201
Figure 1.27: Defended 1% AEP joint probability event plus 20% climate change uplift event 205
Figure 1.28:Defended 1% AEP joint probability event plus 20% climate change uplift event 206
Figure 1.29a: – Undefended 1% AEP joint probability event plus 20% climate change uplift event 207
Figure 1.30: Undefended 1% AEP joint probability event plus 20% climate change uplift event 212
Figure 1.31: Undefended 1% AEP joint probability event plus 20% climate change uplift event 213
Figure 1.32: Undefended 1% AEP joint probability event plus 20% climate change uplift event 214
Figure 1.33: Undefended 1% AEP joint probability event plus 20% climate change uplift event 215
Figure 1.34a: – Environment Agency Long term flood risk from surface water flooding 222
Figure 1.35: Environment Agency Long term flood risk from surface water flooding 223
Figure 1.36: Environment Agency Long term flood risk from surface water flooding 224
Figure 1.37: Environment Agency Long term flood risk from surface water flooding 226
Figure 1.38: Environment Agency Long term flood risk from surface water flooding – climate change scenario 227
Figure 1.39: Environment Agency Long term flood risk from surface water flooding – climate change scenario 228
Figure 1.40: Environment Agency Long term flood risk from surface water flooding – climate change scenario 230

~~Figure 1.41: Environment Agency Long term flood risk from surface water flooding – climate change scenario ..... 231~~

Glossary

Term	Meaning
400 kV grid connection cables	Cables that will connect the onshore substations to the existing National Grid Penwortham substation.
400 kV grid connection cable corridor	The corridor within which the 400 kV grid connection cables will be located.
Applicants	Morgan Offshore Wind Limited (Morgan OWL) and Morecambe Offshore Windfarm Ltd (Morecambe OWL).
Aquifer	A subsurface layer or layers of rock or other geological strata of sufficient porosity and permeability to allow either a significant flow of groundwater or the abstraction of significant quantities of groundwater.
Baseline	The status of the environment without the Transmission Assets in place.
Biodiversity benefit	An approach to development that leaves biodiversity in a better state than before. Where a development has an impact on biodiversity, developers are encouraged to provide an increase in appropriate natural habitat and ecological features over and above that being affected. For the Transmission Assets, biodiversity benefit will be delivered within identified biodiversity benefit areas within the Onshore Order Limits.
Catchments	An area of land where surface water drains to and converges, e.g. a watercourse.
CIRIA	The construction industry research and information association. It is an independent, not-for-profit, member-based research organisation that exists to champion performance improvement in construction.
Code of Construction Practice	A document detailing the overarching principles of construction, contractor protocols, construction-related environmental management measures, pollution prevention measures, the selection of appropriate construction techniques and monitoring processes.
Commitment	This term is used interchangeably with mitigation and enhancement measures. The purpose of commitments is to avoid, prevent, reduce or, if possible, offset significant adverse environmental effects. Primary and tertiary commitments are taken into account and embedded within the assessment set out in the ES.
Cumulative Effects	The combined effect of the Transmission Assets in combination with the effects from other proposed developments, on the same receptor or resource.
Development Consent Order	An order made under the Planning Act 2008, as amended, granting development consent.
Effect	The term used to express the consequence of an impact. The significance of effect is determined by correlating magnitude of the impact with the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria.

Term	Meaning
Environmental Impact Assessment	The process of identifying and assessing the significant effects likely to arise from a project. This requires consideration of the likely changes to the environment, where these arise as a consequence of a project, through comparison with the existing and projected future baseline conditions.
Environmental Statement	The document presenting the results of the Environmental Impact Assessment process.
Exception test	If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable development objectives), the exception test may have to be applied. To pass the exception test it should be demonstrated that: (a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and (b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. Both elements of the exception test should be satisfied for development to be allocated or permitted.
Expert Working Group	A forum for targeted engagement with regulators and interested stakeholders through the Evidence Plan process.
Flood defences	A structure that is used to reduce the probability of floodwater affecting a particular area.
Flood Risk Activity Permit	A permit issued by the Environment Agency required for any work on, within or near a Main River and associated floodplain or flood defence structure (including sea defences).
Flood Risk Assessment	A flood risk assessment is an assessment of the risk of flooding from all flood mechanisms, including the identification of flood mitigation measures, in order to satisfy the requirements of the National Planning Policy Framework and Planning Practice Guidance.
Flood Zone 1	Land having a less than 1 in 1,000 annual probability of river or sea flooding which is considered a low probability of flooding.
Flood Zone 2	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding which is considered a medium probability of flooding.
Flood Zone 3	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding which is considered a high probability of flooding.
Flood Zone 3a	‘High Probability Land’ having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding.
Flood Zone 3b	This zone comprises land where water has to flow or be stored in times of flood (‘the Functional Floodplain’). Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency.

Term	Meaning
Generation Assets	The generation assets associated with the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm include the offshore wind turbines, inter-array cables, offshore substation platforms and platform link (interconnector) cables to connect offshore substations.
Greenfield runoff rate	Rates of surface water runoff from a site that is undeveloped (greenfield).
Groundwater	All water which is below the surface of the ground in the saturated zone and in direct contact with the ground or subsoil.
Intertidal area	The area between Mean High Water Springs and Mean Low Water Springs.
Intertidal infrastructure area	The temporary and permanent areas between MLWS and MHWS.
Landfall	The area in which the offshore export cables make landfall (come on shore) and the transitional area between the offshore cabling and the onshore cabling. This term applies to the entire landfall area at Lytham St. Annes between Mean Low Water Springs and the transition joint bays inclusive of all construction works, including the offshore and onshore cable routes, intertidal working area and landfall compound(s).
Lead Local Flood Authority	Authorities that have responsibility for developing a Local Flood Risk Management Strategy for their area identifying local sources of flooding. The local strategy produced must be consistent with the national strategy. It will set out the local organisations with responsibility for flood risk in the area, partnership arrangements to ensure co-ordination between these organisations, an assessment of the flood risk, and plans and actions for managing the risk.
Local Authority	A body empowered by law to exercise various statutory functions for a particular area of the United Kingdom. This includes County Councils, District Councils and County Borough Councils.
Main Rivers	The term used to describe a watercourse designated as a Main River under the Water Resources Act 1991 and shown on the Main river Map. These are usually larger rivers or streams and are managed by the Environment Agency.
Maximum design scenario	The realistic worst case scenario, selected on a topic-specific and impact specific basis, from a range of potential parameters for the Transmission Assets.
Mean High Water Springs	The height of mean high water during spring tides in a year.
Mean Low Water Springs	The height of mean low water during spring tides in a year.
Morgan and Morecambe Offshore Wind Farms: Transmission Assets	The offshore and onshore infrastructure connecting the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm to the national grid. This includes the offshore export cables, landfall, onshore export cables, onshore substations, 400 kV grid connection cables and associated grid connection infrastructure such as circuit breaker compounds. Also referred to in this report as the Transmission Assets, for ease of reading.
Morgan Offshore Wind Project: Transmission Assets	The offshore export cables, landfall and onshore infrastructure required to connect the Morgan Offshore Wind Project to the National Grid.

Term	Meaning
National Policy Statement(s)	The current national policy statements published by the Department for Energy Security and Net Zero in 2023 and adopted in 2024.
Onshore export cable corridor	The corridor within which the onshore export cables will be located.
Onshore export cables	The cables which would bring electricity from the landfall to the onshore substations.
Onshore Infrastructure Area	The area within the Transmission Assets Order Limits landward of Mean High Water Springs. Comprising the offshore export cables from Mean High Water Springs to the transition joint bays, onshore export cables, onshore substations and 400 kV grid connection cables, and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses. Those parts of the Transmission Assets Order Limits proposed only for ecological mitigation/biodiversity benefit are excluded from this area.
Ordinary watercourses	Watercourses (such as a river, stream, ditch, cut, sluice, dyke or non-public sewer) that are not designated a Main River under the Water Resources Act (1991). Responsibility for management lies with the Lead Local Flood Authority, or Internal Drainage Board for some watercourses where there is an Internal Drainage District.
Ordinary watercourse consent	A permit required prior to works undertaken within or in proximity to an ordinary watercourse or associated flood defence.
Preliminary Environmental Information Report	A report that provides preliminary environmental information in accordance with the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. This is information that enables consultees to understand the likely significant environmental effects of a project and which helps to inform consultation responses.
Principal Aquifer	A strategically important aquifer unit, which is designated by the Environment Agency.
Ramsar sites	Wetlands of international importance that have been designated under the criteria of the Ramsar Convention. In combination with Special Protection Areas and Special Areas of Conservation, these sites contribute to the national site network.
River Basin Management Plan	Plans that describe the current state of the water environment in the river basin district. It sets out improvements that were to be possible by 2027 and how the actions will make a difference to the local environment - the catchments, estuaries, the coast and groundwater.
Secondary A aquifer	Secondary A Aquifers comprise permeable layers that can support local water supplies and may form an important source of base flow to rivers.
Secondary B aquifer	Secondary B aquifers are mainly lower permeability layers that may store and yield limited amounts of groundwater through characteristics like thin cracks (called fissures) and openings or eroded layers.
Sequential test	The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding.

Term	Meaning
Shoreline Management Plan	A large-scale assessment of the risks associated with coastal processes and sets out a policy framework to address these risks to people and the developed, historic and natural environments. Coastal processes include tidal patterns, wave height, wave direction and the movement of beach and seabed materials.
Source Protection Zone	Identify areas of land through which water infiltrates into a groundwater borehole, well or spring that is used for public drinking water supply.
Special Protection Areas	A site designation specified in the Conservation of Habitats and Species Regulations 2017, classified for rare and vulnerable birds, and for regularly occurring migratory species. Special Protection Areas contribute to the national site network.
Strategic Flood Risk Assessment	An assessment that provides information on areas at risk from all sources of flooding.
Study Area	This is an area which is defined for each environmental topic which includes the Transmission Assets Order Limits as well as potential spatial and temporal considerations of the impacts on relevant receptors. The study area for each topic is intended to cover the area within which an impact can be reasonably expected.
Substation	Part of an electrical transmission and distribution system. Substations transform voltage from high to low, or the reverse by means of electrical transformers.
Surface water runoff	Surface water runoff is flow of water that occurs when excess stormwater, meltwater, or other sources of water flows over a surface.
Sustainable Drainage Systems	A sequence of management practices and control measures designed to mimic natural drainage processes by allowing rainfall to infiltrate, and by attenuating and conveying surface water runoff slowly at peak times.
Tidal (Coastal) flooding	Flooding caused by extreme tidal conditions including high tides and storm surges, overtopping local flood defences or coastal features.
Transmission Assets	See Morgan and Morecambe Offshore Wind Farms: Transmission Assets (above)
Transmission Assets Order Limits	The area within which all components of the Transmission Assets will be located, including areas required on a temporary basis during construction and/or decommissioning.
Undifferentiated or unproductive aquifers	Undifferentiated or unproductive strata, reflecting the distribution of superficial deposits with low permeability
UK Climate Projections	Climate projections expressed in terms of absolute values. A projection of the response of the climate system to emission scenarios of greenhouse gases and aerosols, or radiative forcing scenarios based upon climate model simulations and past observations.
Water Framework Directive	Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.
Water Quality	The physical, chemical and biological characteristics of water.
United Utilities	The water company which supplies drinking water, drainage and sewerage services for the north west region of England via a network of pipe and pump infrastructure.

Acronyms

Acronym	Meaning
AEP	Annual Exceedance Probability
AOD	Above Ordnance Datum
BGS	British Geological Survey
CoCP	Code of Construction Practice
DCO	Development Consent Order
DEFRA	Department for Environment, Food and Rural Affairs
DESNZ	Department for Energy Security and Net Zero
EA	Environment Agency
EIA	Environmental Impact Assessment
ES	Environmental Statement
FRA	Flood Risk Assessment
HDD	Horizontal Directional Drilling
LIDAR	Light Detection and Ranging
LPA	Local Planning Authority
MHWS	Mean High Water Springs
MLWS	Mean Low Water Springs
NPPF	National Planning Policy Framework
NPS	National Policy Statement
NSIP	Nationally Significant Infrastructure Project
PPG	Planning Practice Guidance
SFRA	Strategic Flood Risk Assessment
SSSI	Site of Special Scientific Interest
SPZ	Source Protection Zone
SRBC	South Ribble Borough Council
SuDS	Sustainable Drainage System
UK	United Kingdom
UKCP19	United Kingdom Climate Projections 2019
WFD	Water Framework Directive

Units

Unit	Description
%	Percentage
g	Gram
GW	Gigawatts
ha	Hectare
kg	Kilogram
km	Kilometres
km^2	Kilometres Squared
kV	Kilovolt
kW	Kilowatt
l/s	Litres per second
M	Meter
m^3	Cubic Metre
mm/yr	Millimetres per year
MW	Megawatt

1 Flood Risk Assessment

1.1 Introduction

1.1.1.1 This document forms Volume 3, Annex 2.3: Flood Risk Assessment (FRA) of the Environmental Statement (ES) prepared for the Morgan and Morecambe Offshore Wind Farms: Transmission Assets (referred to hereafter as 'the Transmission Assets'). The Environmental Statement presents the findings of the Environmental Impact Assessment (EIA) process for the Transmission Assets.

1.1.1.2 This document provides the FRA for the Transmission Assets in support of Volume 3, Chapter 2: Hydrology and flood risk of the ES.

1.1.1.3 The key objectives of the FRA are set out as follows:

- to set out the flood risk policy and legislation relevant to the Transmission Assets;
- to consider all sources of flooding and screen those relevant to the Transmission Assets;
- to assess the actual flood risk and how it might change over the lifetime of the Transmission Assets;
- to consider how flood risk may be managed; and
- to describe the residual risks of flooding beyond the design standard.

1.1.1.4 The key components of the Transmission Assets relevant to this FRA include the following:

- Intertidal area:
  - Landfall: Landfall refers to the area where the offshore export cables come ashore (i.e., make landfall) and are jointed to the onshore export cables via the Transition Joint Bays (TJBs). This will be undertaken by direct pipe installation. The landfall area comprises the area within the Transmission Assets Order Limits between Mean Low Water Springs (MLWS) and the TJBs, inclusive. This includes all compounds required to facilitate the construction works within the landfall area.
- Onshore elements:
  - Onshore export cables: The cables which would bring electricity from the landfall to the onshore substations.
  - Onshore substations: The onshore substations will include a substation for the Morgan Offshore Wind Project: Transmission Assets and a substation for the Morecambe Offshore Windfarm: Transmission Assets. These will each comprise an area containing the electrical components for transforming the power supplied from the generation assets to 400 kV and to adjust the power quality and power factor, as required to meet the UK Grid Code for supply to the National Grid.

- 400 kV grid connection cable corridor: Cables that will connect the onshore substations to the existing National Grid Penwortham substation.

1.1.1.5 In addition to the permanent components outlined above, temporary onshore infrastructure would be required for the construction phase, including construction compounds and accesses.

1.1.1.6 As set out in Volume 1, Chapter 3: Project description of the ES, the above work will be located within the Transmission Assets Order Limits. This boundary includes a number of proposed biodiversity mitigation/enhancement areas within which no construction works directly related to the onshore electrical infrastructure will occur. Therefore, this FRA concentrates on the Onshore Infrastructure Area which is the area within the Transmission Assets Order Limits landward of Mean High Water Springs (MHWS). It comprises the offshore export cables from MHWS to the TJBs, onshore export cables, onshore substations and 400 kV grid connection cables, and associated temporary and permanent infrastructure including temporary and permanent compound areas and accesses. Those parts of the Transmission Assets Order Limits proposed only for ecological mitigation/biodiversity benefit are excluded from this area.

1.1.1.7 The Transmission Assets are anticipated to be operational by 2036. For the purposes of this assessment, the Transmission Assets are expected to have a 35-year operating lifetime from commencement of operation by 2036 until 2071. At the end of the operation and maintenance phase, the Transmission Assets may be decommissioned or repowered. Potential future repowering and operational life extension of the Transmission Assets is not included as part of the scope of this development consent application or EIA.

1.1.1.8 The onshore export cables and 400 kV grid connection cable corridor will pass through areas designated as Flood Zones 2 and 3. Impacts associated with the cable routes will be predominantly temporary, arising as a result of cable installation. Following installation of the cable routes, land will be reinstated so the only permanent elements along the cable routes will be link box covers. Therefore, there is no potential for significant operational runoff associated with the cable routes.

1.1.1.9 Therefore, this FRA focuses on temporary and permanent impacts for the onshore substations and temporary impacts associated with the construction corridors.

1.2 Methodology

1.2.1 Policy and guidance

1.2.1.1 The FRA has been produced in accordance with the Overarching National Policy Statement (NPS) for Energy (NPS EN-1) (the Department for Energy Security and Net Zero (DESNZ), 2023a), the NPS for Renewable Energy Infrastructure (NPS EN-3) (DESNZ, 2023b) and the NPS for Electricity Networks Infrastructure (NPS EN-5) (DESNZ 2023c), the National Planning Policy Framework (NPPF) and associated Planning Practice Guidance (PPG). Reference has also been made to local flood risk documents and provides an

outline of the relevant local planning policies in addition to potential flood risk and hydrological constraints to the Transmission Assets. The policies cover the requirements for development consent under the Planning Act 2008.

1.2.1.2 Initially, screening studies were undertaken utilising publicly available information within the study area (described further in **section 1.2.2**) which may warrant further consideration. Identified potential flooding matters were then assessed further for each substation site and for all the other elements within the Onshore Infrastructure Area. Each assessment involved:

- a review of all available information;
- a qualitative analysis of the flood risk to the Transmission Assets; and
- identification of any impact of the Transmission Assets on flood risk elsewhere.

1.2.2 Study area

1.2.2.1 The study area for this FRA is described below and shown within **Figure 1.1.**

- The area of land to be temporarily or permanently occupied during the construction, operation and maintenance and decommissioning phases of the Transmission Assets.
- Flood risk receptors located within 250 m of the following elements located within the intertidal infrastructure area and onshore infrastructure area:
  - landfall, including up to six TJBs and two associated compounds and four compounds to the west of TJBs to MLWS;
  - onshore export cable corridor: these cables will link the landfall via TJBs and the onshore substations;
  - 400 kV grid connection cable corridor: these 400 kV cables will connect the onshore substations to the existing National Grid Penwortham substation; and
  - Associated temporary construction compounds and construction access tracks.
- Flood risk receptors located within 1 km of the Morgan and Morecambe onshore substations which are also are located within the onshore infrastructure area, plus:
  - access/egress, temporary construction compounds and construction access tracks associated with the onshore substations.

1.2.2.2 Due to the variety of nature and scale of the Transmission Assets, the study area is appropriate for data collection taking into account the likely zone of influence by hydrological receptors. Beyond these buffer zones, the magnitude of effect will be unable to be accurately assessed as the dilution capacity becomes greater as the hydraulic catchment increases downstream of the Transmission Assets.

1.2.2.3 The buffers have also been chosen to identify any existing receptors, assets or infrastructure that have the potential to be affected by temporary flood risk

as a result of the construction phase of the Transmission Assets. Activities associated with decommissioning will operate within the parameters of those established for construction.

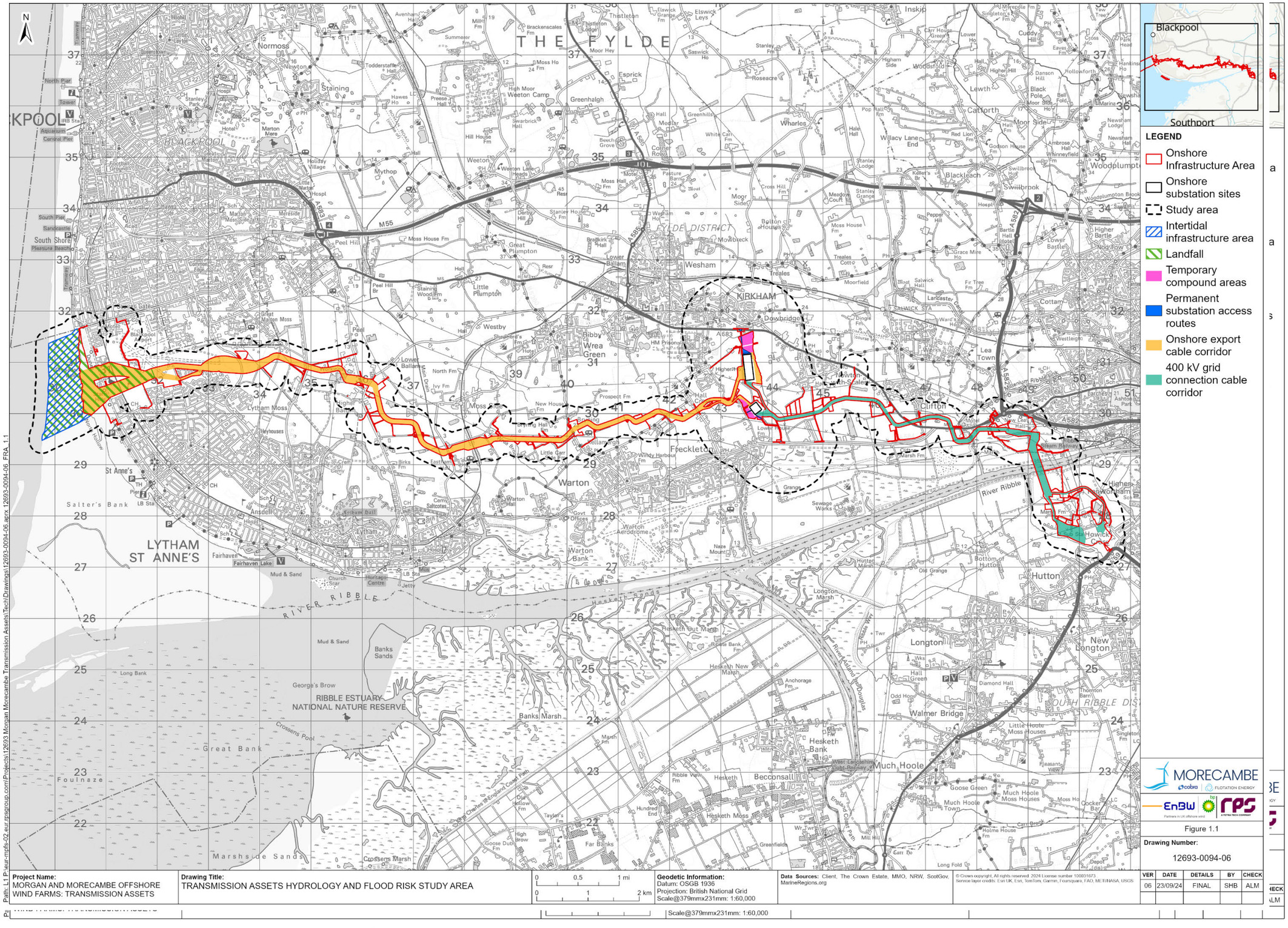


Figure 1.1:- Transmission Assets hydrology and flood risk study area

1.2.3 Information sources

1.2.3.1 The information used in the preparation of this report is set out in **Table 1.1.**

Table 1.1: Information sources consulted during preparation of the FRA

Title	Source	Year published	Author	Description
Catchment Data Explorer	https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow (Accessed August 2024).	2022	Environment Agency (EA)	An interactive online viewer which provides information regarding peak river flow and rainfall intensity climate change allowances to be used within the project.
Climate change allowances for peak rainfall in England	https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall (Accessed August 2024).	2022	EA	An interactive online viewer which provides information regarding impacts to peak rainfall intensities arising from climate change.
Climate change allowances for peak river flow in England	https://environment.data.gov.uk/hydrology/climate-change-allowances/river-flow (Accessed August 2024).	2021	EA	Provides information regarding impacts to peak river flow arising from climate change.
Coastal Design Sea Levels - Coastal Flood Boundary Extreme Sea Levels	https://www.data.gov.uk/dataset/73834283-7dc4-488a-9583-a920072d9a9d/coastal-design-sea-levels-coastal-flood-boundary-extreme-sea-levels-2018 (Accessed August 2024).	2018	EA	Provides information relating to tidal levels around the coast of the United Kingdom.
Enviro and Geo Insight digital reports	GSIP-2023-13424-13081 and GSIP-2023-13424-13081.	2023	Groundsure	Provides information regarding baseline hydrological and hydrogeological conditions.
Flood Estimation Handbook Web Service	https://fehweb.ceh.ac.uk/GB/map (Accessed August 2024).	2023	Flood Estimation Handbook	An interactive online viewer which provides information regarding hydrological conditions of the baseline environment.
Flood Map for Planning	https://flood-map-for-planning.service.gov.uk/ (Accessed May 2025).	2025	EA	An interactive online viewer which provides information regarding EA Flood Zones which was most recently updated by the EA in March 2025.

Title	Source	Year published	Author	Description
Flood Risk Assessments: Climate Change Allowances	https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances (Accessed August 2024).	2022	UK Government	Provides guidance on how to apply climate change allowances for peak river flow, peak rainfall intensities and sea level rise.
Geoindex Onshore Mapping	https://www.bgs.ac.uk/map-viewers/geoindex-onshore (Accessed August 2024).	2023	British Geological Survey (BGS)	Provides information regarding superficial deposits, bedrock geology and borehole log information within the UK.
Internal Drainage Boards Map	https://www.ada.org.uk/idb-map/ (Accessed August 2024).	2023	Internal Drainage Board	Provides information on the location of Internal Drainage Boards within the UK.
Lancashire County Council Flood Risk Asset Register -	https://www.lancashire.gov.uk/media/954608/flood-risk-assets-register-august-2024.pdf (Accessed August 2024).	2024	Lancashire County Council	The register provides information of all structures and features that may have an effect on flood risk in the council area.
Long Term Flood Risk Map	https://check-long-term-flood-risk.service.gov.uk/map (Accessed May 2025).	2025	EA	An interactive online viewer which provides details on surface water flooding and reservoir flooding which was most recently updated by the EA in January 2025.
MAGIC mapping	https://magic.defra.gov.uk/MagicMap.aspx (Accessed August 2024).	2002	DEFRA	An interactive online viewer which provides information regarding the natural environment.
National LIDAR Programme	https://www.data.gov.uk/dataset/f0db0249-f17b-4036-9e65-309148c97ce4/national-lidar-programme (Accessed August 2024).	2024	EA	Provides Light Detection and Ranging (LIDAR) data for the UK. LIDAR data produces a surface model of the land which can be used within assessment of flood risk.
NPPF	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1005759/NPPF_July_2021.pdf (Accessed August 2024).	2023	UK Government (Ministry of Housing Communities & Local Government)	Sets out the Government's planning policies for England and how these should be applied.
OS mapping 1:25 000	https://explore.osmaps.com (Accessed August 2024).	2023	Ordnance Survey	An interactive online viewer of OS mapping data.

Title	Source	Year published	Author	Description
Overarching National Policy Statement (NPS) for Energy EN-1	https://www.gov.uk/government/consultations/planning-for-new-energy-infrastructure-revisions-to-national-policy-statements (Accessed August 2024).	2023	Department for Energy Security and Net Zero	Sets out the government's policy for delivery of major energy infrastructure.
PPG: Flood Risk and Coastal Change	https://www.gov.uk/guidance/flood-risk-and-coastal-change (Accessed August 2024).	2022	UK Government (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government)	Advises how to take account of and address the risks associated with flooding and coastal change in the planning process.
Shoreline Management Plans	https://environment.data.gov.uk/shoreline-planning (Accessed August 2024).	2024	EA	Provides information regarding Shoreline Management Plans.
Spatial Flood Defences (including standardised attributes)	https://environment.data.gov.uk/dataset/8e5be50f-d465-11e4-ba9a-f0def148f590 (Accessed August 2024).	2020	EA	Provides information regarding EA maintained flood defences.
Soilscapes viewer	http://www.landis.org.uk/soilscapes/ (Accessed August 2024).	2023	The National Soils Research Institute	An interactive online viewer which provides which provides information regarding soil data.

1.2.3.2 **Table 1.2** below lists the reports consulted during preparation of the FRA.

Table 1.2: Reports consulted during preparation of the FRA

Title	Source	Year	Author
Blackpool Local Plan Core Strategy (2012 – 2027) Adopted January 2016	https://www.blackpool.gov.uk/Residents/Planning-environment-and-community/Planning/Planning-policy/Blackpool-local-plan/Core-strategy.aspx (Accessed August 2024).	2016	Blackpool Council
Central Lancashire Adopted Core Strategy – Local Development Framework	https://new.fylde.gov.uk/resident/planning/planning-policy-local-plan/adopted-fylde-local-plan-to-2032-incorporating-partial-review/ (Accessed August 2024).	2012	Preston City Council, South Ribble Borough Council and Chorley Borough Council
Fylde Council Coastal Strategy (2015 – 2032)	https://new.fylde.gov.uk/wp-content/uploads/2018/10/Coastal-Strategy-2015-FINAL.pdf (Accessed August 2024).	2015	Fylde Council
Fylde Local Plan to 2032 (incorporating Partial Review)	https://new.fylde.gov.uk/fylde-local-plan-to-2032-incorporating-partial-review-updated/ (Accessed August 2024).	2021	Fylde Council
Local Flood Risk Management Strategy for Lancashire 2021-2027	https://www.lancashire.gov.uk/media/928565/lancashire-flood-risk-management-strategy-2021-2027-final-v2.pdf (Accessed August 2024).	2021	Blackburn with Darwen Council, Blackpool Council, Lancashire County Council.
CL Strategic Flood Risk Assessment (SFRA)	https://www.southribble.gov.uk/media/758/SRE042a-Central-Lancashire-Strategic-Flood-Risk-Assessment-2007/pdf/SRE042a_-_Central_Lancashire_Strategic_Flood_Risk_Assessment_-_2007.pdf?m=637479597051430000 (Accessed August 2024).	2007	Scott Wilson Group PLC on behalf of Preston City Council, South Ribble Borough Council and Chorley Borough Council.
Fylde Coast Authorities (FCA) Level 1 Strategic Flood Risk Assessment	~~https://new.fylde.gov.uk/wp-content/uploads/2025/01/1.-LHI-JBAU-XX-XX-RP-HM-0001-A1-C03-L1SFRA_MainReport.pdf (accessed May 2025)~~https://new.fylde.gov.uk/wp-content/uploads/2025/01/1.-LHI-JBAU-XX-XX-RP-HM-0001-A1-C03-L1SFRA_MainReport.pdf (accessed May 2025)	2024	Blackpool Council, Fylde Council and Wyre Council
North West Shoreline Management Plan	https://www.mycoastline.org.uk/shoreline-management-plans/ (Accessed August 2024).	2011	Blackpool Council

Environment Agency flood model data

1.2.3.3 Product 5 and 6 data of the Ribble Estuary (2014) model and the Ribble Douglas (2010) model were obtained from Environment Agency in 2022. Product 5 data relates to flood modelling and hydrology reports while Product 6 data relates to model output data. It should be acknowledged that data is supplied under the terms of the Environment Agency Conditional License.

Ribble Estuary (2014) model

1.2.3.4 The Ribble Estuary (2014) model provides tidal flood extents and flood levels within the study area for the defended, undefended and breach scenarios. To assess tidal flooding within the intertidal infrastructure area and onshore infrastructure area, flood depths accounting for projected sea level rise have been assessed within Geographic Information Systems software using the 2014 undefended T200 flood level model outputs.

1.2.3.5 Flood depths have been ascertained from provided flood levels from the Ribble Estuary dataset via comparison with 1 m resolution LIDAR Digital Surface Model data from the Environment Agency National LIDAR Programme.

1.2.3.6 Projected sea level rise allowances applied to the 2014 model outputs are provided within **Table 1.3** below. For more information as to how these allowances were derived, see **section 1.4.3.**

Table 1.3: 2036 and 2071 sea level rise allowance applied to the 2014 Ribble Estuary model outputs

Peak sea level (m AOD)		
2014	**2036 0.5% Annual Exceedance Probability (AEP)**	**2071 0.5% AEP**
baseline	+135.3 mm	+507.7 mm

1.2.3.7 The 3.3% AEP extents from the Ribble Estuary (2014) hydraulic model have been used to inform the extents of Flood Zone 3b (further defined within **Table 1.8**).

Ribble Douglas model (2010)

1.2.3.8 The Ribble Douglas (2010) outputs include fluvial and joint probability events for undefended and defended scenarios for a range of climate change scenarios (20%, 30%, 35% and 70%). The effects of climate change have been assessed using the 1% AEP with a 20% uplift in peak river flows during the construction phase, and a 30% uplift in peak river flows to the end of the development lifetime. For more information as to how these allowances were derived, see **section 1.4.3.**

1.2.3.9 The 4% AEP extents from the Ribble Douglas (2010) hydraulic model have been used to inform the extents of Flood Zone 3b (further defined within **Table 1.8**). No data associated with the 3.3% AEP flood extent for the Ribble Douglas is available, hence the use of the 4% AEP extent.

Coastal Design Sea Levels - Coastal Flood Boundary Extreme Sea Levels (2018)

1.2.3.10 The Coastal Design Sea Levels - Coastal Flood Boundary Extreme Sea Levels (2018) have been used to inform flood risk at landfall using the T200 peak sea level for the intertidal infrastructure area and onshore infrastructure area. The base year for the dataset is 2017, and sea level rise from 2018 to the end of the construction phase (2036) and operation and maintenance phase (2071) have been applied to the 2017 0.5% AEP peak sea level. Peak sea levels for 2036 and 2071 with an allowance for sea level rise is presented within **Table 1.4.** For more information as to how sea level rise allowance were derived, see **section 1.4.3.**

Table 1.4: 2017, 2036 and 2071 Coastal design sea levels

	Peak sea level (m AOD)		
Chainage	**2017 0.5% AEP**	**2036 0.5% AEP**	**2071 0.5% AEP**
1210	6.16	6.27 (+118.2 mm)	6.65 (490.5 mm)

1.3 Consultation

1.3.1.1 A summary of the key comments raised during consultation activities to undertaken to date specific to the FRA of the Transmission Assets is provided in **Table 1.5**, together with how these comments have been considered in the production of this annex.

Table 1.5: Summary of key consultation comments raised during consultation activities undertaken for the Transmission Assets relevant to hydrology and flood risk.

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
Climate change			
May 2023	EWG meeting.	Confirmation of climate change allowance to be used within Peak Rainfall Allowances to be provided once clarification on the available flood model data has been shared.	No objections to the peak rainfall intensity to be used within conceptual drainage calculations of the onshore substations were raised during PEIR consultation. The peak rainfall intensity is further considered within the Outline Operational Drainage Management Plan (document reference J10). All Product 5 and 6 data relevant to the site was obtained during the preparation of the ES.
May 2023	EWG meeting.	The Environment Agency to provide a direct contact in relation to Product 6 data and to confirm the climate change allowance used within the Environment Agency fluvial flood model.	Product 5 and 6 data of the Ribble Estuary (2014) model and the Ribble Douglas (2010) model was obtained during the preparation of

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
August 2023	EA, Lancashire County Council and Blackpool EWG Meeting	The Environment Agency to investigate the missing data (flood depths and tidal data), unusable data (.txt and .ascii files) and confirm climate change allowance used within the Environment Agency fluvial model.	the ES and incorporated within this FRA.
November 2023	National Infrastructure Team Environment Agency statutory consultation response	Flood risk: We are generally satisfied with the scope and assessment of hydrology and flood risk and consider that the proposed development could be safe without exacerbating flood risk elsewhere if the proposed flood risk mitigation measures are further developed and implemented. A number of areas need to be addressed in order to make these proposals consistent with government policy. In particular the climate change guidance needs to be applied to any assumptions currently made that underpin the Flood Risk Assessment. This should inform the design flood events being considered. You should treat this as a 'sensitivity test'. It will help assess how sensitive the proposal is to changes in the climate for different future scenarios. This will help to ensure your development can be adapted to large-scale climate change over its lifetime.	An assessment of an increase of peak river flow and sea level rise driven by climate change has been made within this FRA to the end of the construction phase for the landfall, onshore export cable corridor and 400 kV grid connection cable corridor and the operation and maintenance phase for the Morgan onshore substation and Morecambe onshore substation and has been accounted for within fluvial flood risk sections of the FRA. Peak rainfall intensity is taken into account within surface water flooding sections as well as the Outline Operational Drainage Management Plan (document reference J10).
November 2023	National Infrastructure Team Environment Agency statutory consultation response	The FRA does not incorporate consideration of climate change allowances. It does not clearly state how the guidance has been followed and which peak river flow and sea level allowances are to be used in the assessment.	
November 2023	National Infrastructure Team Environment Agency statutory consultation response	This section (2.5.8.5-2.5.8.10 of the PEIR) does not identify what peak river flow allowance considerations are applicable to the proposed development.	
November 2023	National Infrastructure Team Environment Agency statutory consultation response	The section does not reference climate change driven Peak River flows and Sea Level Rise and how these my interact with the scheme.	
November 2023	National Infrastructure	This section (2.5.8.15-2.5.8.16 of the PEIR) does not identify what sea level	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
	Team Environment Agency statutory consultation response	rise allowance considerations are applicable to the proposed development.	
November 2023	Freckleton Parish council planning statutory consultation response	A further example is the lack of forethought that relates to the predicted changes in sea levels that is the driver for the need for green energy. The Fylde and Ribble estuary are naturally low lying with the Environment Agency having provided forecasts of the changes in flood risk in the recent past. This does not appear to have been considered, to date.	
November 2023	National Infrastructure Team Environment Agency statutory consultation response	The current wording within 2.8.6.4 of the PEIR is misleading and implies that Environment Agency mapping should take account of the factors mentioned. Clarify that the Environment Agency does not produce hydraulic or tidal models for development planning purposes, and that it is the applicant's responsibility to satisfactorily assess flood risk. Provide an acknowledgement of the limitations of the model used, and the approach used to overcome these limitations (i.e. Sensitivity testing).	Noted, clarification has been added within this FRA.
Drainage scheme			
December 2022	United Utilities	We request that surface water is only managed via sustainable drainage systems which are multi-functional and at the surface level in preference to conventional underground piped and tanked storage systems. Wherever practicable, Sustainable Drainage Systems (SuDS) should be implemented in accordance with the CIRIA SuDS manual.	Increased rates of surface water runoff arising from additional impermeable areas during construction, operation and maintenance and decommissioning phases of the Transmission Assets is detailed within section 2.11.3 of Volume 3, Chapter 2: Hydrology and flood risk of the ES. The Outline Operational Drainage Management Plan (document reference J10) for both surface water and foul water drainage has been developed in accordance with the NPS, NPPF, PPG ID7 the SuDS Manual, Sustainable drainage systems: non-statutory technical standards and local council policy and details drainage proposals of new impermeable areas. The document includes information regarding the following:
December 2022	United Utilities	Provide details of any drainage proposals in respect of both foul and surface water. No surface water will be allowed to discharge to the existing public sewerage system. Surface water should instead discharge to more sustainable alternatives as outlined in the surface water management hierarchy. If a discharge to a watercourse is proposed, it is to be fully identified within the limits of the DCO.	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
December 2022	Planning Inspectorate, Scoping Opinion	Based on the information within the Scoping Report detailing that the increased area of impermeable land as a result of the construction of the Proposed Development is unlikely to have the potential to lead to a noticeable change in run off rates, the Inspectorate is in agreement that an assessment of flood risk due to additional surface water run off can be scoped out for the operational stage only. The ES should however detail any operational controls on maintenance works, for example an Operational Management Plan.	• sustainable drainage systems; • SuDS at the onshore substations; • climate change allowances; and • greenfield runoff rates. Discussions with United Utilities and landowners will be undertaken at the detailed design stage to confirm the location of water supply pipelines and sewer infrastructure. Impacts to private water supplies are considered in Volume 3, Chapter 1 Geology, hydrogeology and ground conditions of the ES. An Outline CoCP (document reference J1) has been submitted with the application for development consent. This includes an Outline Surface Water and Groundwater Management Plan (document reference J1.9), which relates to the construction phase.
November 2023	Lancashire County Council Local Flood Authority statutory consultation response	Surface water flood risk should be identified, assessed, minimised and mitigated appropriately in accordance with the National Planning Policy Framework and the Planning Practice Guidance through a flood risk assessment. Findings of the flood risk assessment(s) should be used to inform the design of sustainable drainage systems which serve impermeable surfaces, whether permanent or temporary. Surface water flood risk should also be considered during each construction phase, as heavy machinery can compact ground leading to increased surface water runoff. This can have a negative impact on nearby watercourses, such as increased sedimentation which can lead to siltation, poor water quality and an adverse effect on habitats. Surface water runoff from development should not impact on infrastructure such as roads and other infrastructure. If there is any potential for the development to impact the highway, rail or other network, then the suitability of drainage proposals should be discussed with Network Rail and/or the Highway Authority, to ensure the stability of their assets is not negatively affected. The development should maximise the opportunities presented to reduce the causes and impacts of flooding on and off-site, wherever they would be effective, in line with paragraph 161 of the National Planning Policy Framework	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
		and paragraphs 062 to 067 of the Planning Practice Guidance. This should be achieved through the design of the sustainable drainage system and, where appropriate, the use of Natural Flood Management techniques. A comprehensive sustainable drainage approach can help to alleviate flood risk as well as managing the impacts where flooding does occur, for example by: • Maximising opportunities for infiltration of surface water through replacement of impermeable surfaces with permeable surfaces; • Maximising opportunities for planting and vegetated areas, in preference to engineered surfaces, to increase evapotranspiration and provide improvements for biodiversity and wider natural capital benefits; and • Providing additional surface water storage over and above the minimum requirements e.g. an over-sized pond, to accommodate more extreme rainfall events (e.g. 0.5% annual exceedance probability) leading to a more flood/climate resilient electricity infrastructure network. Specifically, appropriate sustainable drainage systems should be incorporated to drain any new impermeable surfaces such as compounds, sub-stations, roads, parking areas etc. SuDS should be designed to be compliant with the requirements set out in the National Planning Policy Framework, the Planning Practice Guidance and the Defra Technical Standards for SuDS. A site-specific 'Operation and Maintenance Manual' for the lifetime of the development of each sustainable drainage component that makes up each sustainable drainage system should be compiled. Typically the Lead Local Flood Authority would expect this to include, as a minimum: • A timetable for its implementation; • Details of the maintenance, operational and access requirement for all SuDS components and connecting drainage structures,	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
		including all watercourses and their ownership; • Pro-forma to allow the recording of each inspection and maintenance activity, as • well as allowing any faults to be recorded and actions taken to rectify issues; • The arrangements for adoption by any public body or statutory undertaker, or any other arrangements to secure the operation of the sustainable drainage scheme in perpetuity; • Details of financial management including arrangements for the replacement of major components at the end of the manufacturer's recommended design life; • Details of whom to contact if pollution is seen in the system or if it is not working correctly; and • Means of access for maintenance and easements. Thereafter the sustainable drainage systems should be retained, managed, and • maintained in accordance with the approved details. In Lancashire we provide general advice and support on SuDS design through the Lancashire SuDS Pro-forma and accompanying guidance which we recommend are used in finalising SuDS designs and for consistency in expectations in Lancashire.	
November 2023	United Utilities statutory consultation response	Acceptance of a drainage strategy does not infer that a detailed drainage design will meet the requirements for a successful adoption application. We strongly recommend that no construction commences until the detailed drainage design, has been assessed and accepted in writing by United Utilities. Any work carried out prior to the technical assessment being approved is done entirely at the developer's own risk and could be subject to change.	
November 2023	United Utilities statutory	We wish to highlight that consistent with the principles of the hierarchy for the management of surface water in national planning policy and the	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
	consultation response	obligations of the Environment Act 2021, no surface water will be allowed to discharge to the existing public sewerage system. Surface water should instead discharge to more sustainable alternatives as outlined in the surface water management hierarchy. This will ensure the impact of development on public wastewater infrastructure, both in terms of the wastewater network and wastewater treatment works, is minimised. We adopt this position as surface water flows are very large when compared with foul flows. By ensuring that no surface water enters the public sewerage system, the impact on customers, watercourses and the environment will be minimised.	
November 2023	United Utilities statutory consultation response	Given the importance of surface water discharging to an alternative to the public sewer, we request that all land that is necessary to facilitate a discharge to a watercourse is fully identified within the limits of the DCO. This will ensure the site benefits from the requisite rights to discharge to more sustainable alternatives than the public sewer for the management of surface water, e.g., a right to discharge to a watercourse or other water body. For clarity, the extent of land should be sufficient to facilitate a surface water discharge to a watercourse/water body for all elements of your proposal. Ensuring that the extent of land within the site and the supporting Environmental Statement is sufficient for the purposes of the discharge of surface water is important as a sewerage company has limited powers to acquire the right to discharge surface water to a water body under the Water Industry Act.	
November 2023	United Utilities statutory consultation response	We request that surface water is only managed via sustainable drainage systems which are multi-functional and at the surface level in preference to conventional underground piped and tanked storage systems. Wherever practicable, Sustainable Drainage Systems (SuDS) should be implemented in accordance with the CIRIA SuDS manual. Managing surface water through the use of SuDS can	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
		provide benefits in water quantity, water quality, amenity and biodiversity. If the applicant intends to offer wastewater assets forward for adoption by United Utilities, their proposed detailed design will be subject to a technical appraisal by our Developer Services team and must meet the requirements outlined in 'Sewers for Adoption and United Utilities' Asset Standards'. This is important as drainage design can be a key determining factor of site levels and layout.	
November 2023	United Utilities statutory consultation response	We would be grateful if you can provide details of any drainage proposals in respect of both foul and surface water. This should include rates of discharge, volumes of discharge, points of connection, the nature and extent of any contaminants, and details of any necessary pre-treatment prior to connection to the public sewer. We request that you provide details of drainage during operation of the windfarm and during the construction period. We request further details of any approach for the storage and disposal of any hazardous fluids. We wish to understand whether there is any intention to connect such flows to our public sewerage network and to ensure any potential impact on water supply assets, including the groundwater environment, is fully considered and mitigated.	
November 2023	United Utilities statutory consultation response	Without effective management and maintenance, sustainable drainage systems can fail or become ineffective. As a provider of wastewater services, we believe we have a duty to advise the determining authority of this potential risk to ensure the longevity of the surface water drainage system and the service it provides to people. We also wish to minimise the risk of a sustainable drainage system having a detrimental impact on the public sewer network should the two systems interact. We therefore recommend that you include details of a management and maintenance regime for any sustainable drainage system that is	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
		included as part of the proposed development. Please note that United Utilities cannot provide comment on the management and maintenance of an asset that is owned by a third party management and maintenance company. We would not be involved in the approval of the management and maintenance arrangements in these circumstances.	
November 2023	United Utilities statutory consultation response	Please note, United Utilities is not responsible for advising on rates of discharge to the local watercourse system. This is a matter for discussion with the Lead Local Flood Authority and/or the Environment Agency (if the watercourse is classified as Main River).	
November 2023	United Utilities statutory consultation response	If considering a diversion, the applicant should contact United Utilities at their earliest opportunity as they may find that a diversion is not possible. In some circumstances, usually related to the size and nature of the assets impacted by proposals, developers may discover that the cost of a diversion is prohibitive in the context of their development scheme. Unless there is specific provision within the title of the property or an associated easement, any necessary disconnection or diversion of assets to accommodate development, will be at the applicant's/developer's expense.	
November 2023	Lancashire County Council Local Flood Authority statutory consultation response	It should be stated how the necessary maintenance and management will be secured for the lifetime of the anticipated planning obligations.	
November 2023	National Infrastructure Team Environment Agency statutory consultation response	Potential for risk of flooding of works compounds associated with HDD	
November 2023	National Infrastructure Team Environment	There is no mention of how sewerage from toilets and welfare facilities in the temporary construction compounds will be handled.	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
	Agency statutory consultation response		
November 2023	United Utilities statutory consultation response	The on-shore drainage from the proposed scheme should also be assessed within the Environmental Statement for the risk to groundwater abstractions (G11). G11 - Discharges from areas subject to contamination Discharges of surface water run-off to ground at sites affected by land contamination, or from sites used for the storage of potential pollutants are likely to require an environmental permit. This applies especially to sites where storage, handling or use of hazardous substances occurs (for example, garage forecourts, coach and lorry parks/turning areas and metal recycling/vehicle dismantling facilities). These sites will need to be subject to risk assessment with acceptable effluent treatment provided.'	
Field drainage/water supply and drainage infrastructure			
November 2023	National Farmers Union statutory consultation response	Drainage: The PEIR Non-Technical Summary 8.3.4.2 notes that the CoCP will include measures to address drainage issues during the construction phase. NFU members have expressed concern that agricultural activities will be severely affected if drainage is not addressed comprehensively and with landowner/tenant engagement. It is understood that the CoCP will include an Outline Operational [Onshore Substation] Drainage Management plan in consultation with the Environment Agency and local flood authorities. However, it is important that similar care is taken with field drainage alongside the cable corridor. The PEIR Volume 1 Chapter 3 highlights the Projects commitments to construction drainage in Table 3.38 and stipulates that the contractor will develop field drainage plans in consultation with landowners. It is essential that the Project appoints a local drainage consultant to help	The impact of damage to existing field drainage is assessed within Volume 3 Chapter 2: Hydrology and flood risk of the ES and section 2.11. Measures to manage impacts to field drainage are set out in the Outline CoCP (document reference J1) to ensure the existing drainage of the land is maintained during and after construction. Further details are provided in Volume 3, Chapter 2: Hydrology and flood risk of the ES section 2.8 and Table 2.19.

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
		develop and design both pre and post construction drainage plans.	
November 2023	National Farmers Union statutory consultation response	The NFU would welcome the opportunity to engage with the Project on this and for the wording to be included within the Outline Code of Construction, so that it is taken forward and becomes binding on contractors under the Code of Construction. The NFU wording covers the following: a) Role of an Agricultural Liaison Officer b) Records of Condition c) Biosecurity d) Irrigation e) Agricultural Land Drainage f) Treatment of Soils g) Agricultural Water Supplies	
December 2022	Planning Inspectorate, Scoping Opinion	Whilst the Inspectorate is in agreement that localised damage to field drainage and water pipes is unlikely during maintenance and operational works as these are limited in duration, scope and the need for excavation, the ES should provide details of any construction or decommissioning control measures to ensure that any damage during these phases is repaired prior to the operational phase so as to ensure there are no impacts during operation.	
November 2023	United Utilities statutory consultation response	We would like to draw the applicant's attention to the various water and wastewater assets that lie within and near to the proposed application boundary. It is important to highlight that these assets include critical assets. These assets would need to be given careful consideration when designing any development proposal.	Localised damage to water supply and drainage infrastructure is considered in Volume 3, Chapter 2: Hydrology and flood risk section 2.11.7. Control measures are outlined in Volume 3, Chapter 2: Hydrology and flood risk of the ES section 2.8 and Table 2.19. These include drainage measures to be provided as part of the Outline CoCP (document reference J1).
November 2023	United Utilities statutory consultation response	Our water mains include large diameter trunk mains, high pressure water supply mains and raw water mains. There are also a range of public sewers crossing the site including large diameter rising main sewers and gravity sewers and outfalls including major wastewater interconnector tunnels and tanks. Preston Wastewater Treatment Works (WwTW) also sits within the proposed site boundary. We would need to be afforded rights to access, repair and	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
		maintain these assets in accordance with our statutory powers.	
Flood risk			
December 2022	Planning Inspectorate, Scoping Opinion	The Scoping Report proposes to scope out flood risk as a result of run off during the decommissioning stage. Based on the information within the Scoping Report detailing that the transmission cable is to be left in situ and therefore the decommissioning will involve the limited areas of above ground installations, the Inspectorate is in agreement that significant effects are unlikely and that this topic can be scoped out.	While this is noted, the decommissioning phase has been scoped back into Volume 3, Chapter 2: Hydrology and flood risk of the ES due to an update in the MDS for decommissioning which was updated post-scoping.
December 2022	Environment Agency, Scoping Opinion	Impacts of increased flood risk arising from damage to existing flood defences. This should include formal constructed flood defences, but also consider impacts to natural flood defence mechanisms, notably the sand dunes at Lytham.	Impacts to formal and informal flood defences are assessed within the impact of increased flood risk arising from damage to existing flood defences within Volume 3, Chapter 2: Hydrology and flood risk of the ES. Assessment of flood risk due to damage to flood defences has been scoped out for operation and maintenance. The Outline Operational Drainage Management Plan (document reference J10) detail operational controls on maintenance works. Embedded and secondary mitigation measures adopted as part of the project in relation to hydrology and flood risk are Volume 3, Chapter 2: Hydrology and flood risk of the ES.
December 2022	Planning Inspectorate, Scoping Opinion	Based on the information within the Scoping Report detailing that maintenance works are unlikely to interact with existing flood defences, the Inspectorate is in agreement that an assessment of flood risk due to damage to flood defences can be scoped out. The ES should however detail any operational controls on maintenance works, for example an Operational Management Plan.	
November 2023	National Infrastructure Team Environment Agency statutory consultation response	Flood risk arising from damage to existing flood defences and because of additional surface water runoff during operation and maintenance have been scoped out of the assessment. This is subject to the ES detailing any operational controls in a management plan. We are satisfied with this approach. However details of such controls have not been considered in the Table of Commitments, CoT35 only considers the Outline CoCP.	
December 2022	United Utilities	Flood risk from all sources, including sewers, must be considered in the delivery of new development.	All forms of flooding including fluvial, tidal, pluvial (surface water), groundwater and artificial sources (reservoir, sewer, field drainage) are considered within this FRA.
November 2023	United Utilities statutory	You should also consider the risk of flooding from reservoirs. You should seek to ensure that reservoir flood	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
	consultation response	paths are avoided in the location of your development. United Utilities manages a large portfolio of statutory and non-statutory reservoirs in the north west of England. It is essential that the ES adequately presents the impact of the development upon dam breach flood inundation mapping, which may affect the statutory dam safety designation of our reservoir assets. UK reservoir safety is regulated by the EA/Department for Environment, Food & Rural Affairs (Defra), and consultation with the EA, our Dam safety management team, and any relevant local authorities is required to ensure that any changes to dam safety risk is fully understood, is appropriate and is approved by the regulator and ourselves as reservoir operator.	
November 2023	United Utilities statutory consultation response	Existing drainage systems are often dominated by combined sewers. This method of sewer infrastructure is a result of the time it was constructed, with combined sewers taking both foul and surface water. If there is a consistent approach to surface water management, it will help to manage and reduce surface water entering the sewer network, decreasing the likelihood of flooding from sewers, the impact on residents and businesses, and the impact on the environment. Whilst we do all that we can to reduce the risk of sewer flooding, there remains a residual risk, which is a source of flooding that should be considered in your Environmental Statement (ES). National policy is clear that flood risk from all sources, including sewers, must be considered in the delivery of new development. As such, it is important to ensure that the assessment of flood risk includes sewer flood risk. It should be ensured that your proposed development does not result in an increase in flood risk from the public sewer as a result of: i) any proposed new drainage connections to the public sewer. This is considered in further detail below; ii) by altering any existing exceedance flood paths of losses from the public sewer;	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
		iii) by locating any above ground elements of your proposal in areas where there is an existing risk of sewer flooding. There are a number of locations within the scoping boundary where our modelling data indicates flood water exceedance paths from the public sewer and we would need to liaise with you to assess your proposals in relation to this point and point ii); iv) as a result of any diversions/works to watercourses or existing sewers which could materially affect hydraulic performance and therefore change/increase any risk of flooding; v) as a result of any changes in ground levels which could materially change existing sewer flood risk; or vi) as a result of any changes to land or property currently affected by existing hydraulic sewer flooding incidents. We therefore request the Environmental Statement considers flood risk from the public sewerage system in liaison with United Utilities so that the above matters are fully considered.	
November 2023	National Infrastructure Team Environment Agency statutory consultation response	In areas where surface water flow paths may be encountered, there is potential to divert and concentrate flow routes of surface water as well as mobilising silt and sediment that could be transported elsewhere to undesirable effect.	
November 2023	United Utilities statutory consultation response	You should also consider the risk of flooding from reservoirs. You should seek to ensure that reservoir flood paths are avoided in the location of your development. United Utilities manages a large portfolio of statutory and non-statutory reservoirs in the north west of England. It is essential that the ES adequately presents the impact of the development upon dam breach flood inundation mapping, which may affect the statutory dam safety designation of our reservoir assets. UK reservoir safety is regulated by the EA/Department for Environment, Food & Rural Affairs (Defra), and consultation with the EA, our Dam safety management team, and any relevant local authorities is required to ensure that any changes to dam safety risk is	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
		fully understood, is appropriate and is approved by the regulator and ourselves as reservoir operator.	
March 2023	Environment Agency Preston and South Ribble Flood Risk Management Scheme	Potential for the construction of the Transmission Assets to coincide with the construction of Penwortham flood defence scheme	It has been confirmed within the May 2023 Hydrology and flood risk EWG that difference in phasing between the Transmission Assets and Preston and South Ribble Flood Risk Management Scheme has made interaction between the schemes unlikely and thus not considered within the ES.
May 2023	EWG consultation meeting.	Applicants to liaise with Central Lancashire strategic Flood Risk Assessment to determine if more up to date data is available for the study area.	Consultation with councils was made during the undertaking of the PEIR and no further responses were received. Latest information provided within each relevant council's website as of August 2024 has been taken forward within this FRA and Volume 3, Chapter 2: Hydrology and flood risk of the ES.
May 2023	EWG consultation meeting.	Lancashire County Council to confirm whether the flood risk management plan (FRMP) for North West and the PRFA for Preston is Penwortham specific.	
May 2023	EWG consultation meeting.	Blackpool Council to provide timescales for the strategic Flood Risk Assessment and whether this data can be shared with the Applicants.	
August 2023	EA, Lancashire County Council and Blackpool EWG Consultation Meeting	Applicants to contact South Ribble Borough Council to request updated flood mapping from the Fylde 2011 SFRA.	
November 2023	National Infrastructure Team Environment Agency statutory consultation response	The FRA is built on out-of-date data. The Environment Agency Flood Model data (Ribble Estuary Tidal model (2014) and the Ribble Douglas model (2010)) used to inform the FRA are at least 10 years old and do not take into account updated climate change requirements for peak river flow and Sea Level Rise (SLR). The FRA does not acknowledge that our product 6 information is supplied under the terms of our Conditional Licence. EA models may have been superseded by updated guidance and may not be suitable for site specific or scheme specific assessments.	The Environment Agency's response to the February 2024 Technical Note confirmed that no new flood risk data is available from the Environment Agency. This FRA has been updated to acknowledge that product 6 information is supplied under the terms of the conditional licence. Flood levels within mapping have been derived from the Environment Agency Product 6 data from the Ribble Douglas and Ribble Estuary hydraulic models. Additional mapping is presented within this FRA including spot flood levels overlain upon flood depth data across the Onshore
November 2023	National Infrastructure	No information is included to explain how the flood levels on site are derived	

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
	Team Environment Agency statutory consultation response		Infrastructure Area at risk of flooding.
November 2023	National Infrastructure Team Environment Agency statutory consultation response	Inconsistent approach in use of terminology. The FRA refers to 'The flood annual exceedance probability (AEP) events'… But then uses Return Periods (years) rather than AEP.	Noted, references have been updated to AEP % rather than return periods (years).
November 2023	National Infrastructure Team Environment Agency statutory consultation response	The figure uses the opposite colouring convention to that used in Flood Map for Planning. The figure shows Flood Zone 3 as light blue and Flood Zone 2 as dark blue.	Noted, mapping has been updated and presented within this FRA.
November 2023	National Infrastructure Team Environment Agency statutory consultation response	Flood alerts cover large areas and the described approach to responding to flood alerts/warnings does not allow for site specific considerations.	The Applicants are committed to preparing flood warning and evacuation procedures as set out within the Outline CoCP of the ES (document reference J1). Control measures are outlined in Volume 3, Chapter 2: Hydrology and flood risk, section 2.8 and Table 2.19.
November 2023	National Infrastructure Team Environment Agency statutory consultation response	CoT90 and CoT97 Flood Risk Management Plans have yet to be developed.	
November 2023	National Infrastructure Team Environment Agency statutory consultation response	CoT39 Potential for damage to/loss of infrastructure associated with Main River or flood risk management	This commitment remains in place. Control measures are outlined in Volume 3, Chapter 2: Hydrology and flood risk, section 2.8 and Table 2.19.
November 2023	National Infrastructure Team Environment Agency statutory consultation response	Incorrect text regarding the status of sand dunes as sea defences. Beach dunes are classed as a sea defences under the North West Regional Land Drainage Byelaws (redacted for EPR 2016). Prohibitions protect the natural sea defence(s) from damage.	Whilst not included within the Environment Agency spatial flood defences dataset, the Fylde sand dunes offer protection from tidal flooding to inland areas by virtue of elevation and also act to reduce wave action. As the beach is not listed within the Environment Agency spatial flood defences dataset and a standard of protection is not defined, the flood

Date	Consultee and type of response	Comment raised	Response to comment raised and/or where considered in this annex
			defences are categorised as informal flood defences.

1.4 Legislation and guidance

1.4.1 National policy legislation and guidance

National Policy Statements

1.4.1.1 There are currently six energy National Policy Statements (NPSs), three of which contain policy relevant to offshore wind development and the Transmission Assets, specifically:

- overarching NPS for Energy (NPS EN-1) which sets out the UK Government's policy for the delivery of major energy infrastructure (DESNZ, 2023a);
- NPS for Renewable Energy Infrastructure (NPS EN-3) (DESNZ, 2023b); and
- NPS for Electricity Networks Infrastructure (NPS EN-5) (DESNZ, 2023c).

1.4.1.2 Planning policy for applications for development consent under the Planning Act 2008, specifically in relation to hydrology and flood risk, is contained in NPS EN-1. It sets out the aims of planning policy on development and flood risk to ensure that flood risk from all sources of flooding is taken into account at all stages in the planning process. Guidance on what is to be considered in the application is set out in Volume 3, Chapter 2: Hydrology and flood risk of the ES. For brevity, this has been reproduced below with a focus on those elements relevant to the FRA as presented within **Table 1.6** below.

Table 1.6: Summary of the NPS EN-1, NPS EN-3, NPS EN-5 requirements relevant to this FRA

Summary of NPS provision	How and where considered in the ES
NPS EN-1	
Climate change adaption	
Climate change is already having an impact and is expected to have an increasing impact on the UK throughout this century. The UK Climate Projections 2018 show an increased chance of milder, wetter winters and hotter, drier summers in the UK, with more intensive rainfall causing flooding. Sea levels will continue to rise beyond the end of the century, increasing risks to vulnerable coastal communities. Within the lifetime of energy projects, these factors will lead to increased flood risks in areas susceptible to flooding, and to an increased risk of the occurrence of floods in some areas which are not currently thought of as being at risk. A robust approach to flood risk management is a vital element of climate change adaptation; the applicant and the Secretary of State should take account of the policy on climate change adaptation in Section 4.10. [Paragraph 5.8.5 NPS EN-1]	Climate change is considered in **section 1.4.3** of this report. An assessment of an increase of peak river flow, peak rainfall intensities and sea level rise driven by climate change has been made within the FRA to the end of the construction phase for the landfall, onshore export cable corridor and 400 kV grid connection cable corridor and the operation and maintenance phase for the Morgan onshore substation and Morecambe onshore substation. Peak river flow and sea level rise are accounted for within fluvial flood risk sections (**section 1.5.4**, **section 1.6.4** and **section 1.7.4**). Peak rainfall intensity is taken into account within surface water flooding sections as well as the Outline Operational Drainage Management Plan (document reference J10). Additional details are provided in section 2.8 of Volume 3, Chapter 2: Hydrology and flood risk of the ES.

Summary of NPS provision	How and where considered in the ES
Where the project is likely to have effects on the water environment, the applicant should undertake an assessment of the existing status of, and impacts of the proposed project on, water quality, water resources and physical characteristics of the water environment, and how this might change due to the impact of climate change on rainfall patterns and consequently water availability across the water environment, as part of the Environmental Statement or equivalent. [Paragraph 5.16.3 of NPS EN-1].	The WFD assessment is presented within Volume 3, Annex 2.1: Water Framework Directive surface and groundwater assessment of the ES and includes a description of the baseline environment and an assessment of the impacts on water quality, resources and physical characteristics. Climate change is considered in section 2.6.10 of Volume 3, Chapter 2: Hydrology and flood risk of the ES and is also detailed within this FRA which takes into account increases in rainfall rates due to climate change to ensure the drainage design is able to accommodate increasing volumes of surface water runoff associated with the effects of climate change.
Whilst offshore wind farms will not be affected by flooding, applicants should demonstrate that any necessary land-side infrastructure (such as cabling and onshore substations) will be appropriately resilient to climate-change induced weather phenomena. Similarly, applicants should particularly set out how the proposal would be resilient to storms. [Paragraph 2.3.8 of NPS EN-3].	Climate change is considered in **section 1.4.3** and is referenced within section 2.6.10 of Volume 3, Chapter 2: Hydrology and flood risk of the ES of this report. Climate change is also considered in Volume 4, Chapter 1: Climate change of the ES. An assessment of an increase of peak river flow, peak rainfall intensities and sea level rise driven by climate change has been made within this FRA to the end of the construction phase for the landfall and onshore cable corridor and the operational and maintenance phase for the onshore substations. Peak river flow and sea level rise are accounted for within fluvial flood risk sections (**section 1.5.4**, **section 1.6.4** and **section 1.7.4**). Peak rainfall intensity is taken into account within surface water flooding sections as well as the Outline Operational Drainage Management Plan (document reference J10). Further details are provided in section 2.8 of Volume 3, Chapter 2: Hydrology and flood risk of the ES.
As climate change is likely to increase risks to the resilience of some of this infrastructure, from flooding for example, or in situations where it is located near the coast or an estuary or is underground, applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to: • flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change; • the effects of wind and storms on overhead lines; • higher average temperatures leading to increased transmission losses; • earth movement or subsidence caused by flooding or drought (for underground cables); and • coastal erosion – for the landfall of offshore transmission cables and their associated	Climate change is considered in **section 1.4.3** and is referenced within section 2.6.10 of Volume 3, Chapter 2: Hydrology and flood risk of the ES. Climate change is also considered in Volume 4, Chapter 1: Climate change of the ES. An assessment of an increase of peak river flow, peak rainfall intensities and sea level rise driven by climate change has been made within this FRA to the end of the construction phase for the landfall and onshore cable corridor and the operational and maintenance phase for the onshore substations. In regards to coastal erosion, Volume 2, Chapter 1: Physical processes of the ES provides details relating to the intertidal area and coastal erosion. The resilience to flood risk of intertidal and onshore elements of the Transmission Assets is set out within this FRA and Volume 3, Chapter: Hydrology and flood risk of the ES.

Summary of NPS provision	How and where considered in the ES
substations in the inshore and coastal locations respectively. [Paragraph 2.3.2 of NPS EN-5].	
Flood risk	
If, following application of the Sequential Test, it is not possible, (taking into account wider sustainable development objectives), for the project to be located in areas of lower flood risk the Exception Test can be applied. The test provides a method of allowing necessary development to go ahead in situations where suitable sites at lower risk of flooding are not available. The Exception Test is only appropriate for use where the Sequential Test alone cannot deliver an acceptable site. It would only be appropriate to move onto the Exception Test when the Sequential Test has identified reasonably available, lower risk sites appropriate for the proposed development where, accounting for wider sustainable development objectives, application of relevant policies would provide a clear reason for refusing development in any alternative locations identified. Examples could include alternative site(s) that are subject to national designations such as landscape, heritage and nature conservation designations, for example Areas of Outstanding Natural Beauty (AONBs), SSSIs and World Heritage Sites (WHS) which would not usually be considered appropriate. Both elements of the Exception Test will have to be satisfied for development to be consented. To pass the Exception Test it should be demonstrated that: • the project would provide wider sustainability benefits to the community that outweigh flood risk; and • the project will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible will reduce flood risk overall. [paragraphs 5.8.9 – 5.8.11 of NPS EN-1].	The Transmission Assets development vulnerability is classified as 'essential infrastructure'. This definition, alongside the definitions for the sequential test and exception test are provided within **section 1.9**. The site selection process is detailed within Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES. Development has been steered towards areas of lowest flood risk, including Flood Zone 1, with onshore substation development platforms assessed to have a low risk of flooding. The Transmission Assets are partially located within Flood Zone 3 (including Flood Zones 3a and 3b) and have been subjected to and deemed to have passed the sequential test as presented within **section 1.9.2**. The exception test for the onshore elements of the Transmission Assets is presented within **section 1.9.3**. The exception test demonstrates the project will provide wider sustainability benefits that outweigh flood risk and the development will be safe for the development lifetime, taking into consideration the vulnerability of its users with the implementation of Flood Evacuation Pans and will not increase flood risk elsewhere.
Development should be designed to ensure there is no increase in flood risk elsewhere, accounting for the predicted impacts of climate change throughout the lifetime of the development. There should be no net loss of floodplain storage and any deflection or constriction of flood flow routes should be safely managed within the site. Mitigation measures should make as much use as possible of natural flood management techniques. [paragraph 5.8.12 of NPS EN-1].	Commitments have been proposed to reduce flood risk and vulnerability to flooding during the construction, operation and maintenance and decommissioning periods and are to be secured through requirements of the DCO. Commitments are presented within **section 1.8.1** and **Table 1.44.** For aspects of the Transmission Assets which are located Flood Zone 2 and 3 (including Flood Zones 3a and 3b) during construction, the measures included in Table 2.19 of Volume 3, Chapter 2: Hydrology and flood risk of the ES will be implemented to reduce vulnerability of site users.

Summary of NPS provision	How and where considered in the ES
	Negligible above ground development will occur as a result of the installation of the landfall, onshore export cable corridor and 400 kV grid connection cable corridor. As a result, no floodplain compensation is required as part of the Transmission Assets. Drainage strategies for the onshore substations are detailed in Outline Operational Drainage Management Plan (document reference J10). The drainage schemes will provide a minor beneficial benefit in regards to surface water flood risk with the restriction of surface water flows from the site to the 1 in 1-year greenfield runoff rate.
A site-specific flood risk assessment should be provided for all energy projects in Flood Zones 2 and 3 in England. In Flood Zone 1, an assessment should accompany all proposals involving: • sites of 1 hectare or more • land which has been identified by the Environment Agency as having critical drainage problems • land identified (for example in a local authority strategic flood risk assessment) as being at increased flood risk in future • land that may be subject to other sources of flooding (for example surface water) • where the EA, LLFA, Internal Drainage Board or other body have indicated that there may be drainage problems. This assessment should identify and assess the risks of all forms of flooding to and from the project and demonstrate how these flood risks will be managed, taking climate change into account. The minimum requirements for Flood Risk Assessments (FRA) are that they should: • be proportionate to the risk and appropriate to the scale, nature and location of the project; • consider the risk of flooding arising from the project in addition to the risk of flooding to the project; • take the impacts of climate change into account, across a range of climate scenarios, clearly stating the development lifetime over which the assessment has been made; • be undertaken by competent people, as early as possible in the process of preparing the proposal; • consider both the potential adverse and beneficial effects of flood risk management infrastructure, including raised defences, flow channels, flood storage areas and other artificial features, together with the consequences of their failure and exceedance;	Due to the scale of the Transmission Assets, an FRA has been undertaken to assess flood risk from fluvial, tidal, surface water (pluvial), groundwater, sewers, reservoirs and artificial sources to the landfall, onshore cable corridors (onshore export cable corridor and 400 kV grid connection cable corridor), Morgan onshore substation and Morecambe onshore substation. Due to negligible above ground development associated with the operation and maintenance phase of the landfall, onshore export cable corridor and 400 kV grid connection cable corridor the FRA focuses on construction phase impacts. The FRA for the Morgan onshore substation and Morecambe onshore substation also assesses flood risk to the development throughout its operation and maintenance phase. An assessment of an increase of peak river flow, peak rainfall intensities and sea level rise driven by climate change has been made within the FRA to the end of the construction phase for the landfall, onshore export cable corridor and 400 kV grid connection cable corridor and the operation and maintenance phase for the Morgan onshore substation and Morecambe onshore substation. Peak river flow and sea level rise are accounted for within fluvial flood risk sections (**section 1.5.4**, **section 1.6.4** and **section 1.7.4**) and peak rainfall intensity is taken into account within surface water flooding sections as well as the operational drainage strategies for the Morgan onshore substation and Morecambe onshore substation. In regards to an assessment of residual flood risk, whilst flood defences are present within the study area and provide a degree of protection against flooding, the undefended scenario has been used to assess residual fluvial and tidal flood risk throughout the development lifetime, taking into account the effects of climate change. Historical flood events recorded by the Environment Agency and SFRA reports are also noted. Commitments have been proposed to reduce flood risk and vulnerability to flooding during the construction, operation and maintenance and decommissioning periods and are to be secured

Summary of NPS provision	How and where considered in the ES
• consider the vulnerability of those using the site, including arrangements for safe access and escape; • consider and quantify the different types of flooding (whether from natural and human sources and including joint and cumulative effects) and include information on flood likelihood, speed-of-onset, depth, velocity, hazard and duration; • identify and secure opportunities to reduce the causes and impacts of flooding overall, making as much use as possible of natural flood management techniques as part of an integrated approach to flood risk management; • consider the effects of a range of flooding events including extreme events on people, property, the natural and historic environment and river and coastal processes; • include the assessment of the remaining (known as 'residual') risk after risk reduction measures have been taken into account and demonstrate that these risks can be safely managed, ensuring people will not be exposed to hazardous flooding; • consider how the ability of water to soak into the ground may change with development, along with how the proposed layout of the project may affect drainage systems. Information should include: i. Describe the existing surface water drainage arrangements for the site ii. Set out (approximately) the existing rates and volumes of surface water run-off generated by the site. Detail the proposals for restricting discharge rates iii. Set out proposals for managing and discharging surface water from the site using sustainable drainage systems and accounting for the predicted impacts of climate change. If sustainable drainage systems have been rejected, present clear evidence of why their inclusion would be inappropriate iv. Demonstrate how the hierarchy of drainage options has been followed. v. Explain and justify why the types of SuDS and method of discharge have been selected and why they are considered appropriate. vi. Explain how sustainable drainage systems have been integrated with other aspects of the development such as open space or green infrastructure, so as to ensure an efficient use of the site	through requirements of the DCO. Commitments are presented within **section 1.8.1** and **Table 1.44.** For aspects of the Transmission Assets which are located Flood Zone 2 and 3 (including Flood Zones 3a and 3b) during construction, the measures included in **Table 1.44** will be implemented to reduce vulnerability of site users. Minimal above ground development (in the form of inspection covers) will occur as a result of the installation of the landfall, onshore export cable corridor and 400 kV grid connection cable corridor. As a result, no floodplain compensation is required in relation to these elements of the Transmission Assets. Drainage strategies for the onshore substations are detailed in Outline Operational Drainage Management Plan (document reference J10). The drainage schemes will provide a minor beneficial benefit in regards to surface water flood risk with the restriction of surface water flows from the site to the 1 in 1-year greenfield runoff rate. Surface water runoff is to be stored within attenuation basins and exceedance events of the drainage schemes are further considered within the Outline Operational Drainage Management Plan (document reference J10). Cumulative effects are assessed within section 2.13 of Volume 3, Chapter 2: Hydrology and flood risk of the ES. With the implementation of the above, it is demonstrated flood risk will not be increased elsewhere, accounts for the predicted impacts of climate change and ensures no reduction in floodplain capacity.

Summary of NPS provision	How and where considered in the ES
vii. Describe the multifunctional benefits the sustainable drainage system will provide viii. Set out which opportunities to reduce the causes and impacts of flooding have been identified and included as part of the proposed sustainable drainage system ix. Explain how run-off from the completed development will be prevented from causing an impact elsewhere x. Explain how the sustainable drainage system been designed to facilitate maintenance and, where relevant, adoption. Set out plans for ensuring an acceptable standard of operation and maintenance throughout the lifetime of the development • detail those measures that will be included to ensure the development will be safe and remain operational during a flooding event throughout the development's lifetime without increasing flood risk elsewhere; • identify and secure opportunities to reduce the causes and impacts of flooding overall during the period of construction; and • be supported by appropriate data and information, including historical information on previous events. Further guidance can be found in the Planning Practice Guidance Flood Risk and Coastal Change section which accompanies the NPPF or successor documents. [Paragraphs 5.8.13 – 5.8.16 of NPS EN-1].	
Development (including construction works) will need to account for any existing watercourses and flood and coastal erosion risk management structures or features, or any land likely to be needed for future structures or features so as to ensure: • Access, clearances and sufficient land are retained to enable their maintenance, repair, operation, and replacement, as necessary • Their standard of protection is not reduced • Their condition or structural integrity is not reduced [paragraph 5.8.17 of NPS EN-1]	Horizontal Directional Drilling (HDD) '(or other trenchless techniques) entry and exit points will be located at least 8 m away from Environment Agency main rivers at least 8 m from ordinary watercourses, surface watercourses or the landward toe of the surface watercourse flood defences'. This commitment is presented within **section 1.8.1** and **Table 1.44**. Commitments will ensure watercourse stand-off distances are not reduced and the condition of flood defences will not be adversely impacted by construction activities.
Applicants for projects which may be affected by, or may add to, flood risk should arrange pre-application discussions before the official pre-application stage of the NSIP process with the Environment Agency and, where relevant, other bodies such as Lead Local Flood Authorities, Internal Drainage Boards, sewerage undertakers,	The Hydrology and Flood Risk EWG met in May and August 2023 and January 2024. In attendance were representatives from stakeholders including the Environment Agency, LLFA (Lancashire County Council), and LPAs. Discussion points raised by the Applicants and stakeholders have been noted and addressed within this FRA and Volume 3, Chapter 2: Hydrology and flood risk of the ES.

Summary of NPS provision	How and where considered in the ES
navigation authorities, highways authorities and reservoir owner and operators. Such discussions should identify the likelihood and possible extent and nature of the flood risk, help scope the FRA, and identify the information that will be required by the Secretary of State to reach a decision on the application when it is submitted. The Secretary of State should advise applicants to undertake these steps where they appear necessary but have not yet been addressed. If the Environment Agency or another flood risk management authority has reasonable concerns about the proposal on flood risk grounds, the applicant should discuss these concerns with the Environment Agency and take all reasonable steps to agree ways in which the proposal might be amended, or additional information provided, which would satisfy the authority's concerns. [paragraphs 5.8.18 – 5.8.20 of NPS EN-1]	A further meeting with the Environment Agency was held in August 2024. The purpose of the meeting was to discuss hydrology and flood risk matters and to discuss concerns from the Environment Agency and to reach a solution to concerns raised. Two hydrology and flood risk Technical Notes (reference EOR0923-01 and EOR0923-05) were prepared to discuss flood risk matters in greater detail. The FRA was then updated in line with the Environment Agency response and a further meeting with the Environment Agency to discuss the approach. The Environment Agency were unable to confirm acceptability within the meeting and aimed to provide a formal response to the Technical Note detailing their stance prior to submission of the ES. For more information on consultation activities, please see **Table 1.5.**
The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account. Where it is not possible to locate development in low-risk areas, the Sequential Test should go on to compare reasonably available sites with medium risk areas and then, only where there are no reasonably available sites in low and medium risk areas, within high-risk areas. The technology specific NPSs set out some exceptions to the application of the Sequential Test. However, when seeking development consent on a site allocated in a development plan through the application of the Sequential Test, informed by a strategic flood risk assessment, applicants need not apply the Sequential Test, provided the proposed development is consistent with the use for which the site was allocated and there is no new flood risk information that would have affected the outcome of the test. Consideration of alternative sites should take account of the policy on alternatives set out in Section 4.3 above. All projects should apply the Sequential Test to locating development within the site. [Paragraphs 5.8.21 – 5.8.23 of NPS EN-1].	The Transmission Assets are classified as 'essential infrastructure', for more information see **section 1.9**. The site selection process is detailed within Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES. Development has been steered towards areas of lowest flood risk, including Flood Zone 1, with onshore substation development platforms assessed to have a low risk of flooding. The Transmission Assets are partially located within Flood Zone 3 (including Flood Zones 3a and 3b) -and have been subjected to the sequential test. The sequential test for the landfall, onshore export cable corridor and 400 kV grid connection cable corridor is presented within **section 1.9.2.** These aspects of the transmission assets are required to connect to the national grid at Penwortham and there are no reasonably available routes available in which cables can traverse without crossing areas of Flood Zone 3 (including Flood Zones 3a and 3b). Furthermore, no permanent above ground development will occur as a result of associated construction activities and flood risk will only be temporarily increased during the construction period up to 2036. The sequential test for Morgan onshore substation is presented within **section 1.9.2.** The development platform, surface water attenuation and associated access/egress has been steered into lowest areas of flood risk. Due to the nature of temporary construction compounds, there are no other reasonable available sites which provide access to the construction activities. The sequential test for Morecambe onshore substation is presented within **section 1.9.2.** The development platform and surface water attenuation has been steered into lowest areas of flood risk. The

Summary of NPS provision	How and where considered in the ES
	Morecambe onshore substation temporary and permanent access tracks are routed across Flood Zone 3a. The permanent use would be for heavy goods vehicle and abnormal loads deliveries only and therefore operational use would be rare. Due to existing development bounding the south, west and north and the Dow Brook located adjacent to the east, there are no other reasonable available sites which the temporary and permanent access tracks can be located to provide access between the onshore substation and public highway network. The Transmission Assets are considered to pass the sequential test.
To satisfactorily manage flood risk, arrangements are required to manage surface water and the impact of the natural water cycle on people and property. In this NPS, the term SuDS refers to the whole range of sustainable approaches to surface water drainage management including, where appropriate: • source control measures including rainwater recycling and drainage • infiltration devices to allow water to soak into the ground, that can include individual soakaways and communal facilities • filter strips and swales, which are vegetated features that hold and drain water downhill mimicking natural drainage patterns • filter drains and porous pavements to allow rainwater and run-off to infiltrate into permeable material below ground and provide storage if needed • basins, ponds and tanks to hold excess water after rain and allow controlled discharge that avoids flooding • flood routes to carry and direct excess water through developments to minimise the impact of severe rainfall flooding Site layout and surface water drainage systems should cope with events that exceed the design capacity of the system, so that excess water can be safely stored on or conveyed from the site without adverse impacts. The surface water drainage arrangements for any project should, accounting for the predicted impacts of climate change throughout the development's lifetime, be such that the volumes and peak flow rates of surface water leaving the site are no greater than the rates prior to the proposed project, unless specific off-site	The drainage strategies for the onshore substations are provided in Outline Operational Drainage Management Plan (document reference J10) and is to be secured as a requirement of the DCO. The drainage strategies have been developed in accordance with the NPS, NPPF, PPG ID7 the SuDS Manual and local council policy. The drainage schemes will provide a minor beneficial benefit in regards to surface water flood risk with the restriction of surface water discharge from the site to the 1 in 1-year greenfield runoff rate. Surface water from impermeable areas will be attenuated up to the 1% AEP storm event plus an allowance for climate change. Flows are to be discharged following the SuDS hierarchy, with discharge to Dow Brook proposed if infiltration testing to be undertaken post-consent deem infiltration based methods of discharge to be unfeasible. Discharge of surface water flows to watercourse are subject to approval by the LPA. With the restricted discharge rate, the drainage strategies will provide a minor beneficial benefit in regards to surface water flood risk immediately downstream of the Morgan and Morecambe onshore substations. Exceedance events of the drainage schemes are further considered within the Outline Operational Drainage Management Plan (document reference J10). Infiltration testing has been undertaken for the Morgan onshore substation and Morecambe onshore substations.

Summary of NPS provision	How and where considered in the ES
arrangements are made and result in the same net effect. It may be necessary to provide surface water storage and infiltration to limit and reduce both the peak rate of discharge from the site and the total volume discharged from the site. There may be circumstances where it is appropriate for infiltration facilities or attenuation storage to be provided outside the project site, if necessary through the use of a planning obligation. [paragraphs 5.8.24 – 5.8.28 of NPS EN-1].	
The sequential approach should be applied to the layout and design of the project. Vulnerable aspects of the development should be located on parts of the site at lower risk and residual risk of flooding. Applicants should seek opportunities to use open space for multiple purposes such as amenity, wildlife Overarching National Policy Statement for Energy (EN-1) habitat and flood storage uses. Opportunities should be taken to lower flood risk by reducing the built footprint of previously developed sites and using SuDS. Where a development may result in an increase in flood risk elsewhere through the loss of flood storage, on-site level-for-level compensatory storage, accounting for the predicted impacts of climate change over the lifetime of the development, should be provided. Where it is not possible to provide compensatory storage on site, it may be acceptable to provide it off-site if it is hydraulically and hydrologically linked. Where development may cause the deflection or constriction of flood flow routes, these will need to be safely managed within the site. Where development may contribute to a cumulative increase in flood risk elsewhere, the provision of multifunctional sustainable drainage systems, natural flood management and green infrastructure can also make a valuable contribution to mitigating this risk whilst providing wider benefits. The receipt of and response to warnings of floods is an essential element in the management of the residual risk of flooding. Flood Warning and evacuation plans should be in place for those areas at an identified risk of flooding. [paragraphs 5.8.29 – 5.8.33 of NPS EN-1].	The site selection process is detailed within Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES. Development has been steered towards areas of lowest flood risk, including Flood Zone 1, with onshore substation development platforms assessed to have a low risk of flooding. The remainder of the Transmission Assets are partially located within Flood Zone 3 (including Flood Zones 3a and 3b) and have been subjected to the sequential test. Sequential tests for the Morgan onshore substation, Morecambe onshore substation plus landfall and cable corridors are provided within **section 1.9.2**. With reference made to Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES, the sequential tests demonstrate a sequential approach has been undertaken regarding the location of proposed development and each sequential test is considered to be passed. No alterations to existing ground levels (and thus the functional floodplain) are proposed as part of aspects of the Transmission Assets that are located within Flood Zone 3 (including Flood Zones 3a and 3b). As a result, no floodplain compensation is required as part of the Transmission Assets. For aspects of the Transmission Assets which are located within Flood Zone 3 (including Flood Zones 3a and 3b), there is a commitment for a flood management plan to reduce vulnerability of site users during the construction phase and operational and maintenance phase (please see **section 1.8.1** and **Table 1.44**). These measures will ensure development is safe for its lifetime. The drainage strategies for the onshore substation are presented within the Outline Operational Drainage Management Plan (document reference J10) and are to be secured through requirements of the DCO. The drainage schemes will provide a minor beneficial benefit in regards to surface water flood risk with the restriction of surface water discharge from the site to the 1 in 1-year greenfield runoff rate.
The applicant should take advice from the local authority emergency planning team, emergency services and, where appropriate, from the local	The Applicants are committed to preparing flood warning and evacuation procedures as set out within Outline CoCP (document reference J1) to ensure safe

Summary of NPS provision	How and where considered in the ES
resilience forum when producing an evacuation plan for a manned energy project as part of the FRA. Any emergency planning documents, flood warning and evacuation procedures that are required should be identified in the FRA. [paragraph 5.8.34 if NPS EN-1]	access and escape routes are safely maintained for the lifetime of the development. Further details are provided in **section 1.8.1** and **Table 1.44.**
Flood resistant and resilient materials and design should be adopted to minimise damage and speed recovery in the event of a flood. [paragraph 5.8.35 if NPS EN-1]	Permanent above ground development at risk of flooding includes the Morecambe onshore substation access track. The access track will comprise flood resistant and resilient materials within its construction and will require minimal maintenance after a flood event. The permanent use would be for heavy goods vehicle and abnormal loads deliveries only and therefore operational use would be rare.
In determining an application for development consent, the Secretary of State should be satisfied that where relevant: • the application is supported by an appropriate FRA • the Sequential Test has been applied and satisfied as part of site selection • a sequential approach has been applied at the site level to minimise risk by directing the most vulnerable uses to areas of lowest flood risk • the proposal is in line with any relevant national and local flood risk management strategy • SuDS (as required in the next paragraph on National Standards) have been used unless there is clear evidence that their use would be inappropriate • in flood risk areas the project is designed and constructed to remain safe and operational during its lifetime, without increasing flood risk elsewhere (subject to the exceptions set out in paragraph 5.8.42) • the project includes safe access and escape routes where required, as part of an agreed emergency plan, and that any residual risk can be safely managed over the lifetime of the development • land that is likely to be needed for present or future flood risk management infrastructure has been appropriately safeguarded from development to the extent that development would not prevent or hinder its construction, operation or maintenance [paragraph 5.8.36 if NPS EN-1]	Details of the site selection process for the Transmission Assets, including the onshore substations, are provided in Volume 1, Chapter 4: Site selection and alternatives of the ES. The FRA has been developed in accordance with the NPS EN-1, NPPF, PPG ID7 and local council policy and considers the flood risk associated with the onshore elements of the Transmission Assets. The site selection process is detailed within Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES. Development has been steered towards Flood Zone 1, with Permanent substations located within Flood Zone 1. Temporary and permanent access tracks are located within Flood Zone 1, 2 and 3 (including Flood Zones 3a and 3b) and have been subjected to and are deemed to have passed the sequential test (**section 1.9.2**) and exception test (**section 1.9.3**). The Outline Operational Drainage Management Plan (document reference J10) is to be secured through requirements of the DCO and has been developed in accordance with the NPS, NPPF, PPG ID7 the SuDS Manual, Sustainable drainage systems: non-statutory technical standards and local council policy. Appropriate mitigation measures in regard to flood risk, such as Flood Management Plans are presented within **section 1.8** and **Table 1.44** and will be secured through the requirements of the DCO. As per CoT95, the Applicants are committed to preparing flood warning and evacuation procedures as set out within Outline Code of Construction Practice (document reference J1) to ensure safe access and escape routes are safely maintained for the lifetime of the development. Commitments are to be secured through requirements of the DCO 8 m stand-off distances from the onshore substations and Dow Brook (EA Designated Main River) and associated flood defences have been maintained to ensure present day and future flood risk management activities can be undertaken unhindered by the

Summary of NPS provision	How and where considered in the ES
	Transmission Assets. Furthermore, The Environment Agency within HFR EWG 1 that difference in phasing between the Transmission Assets and Penwortham Flood Defence Scheme makes interaction between the schemes unlikely.
For energy projects which have drainage implications, approval for the project's drainage system, including during the construction period, will form part of the development consent issued by the Secretary of State. The Secretary of State will therefore need to be satisfied that the proposed drainage system complies with any National Standards published by Ministers under paragraph 5(1) of Schedule 3 to the Flood and Water Management Act 2010. In addition, the Development Consent Order, or any associated planning obligations, will need to make provision for appropriate operation and maintenance of any SuDS throughout the project's lifetime. Where this is secured through the adoption of any SuDS features, any necessary access rights to property will need to be granted. Where relevant, the Secretary of State should be satisfied that the most appropriate body is being given the responsibility for maintaining any SuDS, taking into account the nature and security of the infrastructure on the proposed site. Responsible bodies could include, for example the landowner, the relevant lead local flood authority (LLFA) or water and sewerage company (through the Ofwat approved Sewerage Sector Guidance), or another body, such as an Internal Drainage Board. [Paragraphs 5.8.37 – 5.8.39 of NPS EN-1].	The Outline CoCP (document reference J1) includes an Outline Pollution Prevention Plan (document reference J1.4), an Outline Spillage and Emergency Response Plan (document reference J1.8) and an Outline Surface Water and Groundwater Management Plan (document reference J1.9) which include information for managing surface water runoff during construction and protective measures to control the risk of pollution to groundwater throughout the development lifetime. These will be secured through the requirements of the DCO. The Outline Operational Drainage Management Plan (document reference J10) is to be secured through requirements of the DCO and has been developed in accordance with the NPS, NPPF, PPG ID7 the SuDS Manual, Sustainable drainage systems: non-statutory technical standards and local council policy. Surface water from impermeable areas will be attenuated up to the 1% AEP storm event plus an allowance for climate change. Flows are to be discharged following the SuDS hierarchy, with discharge to Dow Brook proposed if infiltration testing undertaken post-consent deem infiltration based methods of discharge to be unfeasible. Discharge of surface water flows to watercourse are subject to approval by the LPA. The drainage schemes will provide a minor beneficial benefit in regards to surface water flood risk to land downstream of the onshore substations with the restriction of surface water discharge from the site to the 1 in 1-year greenfield runoff rate. The Outline Operational Drainage Management Plan provides information relating to exceedance events of the drainage schemes and also provides information regarding the management and maintenance of SuDS within the Morgan onshore substation and Morecambe onshore substation. Infiltration testing for the Morgan onshore substation and Morecambe onshore substation has been undertaken.
If the Environment Agency or another flood risk management authority continues to have concerns and objects to the grant of development consent on the grounds of flood risk, the Secretary of State can grant consent, but would need to be satisfied before deciding whether or not to do so that all reasonable steps have been taken by the applicant and the authority to try to resolve the concerns. [paragraph 5.8.40 if NPS EN-1]	The Applicants have engaged with the Environment Agency and LLFA with four EWG meetings to discuss issues relating to hydrology and flood risk. Two technical notes have also been written and a further meeting was held with the Environment Agency in August 2024 to ensure flood risk is deemed to be appropriately assessed by the Environment Agency. The Environment Agency have responded to the Applicants technical note on these matters.

Summary of NPS provision	How and where considered in the ES
	Key consultation summaries are presented within **Table 1.5**.
Energy projects should not normally be consented within Flood Zone 3b, or on land expected to fall within these zones within its predicted lifetime. This may also apply where land is subject to other sources of flooding (for example surface water). However, where essential energy infrastructure has to be located in such areas, for operational reasons, they should only be consented if the development will not result in a net loss of floodplain storage, and will not impede water flows. Exceptionally, where an increase in flood risk elsewhere cannot be avoided or wholly mitigated, the Secretary of State may grant consent if they are satisfied that the increase in present and future flood risk can be mitigated to an acceptable and safe level and taking account of the benefits of, including the need for, nationally significant energy infrastructure as set out in Part 3 above. In any such case the Secretary of State should make clear how, in reaching their decision, they have weighed up the increased flood risk against the benefits of the project, taking account of the nature and degree of the risk, the future impacts on climate change, and advice provided by the Environment Agency and other relevant bodies. [paragraph 5.8.41 – 5.8.42 of NPS EN-1]	The extent of Flood Zone 3b has been ascertained via SFRA data, the 3.3% AEP extent from with the Ribble Estuary (2014) hydraulic model and the 4% AEP extent from the Ribble Douglas (2010) hydraulic model. Based on this information, the location of Transmission Assets within Flood Zone 3a and Flood Zone 3b have been differentiated. This is also included in **paragraphs 1.7.4.6 to 1.7.4.7**) The following components are located within Flood Zone 3a: • The onshore export cable corridor (see **section ~~1.7 and Figure 1.17);~~1.7**and **Figure 1.15**) • ~~The~~ The majority of the 400kv grid connection cables (see **section ~~1.7~~ 1.7**and • ~~**Figure** 1.17);~~ • **Figure 1.15**) • The majority of construction and operational access tracks (see **sections 1.5** and **1.6**); • The majority of construction compounds (see **sections 1.5** and **1.6)**; • ~~The~~Access to the Morgan onshore substation ~~and associated access~~ (see **paragraphs ~~1.1.1.1 to~~ 1.5.4.1** to Error! Reference source not found. and **Figure 1.2**); and • The Morecambe onshore substation ~~and associated~~ access (see **paragraphs ~~1.1.1.1~~ 1.6.4.1**to **~~1.6.4.5~~ 1.6.4.5**and **~~Figure 1.14~~Figure 1.12**). The following components are located within Flood Zone 3b: • A small extent of the 400kv grid connection cables in proximity to the River Ribble and Savick Brook (see **section ~~1.7 and Figure 1.17);~~1.7**and **Figure 1.15**). • An operational access track located to the south of the River Ribble (see **section ~~1.7 and Figure 1.17);~~1.7**and **Figure 1.15**) • Portions of two 400kv grid connection construction access tracks (see **section ~~1.7~~1.7** and **~~Figure 1.17); and~~Figure 1.15**). • Two construction compounds located to the south of the River Ribble (see **section ~~1.7~~1.7** and **Figure 1.15**). No alterations to existing ground levels (and thus the functional floodplain) are proposed as part of aspects of the Transmission Assets that are located within Flood Zone 3 (which includes Flood Zone 3a and 3b).

Summary of NPS provision	How and where considered in the ES
	The site selection process is detailed within Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES. Development has been steered towards Flood Zone 1, with onshore substations located within Flood Zone 1. The Transmission Assets (landfall, export cable corridor and 400 kV grid connection cable corridor, Morgan onshore substation and Morecambe onshore substation) are partially located within Flood Zone 3 (which includes Flood Zone 3a and 3b) and have been subject to and are deemed to have passed the sequential test (**section 1.9.2**) and exception test (**section 1.9.3**). For aspects of the Transmission Assets which are located Flood Zone 2 and 3 (including Flood Zones 3a and 3b) during construction, the measures included in **Table 1.44** will be implemented to reduce vulnerability of site users. Negligible above ground development will occur as a result of the installation of the landfall, onshore export cable corridor and 400 kV grid connection cable corridor. As a result, no floodplain compensation is required as part of the Transmission Assets. Additional mitigation measures are presented within **section 1.8** to ensure flood risk is mitigated to an acceptable and safe level during the development lifetime.
Water Quality Resources	
Where possible, applicants are encouraged to manage surface water during construction by treating surface water runoff from exposed topsoil prior to discharging and to limit the discharge of suspended solids e.g. from car parks or other areas of hard standing, during operation. Applicants are encouraged to consider protective measures to control the risk of pollution to groundwater beyond those outlined in River Basin Management Plans and Groundwater Protection Zones – this could include, for example, the use of protective barriers. [paragraph 5.16.5 – 5.16.6 of NPS EN-1].	The Outline CoCP (document reference J1) includes an Outline Surface Water and Groundwater Management Plan (document reference J1.9) and Outline Pollution Prevention Plan (document reference J1.4), which include information for managing surface water runoff during construction and protective measures to control the risk of pollution to groundwater during construction and operation. Details are provided in **section 1.8** and **Table 1.44**.
The Environmental Statement should in particular describe: • The existing quality of waters affected by the proposed project and the impacts of the proposed project on water quality, noting any relevant existing discharges, proposed new discharges and proposed changes to discharges • Existing water resources affected by the proposed project and the impacts of the proposed project on water resources, noting any relevant existing abstraction rates, proposed new abstraction rates and proposed	The WFD Assessment (Volume 3 Annex 2.1: Water Framework Directive surface and groundwater assessment of the ES) has been undertaken in accordance with the Planning Inspectorate Nationally Significant Infrastructure Projects: Advice on the Water Framework Directive (Planning Inspectorate, 2024). The assessment considers the potential impact of the Transmission Assets within the intertidal infrastructure area and onshore infrastructure area during the construction, operation and maintenance, and decommissioning. The WFD assessment and the proposed measures adopted as part of the Transmission Assets have taken into account the requirements of the North

Summary of NPS provision	How and where considered in the ES
changes to abstraction rates (including any impact on or use of mains supplies and reference to Abstraction Licensing Strategies) and also demonstrate how proposals minimise the use of water resources and water consumption in the first instance • Existing physical characteristics of the water environment (including quantity and dynamics of flow) affected by the proposed project and any impact of physical modifications to these characteristics • Any impacts of the proposed project on water bodies or protected areas (including shellfish protected areas) under the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 and source protection zones (SPZs) around potable groundwater abstractions • How climate change could impact any of the above in the future • Any cumulative effects [Paragraph 5.16.7 of NPS EN-1].	Western RBMP and WFD to ensure all potential impacts on the water environment are mitigated to within acceptable levels including drinking water protected areas associated with public and private abstractions. Environment Agency, Fylde Council, Blackpool Council, South Ribble Borough Council and Preston City Council (and Lancashire County Council at the County level) have been consulted during the preparation of the WFD assessment. The impact on hydromorphological supporting conditions to the biological elements of ecological status have been considered in the WFD assessment. The document has undertaken an assessment of the water bodies and associated protected areas including designated shellfish waters and drinking water protected areas. Impacts to peak river flow, peak rainfall intensity and sea level rise as a result of climate change has been described and taken into account within this FRA. Where appropriate, mitigation measures have been applied. A cumulative impact assessment of the water environment has been undertaken in Volume 3, Chapter 1: Geology, hydrogeology and ground conditions of the ES and Chapter 2: Hydrology and flood risk of the ES.
The Secretary of State should consider whether mitigation measures are needed over and above any which may form part of the project application. A construction management plan may help codify mitigation at that stage. The risk of impacts on the water environment can be reduced through careful design to facilitate adherence to good pollution control practice. For example, designated areas for storage and unloading, with appropriate drainage facilities, should be clearly marked. The impact on local water resources can be minimised through planning and design for the efficient use of water, including water recycling. If a development needs new water infrastructure, significant supplies or impacts other water supplies, the applicant should consult with the local water company and the EA. [paragraphs 5.16.8 to 5.16.10, NPS EN-1].	Flood risk mitigation measures are presented within **section 1.8**. An assessment of effects to hydrology and flood risk has been undertaken as part of Volume 3, Chapter 2: Hydrology and flood risk of the ES, and commitments (mitigation measures) are detailed within section 2.8. Appropriate mitigation measures to reduce the impacts on the water environment are set out in the Outline CoCP (document reference J1) which has been prepared as part of the application. This includes measures relating to control of impacts to the water environment during construction, as set out in **section 1.8** and **Table 1.44**.
Activities that discharge to the water environment are subject to pollution control. The considerations set out in Section 4.12 on the interface between planning and pollution control therefore apply. These considerations will also apply in an analogous way to the abstraction licensing regime regulating activities that take water from the water environment, and to the control regimes relating to	Measures to ensure discharges to the water environment are subject to pollution control are detailed within the Outline Operational Drainage Management Plan (document reference J10) and Outline Code of Construction Practice (document reference J1) which includes an Outline Onshore Pollution Prevention Plan (document reference J1.4).

Summary of NPS provision	How and where considered in the ES
works to, and structures in, on, or under controlled waters. [paragraph 5.16.11 of NPS EN-1].	Potential impacts from pollution and contamination are assessed within section 2.11.2 of Volume 3, Chapter 2: Hydrology and flood risk.
The Secretary of State should be satisfied that a proposal has regard to current River Basin Management Plans and meets the requirements of the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 (including regulation 19). The specific objectives for particular river basins are set out in River Basin Management Plans. The Secretary of State must refuse development consent where a project is likely to cause deterioration of a water body or its failure to achieve good status or good potential, unless the requirements set out in Regulation 19 are met. A project may be approved in the absence of a qualifying Overriding Public Interest test only if there is sufficient certainty that it will not cause deterioration or compromise the achievement of good status or good potential. The Secretary of State should also consider the interactions of the proposed project with other plans such as Water Resources Management Plans and Shoreline Management Plans [Paragraph 5.16.14 – 5.6.15 of NPS EN-1].	The WFD assessment (Volume 3 Annex 2.1: Water Framework Directive Water Framework Directive surface and groundwater assessment of the ES) has considered the North Western RBMP 2021-2027. The WFD assessment has been undertaken to demonstrate that the Transmission Assets are compliant with the requirements of the WFD and the implementing legislation in England and Wales, i.e. Water Environment (Water Framework Directive) (England and Wales) Regulations 2017. The assessment and the proposed mitigation measures have taken into account the requirements of the RBMP, and in particular the environmental objectives of the water bodies affected, to ensure all potential impacts on the water environment are mitigated to within acceptable levels. Therefore, the achievement of the environmental objectives of the water bodies within the WFD study area will not be compromised as a result of the project activities associated with the Transmission Assets. The shoreline management plan is defined and discussed within this FRA and the potential impacts to Lytham St Annes dunes which are detailed within the shoreline management plan is discussed within section 2.11 of Volume 3, Chapter 2: Hydrology and flood risk.
NPS EN-3	
Climate change adaption	
Whilst offshore wind farms will not be affected by flooding, applicants should demonstrate that any necessary land-side infrastructure (such as cabling and onshore substations) will be appropriately resilient to climate-change induced weather phenomena. Similarly, applicants should particularly set out how the proposal would be resilient to storms. [Paragraph 2.4.8 of NPS EN-3].	Climate change is considered in **section 1.4.3** of this report. Climate change is also considered in Volume 3, Chapter 2: Hydrology and flood risk and Volume 4, Chapter 1: Climate change of the ES. An assessment of an increase of peak river flow, peak rainfall intensities and sea level rise driven by climate change has been made within the FRA to the end of the construction phase for the landfall and onshore cable corridor and the operational and maintenance phase for the Morgan onshore substation and Morecambe onshore substation. Peak river flow and sea level rise are accounted for within fluvial flood risk sections (**section 1.5.4**, **section 1.6.4** and **section 1.7.4**). Peak rainfall intensity is taken into account within surface water flooding sections as well as the Outline Operational Drainage Management Plan (document reference J10), to be secured through requirements of the DCO.
NPS EN-5	
Climate change adaption	

Summary of NPS provision	How and where considered in the ES
As climate change is likely to increase risks to the resilience of some of this infrastructure, from flooding for example, or in situations where it is located near the coast or an estuary or is underground, applicants should in particular set out to what extent the proposed development is expected to be vulnerable, and, as appropriate, how it has been designed to be resilient to: • flooding, particularly for substations that are vital to the network; and especially in light of changes to groundwater levels resulting from climate change; • the effects of wind and storms on overhead lines; • higher average temperatures leading to increased transmission losses; • earth movement or subsidence caused by flooding or drought (for underground cables); and • coastal erosion – for the landfall of offshore transmission cables and their associated substations in the inshore and coastal locations respectively. [Paragraph 2.3.2 of NPS EN-5].	Climate change is considered in **section 1.4.3** of this report. Climate change is also considered in Volume 3, Chapter 2: Hydrology and flood risk and Volume 4, Chapter 1: Climate change of the ES. An assessment of an increase of peak river flow, peak rainfall intensities and sea level rise driven by climate change has been made within the flood risk assessment to the end of the operation and maintenance phase. In regards to coastal erosion, Volume 2, Chapter 1: Physical processes of the ES provides details relating to the intertidal area and coastal erosion. The resilience to flood risk of the onshore elements of the Transmission Assets is set out within this annex and Volume 3, Chapter 2: Hydrology and flood risk of the ES.

1.4.2 National Planning Policy

The National Planning Policy Framework

1.4.2.1 The National Planning Policy Framework (NPPF) was published in 2012 and updated in 2018, 2019, 2021 and 2023 (Department for Levelling Up, Housing and Communities, 2023). The NPPF sets out the Government's planning policies for England.

1.4.2.2 The Government has published proposed reforms to the NPPF for consultation on 30 July 2024, with the consultation period ending on 24 September 2024 (Ministry of Housing, Communities and Local Government, 2024). Following consultation, the NPPF will be updated.

1.4.2.3 The PPG (Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities and Local Government, 2023) supports the NPPF and provides guidance across a range of topic areas.

Table 1.7: Summary of NPPF and PPG requirements and guidance relevant to this chapter

Key provisions	How and where considered in the ES
National Planning Practice Framework	
A site-specific FRA is required for all proposals for new development in Flood Zones 2 and 3, and for any proposed development covering an area of 1 hectare (ha) or greater in Flood Zone 1 (footnote 59 of the NPPF).	Due to the scale and nature of development proposals, an FRA for the permanent and temporary Onshore Infrastructure Area has been undertaken and is presented within **section 1.7**.
New development should take into account climate change and that appropriate mitigation should be provided. It states that inappropriate development should be located away from high risk areas and a sequential risk-based approach should be applied through the local planning system to the location of development (Paragraph 158).	Climate change has been considered in the FRA in the form of impacts to peak river flow, peak rainfall intensity and sea level rise. This is considered within section 2.6.10 of Volume 3, Chapter 2: Hydrology and flood risk and applied and assessed within the FRA for each element of the Transmission Assets (Morgan onshore substation, Morecambe onshore substation and landfall, onshore export cables and 400 kV grid connection cables). Where appropriate, mitigation measures have been applied which mainly involves steering infrastructure towards areas of lowest flood risk and ensuring development is safe for its lifetime. As such, sequential and exception tests have been undertaken as part of the Flood Risk Assessment and are presented within section 1.9.2 and section 1.9.3 of Volume 3, Annex 2.3: Flood Risk Assessment of the ES.
Annex 3: Flood risk vulnerability classification	The Transmission Assets and their associated construction activities and enabling works are classified as 'essential infrastructure'. This is defined as *'Essential utility infrastructure which has to be located in a flood risk area for operational reasons, including infrastructure for electricity supply including generation, storage and distribution systems; including electricity generating power stations, grid and primary substations storage; and water treatment works that need to remain operational in times of flood.'*
The sequential test The aim of the sequential test is to steer new development to areas with the lowest risk of flooding from any source. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding.	The location and siting of the Transmission Assets has been informed by a site selection and route refinement process set out in Volume 1, Chapter 4: Site selection and consideration of alternatives. The site selection process considered a range of alternative locations, in consideration of a wide range of environmental constraints including flood risk. The Transmission Assets (landfall, export cable corridor and 400 kV grid connection cable corridor, Morgan onshore substation and Morecambe onshore substation) are partially located within Flood Zone 3 (which includes Flood Zone 3a and 3b) and have been subject to and are deemed to have passed the sequential test, as presented within **Section 1.9.2.**
The exception test If it is not possible for development to be located in areas with a lower risk of flooding (taking into account wider sustainable	The exception test has been applied to aspects of the Transmission Assets that are not able to be situated within areas of lower flood risk and is presented within **section 1.9.3**.

Key provisions	How and where considered in the ES
development objectives), the exception test may have to be applied. To pass the exception test it should be demonstrated that: (a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and (b) the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall. Both elements of the exception test should be satisfied for development to be allocated or permitted.	For these aspects of development, it has been demonstrated that development will be safe for its lifetime, taking into account of the vulnerability of its users, without increasing flood risk elsewhere.
National Planning Practice Guidance	
The use of SuDS	The drainage strategies for the onshore substations are presented within the Outline Operational Drainage Management Plan (document reference J10) and are to be secured through requirements of the DCO.
Reducing the impacts of flooding	For the purposes of the FRA, the term 'measures adopted as part of the project' is used to include the following measures (adapted from IEMA, 2016): • Embedded mitigation. This includes the following. – Primary (inherent) mitigation - measures included as part of the project design. IEMA describes these as 'modifications to the location or design of the development made during the pre-application phase that are an inherent part of the project and do not require additional action to be taken'. This includes modifications arising through the iterative design process. These measures will be secured through the consent itself through the description of the project and the parameters secured in the DCO and/or marine licences. For example, a reduction in footprint or height. – Tertiary (inexorable) mitigation. IEMA describes these as 'actions that would occur with or without input from the EIA feeding into the design process. These include actions that will be undertaken to meet other existing legislative requirements, or actions that are considered to be standard practices used to manage commonly occurring environmental effects'. It may be helpful to secure such measures through a Code of Construction Practice or similar. • Secondary (foreseeable) mitigation. IEMA describes these as 'actions that will require further activity in order to achieve the anticipated outcome'. These include measures required to reduce the significance of environmental effects (such as lighting limits) and may be secured through environmental management plan. Commitments have been proposed to reduce flood risk and vulnerability to flooding during the construction,

Key provisions	How and where considered in the ES
	operation and maintenance and decommissioning periods and are to be secured through requirements of the DCO. Commitments are presented within **section 1.8.1** and **Table 1.44.**
Flood Zone and flood risk tables	Please see **paragraphs 1.4.2.5, 1.4.2.6** and **Table 1.8** for more information regarding Environment Agency Flood Zones and flood risk classification and vulnerability for the Transmission Assets development classification.

1.4.2.4 The consultation draft includes similar provisions as the designated NPPF. The consultation draft NPPF has been reviewed and there are no material updates for flood risk.

Flood Map for Planning

1.4.2.5 The Environment Agency Flood Map for Planning was updated in March 2025 and shows the locations of Flood Zones. Flood Zones refer to the probability of flooding from rivers and sea in a given year, assuming no defences are in place. Mapping does not account for climate change. Flood zone definitions are presented below within **Table 1.8.**

Table 1.8: Flood Map for Planning Flood Zones.

Flood zone	Flood zone definitions
Flood Zone 1	land assessed as having a less than 0.1% annual probability of river or sea flooding. (Land shown as 'clear' on the Flood Map for Planning (FMfP))
Flood Zone 2	land assessed as having between a 1% and 0.1% annual probability of river flooding, or between a 0.5% and 0.1% annual probability of sea flooding in any year. (Land shown in light blue on the FMfP)
Flood Zone 3a	land having a 1% or greater annual probability of river flooding, or a 0.5% or greater annual probability of flooding from the sea in any year. (Land shown in dark blue on the FMfP).
Flood Zone 3b	This zone comprises land where water from rivers or the sea has to flow or be stored in times of flood. The identification of functional floodplain should take account of local circumstances and not be defined solely on rigid probability parameters. Functional floodplain will normally comprise: • land having a 3.3% or greater annual probability of flooding, with any existing flood risk management infrastructure operating effectively; or • land that is designed to flood (such as a flood attenuation scheme), even if it would only flood in more extreme events (such as 0.1% annual probability of flooding).

1.4.2.6 ~~Indicative extents~~ The extent of Flood Zone 3b ~~have~~has been ~~derived~~ascertained from the ~~'River and Sea~~3.3% AEP extent from with ~~Defences' dataset which~~the Ribble Estuary (2014) hydraulic model and the 4% AEP extent from the Ribble Douglas (2010) hydraulic model. Where detailed modelled data is ~~included within the EA's updated Flood Map for Planning. The mapped 1 in 30-year annual likelihood of flooding extent provides an indicative extent of~~not available, a conservative approach has been taken through using the Flood Zone 3 extent as a proxy for Flood Zone 3b.

~~1.4.2.6~~1.4.2.7

~~1.4.2.7~~1.4.2.8 According to Table 3: Flood risk vulnerability and flood zone compatibility of the NPPF, the Transmission Assets and their associated construction activities and enabling works is classified as 'essential infrastructure' and as such is acceptable within Flood Zones 1 and 2. The exception test is required if development is proposed within Flood Zone 3.

Long Term Flood Risk Mapping

~~1.4.2.8~~1.4.2.9 The Environment Agency's Long Term Flood Risk Mapping is available online and includes the Risk of Flooding from Surface Water mapping which was updated in January 2025. This mapping identifies areas at risk of surface water flooding, primarily from pluvial sources and small watercourses. The classification of the chance is based on the following. Note, 'risk' has been amended to 'chance' to align with the March 2025 Environment Agency's Flood Map for Planning.

- High chance: The area has a chance of flooding of greater than 1 in 30 (3.3%) each year.
- Medium chance: The area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%) each year.
- Low chance: The area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%) each year.
- Very low chance: The area has a chance of flooding of less than 1 in 1000 (0.1%) each year.

~~1.4.2.9~~1.4.2.10 The updated mapping also contains future flood map for the annual probability of surface water flooding between 2040 and 2060 which uses the 'central' allowance for the 2050's epoch for risk of flooding from surface water (see **Section ~~1.4.3~~ '1.4.3**'Peak rainfall intensity' for more information).

1.4.3 Climate change

1.4.3.1 As described within **Table 1.7,** The NPPF states that new development should take into account climate change and that appropriate mitigation should be provided to minimise vulnerability and provide resilience to the impacts of climate change.

1.4.3.2 The NPPF and supporting planning practice guidance on flood risk and coastal change require an FRA to demonstrate how flood risk will be managed now and over the development's lifetime, taking climate change into account. In relation to how flood risk will evolve as a result of climate change, impacts to how peak river flows, rainfall intensity and sea level rise is defined and described in this section, and how these impacts could affect the Transmission Assets for its development lifetime.

Peak river flow

1.4.3.3 Peak river flow allowances show the anticipated changes to peak flows within rivers as a result of climate change. In May 2022, the Environment Agency released its latest climate change allowances, which update the 2020 and 2011 version of Adapting to Climate Change: Advice to Flood and Coastal Risk Management. The Environment Agency has used the UKCP18 projections to update the peak river flow allowances and have based them on management catchments instead of river basin districts.

1.4.3.4 The guidance on how to apply peak river flow allowances has also been changed. The following allowances must be used:

- the central allowance for all assessments except for essential infrastructure, where you use the higher central allowance;
- the upper end for 'credible maximum scenario' assessments; and
- the central allowance to calculate flood storage compensation, except for where essential infrastructure is affected, where you use the higher central allowance.

1.4.3.5 The document provides a central, higher and upper estimate for increases in river flow as a consequence of climate change. The Transmission Assets are located across the boundary of two management catchments with differing climate change allowance. These are the Douglas Management Catchment and Ribble Management Catchment, both located within the North West River Basin District.

1.4.3.6 **Table 1.9** presents the anticipated increase in peak river flows for each management catchment.

Table 1.9: Peak river flow allowances by management catchment

Management Catchment	Allowance category	Total potential change anticipated for '2020s' (2015-39)	Total potential change anticipated for '2050s' (2040-2069)	Total potential change anticipated for the '2080s' (2070 - 2115)
Douglas	Upper Estimate	24%	45%	79%
	Higher Central Estimate	15%	26%	47%
	Central Estimate	12%	19%	35%
Ribble	Upper Estimate	27%	44%	71%
	Higher Central Estimate	19%	29%	46%
	Central Estimate	16%	23%	36%

1.4.3.7 The onshore substations are located within the Ribble Management Catchment. To the south of the River Ribble, the wider Transmission Assets Order Limits cross into the Douglas Management Catchment.

1.4.3.8 The construction phase may continue until 2036. The Transmission Assets are classified as 'essential infrastructure' and have been assessed to the 2020's epoch 'higher central' allowance to evaluate uplifts to peak river flow within the study area to the end of the construction phase. This equates to 19% within the Ribble Management Catchment and 15% within the Douglas Management Catchment.

1.4.3.9 During the operational and maintenance phase, the Transmission assets are to be assessed to the 2080's epoch 'higher central' allowance. This equates to 46% within the Ribble Management Catchment and 47% within the Douglas Management Catchment.

1.4.3.10 Several climate change uplift scenarios were provided alongside the Ribble Douglas Model (20%, 30%, 35% and 70%). The 20% uplift for climate change has been used to assess flood risk to the Transmission Assets during construction phase.

1.4.3.11 The impact of peak river flow allowances on flood risk is discussed within **sections 1.5.4**, **1.6.4** and **1.7.4** of the FRA.

Peak rainfall intensity

1.4.3.12 Increased rainfall affects surface water flood risk and how drainage systems need to be designed. In May 2022 the Environment Agency released revised peak rainfall climate change allowances, to also reflect the management catchment geography. The anticipated increases are provided in **Table 1.10**.

Table 1.10: Peak rainfall intensity allowance by Management Catchments

Management Catchment	Allowance category	Total potential change anticipated for 2050s (2022 to 2060)	Total potential change anticipated for 2070s (2061 to 2125)
Douglas	Upper Estimate	40%	45%
	Central Estimate	25%	35%
Ribble	Upper Estimate	40%	50%
	Central Estimate	25%	35%

1.4.3.13 The onshore export cable corridor, onshore substations and 400 kV grid connection cable corridor to the north of the River Ribble are located within the Ribble Management Catchment. The 400 kV grid connection cable corridor cross into the Douglas Management Catchment to the south of the River Ribble.

1.4.3.14 Runoff and attenuation calculations should take into account the above allowance for climate change, which is determined by the lifetime of the development as follows.

- Developments with a lifetime beyond 2100 must assess the upper end allowance for the 2070s epoch. The development should be designed so

that there is no increased flood risk elsewhere and the development is safe from surface water flooding for the upper end allowance in the 1% Annual Exceedance Probability (AEP) event (1 in 100-year rainfall event).

- Developments with a lifetime between 2061 and 2100 should consider the central allowance for the 2070s epoch.
- Developments with a lifetime up to 2060 should consider for the central allowance for the 2050s epoch.

1.4.3.15 The Transmission Assets are to be fully operational by 2036. For the purposes of this assessment, the Transmission Assets are expected to have a 35-year operating lifetime from commencement of operation by 2036.

1.4.3.16 The substations are be located within the Ribble Management Catchment. Therefore, the 2070's 'central' allowance (for developments with a lifetime of between 2061 and 2125) of 35% has been confirmed to be considered to be acceptable by the LPAs.

1.4.3.17 The peak rainfall intensity allowance has been incorporated within the Outline Operational Drainage Management Plan (document reference J10) which is to be secured through requirements of the DCO.

Sea level rise

1.4.3.18 The Environment Agency expect sea level rise to increase over coming decades due to the impacts of climate change and in turn, increase the geographical extents at risk from tidal flooding. **Table 1.11** presents the anticipated sea level rise for given timeframes associated with climate change for the North West River Basin District. There are a range of allowances for each river basin district and epoch for sea level rise.

Table 1.11: Sea level allowances for each epoch in mm for each year (based on a 1981 to 2000 baseline) – the total sea level rise for each epoch is in brackets

Area of England/River Basin District	Allowance category	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
North West	Higher Central	4.5 (158)	7.3 (219)	10 (300)	11.2 (336)	1.01
	Upper End	5.7 (200)	9.9 (297)	14.2 (426)	16.3 (489)	1.41

1.4.3.19 According to the NPPF it is advised that flood risk assessments consider both the higher central and upper end allowances.

1.4.3.20 Based on **Table 1.11** and the upper end allowance, 135.3 mm of sea level rise is projected until 2036, the target year for the start of operation. During the construction of the Transmission Assets, 507.7 mm of sea level rise is projected by 2071.

1.4.3.21 Sea level rise projections have been calculated from 2014 for the Ribble Estuary model (2014) and 2017 by the Environment Agency Coastal Design Sea Levels - Coastal Flood Boundary Extreme Sea Levels (2018) dataset at chainage 1210. These are presented below within **Table 1.12.**

Table 1.12: Cumulative projected sea levels used for each dataset within the FRA

	Cumulative sea level rise (mm)		
	2036	2071	
Ribble Estuary (2014)	135.3	507.7	
Coastal design sea levels (2017)	118.2	490.5	

1.4.3.22 Sea level rise and its impact of flood risk has been taken into consideration within **section 1.5.4**, **section 1.6.4** and **section 1.7.4** of the FRA.

Credible maximum climate change scenario

1.4.3.23 In line with NPS EN-1 guidance, the Applicants should demonstrate proposals can be adapted over the predicted lifetimes to remain resilient to a credible maximum climate change scenario.

1.4.3.24 H++ is the credible maximum scenario for sea level rise to 2100 and informed by including a 1.9m allowance onto the design flood level.

1.4.3.25 The Upper Estimate peak river flow allowance is used as the credible maximum design scenario for fluvial flood risk.

1.4.3.26 Further discussion regarding the H++ assessment is presented within **section 1.5.4**, **section 1.6.4** and **section 1.7.4** of the FRA.

1.4.4 Local planning policy

1.4.4.1 The onshore elements of the Transmission Assets are located within the LPA administrative areas of Fylde Council, Blackpool Council, South Ribble Borough Council and Preston City Council (and Lancashire County Council at the County level).

1.4.4.2 SFRA data from Fylde Coast Authorities (2024) (Blackpool Council, Fylde Council and Wyre Council), Preston City Council, South Ribble Borough Council and Chorley Borough Council (2007) and Blackpool Council (2020) have been included within the assessment and relevant findings are included within the FRAs for the Morgan onshore substation, Morecambe onshore substation and landfall, onshore export cable corridor and 400 kV grid connection cable corridor.

1.4.4.3 The relevant local planning policies applicable to hydrology and flood risk based on the extent of the study area for this assessment are summarised in **Table 1.13** below.

Table 1.13: Summary of local planning policy relevant to this chapter

Policy	Key provisions	How and where considered in the ES
Adopted Fylde Local Plan to 2032 (incorporating Partial Review) (Adopted December 2021) (Fylde Council, 2021)		
Strategic Policy CL1 - Flood Alleviation, Water Quality and Water Efficiency.	Planning decisions should follow the sequential, risk-based approach to the location of development, as required by the NPPF. All new development is required to minimise flood risk impacts on the environment, retain water quality and water efficiency, and mitigate against the likely effects of climate change on present and future generations.	This FRA has been undertaken in line with NPS EN-1, NPPF and PPG ID7. Assessment has been made to all sources of flood risk and includes an allowance for the impacts of climate change to peak river flow, sea level rise and peak rainfall intensities. Mitigation measures (commitments) have been proposed, where required, to ensure flood risk from all sources and vulnerability of site users during the development lifetime is managed and will be secured through the requirements of the DCO. The Outline Operational Drainage Management Plan (document reference J10) is to be secured through requirements of the DCO and has been developed in accordance with the NPS, NPPF, PPG ID7 the SuDS Manual, Sustainable drainage systems: non-statutory technical standards and local council policy. Surface water from impermeable areas within the onshore substations will be attenuated within a basin on-site for up to the 1% AEP storm event plus an allowance for climate change. Flows are to be discharged following the SuDS hierarchy, with discharge to Dow Brook proposed if infiltration testing to be undertaken post-consent deem infiltration based methods of discharge to be unfeasible. Discharge of surface water flows to watercourse are subject to approval by the LPA. The Outline Operational Drainage Management Plan provides information relating to exceedance events of the drainage schemes and also provides information regarding the management and maintenance of SuDS within the onshore substations. The drainage schemes will provide a minor beneficial benefit in regards to surface water flood risk to land downstream of the onshore substations with the restriction of surface water discharge from the site to the 1 in 1-year greenfield runoff rate.
Strategic Policy CL2 - Surface Water Runoff and Sustainable Drainage.	Discharge rates should be agreed as part of any pre-application negotiations between the relevant parties. New development must incorporate the following sequential attenuation measures: • store rainwater for later use; or • the first 5 mm of rainfall should infiltrate. In areas where infiltration rates are slow, e.g. soils with a high proportion of clay, then permeable surfaces may be under-drained. This will have the effect of slowed surface water runoff rates; or • attenuate rainwater in ponds or open features for gradual release into the watercourse; or • attenuate rainwater by storing in tanks or sealed water features for gradual release into a watercourse.	

Policy	Key provisions	How and where considered in the ES
South Ribble Local Plan 2012-2026 (South Ribble Borough Council, 2015)		
Chapter J – Tackling Climate Change.	Core Strategy Objectives. • To reduce energy use and carbon dioxide emissions in new developments. • To encourage the use and generation of energy from renewable and low carbon sources. • To manage flood risk and the impacts of flooding especially adjoining the River Ribble. • To reduce water usage, protect and enhance water resources and minimise pollution of water, air and soil.	This FRA has been undertaken in line with NPS EN-1, NPPF and PPG ID7. Assessment has been made to all sources of flood risk and includes an allowance for the impacts of climate change to peak river flow, sea level rise and peak rainfall intensities. Commitments have been proposed to reduce flood risk and vulnerability to flooding during the construction, operation and maintenance and decommissioning periods and are to be secured through requirements of the DCO. Commitments are presented within **section 1.8** and **Table 1.44**. A WFD surface water and groundwater assessment has been undertaken and is presented within Volume 3, Annex 2.1: Water Framework Directive surface and groundwater assessment of the ES. The assessment takes into account the requirements of the river basin management plan and WFD to ensure all potential impacts on the water environment are mitigated to within acceptable levels.
Central Lancashire Adopted Core Strategy (South Ribble, Preston and Chorley LPAs) – adopted July 2012		
Policy 29 - Water Management.	Improve water quality, water management and reduce the risk of flooding by. • Minimising the use of potable mains water in new developments. • Working with the regional water company and other partners to promote investment in sewage water treatment works to reduce the risk of river pollution from sewage discharges. • Working with farmers to reduce runoff polluted with agricultural residues into watercourses. • Appraising, managing and reducing flood risk in all new developments, avoiding inappropriate development in flood risk areas particularly in Croston, Penwortham, Walton-le-Dale and south west Preston. • Pursuing opportunities to improve the sewer infrastructure, particularly in Grimsargh, Walton-le-Dale and Euxton, due to the risk of sewer flooding.	This FRA has been undertaken in line with NPS EN-1, NPPF and PPG ID7. Assessment has been made to all sources of flood risk and includes an allowance for the impacts of climate change to peak river flow, sea level rise and peak rainfall intensities. Commitments have been proposed to reduce flood risk and vulnerability to flooding during the construction, operation and maintenance and decommissioning periods through requirements of the DCO. Commitments are presented within **section 1.8** and **Table 1.44**. For aspects of the Transmission Assets which are located Flood Zone 2 and 3 (Flood Zones 3a and 3b) during construction, the measures included in **Table 1.44** will be implemented to reduce vulnerability of site users. Negligible above ground development will occur as a result of the installation of the landfall, onshore export cable

Policy	Key provisions	How and where considered in the ES
	• Managing the capacity and timing of development to avoid exceeding sewer infrastructure capacity. • Encouraging the adoption of Sustainable Drainage Systems. • Seeking to maximise the potential of Green Infrastructure to contribute to flood relief.	corridor and 400 kV grid connection cable corridor. As a result, no floodplain compensation is required as part of the Transmission Assets. Drainage strategies for the onshore substations are detailed in Outline Operational Drainage Management Plan (document reference J10) and include provisions for SuDS in the form of an attenuation basin to enable a greenfield surface water discharge rate from both onshore substations.
Blackpool Local Plan Core Strategy (2012 – 2027) Adopted January 2016		
Policy CS9: Water Management	To reduce flood risk, manage the impacts of flooding and mitigate the effects of climate change, all new development must: a) Be directed away from areas at risk of flooding, through the application of the Sequential Test and where necessary the Exception Test, taking account of all sources of flooding; b) Incorporate appropriate mitigation and resilience measures to minimise the risk and impact of flooding from all sources; c) Incorporate appropriate Sustainable Drainage Systems (SuDS) where surface water run-off will be generated; d) Where appropriate, not discharge surface water into the existing combined sewer network. If unavoidable, development must reduce the volume of surface water run-off discharging from the existing site in to the combined sewer system by as much as is reasonably practicable; e) Make efficient use of water resources; and f) Not cause a deterioration of water quality. Where appropriate, the retro-fitting of SuDS will be supported in locations that generate surface water run-off.	This FRA has been undertaken in line with NPS EN-1, NPPF and PPG ID7. Assessment has been made to all sources of flood risk and includes an allowance for the impacts of climate change to peak river flow, sea level rise and peak rainfall intensities. The site selection process is detailed within Volume 1, Chapter 4: Site selection and consideration of alternatives of the ES. Development has been steered towards areas of lowest flood risk, including Flood Zone 1, with onshore substation development platforms assessed to have a low risk of flooding. The Transmission Assets are partially located within Flood Zone 3 (including Flood Zones 3a and 3b) and have been subjected to the sequential test (**section 1.9.2**) and the exception test (**section 1.9.3**). Commitments have been proposed to reduce flood risk and vulnerability to flooding during the construction, operation and maintenance and decommissioning periods and are to be secured through requirements of the DCO. Commitments are presented within **section 1.8.1** and **Table 1.44.** For aspects of the Transmission Assets which are located Flood Zone 2 and 3 (Flood Zones 3a and 3b) during construction, the measures included in **Table 1.44** will be implemented to reduce vulnerability of site users. Negligible above ground development will occur as a result of the installation of the landfall, onshore export cable

Policy	Key provisions	How and where considered in the ES
		corridor and 400 kV grid connection cable corridor. As a result, no floodplain compensation is required as part of the Transmission Assets. Drainage strategies for the onshore substations are detailed in Outline Operational Drainage Management Plan (document reference J10) and include provisions for SuDS in the form of an attenuation basin to enable a greenfield surface water discharge rate from both onshore substations.
Policy D M31: Surface Water Management	Surface water from development sites will be discharged via the most sustainable drainage option available. The discharge of surface water should be in line with the following order of priority, in accordance with National Planning Practice Guidance: a) into the ground (infiltration); b) to a surface water body; c) to a surface water sewer, highway drain, or another drainage system; d) to a combined sewer. On greenfield sites applicants will be required to demonstrate that the current natural discharge rate is replicated as a minimum. The starting point for this will be a maximum greenfield run-off rate for greenfield sites. On previously developed sites applicants should target a reduction from pre-existing discharges of surface water to a target of greenfield rates and volumes so far as reasonably practicable, with a starting point of a maximum of a 30% reduction in run-off rates. In critical drainage areas the greenfield standard will be expected, with a minimum of a 50% reduction in run-off rates. All new development should: a) include the use of sustainable drainage systems, unless demonstrated to be inappropriate; and b) reduce areas of existing impermeable surfaces. Approved development proposals will be required to be supplemented by appropriate maintenance and management regimes for surface water drainage schemes	There is no permanent above ground development proposed within the Blackpool Council boundary and as such this policy is noted but not required to be adhered within the Transmission Assets FRA.

Policy	Key provisions	How and where considered in the ES
Policy D M33: Coast and Foreshore	Development proposals will be supported which secure further improvements to bathing water quality or flood protection. Development proposals that would adversely affect the appearance, integrity or environmental quality of the beach and foreshore will be resisted.	The WFD coastal waters assessment has considered the different activities associated with the Transmission Assets in the context of the environmental objectives of any affected WFD surface water body. This has considered the potential impact on WFD transitional and coastal receptors (see Volume 2, Annex 2.2: Water Framework Directive coastal waters assessment of the ES).
Policy D M36: Controlling Pollution and Contamination	Development will be permitted where in isolation or in conjunction with other planned or committed developments it can be demonstrated that the development: a) Will be compatible with adjacent existing uses and would not lead to unacceptable adverse effects on health, amenity, safety and the operation of surrounding uses and for occupants, users of the development itself or designated sites of importance for biodiversity, with reference to noise, vibration, odour, light, dust, other pollution or nuisance. Applications will be required to be accompanied, where appropriate by relevant impact assessments and mitigation proposals; b) In the case of previously developed, other potentially contaminated or unstable land, a land remediation scheme can be secured which will ensure that the land is remediated to a standard which provides a safe environment for occupants and users and does not displace contamination; c) Will not give rise to a deterioration of air quality in the defined Air Quality Management Area in Blackpool Town Centre or result in the declaration of a new AQMA. Where appropriate an air quality impact assessment will be required to support development proposals; d) Where development will result in, or contribute to, a deterioration in air quality, permission will only be granted where any such harm caused is significantly and demonstrably outweighed by other planning considerations and appropriate mitigation measures are provided to minimise any such harm. e) Will not pose a risk of pollution to controlled waters (surface or ground	This FRA has been undertaken in line with NPS EN-1, NPPF and PPG ID7. Assessment has been made to all sources of flood risk and includes an allowance for the impacts of climate change to peak river flow, sea level rise and peak rainfall intensities. Commitments have been proposed to reduce flood risk and vulnerability to flooding during the construction, operation and maintenance and decommissioning periods and are to be secured through requirements of the DCO. Commitments are presented within **section 1.8.1** and **Table 1.44**. A WFD surface water and groundwater assessment has been undertaken and is presented within Volume 3, Annex 2.1: Water Framework Directive surface and groundwater assessment of the ES. The assessment takes into account the requirements of the river basin management plan and WFD to ensure all potential impacts on the water environment are mitigated to within acceptable levels. As part of the outline Code of Construction Practice (document reference J1) an Outline Pollution Prevention Plan (document reference J1.4) and Outline Spillage and Emergency Response Plan (document reference J1.8) have been prepared and are to be secured through requirements of the DCO. The documents provide information regarding measures to be implemented to prevent pollution to waterbodies and emergency procedures to be taken if a spillage or contamination incident were to occur.

Policy	Key provisions	How and where considered in the ES
	water) and will, where required, include mitigation and/or remediation to prevent any unacceptable levels of water pollution. Proposals for the development of hazardous installations/pipelines, modifications to existing sites, or development in the vicinity of hazardous installations or pipelines, will be permitted where it has been demonstrated that the amount, type and location of hazardous substances would not pose unacceptable health and/or safety risks.	
Lancashire County Council		
OWC1: Application Validation Policy	An application for Ordinary Watercourse consent will be valid once the correct fee and the minimum information stated in the validation checklist (applicable at the time of application) for Ordinary Watercourse consent has been submitted in writing and considered valid by the Lead Local Flood Authority.	It should be noted that this development is exempt from applying for Ordinary Watercourse consent from the county council as the legislation that requires ordinary watercourse consents is being disapplied such that separate consents are not required. Instead, approvals will be managed through the protective provisions set out within the DCO. These are included in the draft DCO provided as part of the application (document reference C1) and will be updated post submission further to conversation with the LLFA. Notwithstanding, assessment of the impacts of contaminated runoff on the quality of surface waters and ground receptors is presented within Volume 3, Chapter 2: Hydrology and flood risk of the ES. The assessment of the impact of increased flood risk arising from additional surface water runoff is presented within Volume 3, Chapter 2: Hydrology and flood risk of the ES.
OWC2: Modification Hierarchy Policy	Applicants should avoid crossing, diverting and/or culverting an Ordinary Watercourse. Where, in the opinion of the Lead Local Flood Authority, this cannot be avoided consent applications must include evidence, as specified by the Lead Local Flood Authority, as to why any specific level of the hierarchy below cannot be met and why the level(s) higher up the hierarchy cannot be utilised. Without this your application may be refused. 1. Where an existing culverted Ordinary Watercourse exists, it is reopened (daylighted); 2. Installation of a clear span bridge over an open Ordinary Watercourse; 3. Installation of another type of bridge, or diversion of an open Ordinary Watercourse and habitat amenity approved, or installation of or alteration to an existing crossing; 4. Installation of a gravity culvert; 5. Installation of a siphon/sag culvert.	
OWC3: Culvert and Screen Policy	The Lead Local Flood Authority may refuse a consent application to culvert an open section of an Ordinary Watercourse if evidence fails to demonstrate that: 1. The modification hierarchy in policy OWC2 has been applied and a culvert is justified; and,	

Policy	Key provisions	How and where considered in the ES
	2. the size of the culvert is based on a hydraulic assessment of the contributing catchment and the culvert should be no smaller than 450mm diameter or 500mm wide x 450mm high box; and, 3. the necessity of any screen(s) as evidenced by an accepted Screen Risk Assessment; and, 4. mitigation measures are incorporated as necessary and conditioned by the Lead Local Flood Authority.	
OWC4: Water and Environmental Management Policy	The Lead Local Flood Authority will usually refuse a consent application if evidence fails to demonstrate that: 1. the proposed works will not increase the risk of flooding in the design standard, taking into account the effects of climate change, through the introduction of a new structure or modification of an existing structure; and, 2. any residual risk can be safely managed through overland flow routes and floodplain storage which minimises the risk of flooding in the event of a blockage or exceedance event; and, 3. the proposals will not increase the risk of scour to the bed and banks of the Ordinary Watercourse demonstrated through an accepted Scour Risk Assessment; and, 4. where necessary, proposals have been designed to include appropriate mitigation to avoid barriers to fish and/or mammal passage; and, 5. the proposals will preserve and where possible improve the water quality and ecological status of the Ordinary Watercourse, demonstrated through an accepted Water Framework Directive Assessment. Where applicable, Ordinary Watercourse consent applications must also be accompanied by an accepted Habitat Regulations Assessment to demonstrate compliance with the Conservation of Habitats and Species Regulations. Mitigation measures to satisfy this policy may be conditioned by the Lead Local Flood Authority.	
OWC5: Inspection, Operation and Maintenance Policy	The Lead Local Flood Authority will usually refuse a consent application if the applicant fails to demonstrate that appropriate inspection, operational and maintenance arrangements are in place for the lifetime of each structure	

Policy	Key provisions	How and where considered in the ES
OWC6: Enforcement Prioritisation Policy	Lancashire County Council, upon notification of an issue in connection with an Ordinary Watercourse, may use its powers under Sections 21, 24 and 25 of the Land Drainage Act 1991 (as amended) to take enforcement action on Ordinary Watercourses where: 1. flood risk is increased AND 2. that failure to comply with an obligation, prohibition or impediment may cause harm to a receptor as defined in the policy document.	

Strategic Flood Risk Assessments

1.4.4.4 The SFRA is a high-level document produced by LPAs to assess flood risk at a borough-wide scale for the present day and future, by accounting for the impacts of climate change. The following SFRAs have been referenced throughout this FRA report:

- CL SFRA (2007); and
- Fylde Coast Authorities SFRA (2024) and).
- ~~Blackpool Council SFRA (2020).~~

1.4.4.5 It is noted only the Fylde Coast Authorities SFRA is relevant to the Morgan and Morecambe onshore substations.

Local Flood Risk Management Strategy

1.4.4.6 Lancashire County Council produced a Local Flood Risk Management Strategy in 2021. The Local Flood Risk Management Strategy outlines the aims and objectives of the Council as the LLFA up to 2027 and beyond. Several objectives are provided as part of the Local Flood Risk Management Strategy, including improving the level of coastal protection offered by sand dunes at Lytham St Annes in which landfall is made.

Coastal Strategy

1.4.4.7 The Fylde Council Costal Strategy was produced in 2015 and provides a vision for the regeneration of the council's coastline which runs from Starr Gate to Savick Brook.

Asset Register

1.4.4.8 Lancashire County Council produced register of flood risk assets within the county council's boundary. The asset register is regularly updated, with last updated noted in August 2024.

Shoreline Management Plan

1.4.4.9 Shoreline Management Plans help to deliver the ambitions of the National Flood and Coastal Erosion Risk Management Strategy. They set out a planned approach to managing flood and coastal erosion risk around the coast of England to 2105.

1.4.4.10 The study area is located within the Shoreline Management Plan 2 Great Ormes Head to Scotland sub cell 11B 1: *'Ribble Estuary and 2: St Annes to Rossall Points'*. Policy units boundaries are set based on analysis of coastal processes and the character of the shoreline. Relevant policy units to the study area are listed below within **Table 1.14**.

Table 1.14: SMP management approaches within the study area

		Policy and approach		
Policy unit	**Policy name**	**2005 – 2025**	**2025 – 2055**	**2055 – 2105**
11B2.2	Squires Gate to Blackpool Tower'	Hold the line Maintain/replace	Hold the line Maintain/replace	Hold the line Maintain/replace
11B2.1	St Annes (northern boundary) to Squires Gate	Managed realignment Natural features	Hold the line Natural features	Hold the line Natural features
11B1.21	St Anne's Pier to Annes' Northern Boundary	Hold the line Natural features	Hold the line Natural features	Hold the line Natural features
11B1.12	Penwortham Bridge to Freckleton Marsh (West end of sewage works)	Hold the line Maintain/replace	Hold the line Maintain/replace	Hold the line Maintain/replace
11B1.10	Hutton Marsh to Penwortham Golf Course	Hold the line Maintain/replace	Managed realignment Set back defence	Hold the line Maintain/replace

1.4.4.11 Landfall is located within SMP unit 11B2.1. The generic approach assigned to this unit is to maintain flood risk management performance of the natural features of sand dunes by reducing wave action via the Fylde Sand Dunes Project. The Fylde Sand Dunes Project is a partnership between Fylde Council, Blackpool Council and The Wildlife Trust for Lancashire, Manchester and North Merseyside and is funded by the Environment Agency until 2027 (Lancashire Manchester and North Merseyside Wildlife Trust 2024).

1.4.4.12 The 400 kV grid connection cable corridor are located within SMP unit 11B1.12 and 11B1.10. The generic approach assigned to these units is to retain a flood defence along the current alignment where protection is currently provided. During 2025 – 2055, a managed realignment of flood defence set back is intended for 11B1.10. A planned action for the establishment for funding plan by the Environment Agency is currently proposed (reference 11b_1_0.17).

1.5 Morgan onshore substation site flood risk assessment

1.5.1 Baseline conditions

Location

1.5.1.1 The Morgan substation site is located between Kirkham and Freckleton, to the south of the A583 Kirkham Bypass and west of Newton-with-Scales. Lower Lane, Greenbank Farm and Freshfield Farm are located to the west of the site.

1.5.1.2 The location of the Morgan substation site is presented on **Figure 1.1**.

Topography

1.5.1.3 The Morgan onshore substation site boundary is approximately 20 m above ordnance datum (AOD) in the western extent of the site and falls to approximately 9 m AOD in the eastern extent of the site. The local topography within the 1 km study area of the Morgan substation site generally falls towards Dow Brook, located to the east of the site.

Existing use

1.5.1.4 The Morgan onshore substation site currently comprises agricultural fields, with field margins delineated by mature trees and hedgerows. Public bridleway BW0505016 is located adjacent to the western boundary of the Morgan substation site, running north to south. Two ordinary watercourses, tributaries of Dow Brook are noted to bisect the northern extent of the site where the temporary and permanent access is proposed, conveying flow to the east. Several ponds are also noted to be present across the Morgan substation site.

1.5.1.5 The 1 km study area associated with the Morgan onshore substation site includes predominantly agricultural land use, with residential areas located to the west, east and to the north. Carr Hill High School and Sixth Form Centre is located in the northern extent of the study area. His Majesty's Prison (HMP) Kirkham and a solar array are located within the western part of the study area. Several additional ponds and agricultural reservoirs are also present.

Proposed use

1.5.1.6 The maximum design scenario (MDS) relevant to the Morgan onshore substation FRA is presented within **Table 1.15.** Additional information is provided within Volume 1, Chapter 3: Project description of the ES.

Table 1.15: Morgan onshore substation MDS

Substation compounds/buildings	Morgan MDS
Permanent development	
Area of permanent footprint (m^2) including attenuation pond/ditch, access and landscaping.	164,000
Area of permanent LSS footprint (m^2) excluding attenuation area and landscaping	80,000
Area of platform Type 1 stone (m^2)	72,600
Area of permanent attenuation (m^2)	8,000
Area of main building (m^2)	3,600
Area of secondary buildings (m^2)	11,000
Permanent access track width with drainage and potential services (m)	15
Information on operational activities	Unmanned substation; continuously monitoring remotely. operational and maintenance staff visiting to undertake preventative and corrective works on a regular basis.
Temporary development	
Substation temporary construction compound (m^2)	70,000
Substation temporary construction compound asphalt surface area (m^2)	5,000
Substation temporary construction compound hardstanding area (m^2)	58,000
Area of asphalt surface with substation compound (m2)	7,400
Temporary access width (including passing places) (m)	20
Construction duration (months)	30

1.5.1.7 The permanent and temporary access tracks to the Morgan onshore substation site are taken via Kirkham Bypass, to the north and west of the temporary construction compounds.

1.5.1.8 The drainage strategy for the Morgan onshore substation are presented within the Outline Operational Drainage Management Plan (document reference J10) and is to be secured through requirements of the DCO.

Decommissioning

1.5.1.9 The design life for the onshore substations will exceed 35 years. The case for decommissioning the onshore substations in the event of the Generation Assets being decommissioned will be reviewed in discussion with the transmission system operator and any relevant regulators in the light of any other existing or proposed future use of the onshore substations.

1.5.1.10 Activities associated with decommissioning will operate within the parameters of those established for construction. If complete decommissioning takes

place, then all the electrical infrastructure will be removed, and any waste arising disposed of in accordance with relevant regulations and where applicable any legislative requirements at the time. Foundations will be broken up and the site reinstated, or alternately repurposed for another use. Where alternate uses may be explored, these may be subject to additional relevant consents and licenses at the time. For the purposes of EIA, decommissioning of the onshore substations is assumed to be similar to the construction and in reverse sequence.

1.5.1.11 An Onshore Decommissioning Plan (see **Section 1.8, Table 1.44**) will be developed prior to decommissioning in a timely manner. The Onshore Decommissioning Plan will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The Onshore Decommissioning Plan will be in line with the latest relevant available guidance.

1.5.2 Hydrological overview

1.5.2.1 A 1 km study area was selected for the Morgan onshore substation site to identify any potential receptors that might be affected in relation to flood risk by the substation. The 1 km study area is considered an appropriate study area to identify changes in flood risk in the surrounding area. Watercourses within the study area are presented within **Figure 1.2**.

1.5.2.2 Two ordinary watercourses are shown on OS mapping to flow across the permanent and temporary access tracks of the Morgan onshore substation. Watercourses are shown to outfall to the Dow Brook, an Environment Agency designated Main River. Dow Brook is located approximately 150 m to the east of the permanent Morgan onshore substation and conveys flows in a southerly direction. Numerous pond features are also shown to be located within the extent of the permanent Morgan onshore substation.

1.5.2.3 The 1 km study area includes multiple ponds and ordinary watercourses which eventually discharge to Dow Brook.

Flood defences

1.5.2.4 The Environment Agency spatial flood defences (including standardised attributes) mapping is presented within **Figure** 1.2 and shows flood defences classified as ‘natural high ground’ are present along the banks of the Dow Brook. Information regarding flood defences is presented within **Table 1.6** below.

1.5.2.5 Flood defences are also present within the 1 km study area and are associated with Dow Brook and consist of naturally high ground, providing an average 50-year standard of protection.

Table 1.16: Flood defences within the Morgan onshore substation

FRMS code	Asset id	Asset type	Asset maintainer	Current condition	Design standard of protection
FR/09/S124	109300	Natural High Ground	Unknown	unknown	70 years
FR/09/S124	109299	Natural High Ground	Unknown	unknown	70 years
FR/09/S124	64629	Natural High Ground	Unknown	unknown	70 years
FR/09/S124	66597	Natural High Ground	Unknown	unknown	70 years
FR/09/S124	89411	Natural High Ground	Unknown	unknown	50 years
FR/09/S124	93616	Natural High Ground	Unknown	unknown	50 years

1.5.2.6 The Lancashire County Council asset register lists several flood risk assets within the county council's boundary. No assets specifically for flood defence were recorded within Morgan onshore substation or 1km study area.

Flood warning/flood alert

1.5.2.7 The Environment Agency Flood Warning Service operates in areas at risk of flooding from rivers, sea and groundwater. In order to communicate the risk of flooding and actions to take, the Environment Agency classifies geographical areas at risk of flooding into Flood Alerts and Flood Warnings.

1.5.2.8 A Flood Alert Area is where it is possible for flooding of low-lying land and roads to occur from rivers and sea and in some locations, groundwater. The eastern extent of the Morgan onshore substation site is located within the Lower River Wyre Flood Alert Area 012WAFLW.

1.5.2.9 Flood Warning Areas are where the Environment Agency expects flooding to occur (e.g., a floodplain) and provide a Flood Warning Service to communicate flood risk and evacuation information to the local community within the Flood Warning Area. The 1 km study area is also located within the Ribble Estuary west of Preston Flood Alert Area and Flood Warning Area 012WATRE.

1.5.2.10 Flood warnings and flood alerts are presented within **Figure 1.3**.

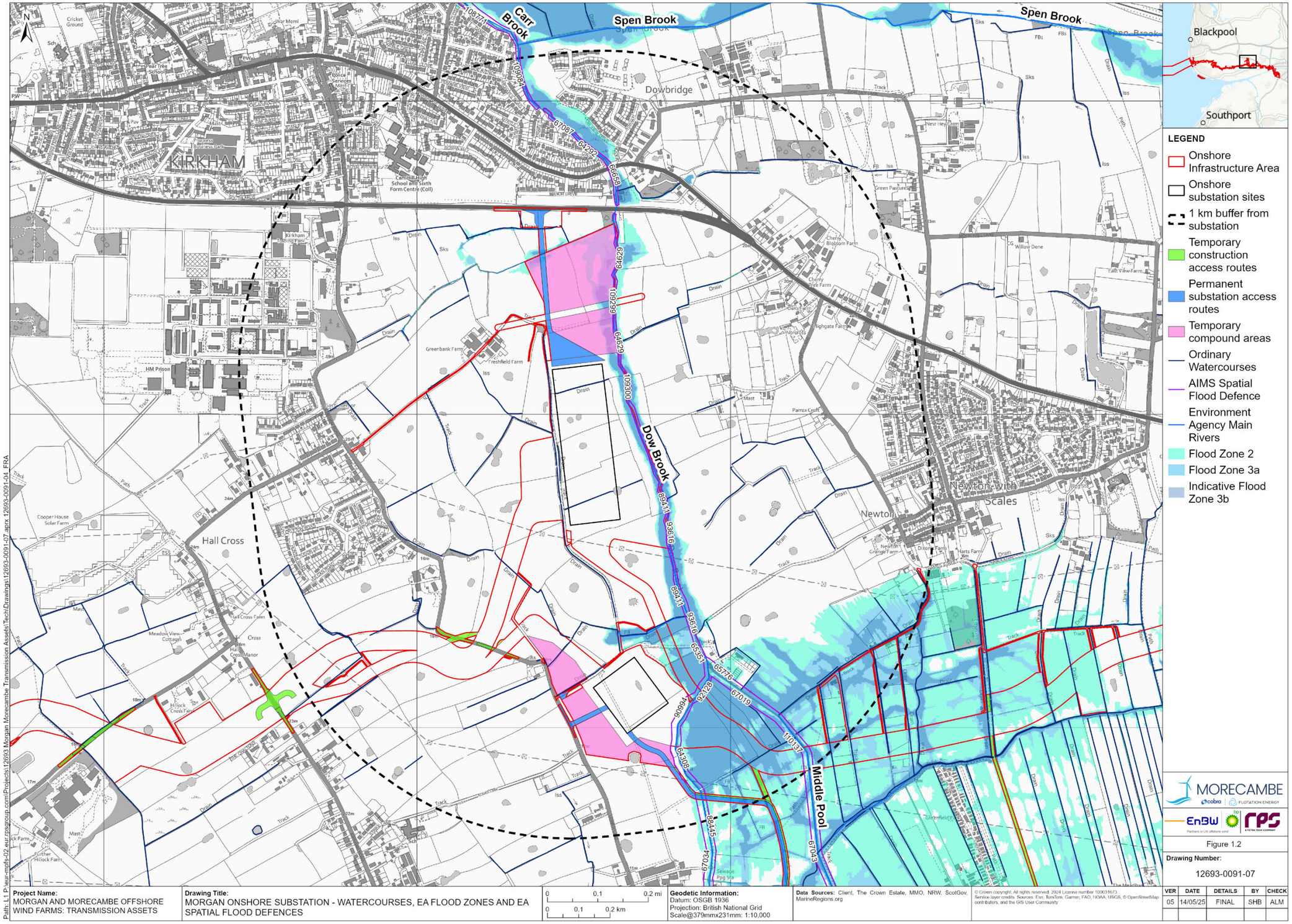


Figure 1.2:- Morgan onshore substation - Watercourses, EA Flood Zones and EA Spatial Flood Defences

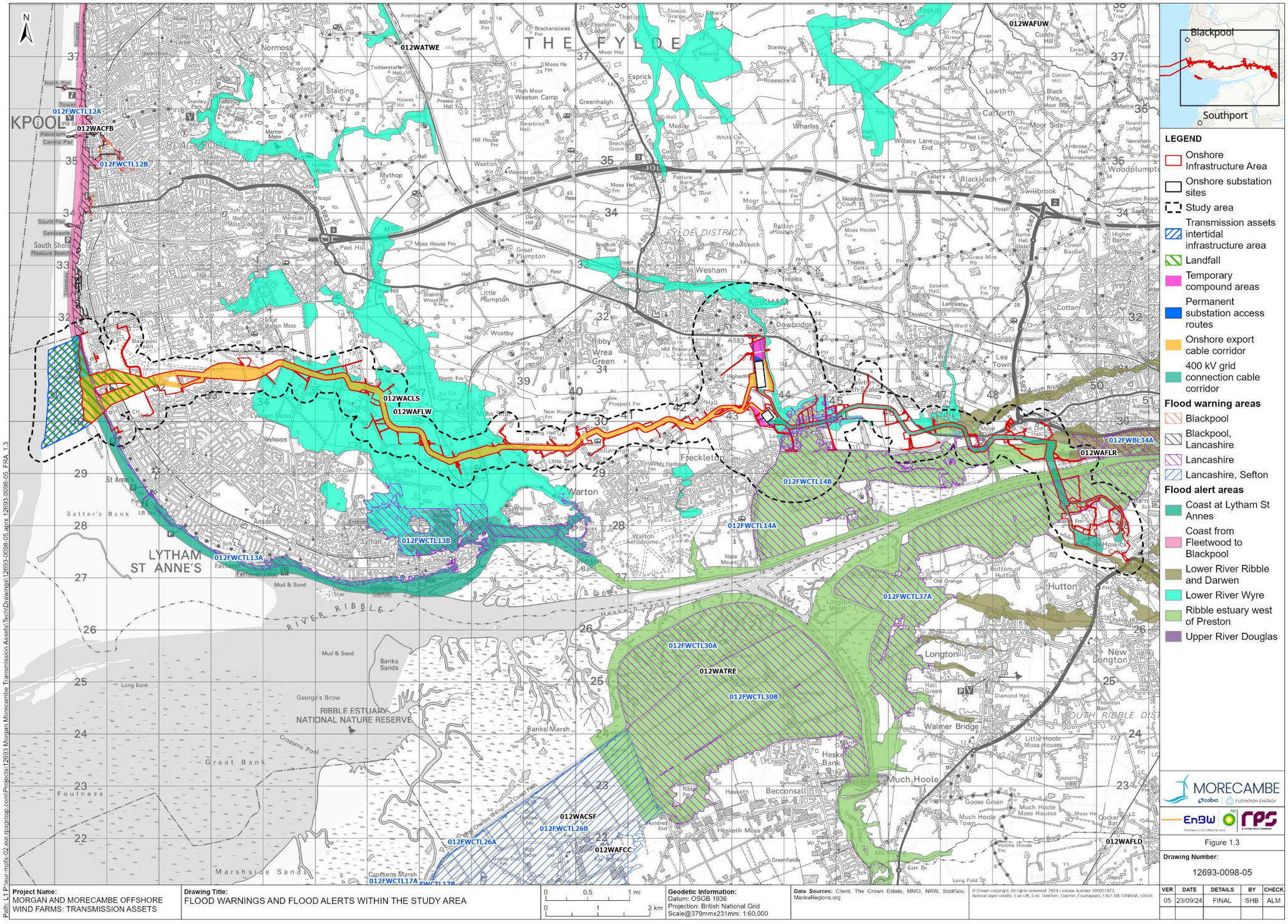


Figure 1.3: Flood ~~warnings~~Warning and ~~flood alerts in~~Flood Alerts within the study area

1.5.3 Hydrogeological overview

Geological setting

1.5.3.1 The permanent Morgan onshore substation site is underlain by Devensian till (diamicton). The temporary and permanent access tracks to the Morgan onshore substation and temporary substation area are also underlain by head (clay, silt, sand and gravel) and tidal flat deposits (silt, clay and sand).

1.5.3.2 The surrounding 1 km study area is predominantly underlain by Devensian Till (diamicton). Extents within proximity to Dow Brook are underlain by tidal flat deposits (silt, clay and sand), and limited extents of head (clay, silt, sand and gravel) and Devensian glaciofluvial ice contact deposits (gravel, sand and silt) are also present. Superficial deposits within the study area are presented within **Figure 1.4.**

1.5.3.3 The BGS Geology of Britain bedrock mapping (1:50,000 scale) indicates the entirety of the Morgan substation site and majority of the associated 1 km study area are underlain by Breckells Mudstone Member (mudstone). A marginal area of Sherwood Sandstone Group (sandstone) is present within the south western part of the study area. Bedrock geology within the study area is presented within **Figure 1.5**.

1.5.3.4 The geological setting is discussed in further detail within Volume 3, Chapter 1: Geology, hydrogeology and ground conditions of the ES.

Groundwater

1.5.3.5 The BGS Geology of Britain mapping shows there are no non-classified borehole log datasets available within the Morgan substation site.

1.5.3.6 A BGS borehole record reference SD42NW47 located 880 m to the south of the site is present within the southern extent of the 1 km study area and encountered groundwater at 3 m below ground level.

Aquifer designation

1.5.3.7 Bedrock Geology Aquifer Designation mapping indicates mudstones of the Breckells Mudstone Member are designated as a Secondary B aquifer. These are predominantly lower permeability layers which may store and yield limited amounts of groundwater. Sherwood sandstone group (sandstone) is classified as a principal aquifer; permeable geology able to provide a high level of water storage and able to support water supply and/or river base flow on a strategic scale.

1.5.3.8 Superficial Deposits Aquifer Designation mapping indicates extents of blown sand deposits within the 1 km study area comprise Secondary A aquifers (formations of permeable layers capable of supporting water supplies at a local scale, in some cases forming an important source of base flow to rivers). Secondary (Undifferentiated) aquifers (i.e., rock considered to have variable and insignificant contributions to water resources and river base flows) reflect the distribution of superficial deposits with low permeability such as glacial till and tidal flat deposits.

1.5.3.9 Additional detail can be found within Volume 3, Chapter 1: Geology, hydrogeology and ground conditions of the ES.

Source protection zone

1.5.3.10 The entirety of Morgan onshore substation site and the associated 1 km study area is located outside of any Source Protection Zone (SPZ). SPZs within the study area are presented within **Figure 1.6**.

Soils classification

1.5.3.11 The National Soils Research Institute Soilscapes viewer classifies soils underlying the eastern extent of the Morgan onshore substation site to be '*slightly acid loamy and clayey soils with impeded drainage*'. Soils within the western extent of the substation are classified as '*slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils*'.

1.5.3.12 The surrounding 1 km study area also includes *'slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils'* soils within the south west and 'loamy and clayey soils of coastal flats with naturally high groundwater' within the south east.

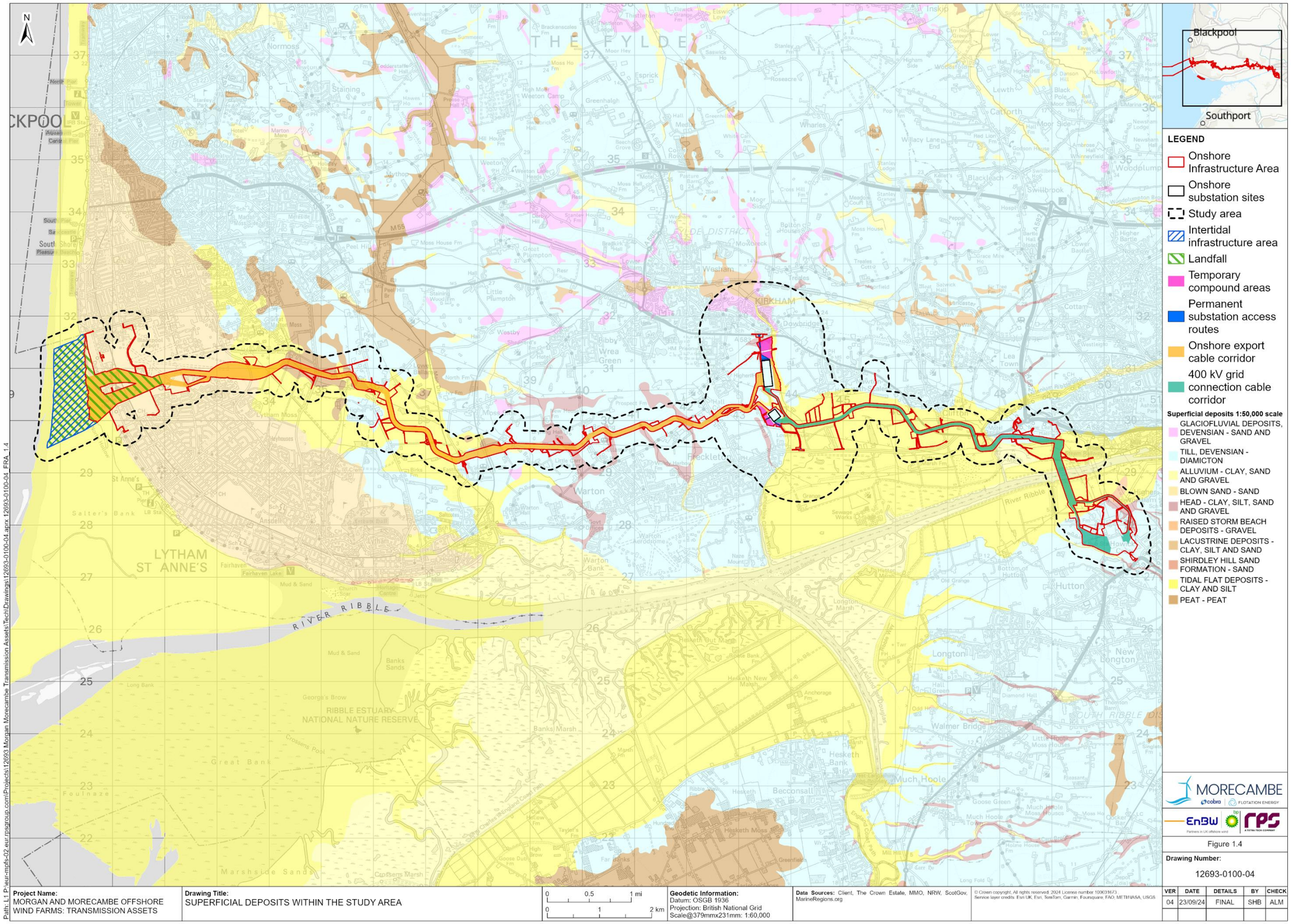


Figure 1.4: Superficial deposits within the study area

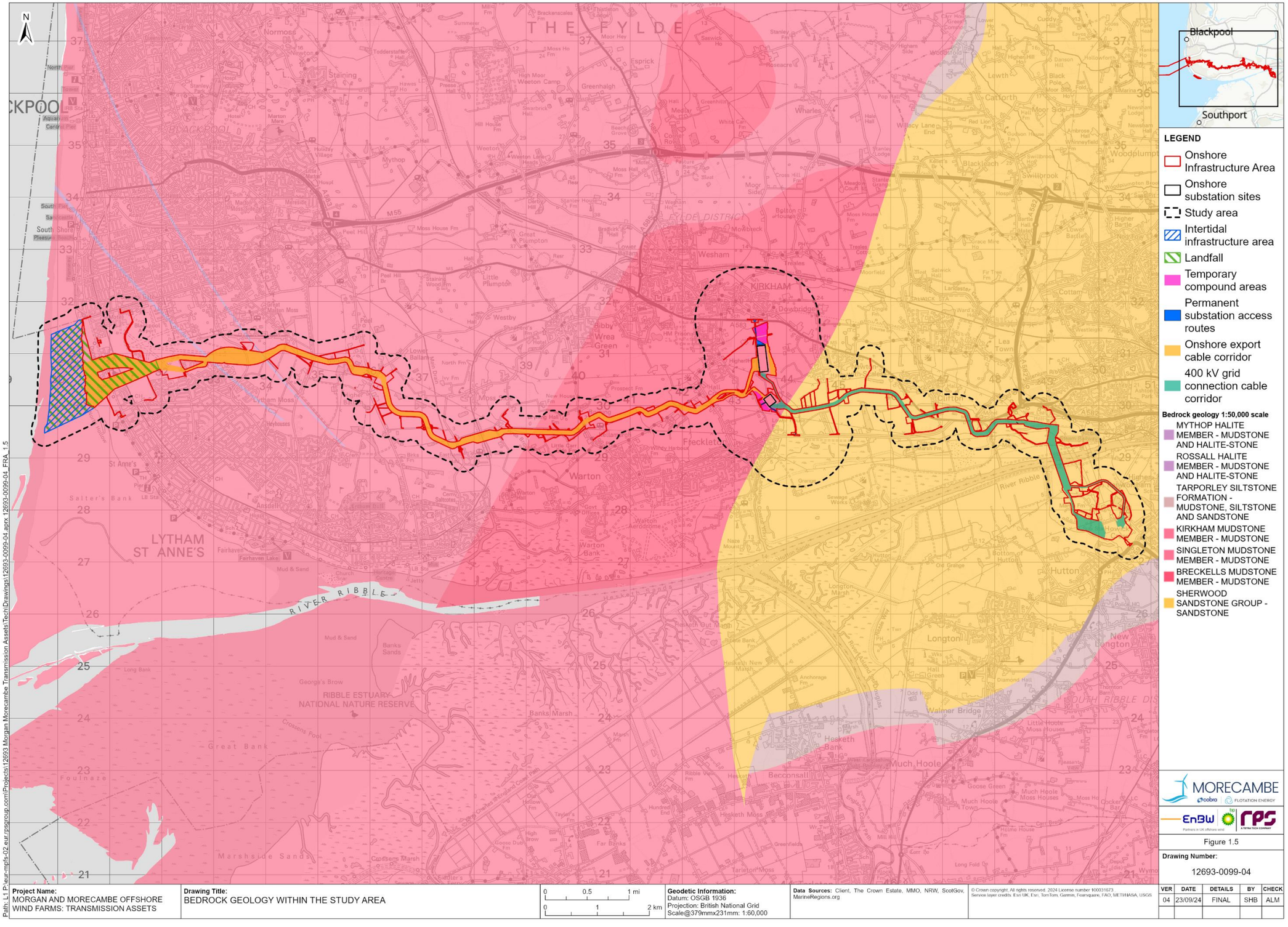


Figure 1.5: Bedrock geology within the study area

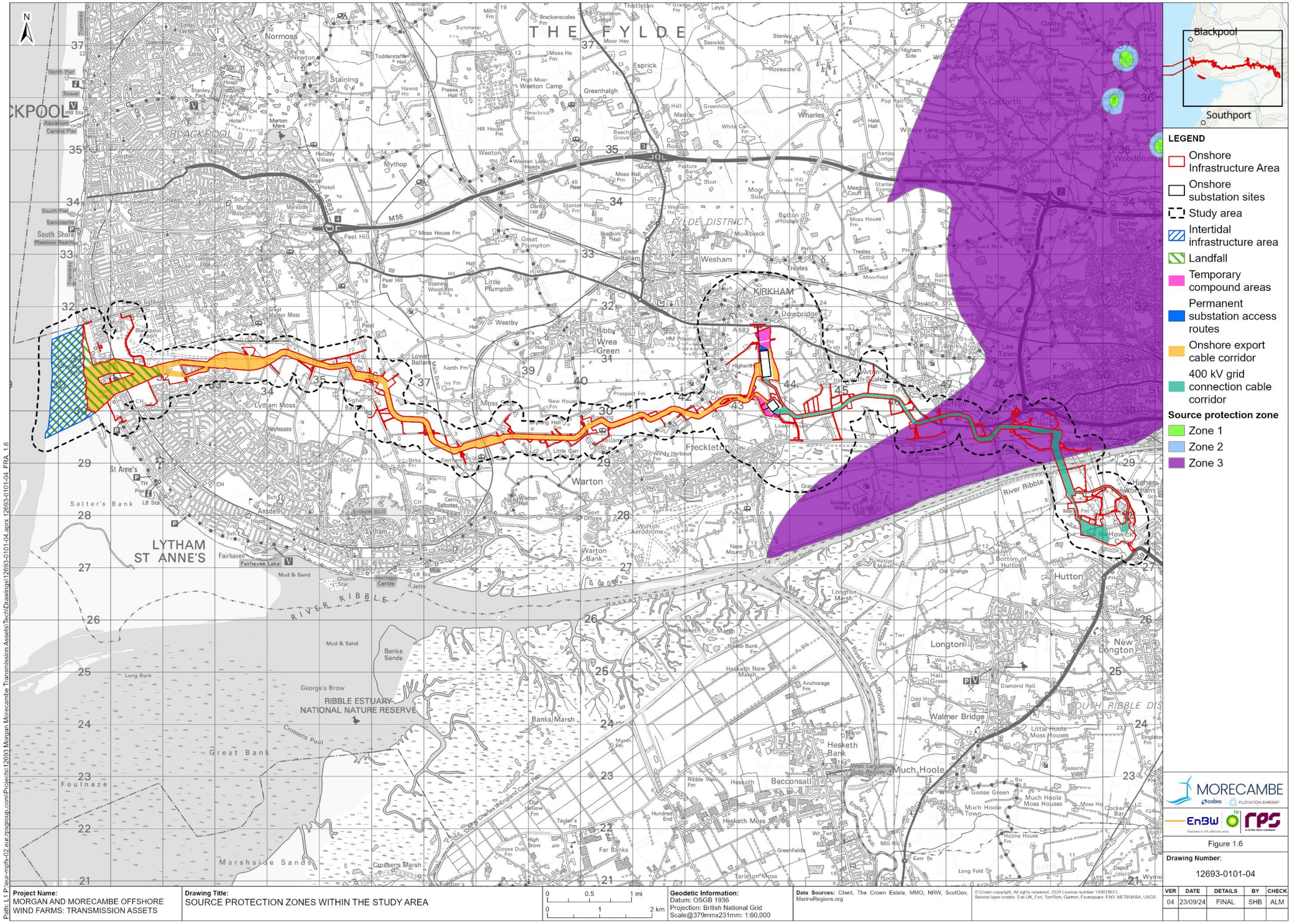


Figure 1.6: Source protection zones within the study area

1.5.4 Fluvial and tidal flood risk

Flood Map for Planning

1.5.4.1 The Flood Map for Planning was updated by the EA in March 2025 and contains Environment Agency Flood Zones that refer to the probability of flooding from rivers and sea in a given year, assuming no defences (as presented within **Table 1.8**) are in place. Mapping does not account for climate change. A figure demonstrating Environment Agency Flood Zones in relation to Morgan onshore substation is presented within **Figure 1.2**. Land not included within hatching associated with Flood Zone 2 and 3 is considered to be Flood Zone 1.

1.5.4.2 The Environment Agency Flood Map for Planning, as illustrated in **Figure 1.2** shows that infrastructure associated with the permanent Morgan onshore substation, including surface water attenuation features are located within Flood Zone 1. The temporary and permanent access tracks and construction compounds are located within Flood Zones 1, 2 and 3.

1.5.4.3 Throughout the 1 km study area, land immediately adjacent to the Dow Brook is located within Flood Zones 2 and 3. Land is assessed to have a low to high risk of flooding from fluvial and tidal sources.

Delineation of Flood Zone 3a and 3b

1.5.4.4 The ~~delineation between~~ extent of Flood Zone ~~3a and~~ 3b has been ~~undertaken via~~ascertained from the ~~use of the 'River and Sea~~3.3% AEP extent from with ~~Defences' dataset which~~the Ribble Estuary (2014) hydraulic model and the 4% AEP extent from the Ribble Douglas (2010) hydraulic model. Where detailed modelled data is ~~included within the updated Flood Map~~not available, a conservative approach has been taken through using the Flood Zone 3 extent as a proxy for ~~Planning. The mapped 1 in 30-year annual likelihood of flooding extent provides an indicative extent of~~ Flood Zone 3b.

1.5.4.5 ~~An~~The area immediately adjacent along the length of Dow Brook~~, which forms part of the Morgan onshore substation site~~ is located within the proxy Flood Zone ~~3a. This area is proposed for landscaping, water attenuation and environmental mitigation only~~3b extent. The temporary and permanent access tracks associated with the Morgan onshore substation are shown to be bisected by a small area of ~~indicative~~proxy Flood Zone ~~3a and~~ 3b, associated with out of bank flooding from a tributary of Dow Brook. ~~Areas of Flood Zone 3 within the 1km study area is also shown to be indicatively located within Flood Zone 3b; associated with fluvial and tidal flooding.~~

Environment Agency Flood Model Data

Fluvial flooding

1.5.4.6 The Environment Agency confirmed flood extents within proximity to the Dow Brook have been informed by JFLOW modelling which does not account for the effects of climate change and is not appropriate to use within FRAs, as per standard Environment Agency guidance.

1.5.4.7 The Environment Agency confirmed that the Flood Zones published in March 2025 have been informed by New National Modelling (NNM). The NNM uses JFLOW modelling to present data that can be scaled nationally, at the time of writing, no depth or peak flow information is available through the NNM. In lieu of this detailed information, the below approach has been used to estimate flood levels on site at the Morgan onshore substation.

~~1.5.4.7~~1.5.4.8 The fluvial catchment of the Dow Brook is relatively small, incorporating an area of 16.69km^2 at a point downstream of the Morgan and Morecambe onshore substations. Due to the small nature of the catchment, flood risk from this catchment can be assessed within the Environment Agency Long Term Flood Risk from surface water mapping.

~~1.5.4.8~~1.5.4.9 In lieu of the lack of available climate change information available for the Dow Brook within proximity to the Morgan onshore substation, the Long Term Flood Risk from surface water mapping 0.1% AEP flood extent and depth data has been used to assess how fluvial flood risk from the Dow Brook evolves due to climate change. It is noted flows associated with the 1% AEP event from the Dow Brook catchment are conveyed within the river channel.

~~1.5.4.9~~1.5.4.10 In order to establish if the use of the 0.1% AEP surface water event as a proxy for the 1% AEP year plus climate change event is appropriate an assessment of local flow rates based on catchment descriptors has been undertaken. The descriptors for the Dow Brook have been extracted for this watercourse with the main catchment features presented below:

- Area: 16.69km^2
- SAAR 61-90: 940mm
- PROP WET: 0.5
- BFIHOST19: 0.43

~~1.5.4.10~~1.5.4.11 At this location the watercourse is situated within the Ribble Management Catchment as such the 29% allowance should be used which assess the 2050's higher central peak river flow allowance. The 2050's upper peak river flow allowance of 44% has also been assessed to evaluate the credible maximum climate change scenario from fluvial flows.

~~1.5.4.11~~ Extracted ReFH2 values for the peak flow indicate that the 0.1% AEP produces higher results than 1% + 29% climate change and 1% + 44% climate change allowance, as presented within **Table 1.17**. It is therefore, considered acceptable to use the 0.1% AEP surface water flood extents at this location in the absence of climate change data at this location.

Table 1.17: ReFH2 Peak flows for the Dow Brook

		Peak flow (m^3/s)			
Location	**Description**	**1% AEP**	**1% AEP + 29% CC**	**1% AEP + 44% CC**	**0.1% AEP**
343950, 429450	Dow Brook	8.21	10.59	11.82	12.02

1.5.4.12 Using the National LIDAR Programme 1 m resolution Digital Surface Model data, the 0.1% AEP surface water flooding extent from the Long Term Flood Risk mapping corresponds to the 7.00 m AOD contour level. Flood depths associated with this event outside of the river channel are generally up to 300mm, with some isolated areas up to 900mm due to undulations in topography. The Morgan onshore substation is to be raised upon a platform between 13.01 and 15.22 m AOD. The surface water attenuation is located above 8.47 m AOD and temporary and permanent access roads are located between 14.00 m AOD and 16.00 m AOD. Development associated with the Morgan onshore substation is thus assessed to be located above the maximum proxy climate change flood level.

1.5.4.13 The updated Flood Map for Planning shows Extents of Flood Zone 2 and 3 (which includes Flood Zone 3a and 3b) associated with tributaries of Dow Brook that bisect the temporary and permanent access tracks. These flood extents are also presented within the Environment Agency's Long Term Flood Risk mapping and are described in greater detail within **Section 1.5.6**. Out of channel flood depths are associated with a 'low' chance of occurrence, presenting flood depths of up to 300mm during the present day and climate change epochs.

1.5.4.14 Whilst not used within the assessment of flood risk, the extent of Flood Zone 3 (which includes Flood Zone 3a and 3b) from JFLOW data has been used to inform extents where no profiling of ground levels is to take place, as presented within the Outline CoCP. The retaining of existing ground levels within Flood Zone 3 (which includes Flood Zone 3a and 3b) will ensure floodplain capacity is maintained as well as flow conveyance as to not increase flood risk downstream of the development. Mitigation measures to reduce development and user vulnerability are presented within **Table 1.18**.

1.5.4.15 Based on the above, the Morgan onshore substation is not assessed to be at risk of fluvial flooding for the development lifetime.

Credible maximum climate change scenario

1.5.4.16 The upper estimate peak river flow allowance has been used to assess the credible maximum climate change scenario from fluvial flows. This is 44% for the Dow Brook under the 2050's epoch, as per **Table 1.9**. As demonstrated within **Table 1.17**, peak flows from the 1% AEP + 44% climate change scenario event are lower than the 0.1% AEP event which has been used to assess fluvial flood risk to the onshore substation. As such the Morgan onshore substation is not considered to be at risk from the credible maximum climate change scenario from fluvial flows.

Tidal flooding

1.5.4.17 Hydraulic modelling data from the Ribble Estuary Tidal model (2014) demonstrates Morgan onshore substation is located outside the mapped extents of tidal flood risk throughout the development lifetime.

1.5.4.18 The southern extent of the study area (within areas in which the Morecambe temporary and permanent access tracks are proposed, discussed in greater detail within **Section 1.6.4**) is at risk of flooding from the undefended 0.5% tidal scenario during the construction phase and the operational and maintenance phase.

Credible maximum climate change scenario

1.5.4.19 H++ sea level rise projections have been assessed via the application of 1.9m to the 0.5% AEP 2014 tidal scenario. This produces a maximum H++ tidal flood level of 7.41m AOD within the south of the study area. The Morgan onshore substation is to be raised upon a platform between 13.01 and 15.22 m AOD and remain above the H++ tidal flood level. As such, the H++ approach is not considered necessary to be applied.

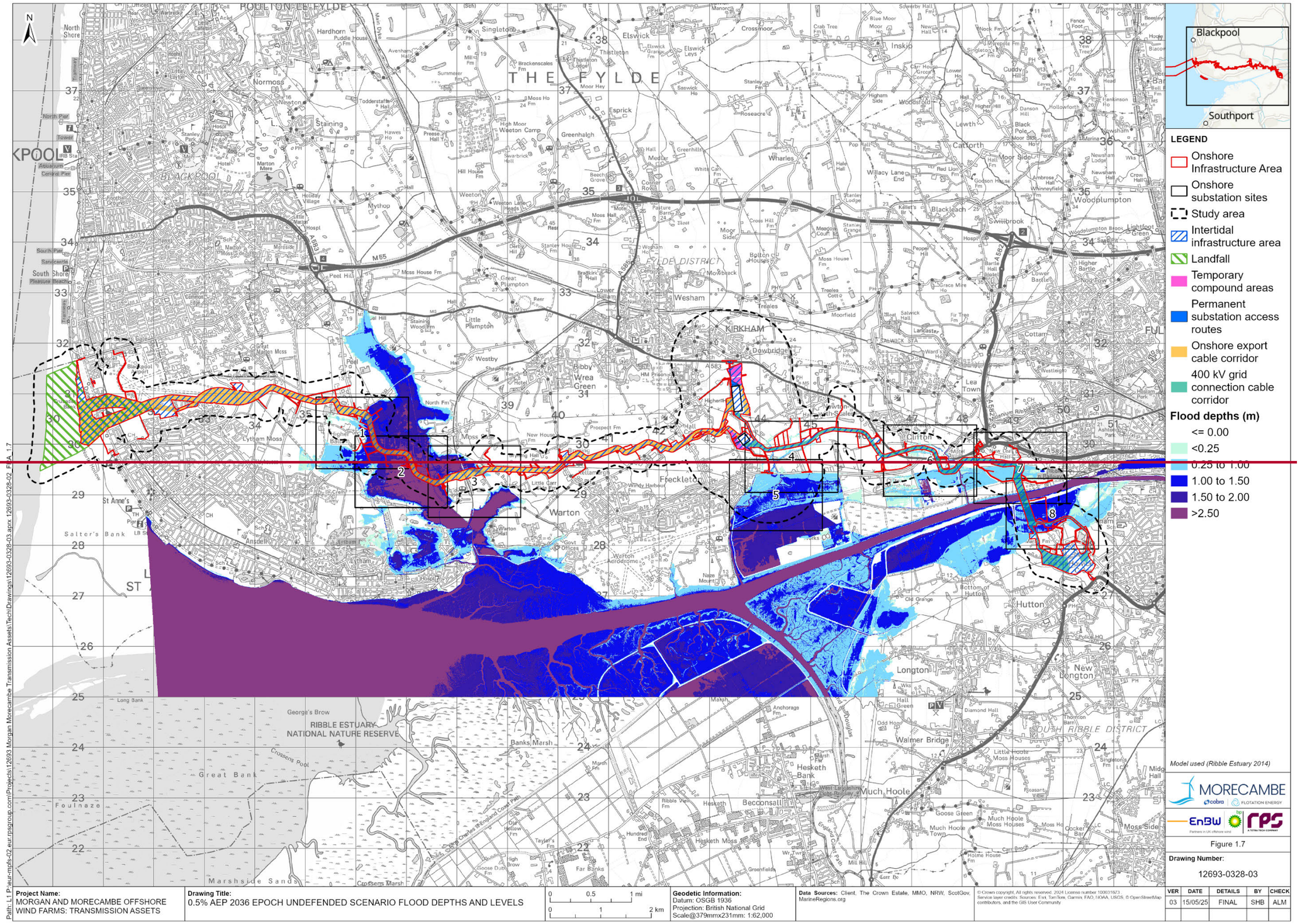
Strategic Flood Risk Assessment

The Fylde Coast Authorities Strategic Flood Risk Assessment (2024)

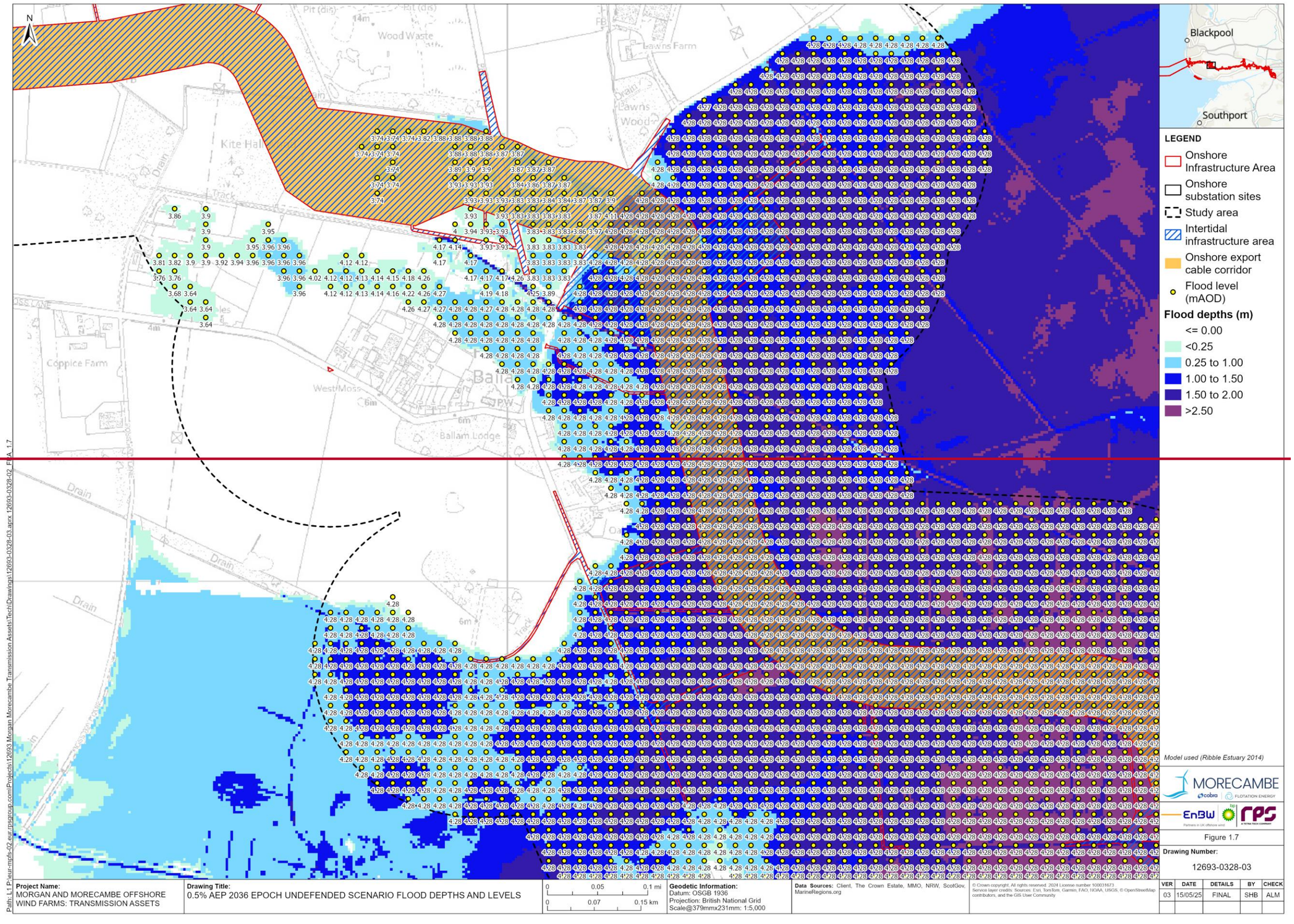
1.5.4.20 Relevant information regarding fluvial and tidal flood risk from the FCA SFRA to the Morgan onshore substation has been extracted and included as follows.

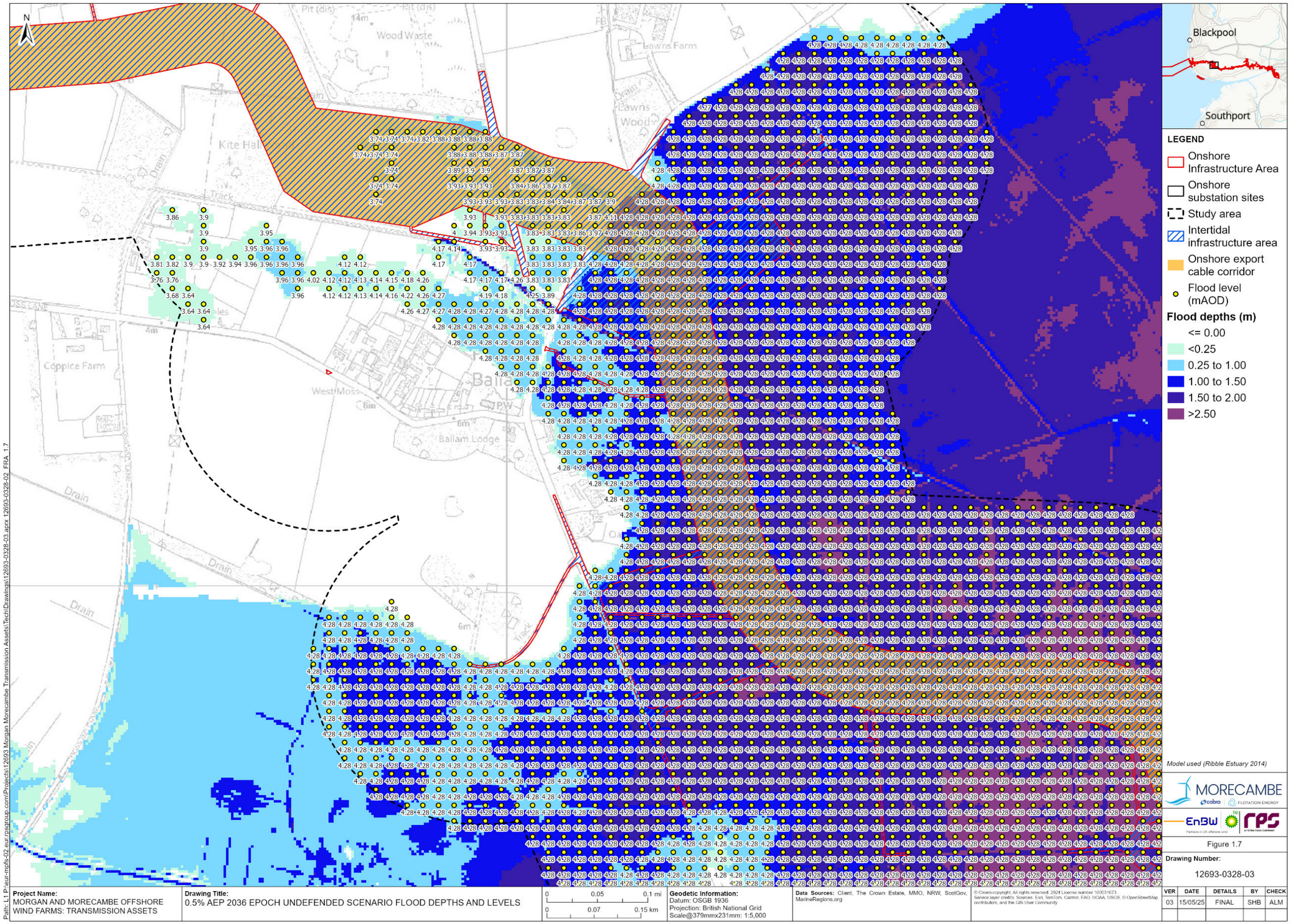
- Within the Fylde Council area, The main fluvial flood risk in Fylde comes from tributaries of the River Ribble which flow south through the area to join the River Ribble, which runs along the southern border of the area. Considerable parts of the fluvial flood risk affect rural areas; however, settlements affected by fluvial flood risk include Lytham, Kirkham, Warton, and Freckleton.
- Within the Fylde Council area, the Ribble estuary presents a tidal flood risk to the south of the area. In the southwest, the east side of the settlement of Lytham is shown to be at tidal risk. In the southeast, it is largely rural areas to the east of Freckleton that are shown to be at risk.
- Extents of Flood Zone 2 and 3 broadly correspond to the EA Flood Map for Planning, with the exception of the extent of Flood Zone 2 and 3 associated with a tributary of Dow Brook which bisects the temporary and permanent access track. Within the FCA SFRA, this extent is classified as Flood Zone 1. This is thought to be due to more up to date information being used within Environment Agency data which was released in March 2025.
- All Flood Zone 3 extents associated with the Dow Brook are classified as Flood Zone 3b.
- No tidal flood extents are located within the study area.

- Flooding from Dow Brook is classified as ‘surface water’ rather than ‘fluvial’, assumed due to the watercourses small hydrological catchment.



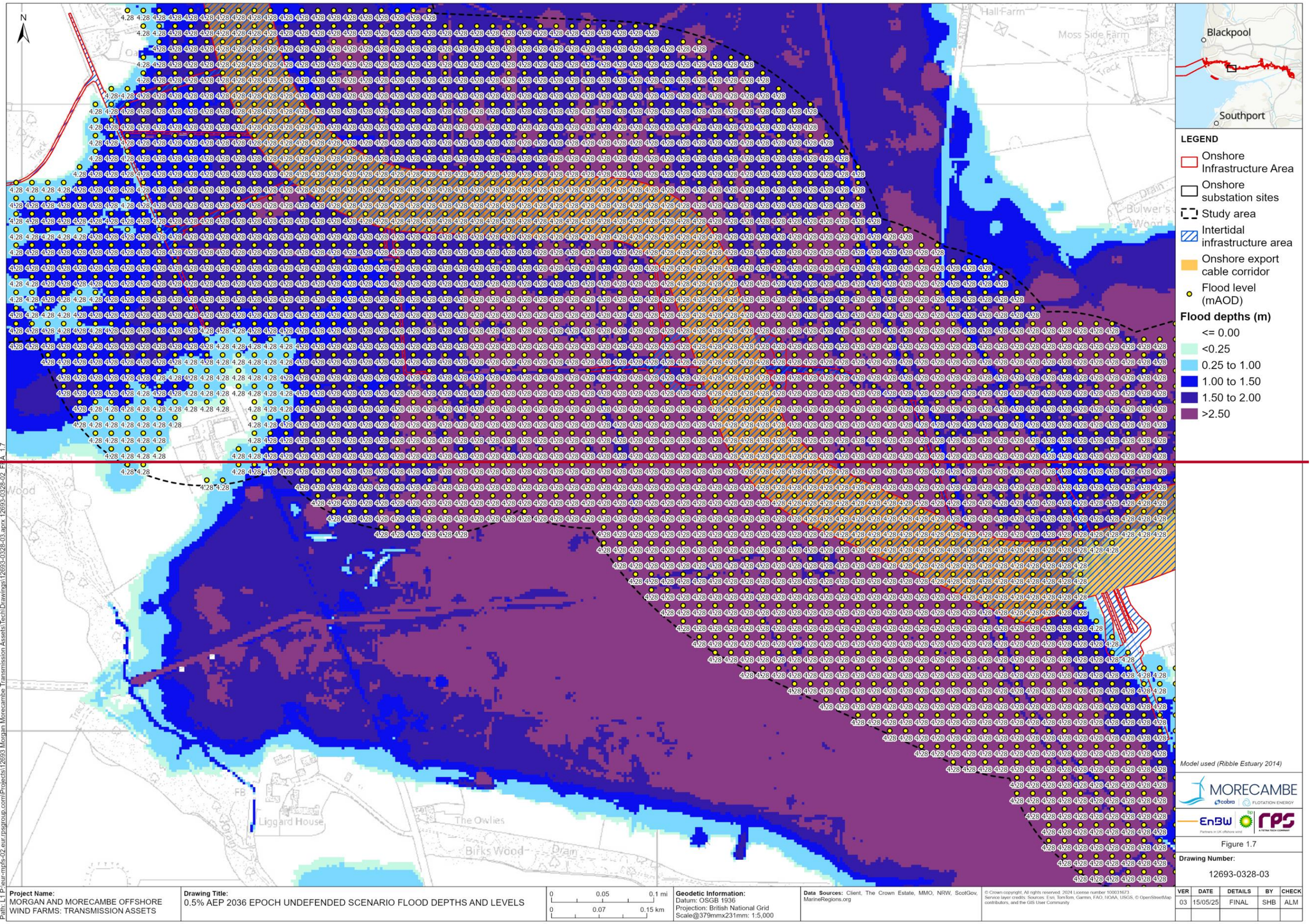
0.5% AEP 2036 epoch undefended scenario flood depths and levels


N
Blackpool
Southport
LEGEND
Onshore Infrastructure Area
Onshore substation sites
Study area
Intertidal infrastructure area
Onshore export cable corridor
Flood level (mAOD)
Flood depths (m)
<= 0.00
<0.25
0.25 to 1.00
1.00 to 1.50
1.50 to 2.00
>2.50
Model used (Ribble Estuary 2014)
Figure 1.7
Drawing Number:
12693-0328-03
Project Name:
MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS
Drawing Title:
0.5% AEP 2036 EPOCH UNDEFENDED SCENARIO FLOOD DEPTHS AND LEVELS
0 0.05 0.1 mi
0 0.07 0.15 km
Geodetic Information:
Datum: OSGB 1936
Projection: British National Grid
Scale@379mmx231mm: 1:5,000
Data Sources: Client, The Crown Estate, MMO, NRW, ScotGov, MarineRegions.org
© Crown copyright. All rights reserved. 2024 License number 100031673
Service layer credits: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
VER | DATE | DETAILS | BY | CHECK
03 | 15/05/25 | FINAL | SHB | ALM
Path: L:\Projects\12693 Morgan Morecambe Transmission Assets\Tech\Drawings\12693-0328-03.annx 12693-0328-02_FIA_1.7
Path: L:\Projects\12693 Morgan Morecambe Transmission Assets\Tech\Drawings\12693-0328-02_FIA_1.7

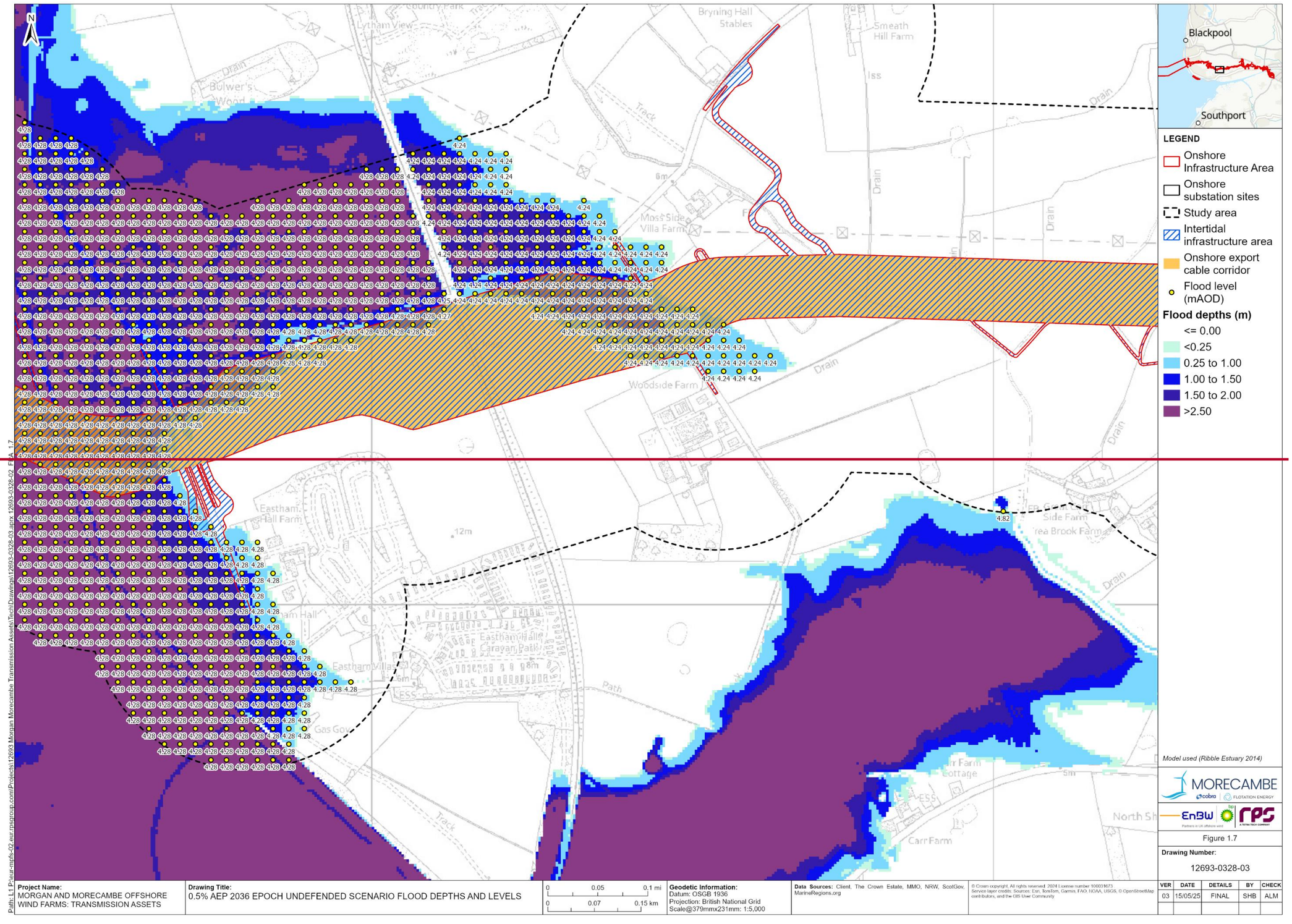


0.5% AEP 2036 epoch undefended scenario flood depths and levels

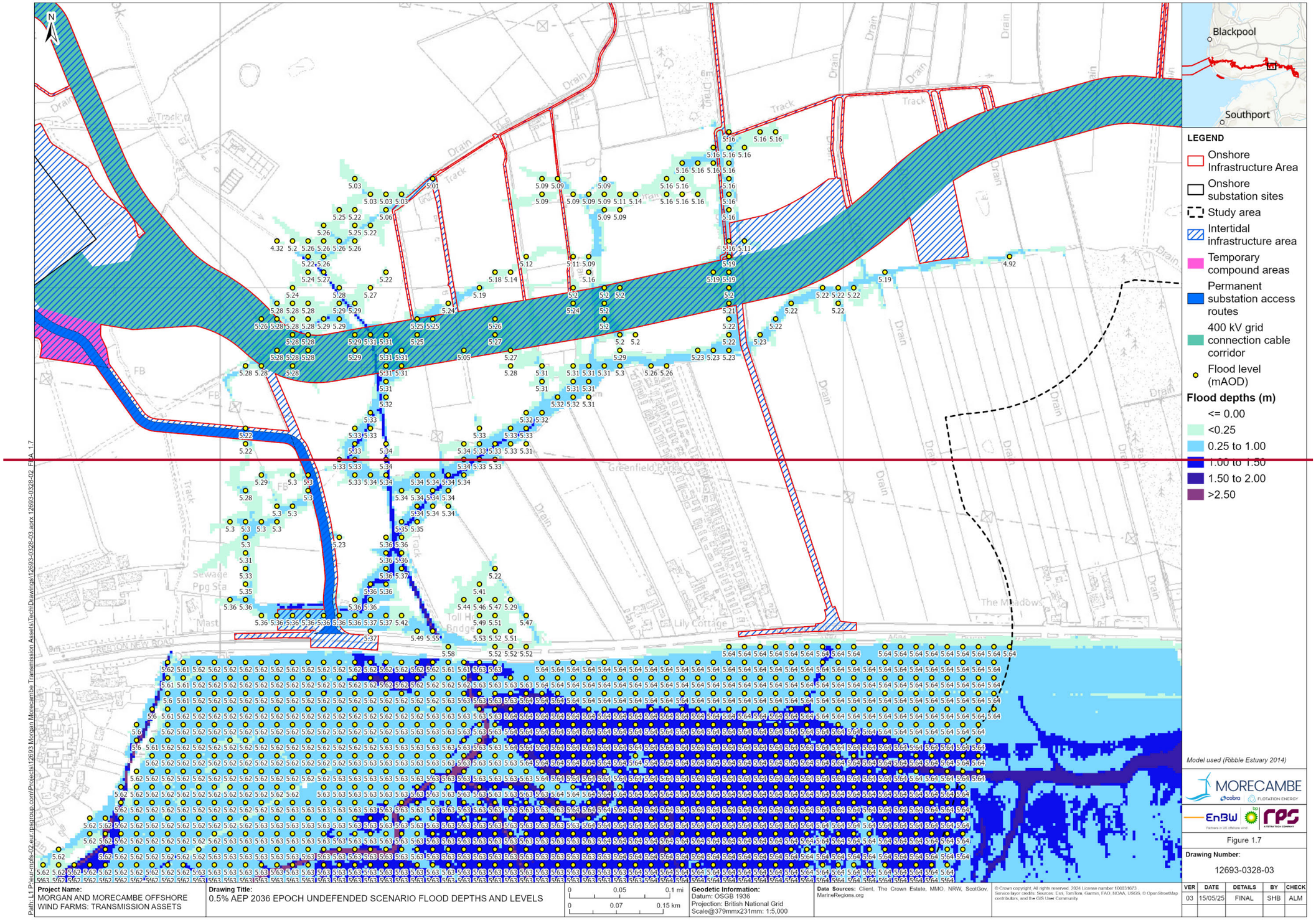
0.5% AEP 2036 epoch undefended scenario flood depths and levels



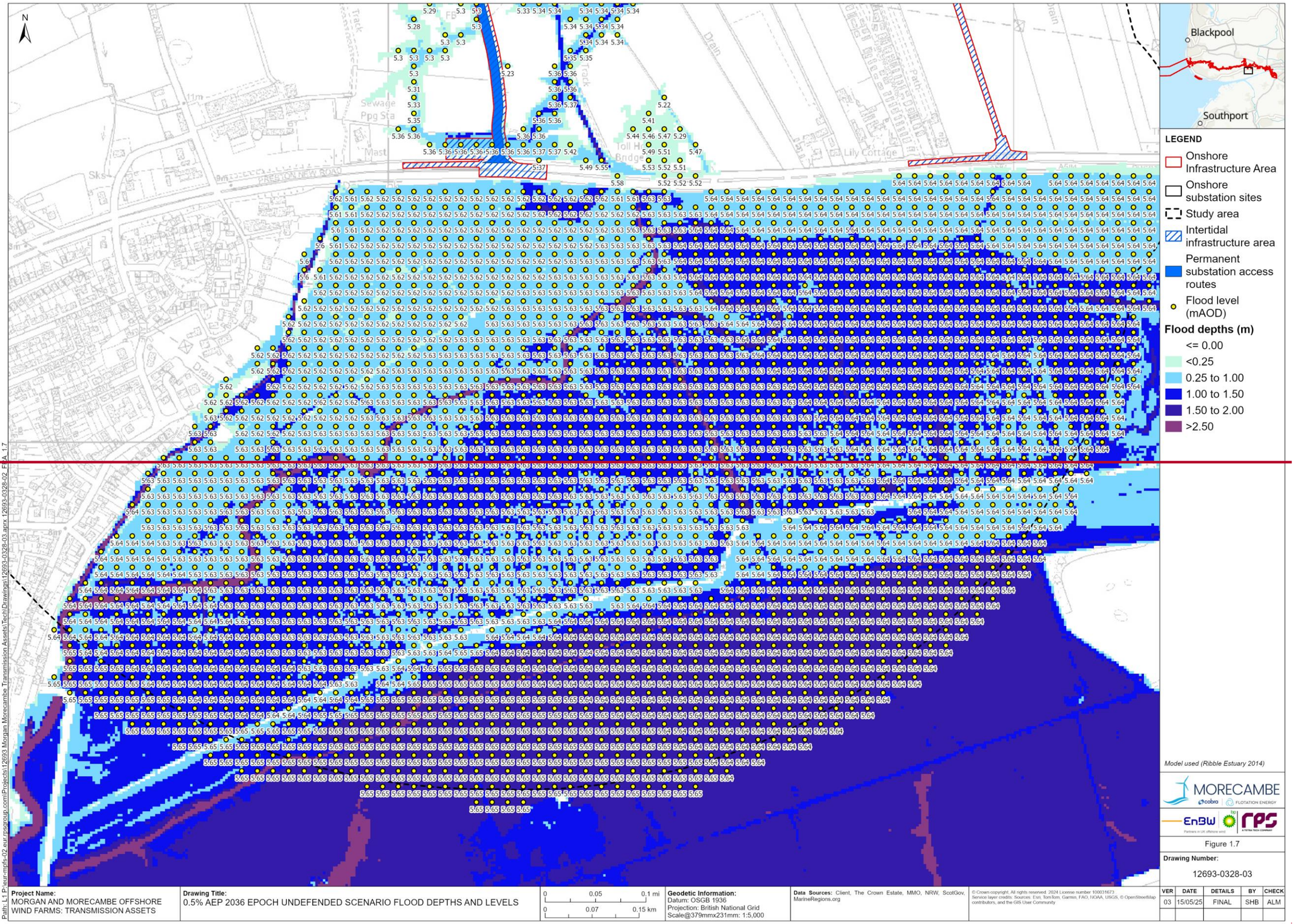
0.5% AEP 2036 epoch undefended scenario flood depths and levels



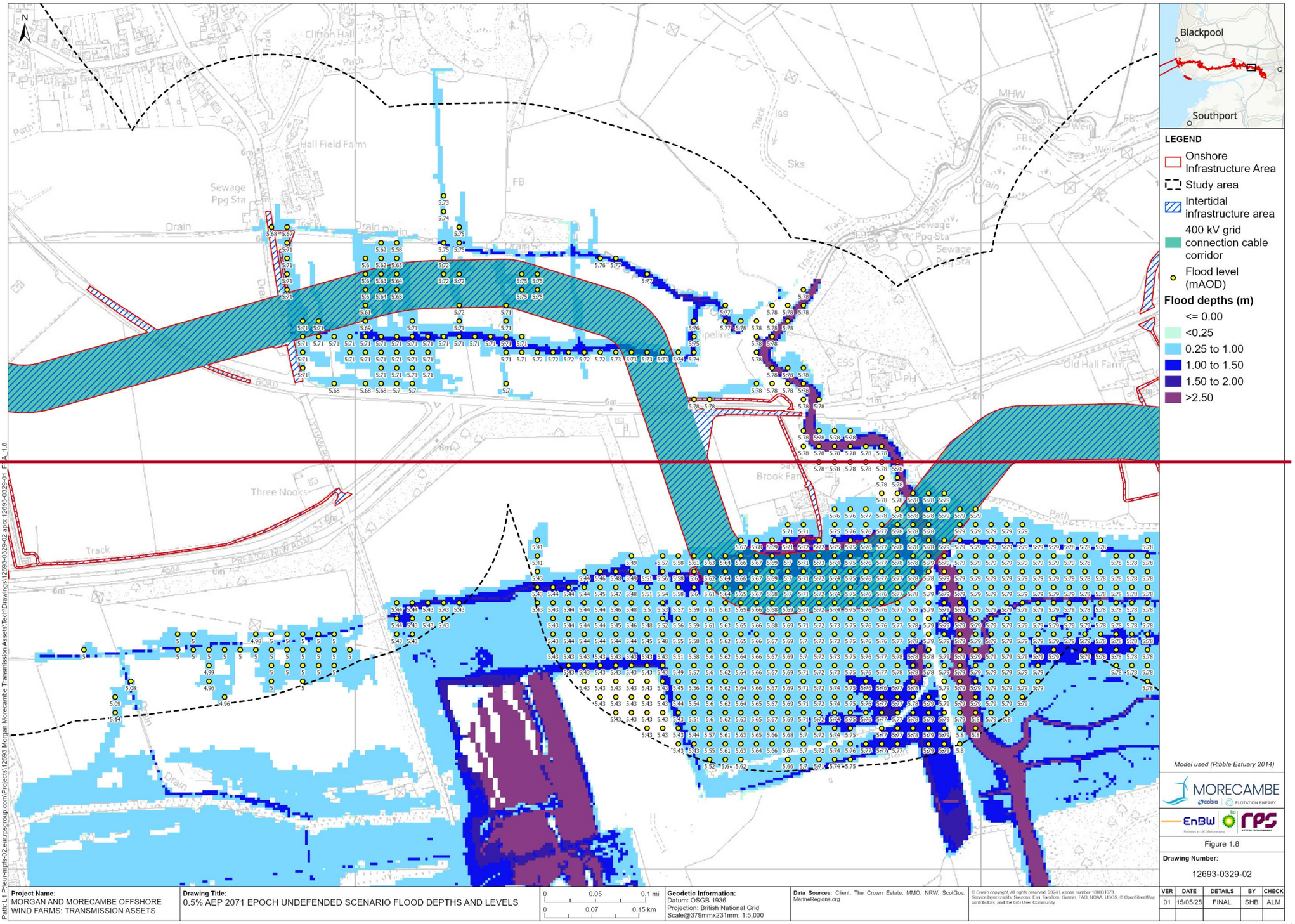
~~Figure 1.7a: 0.5% AEP 2036 epoch undefended scenario flood depths and levels~~



~~Figure 1.7a: 0.5% AEP 2036 epoch undefended scenario flood depths and levels~~

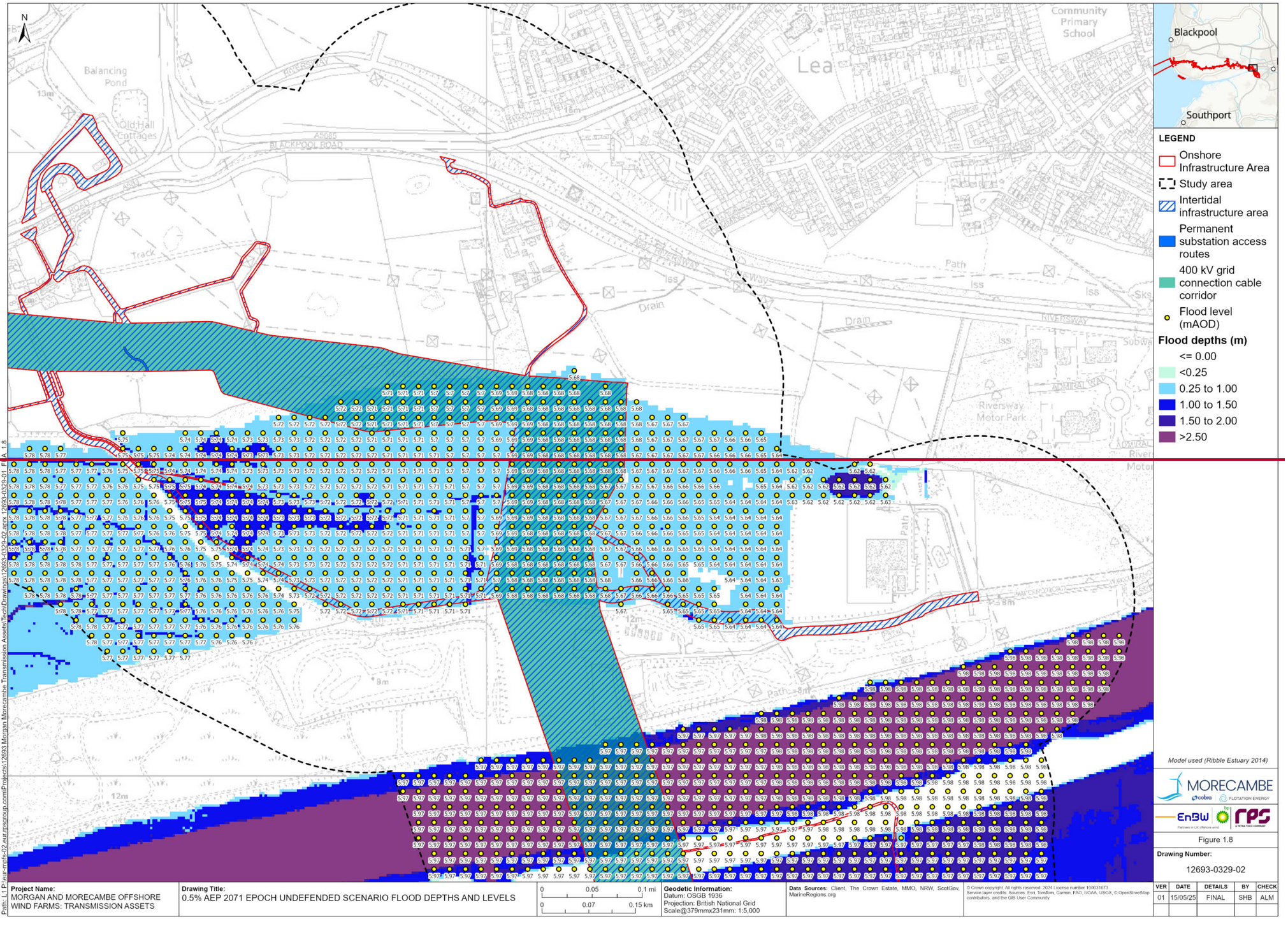


~~**Figure 1.7a: 0.5% AEP 2036 epoch undefended scenario flood depths and levels**~~

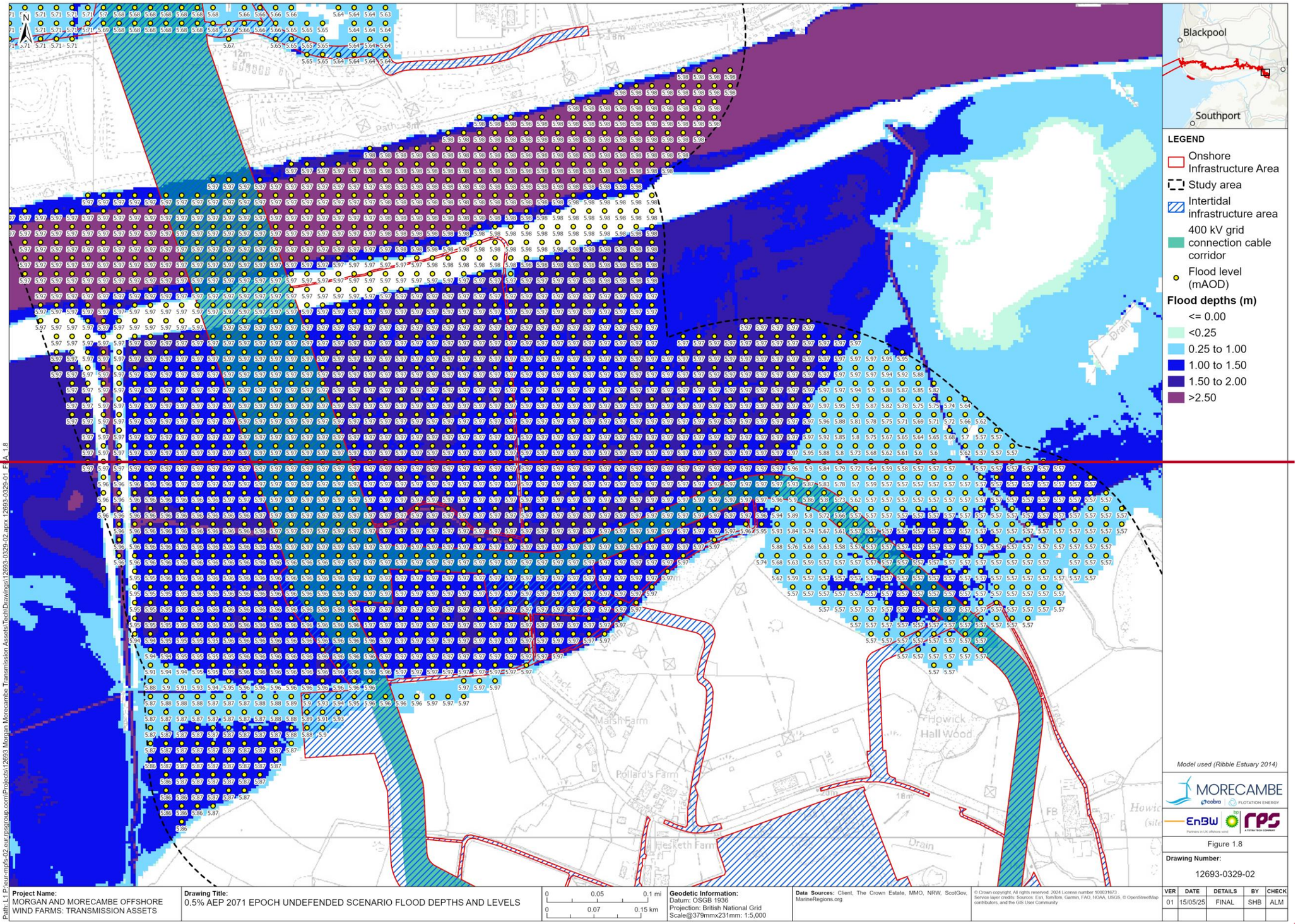


Path: L:\Fleur-mpfs-02.eur.rpsgroup.com\Projects\12693 Morgan Morecambe Transmission Assets\Tech\Drawings\12693-0329-02.aprx 12693-0329-02 FIG 1.8

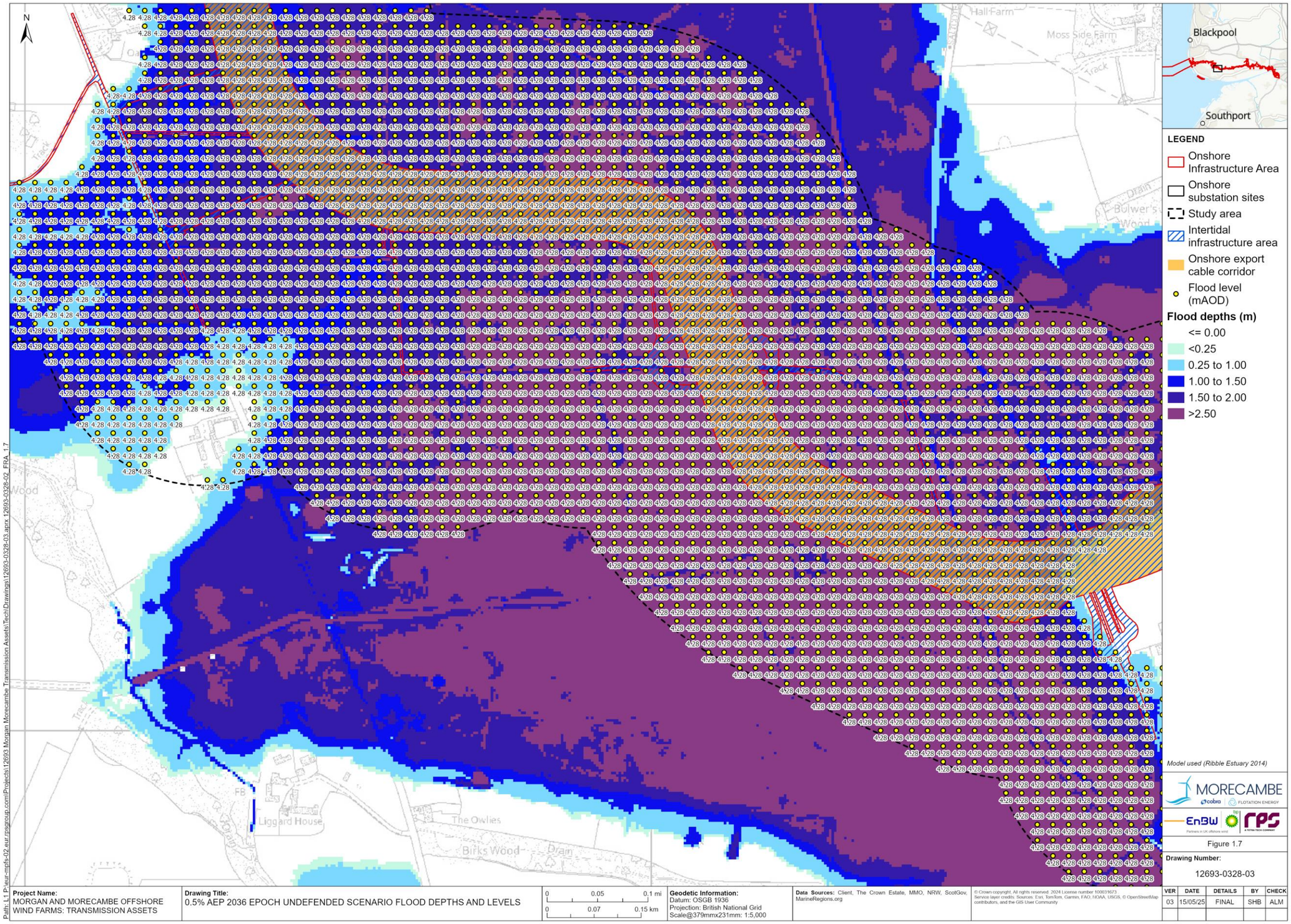
~~Figure 1.7a: 0.5% AEP 2036 epoch undefended scenario flood depths and levels~~



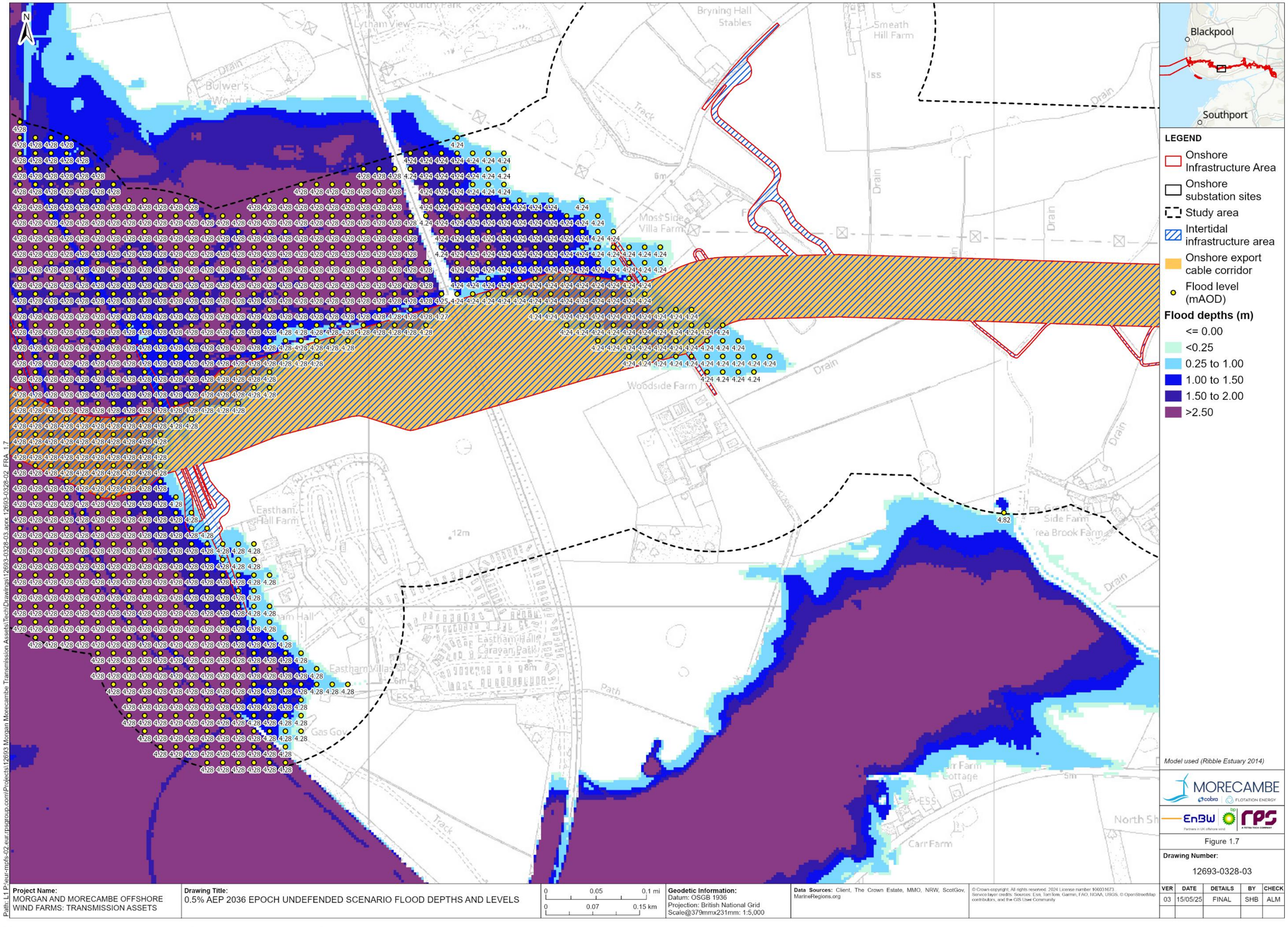
~~**Figure 1.7a: 0.5% AEP 2036 epoch undefended scenario flood depths and levels**~~



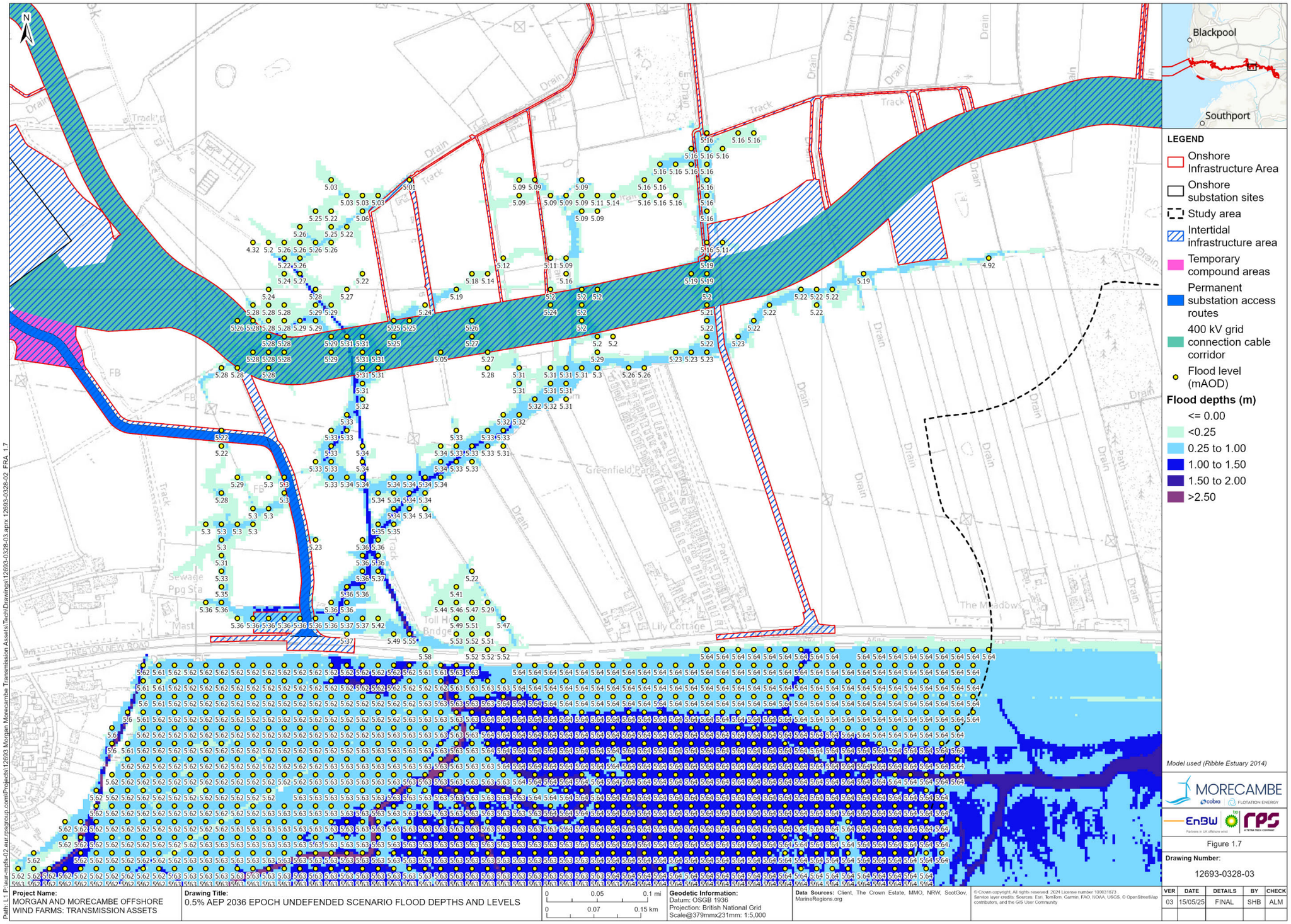
~~Figure 1.7a: 0.5% AEP 2036 epoch undefended scenario flood depths and levels~~



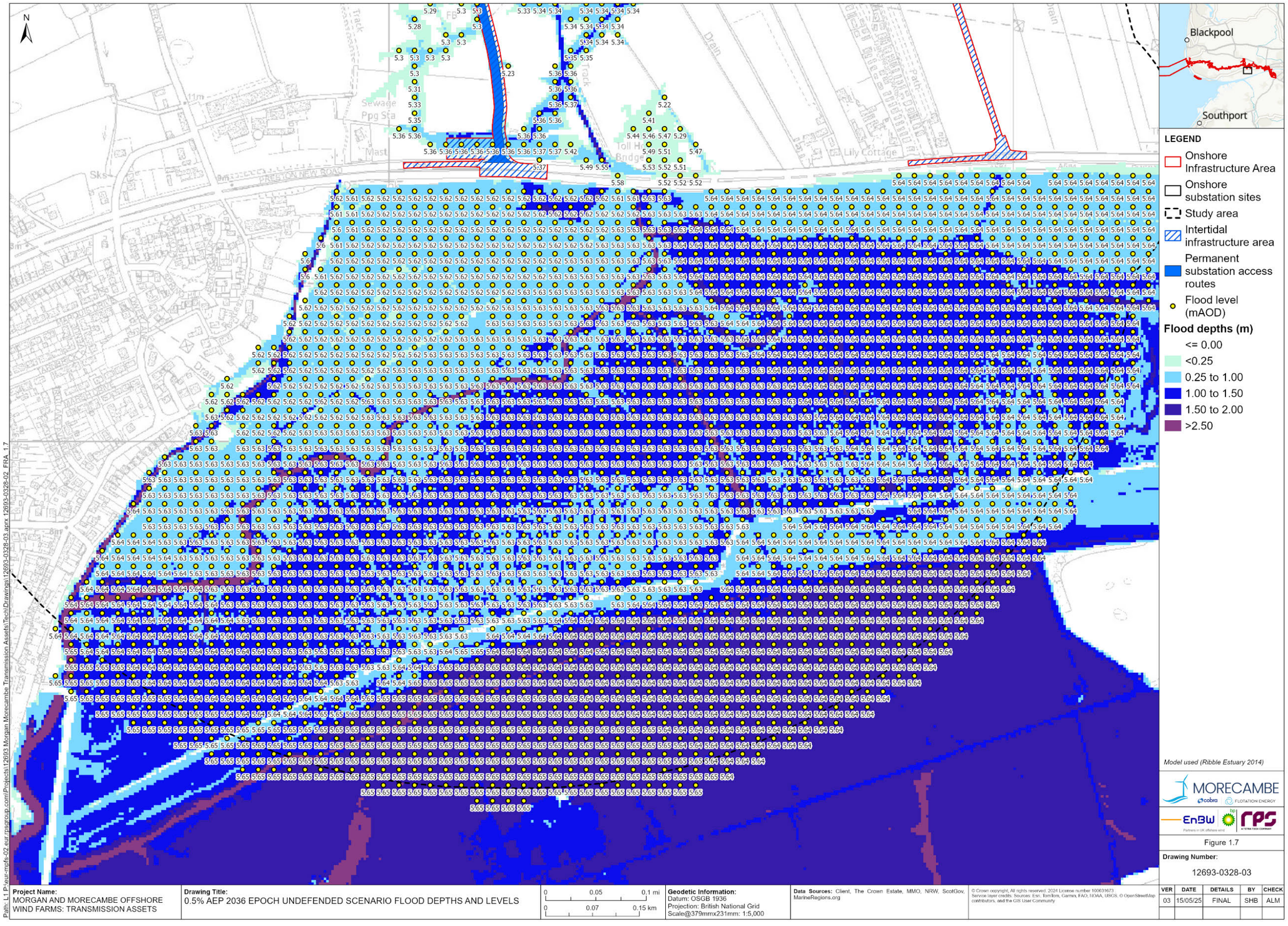
0.5% AEP 2036 epoch undefended scenario flood depths and levels



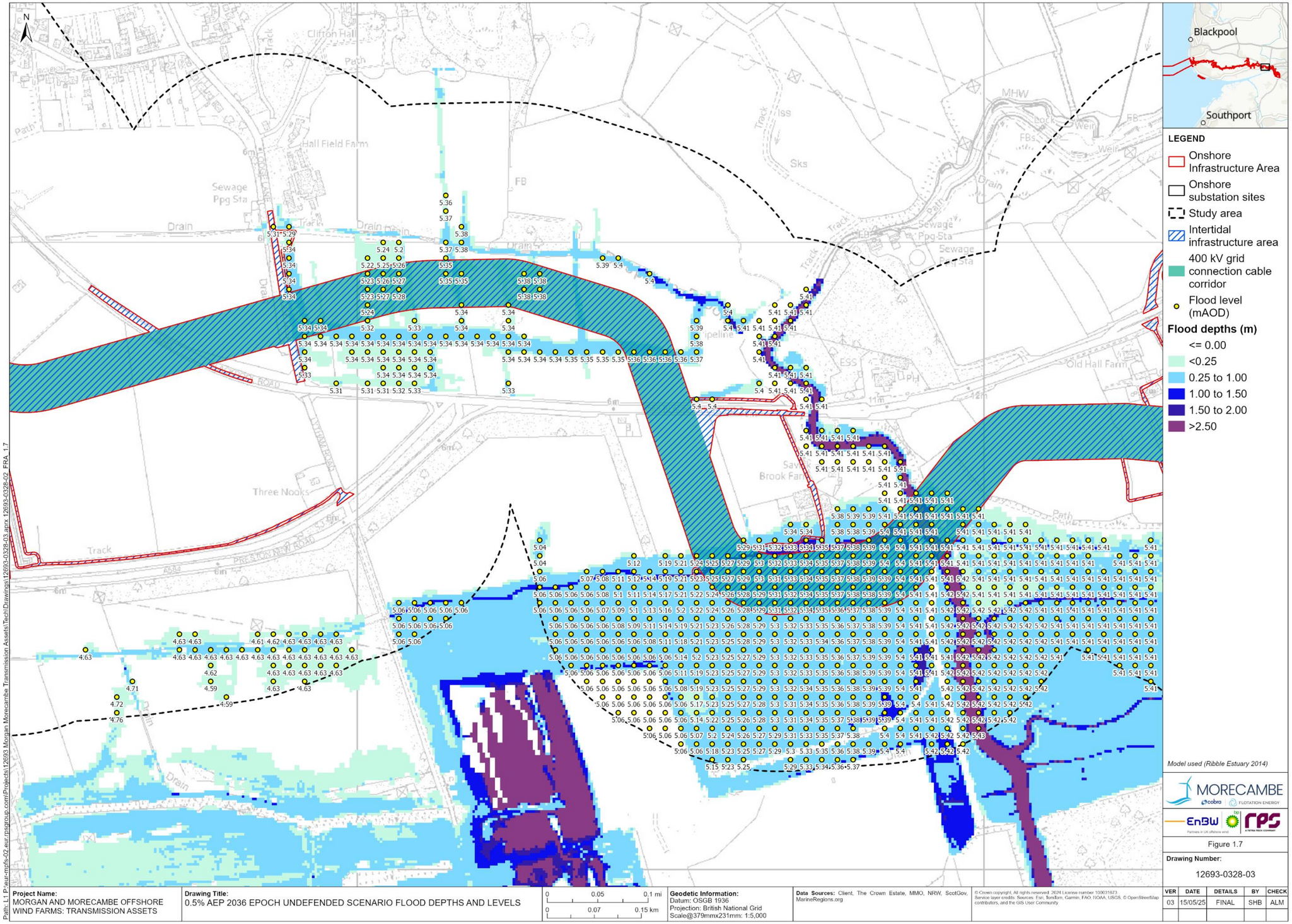
0.5% AEP 2036 epoch undefended scenario flood depths and levels



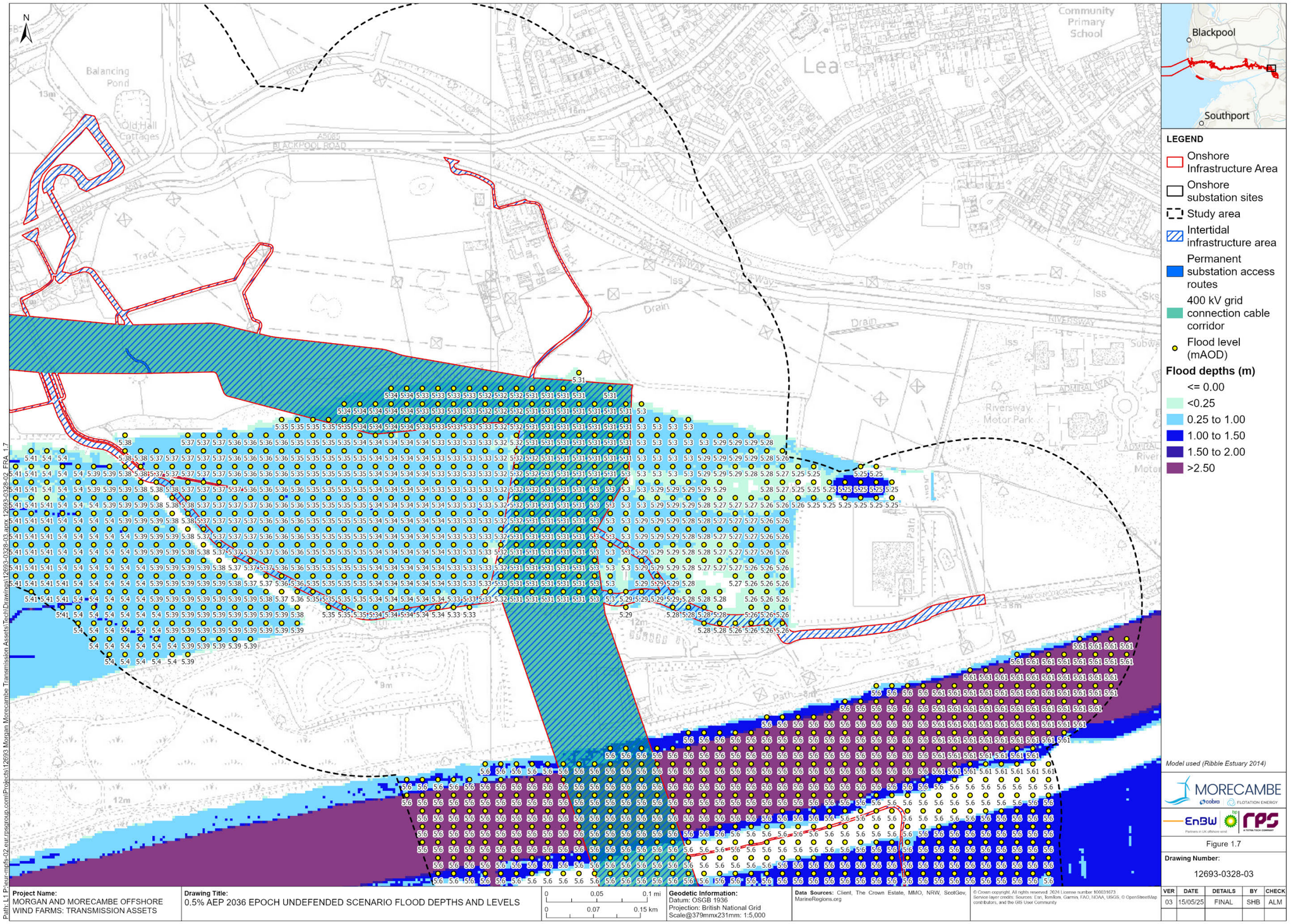
0.5% AEP 2036 epoch undefended scenario flood depths and levels



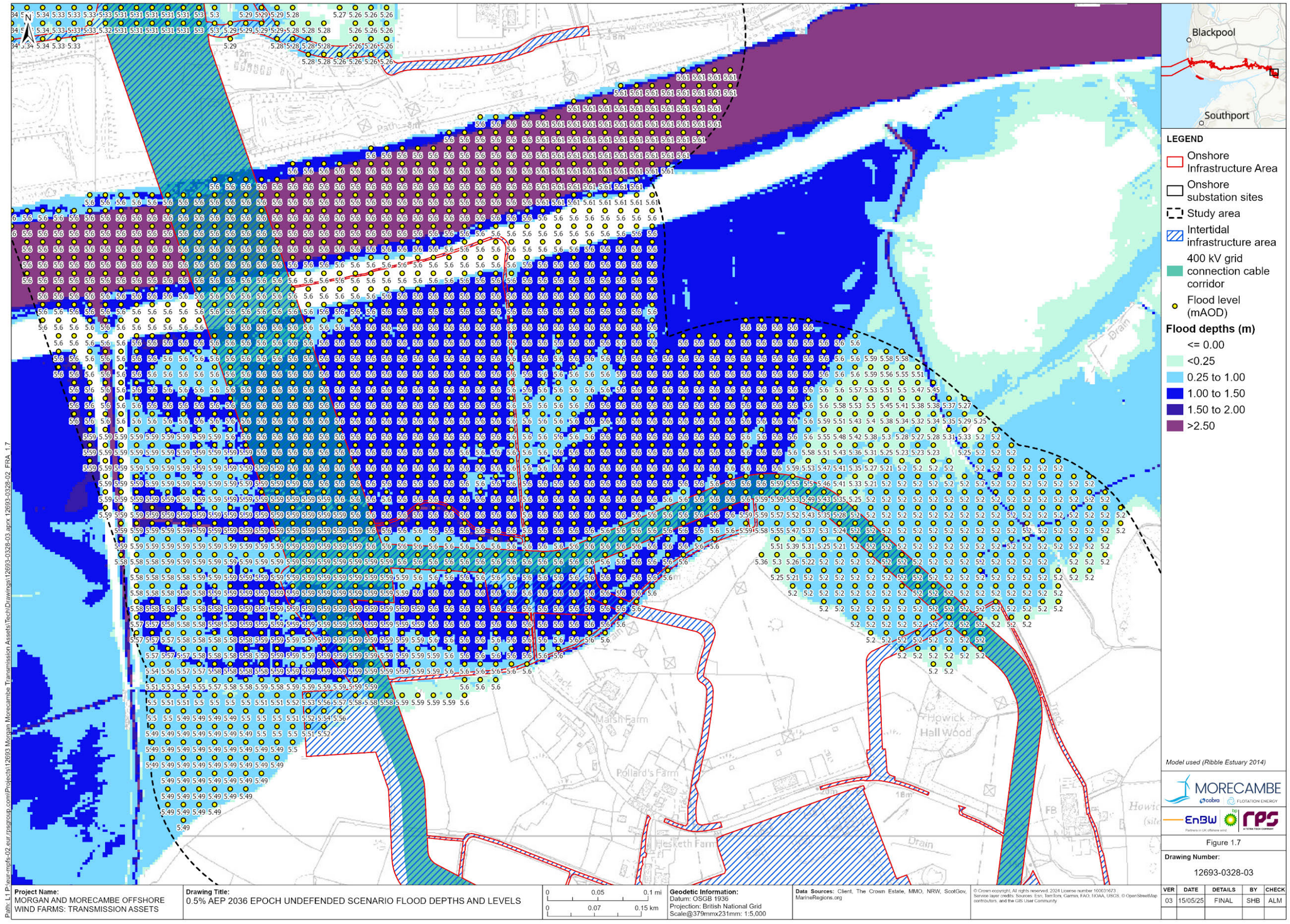
0.5% AEP 2036 epoch undefended scenario flood depths and levels



0.5% AEP 2036 epoch undefended scenario flood depths and levels



0.5% AEP 2036 epoch undefended scenario flood depths and levels



0.5% AEP 2036 epoch undefended scenario flood depths and levels

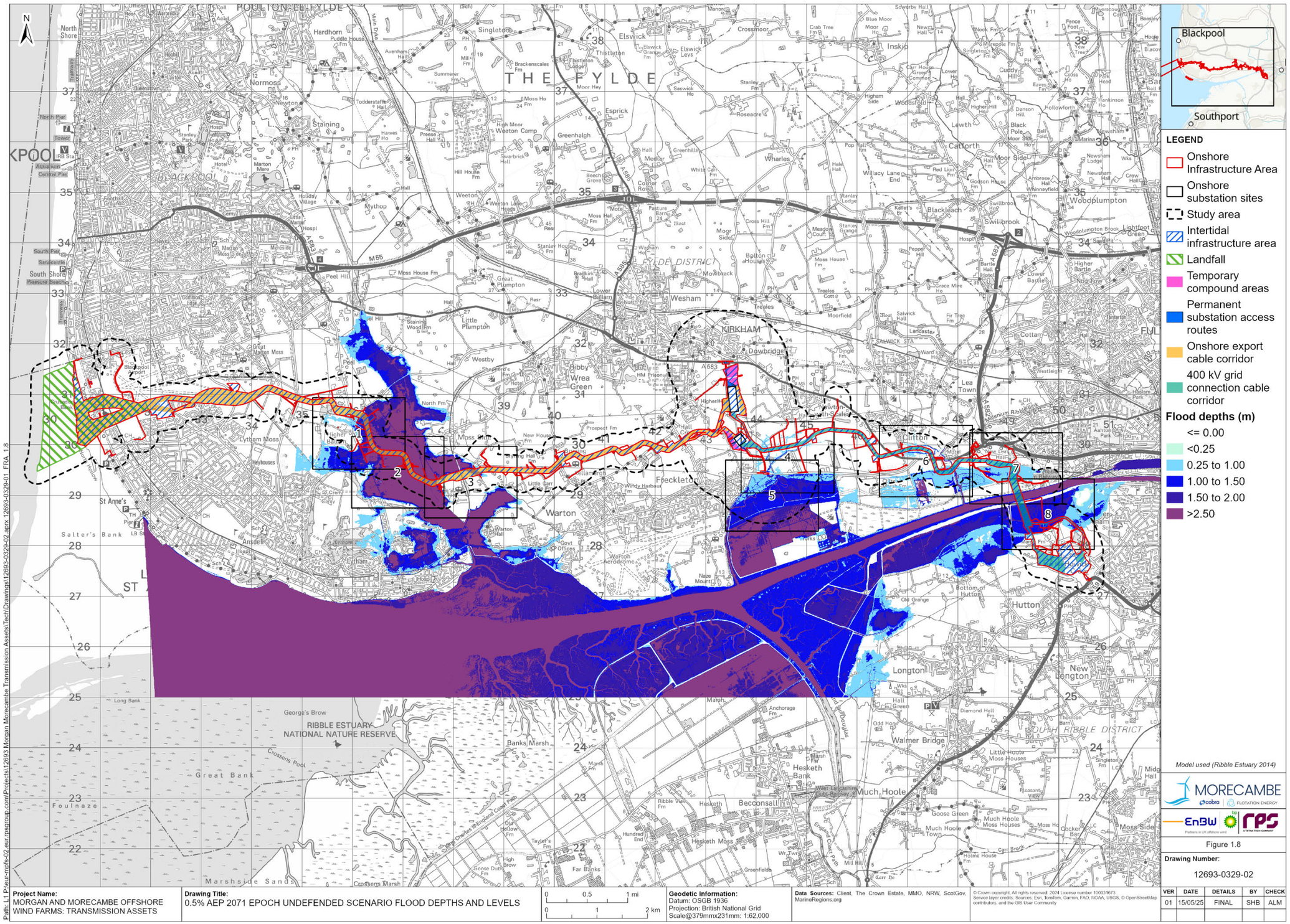


Figure 1.7~~a~~: **0.5% AEP 2071 epoch undefended scenario flood depths and levels**

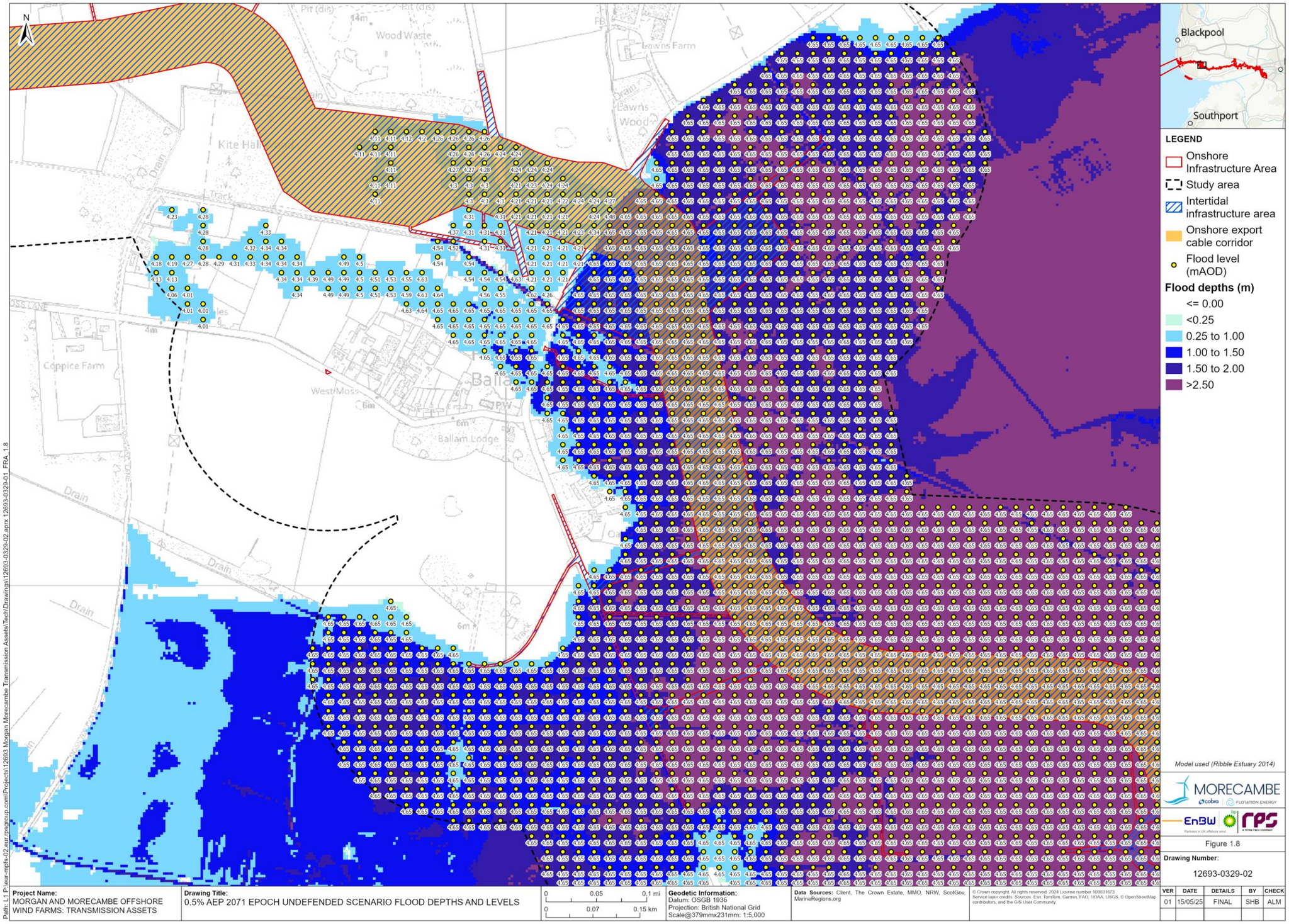
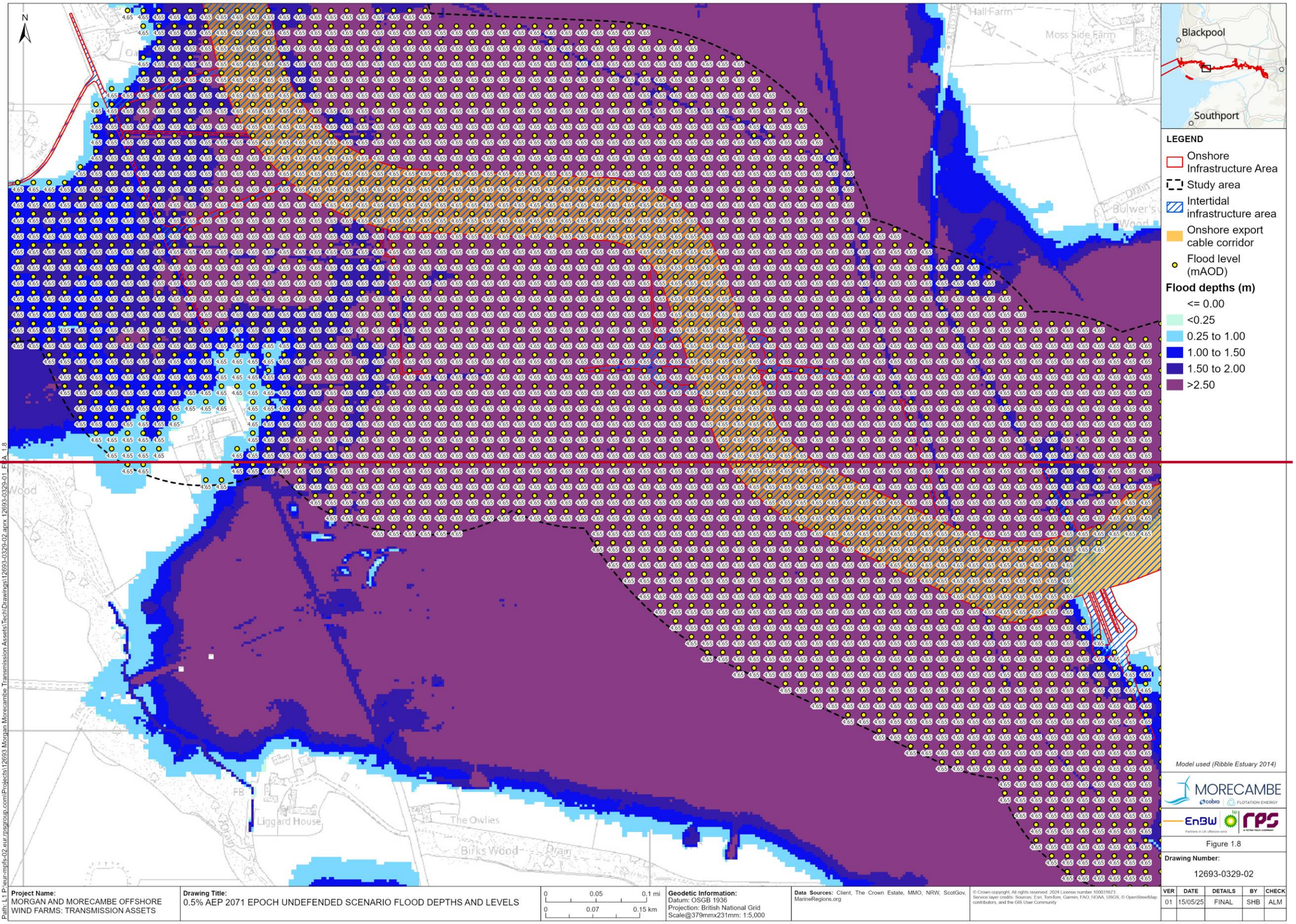


Figure 1.7: 0.5% AEP 2071 epoch undefended scenario flood depths and levels


N
Hall Farm
Moss Side Farm
Track
Drain
Bulwer's Wood
Blackpool
Southport
LEGEND
Onshore Infrastructure Area
Study area
Intertidal infrastructure area
Onshore export cable corridor
Flood level (mAOD)
Flood depths (m)
<= 0.00
<0.25
0.25 to 1.00
1.00 to 1.50
1.50 to 2.00
>2.50
Wood
Liggard House
The Owlies
Birks Wood
Drain
Model used (Ribble Estuary 2014)
Figure 1.8
Drawing Number:
12693-0329-02
Project Name:
MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS
Drawing Title:
0.5% AEP 2071 EPOCH UNDEFENDED SCENARIO FLOOD DEPTHS AND LEVELS
0 0.05 0.1 mi
0 0.07 0.15 km
Geodetic Information:
Datum: OSGB 1936
Projection: British National Grid
Scale@379mmx231mm: 1:5,000
Data Sources: Client, The Crown Estate, MMO, NRW, ScotGov, MarineRegions.org
© Crown copyright. All rights reserved. 2024 License number 100031673
Service layer credits: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community
VER | DATE | DETAILS | BY | CHECK
01 | 15/05/25 | FINAL | SHB | ALM
Path: L:\Projects\12693 Morgan Morecambe Transmission Assets\Tech\Drawings\12693-0329-02.aprx 12693-0329-01_FIA_1.8

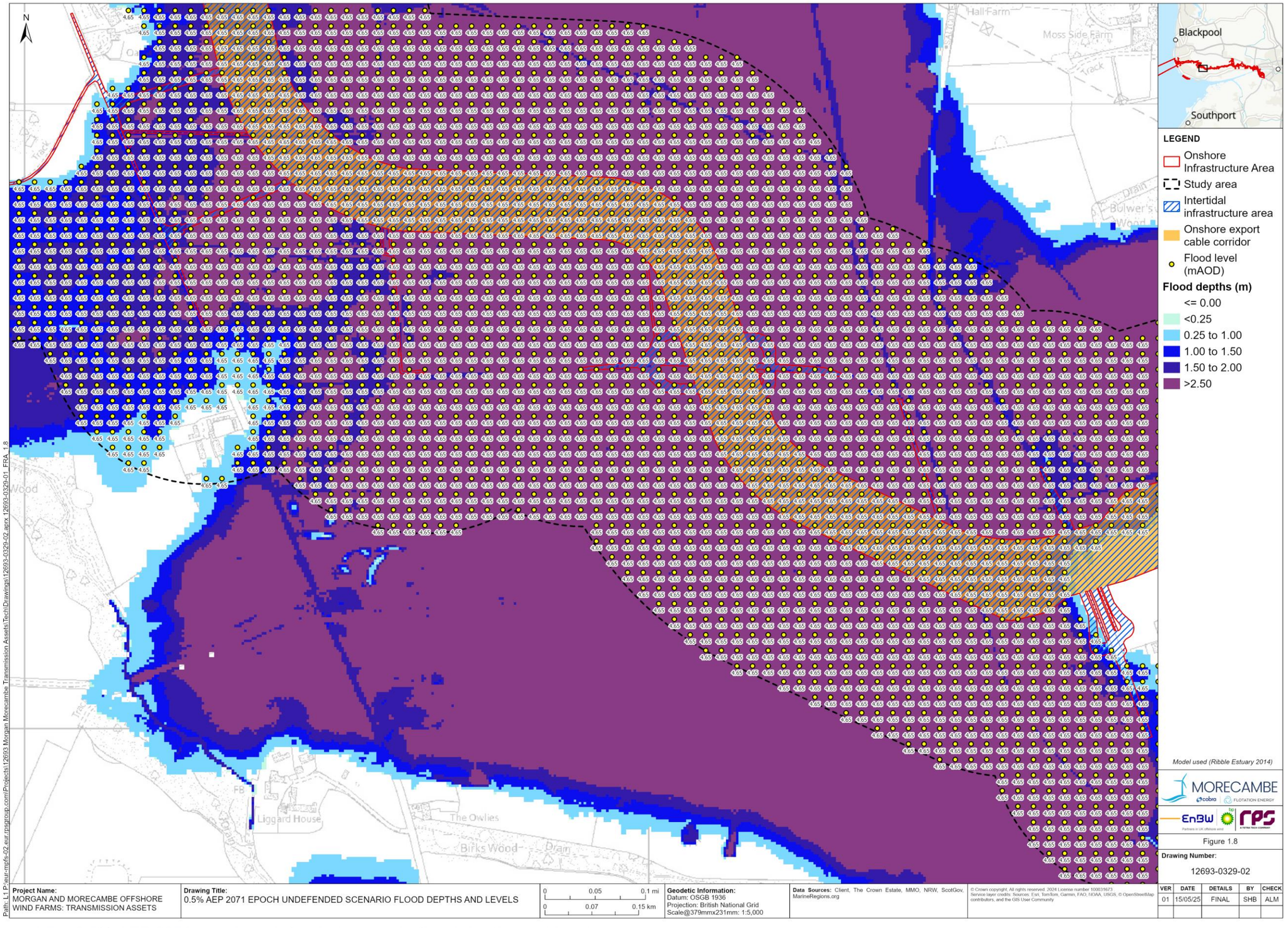


Figure 1.7: 0.5% AEP 2071 epoch undefended scenario flood depths and levels