

MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

Volume 3, Annex 2.3: Flood risk assessment



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MORGAN AND MORECAMBE OFFSHORE WIND FARMS: TRANSMISSION ASSETS

Environmental Statement

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



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Prepared by:

RPS

Prepared for:

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Morecambe Offshore Windfarm Ltd**

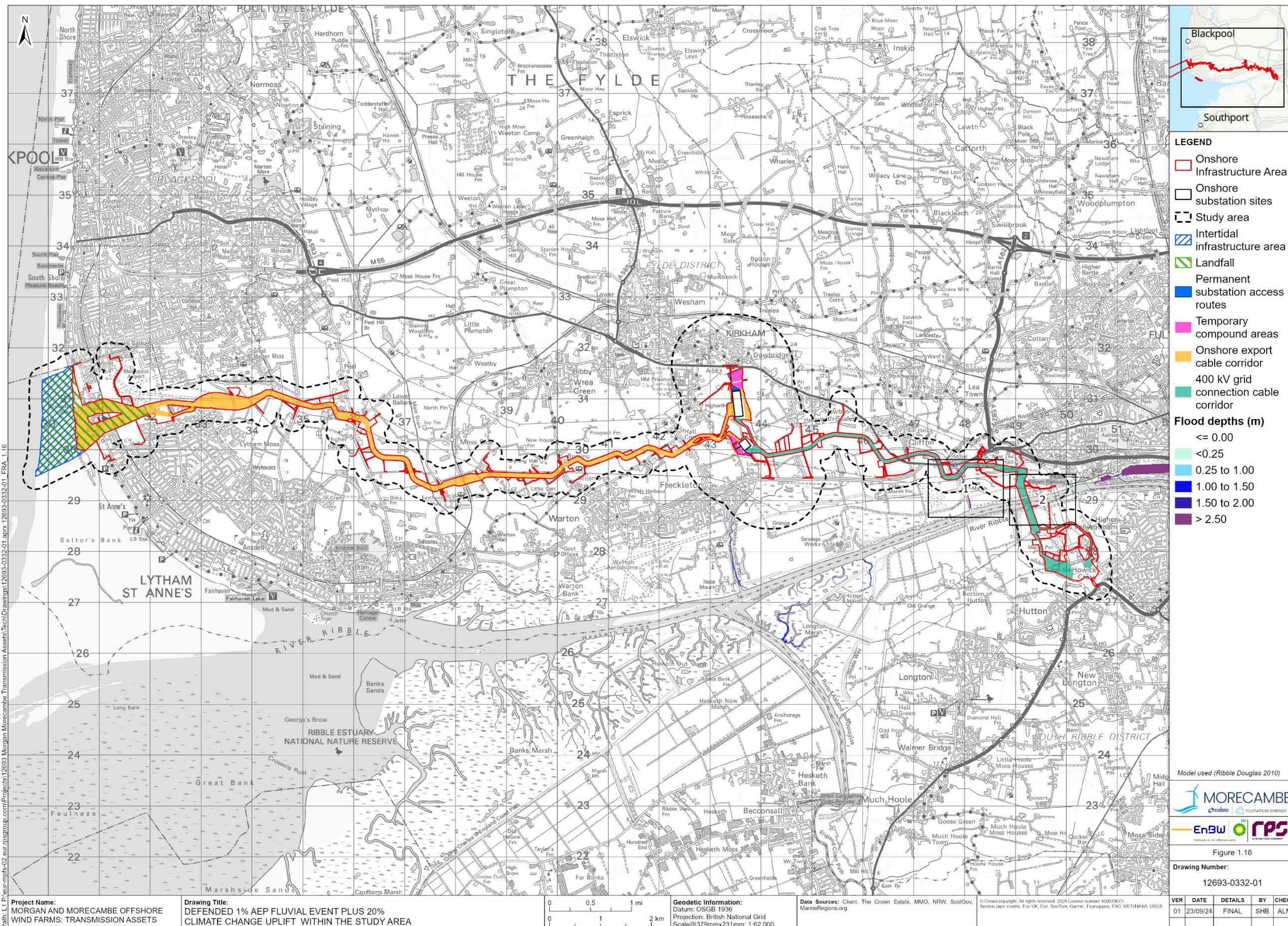


Figure 1.19a: Defended 1% AEP fluvial event plus 20% climate change uplift

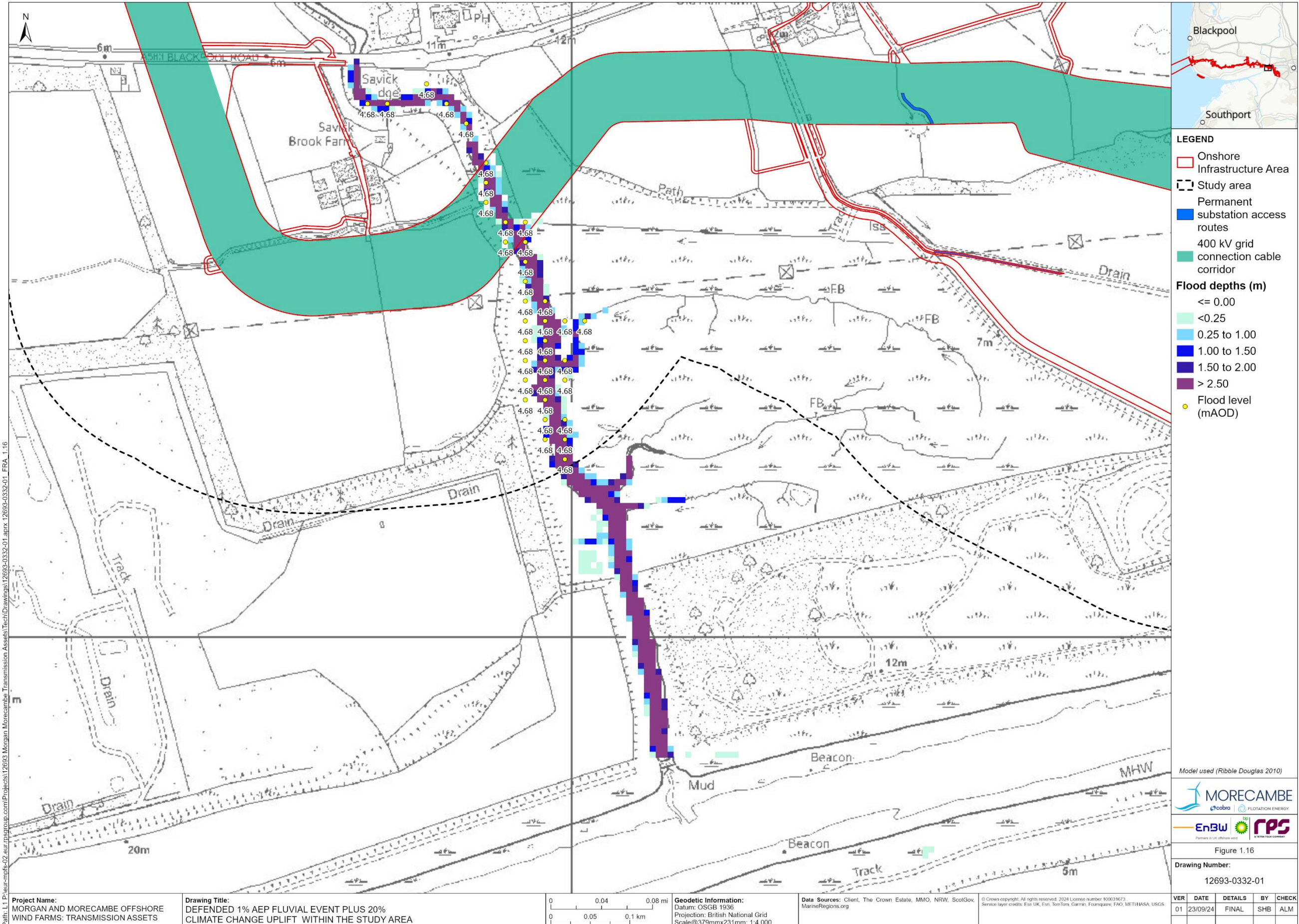


Figure 1.16a: Defended 1% AEP fluvial event plus 20% climate change uplift

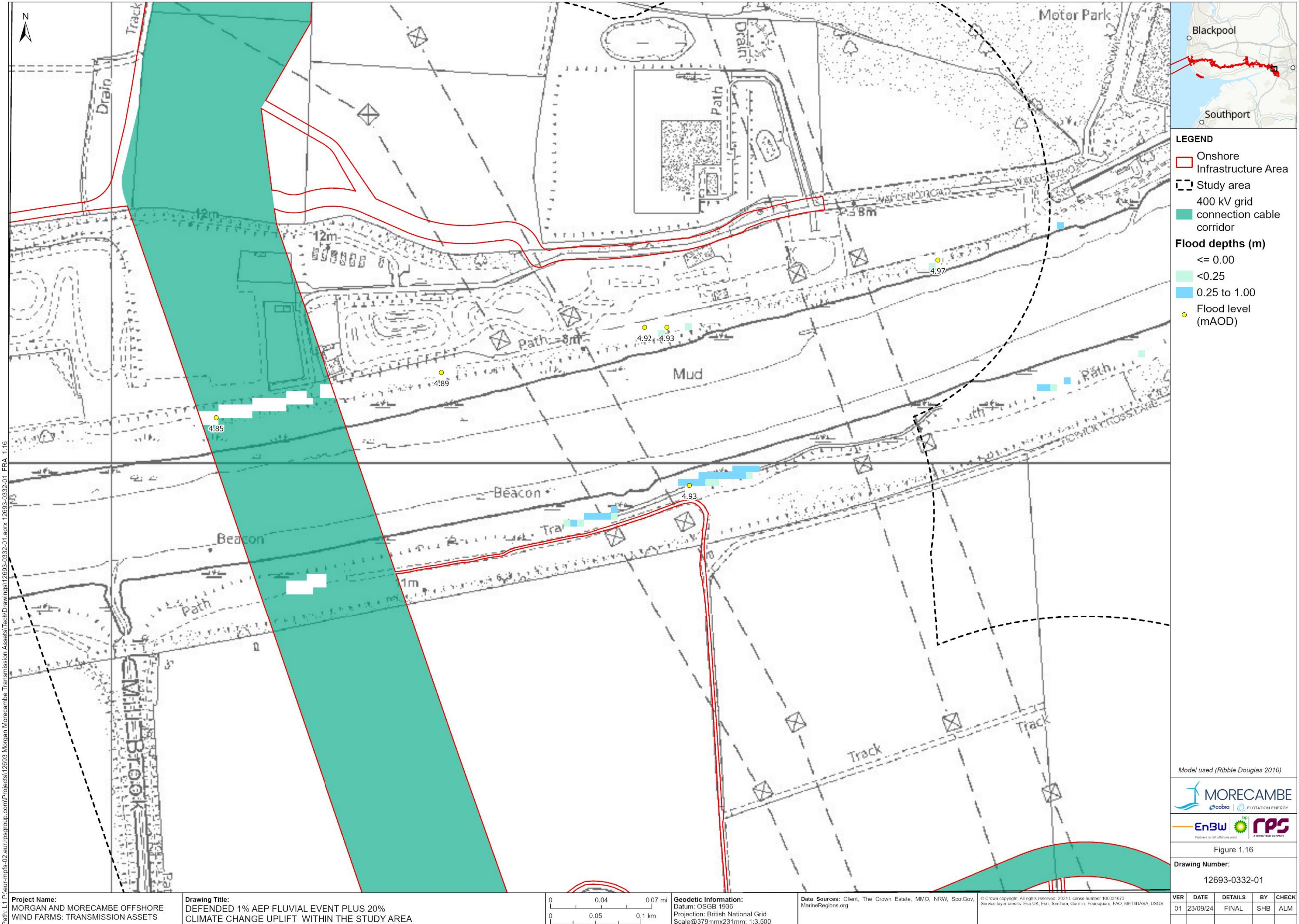
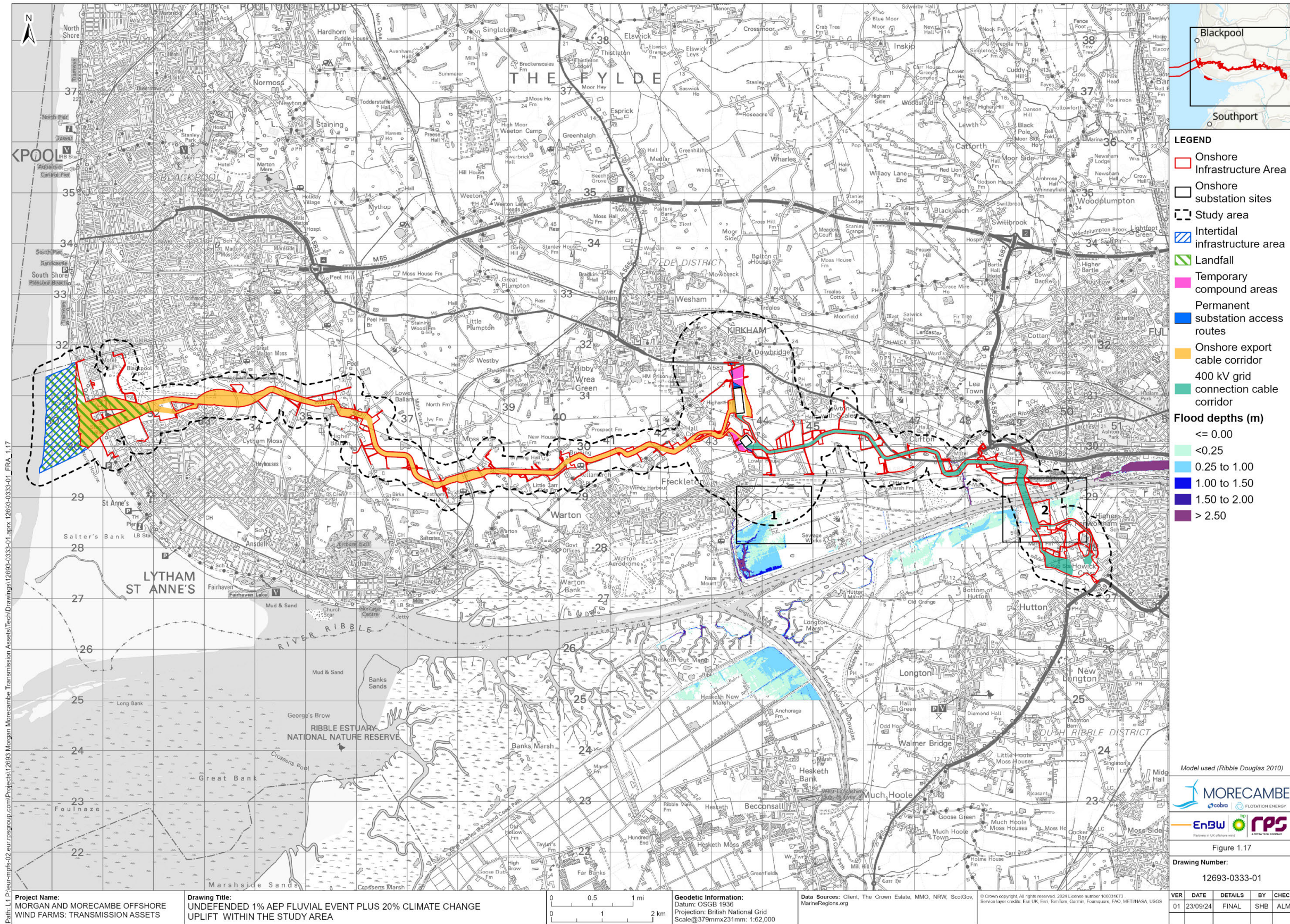


Figure 1.16a: Defended 1% AEP fluvial event plus 20% climate change uplift



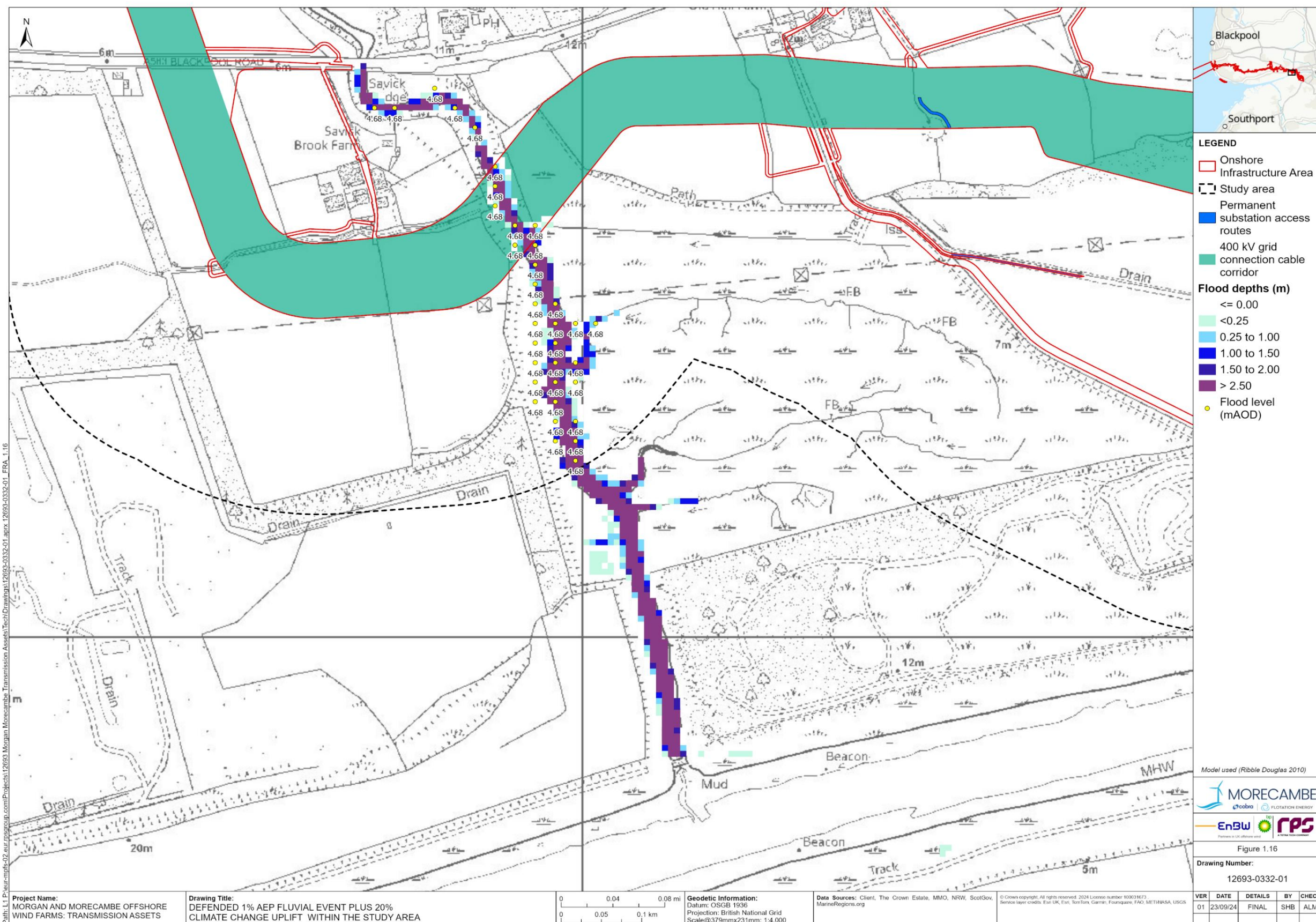


Figure 1.20: Defended 1% AEP fluvial event plus 20% climate change uplift

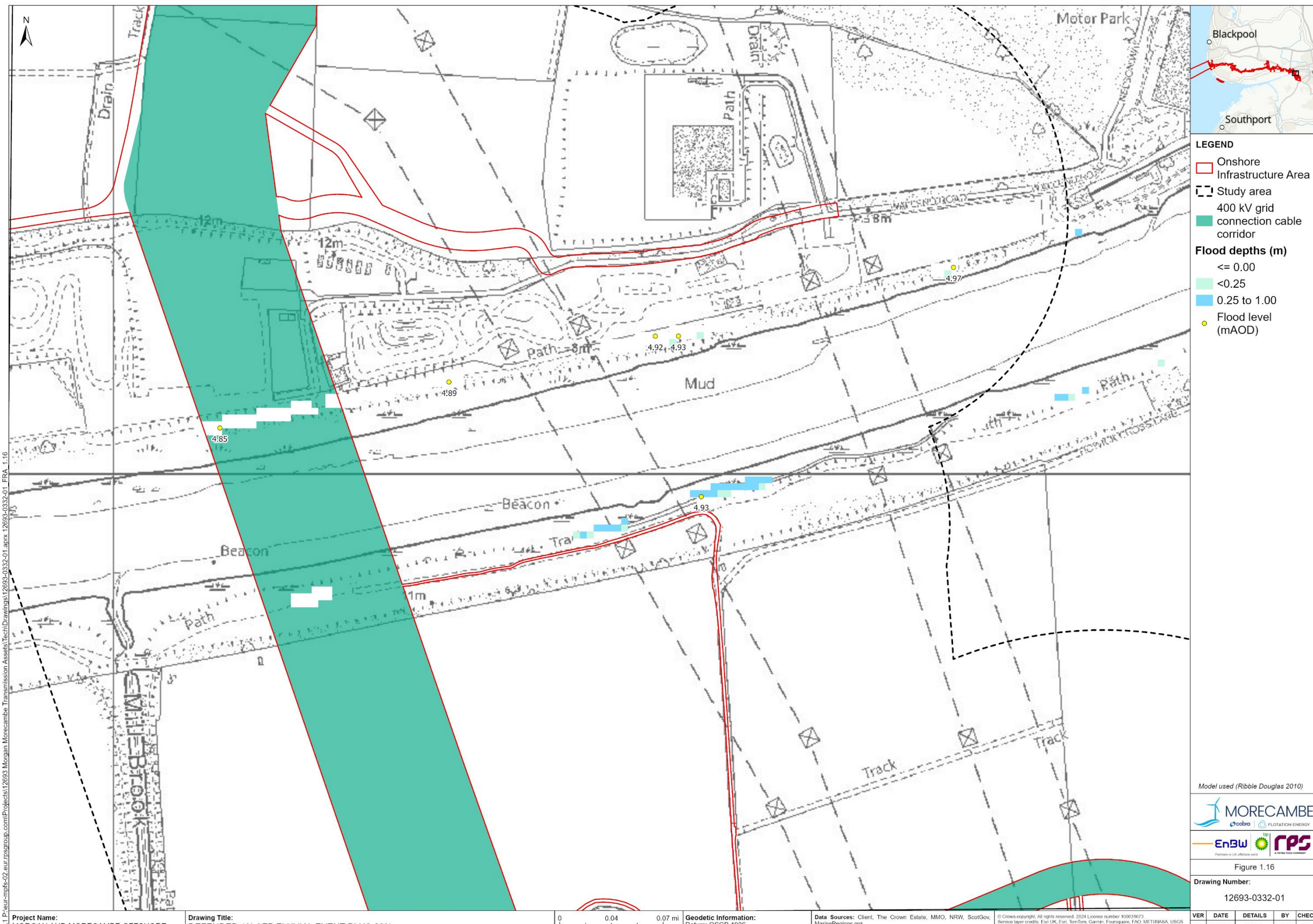


Figure 1.21: Defended 1% AEP fluvial event plus 20% climate change uplift

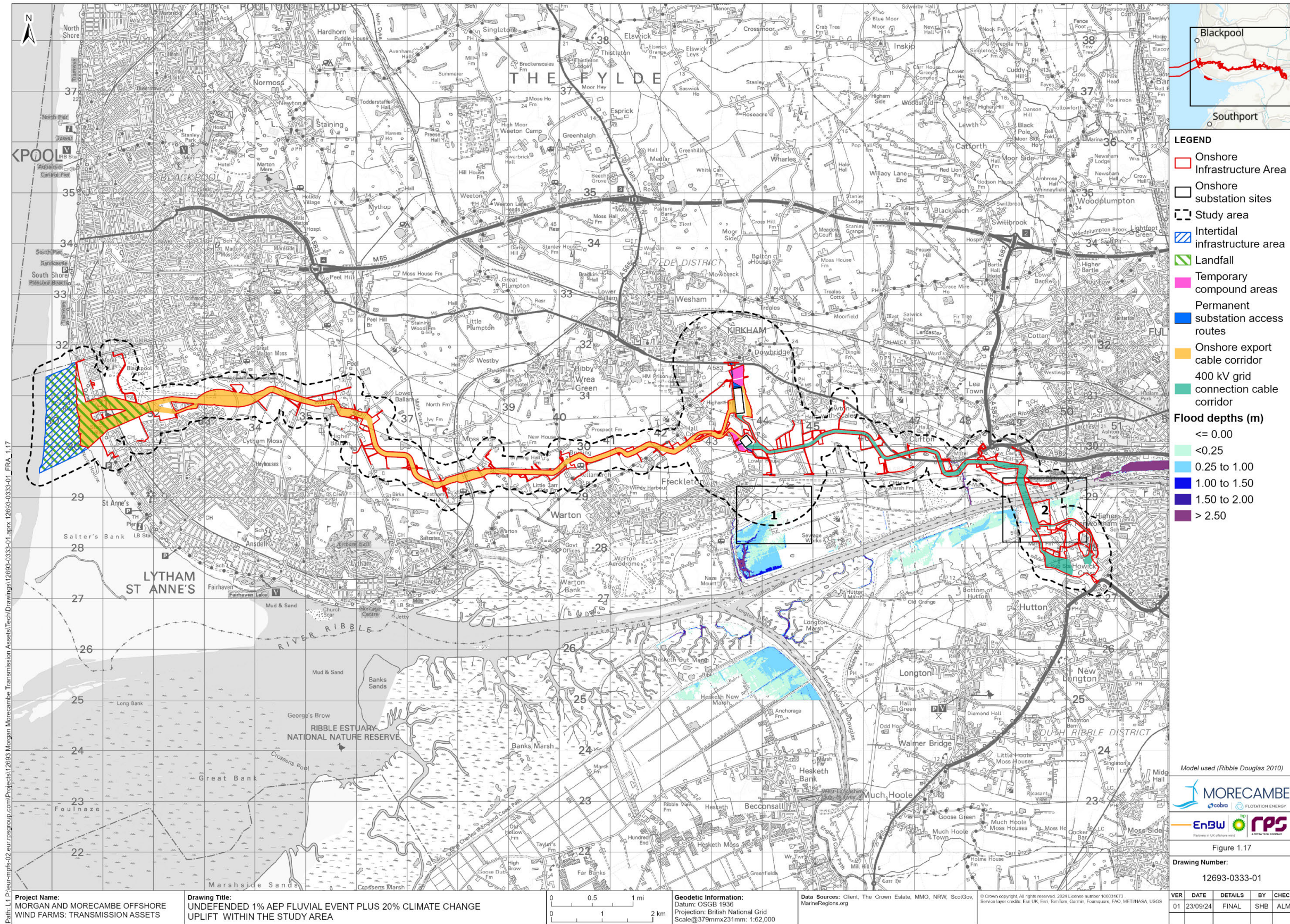


Figure 1.22a: Undefended 1% AEP fluvial event plus 20% climate change uplift

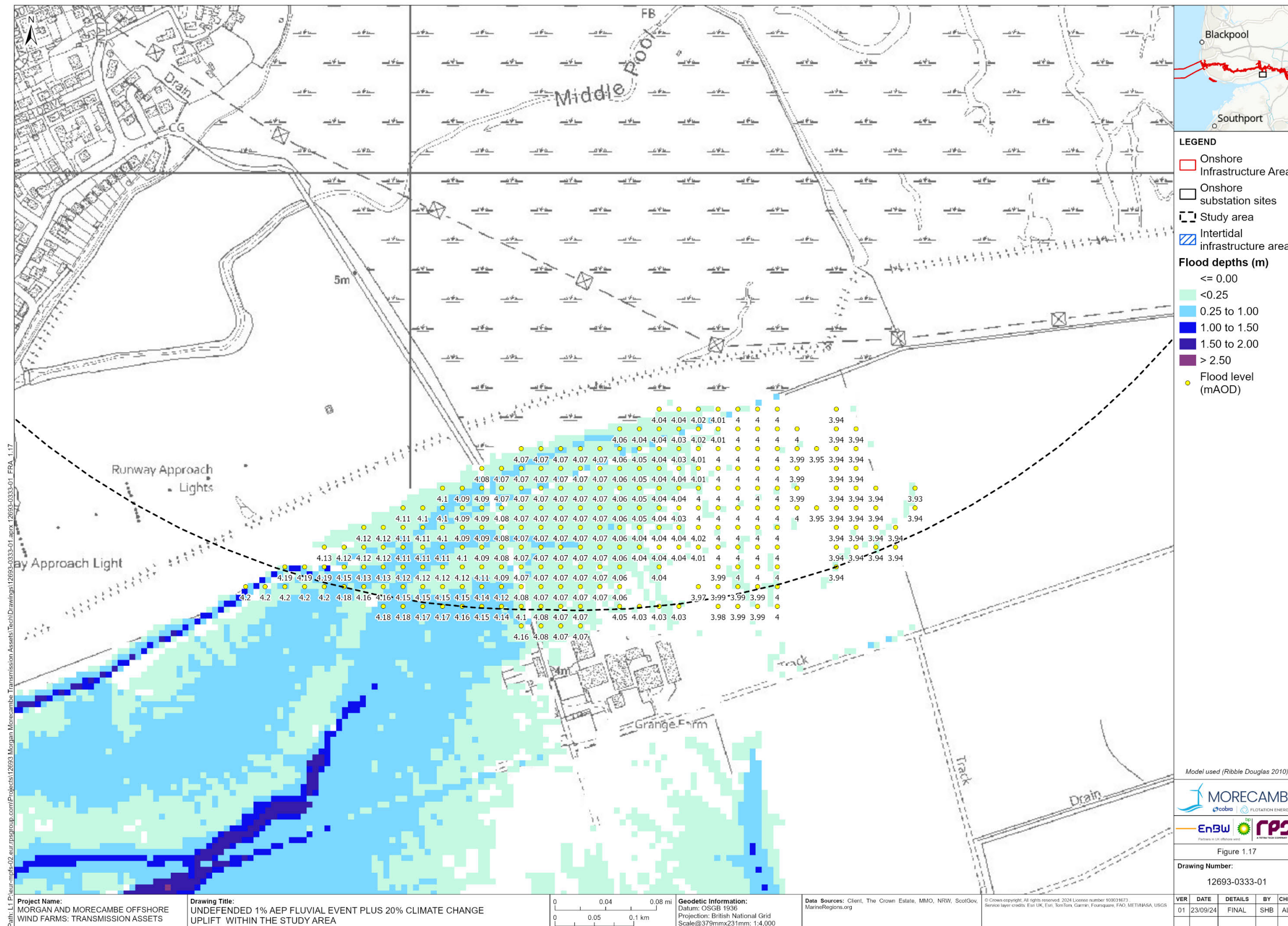


Figure 1.17a: Undefended 1% AEP fluvial event plus 20% climate change uplift

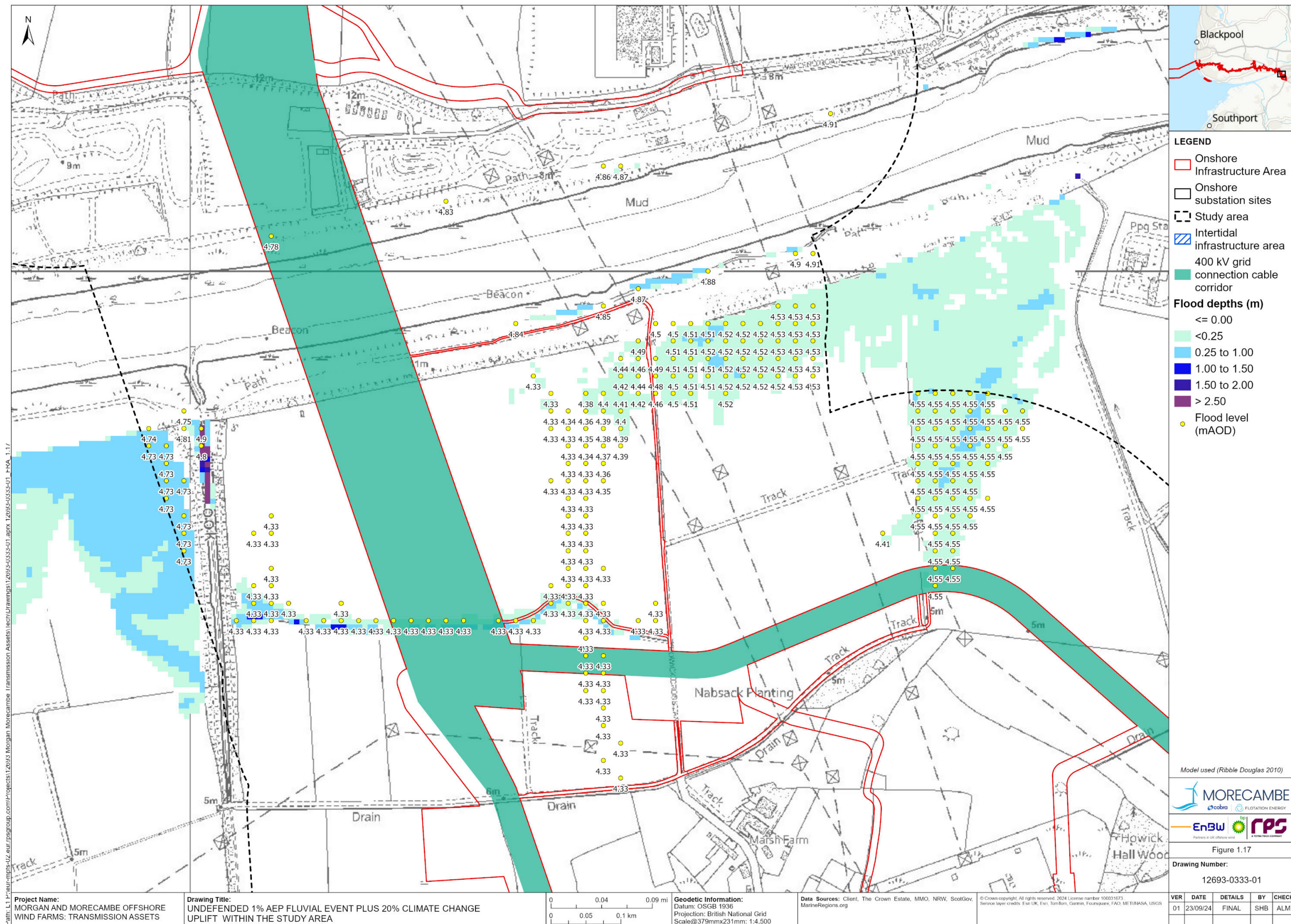
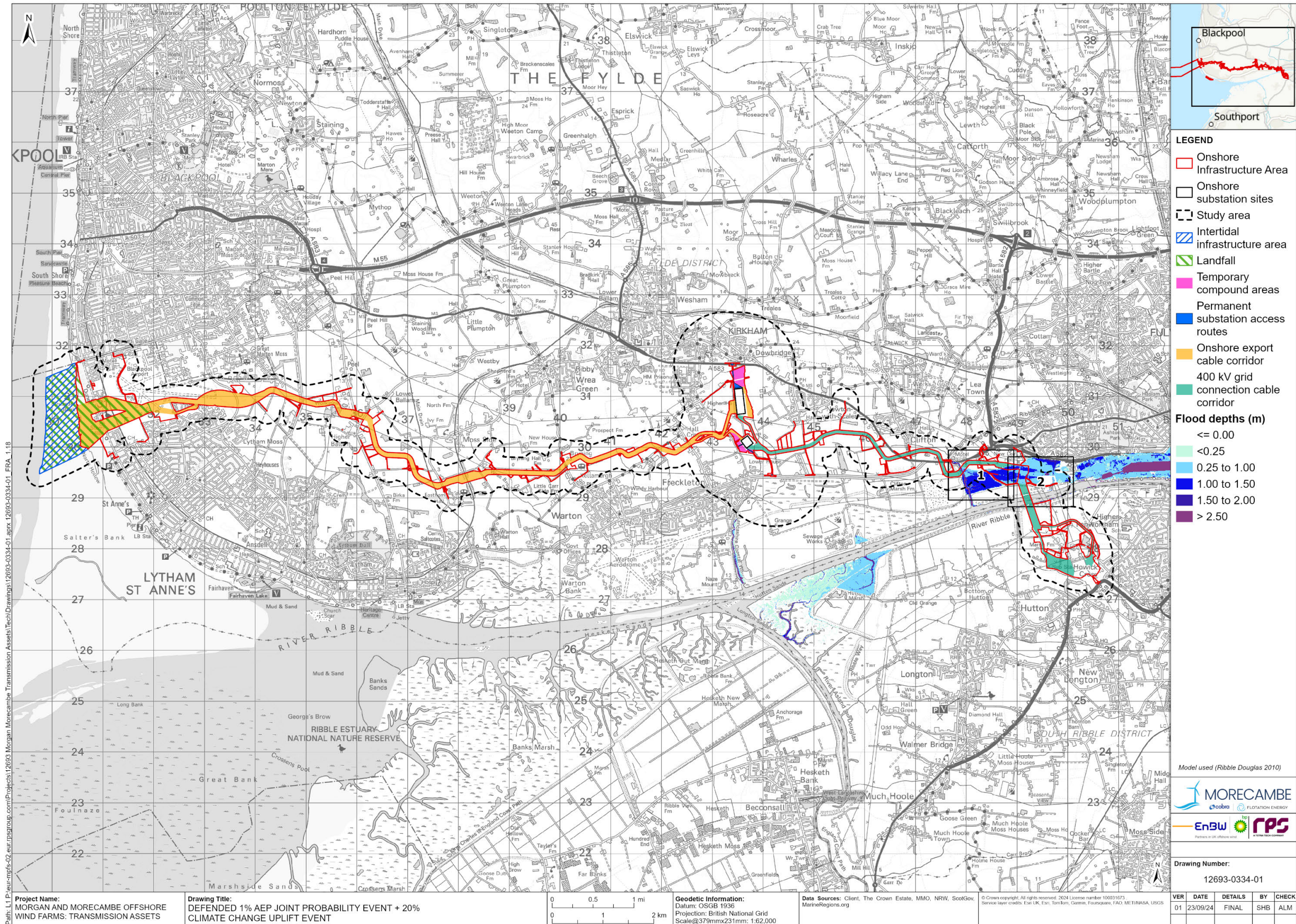


Figure 1.17a: Undefended 1% AEP fluvial event plus 20% climate change uplift



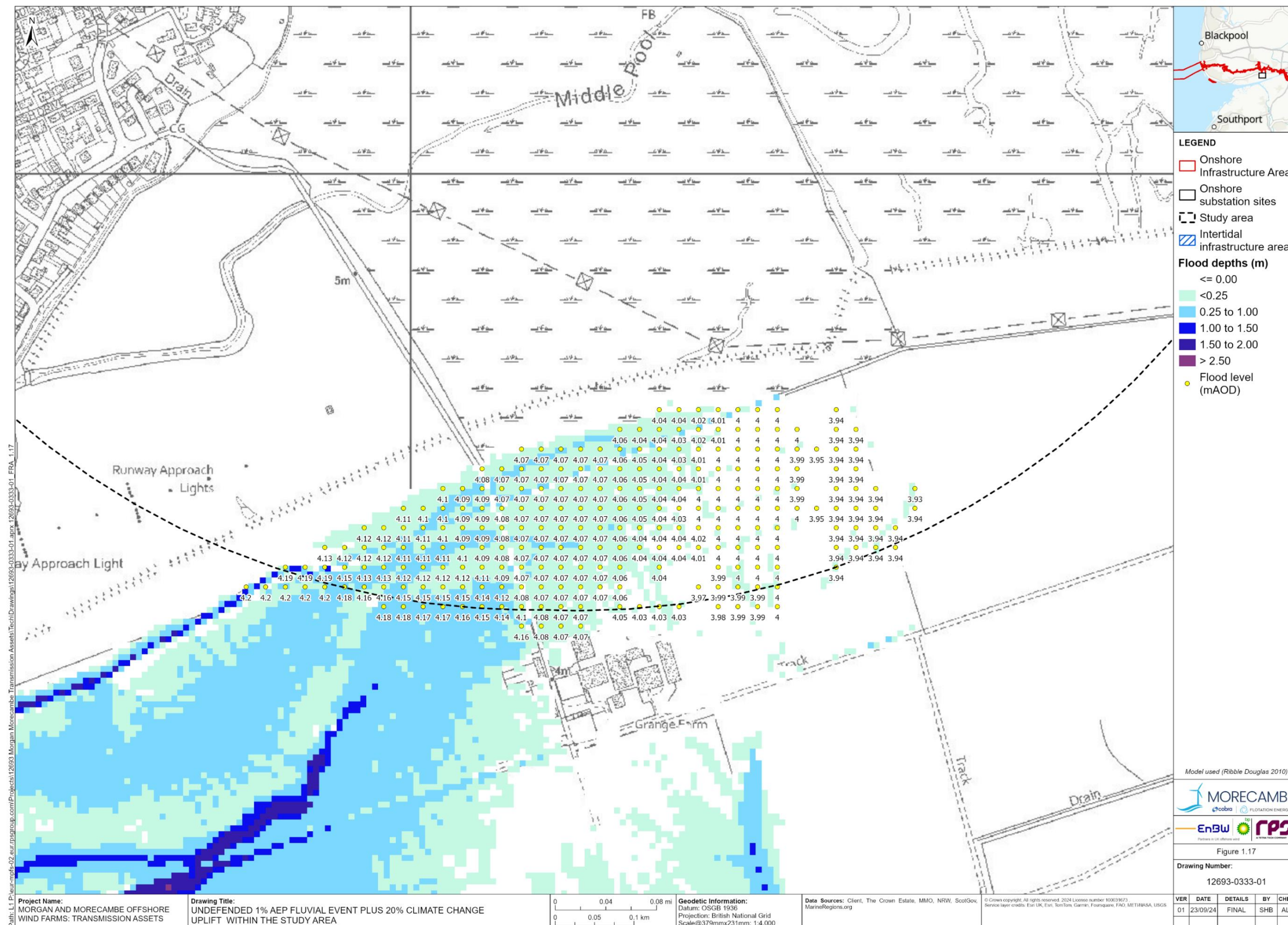


Figure 1.23: Undefended 1% AEP fluvial event plus 20% climate change uplift

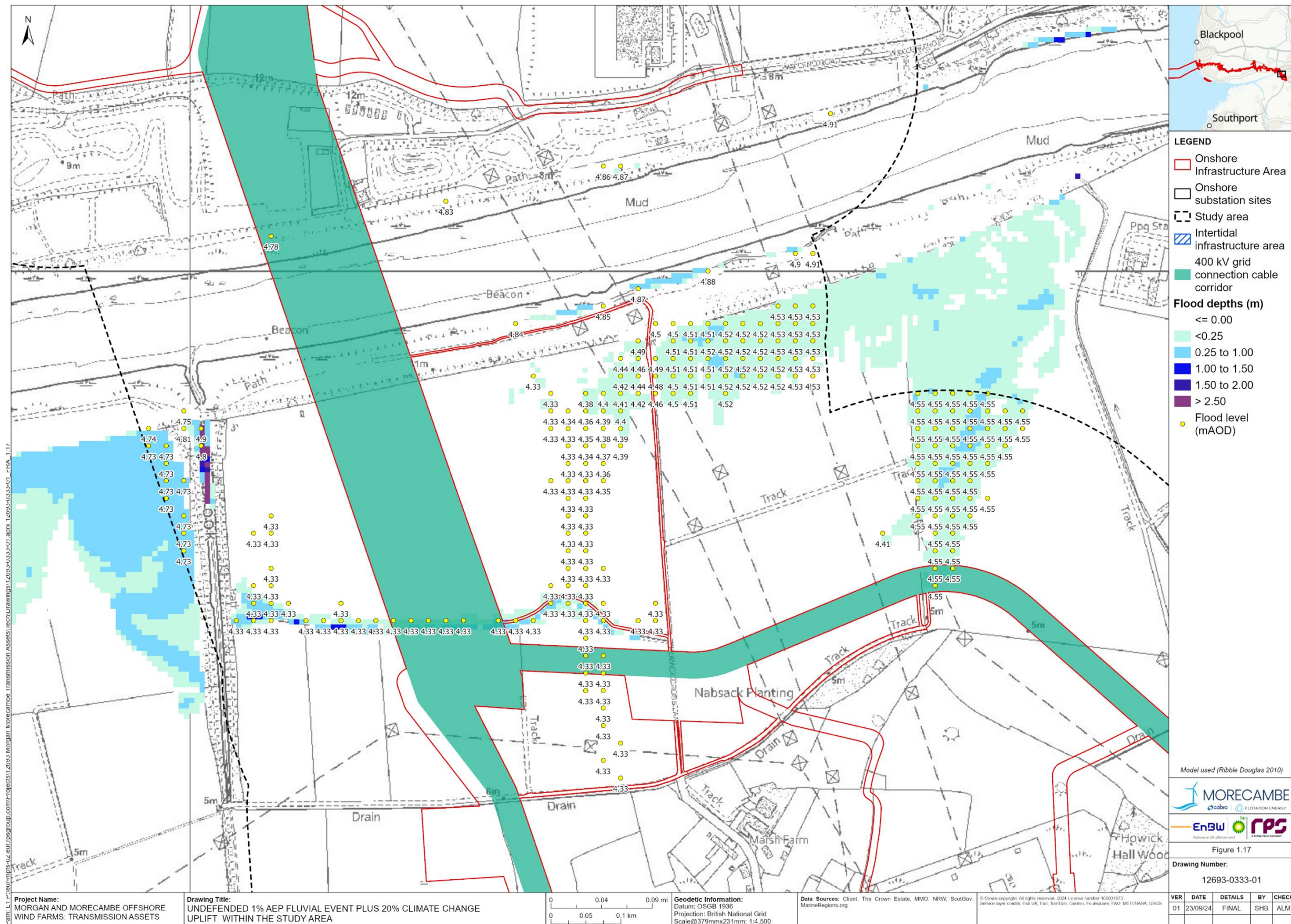
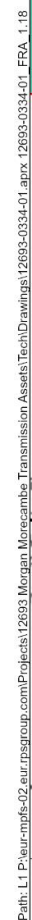


Figure 1.24: Undefended 1% AEP fluvial event plus 20% climate change uplift



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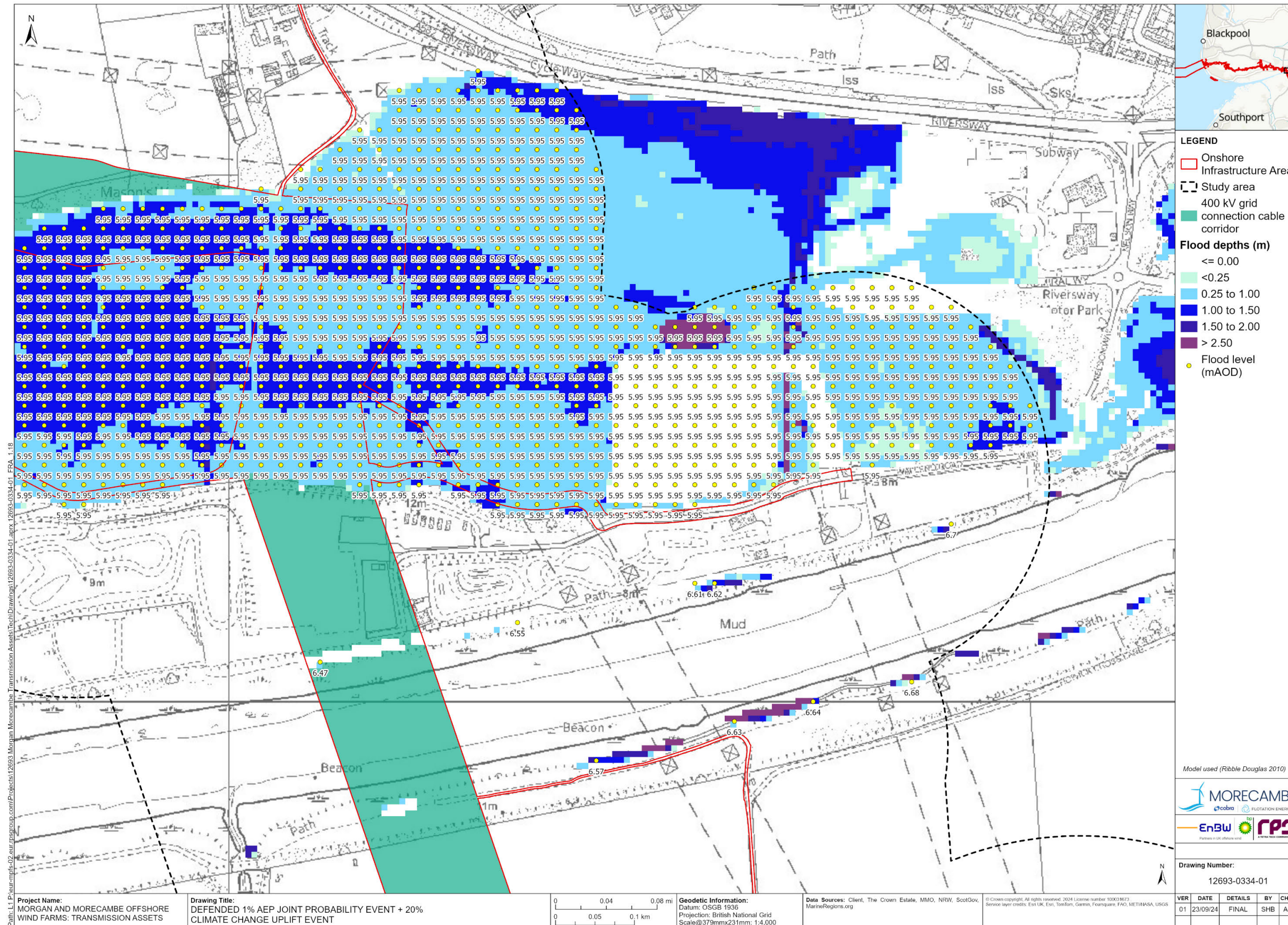
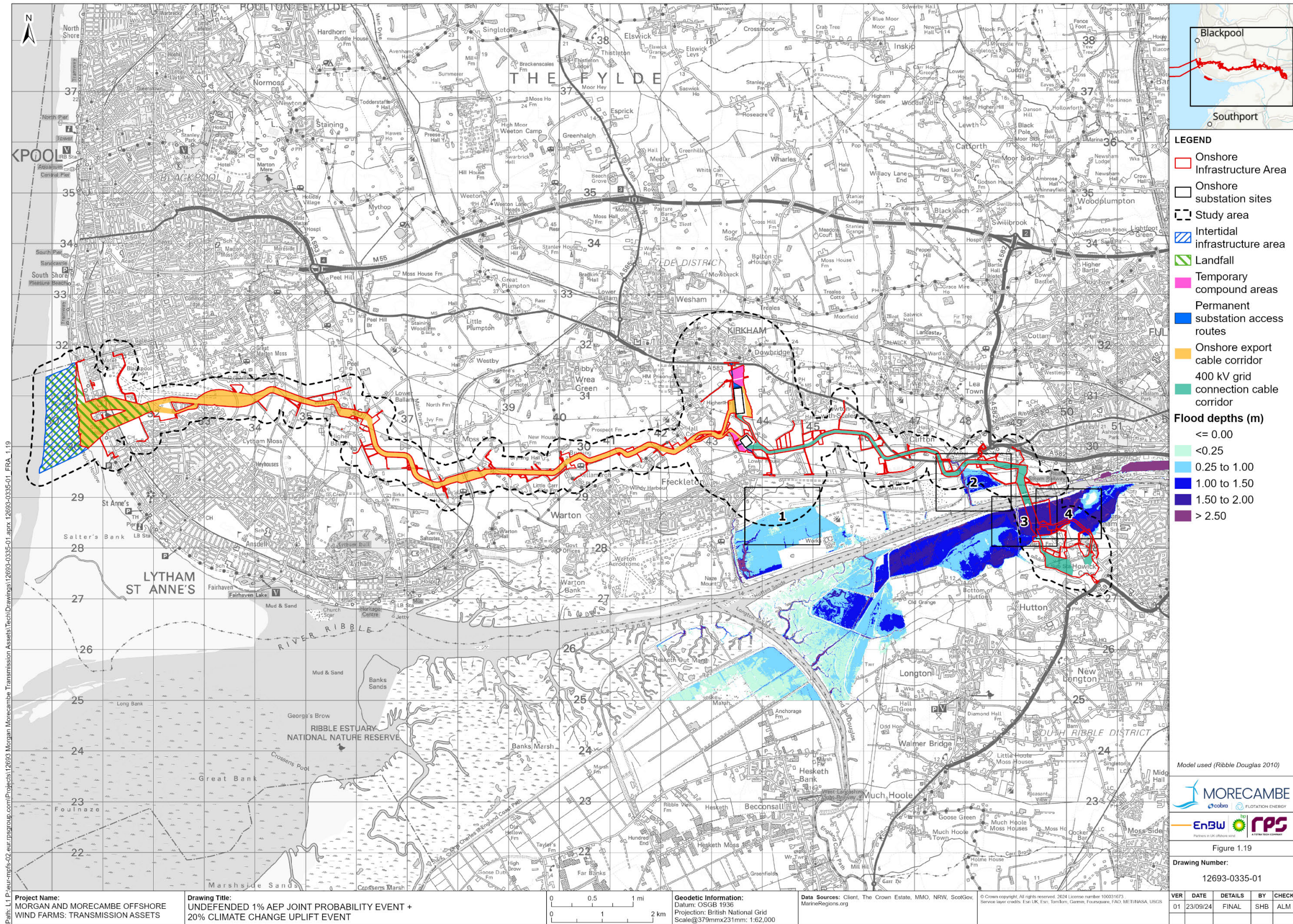


Figure 1.18a: Defended 1% AEP joint probability event plus 20% climate change uplift event



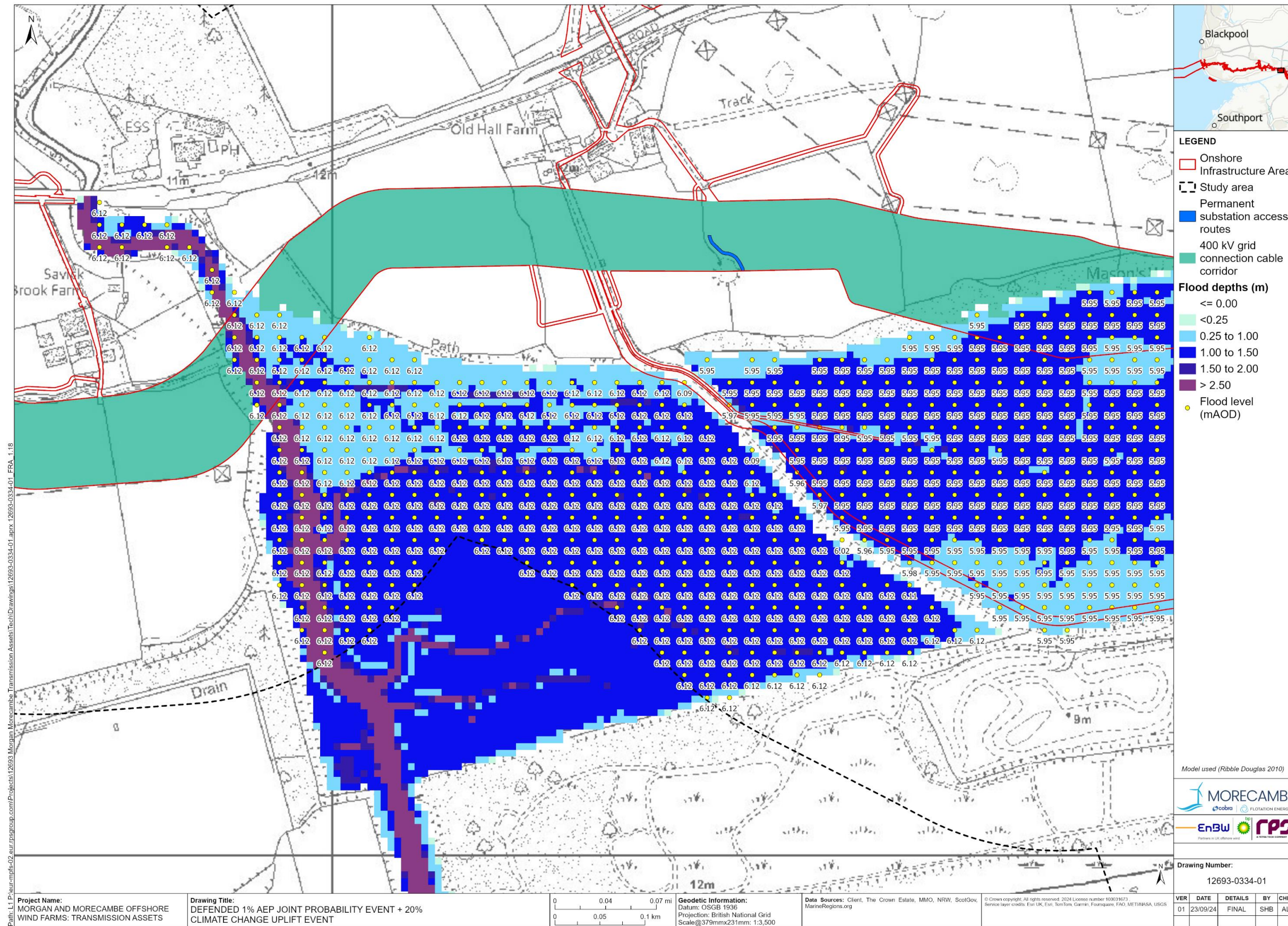


Figure 1.26: Defended 1% AEP joint probability event plus 20% climate change uplift event

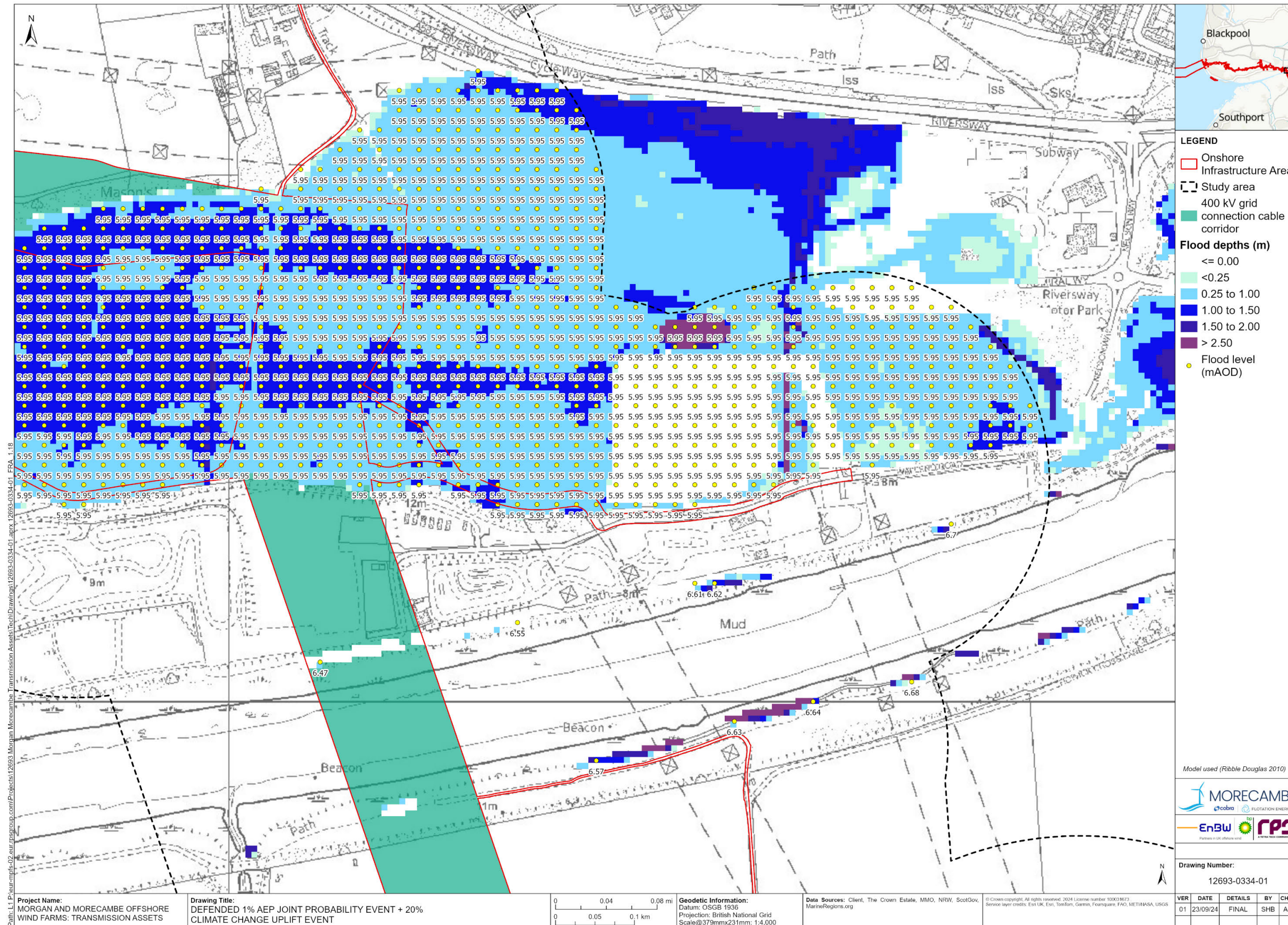


Figure 1.27: Defended 1% AEP joint probability event plus 20% climate change uplift event

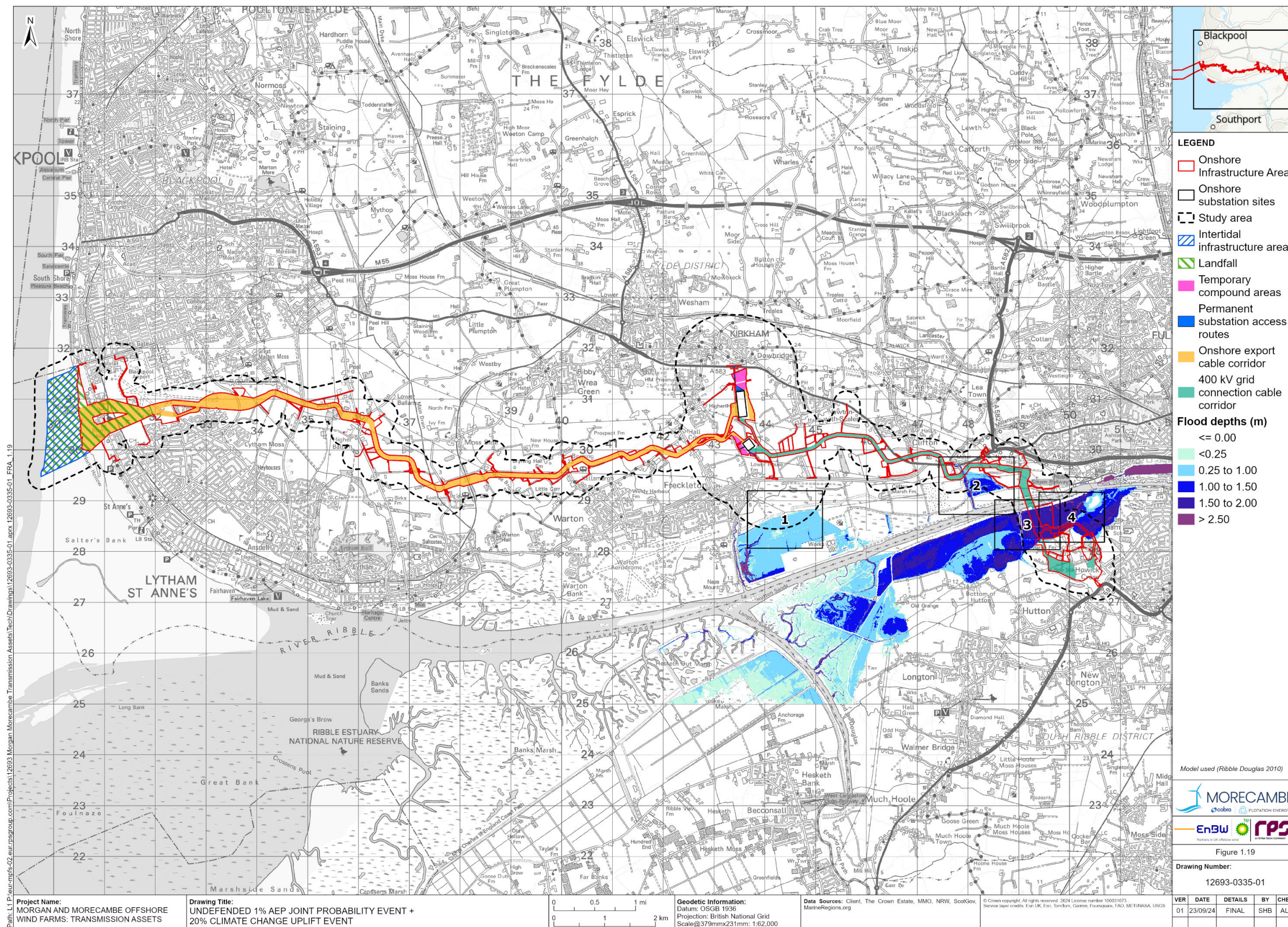


Figure 1.28a: Undefended 1% AEP joint probability event plus 20% climate change uplift event

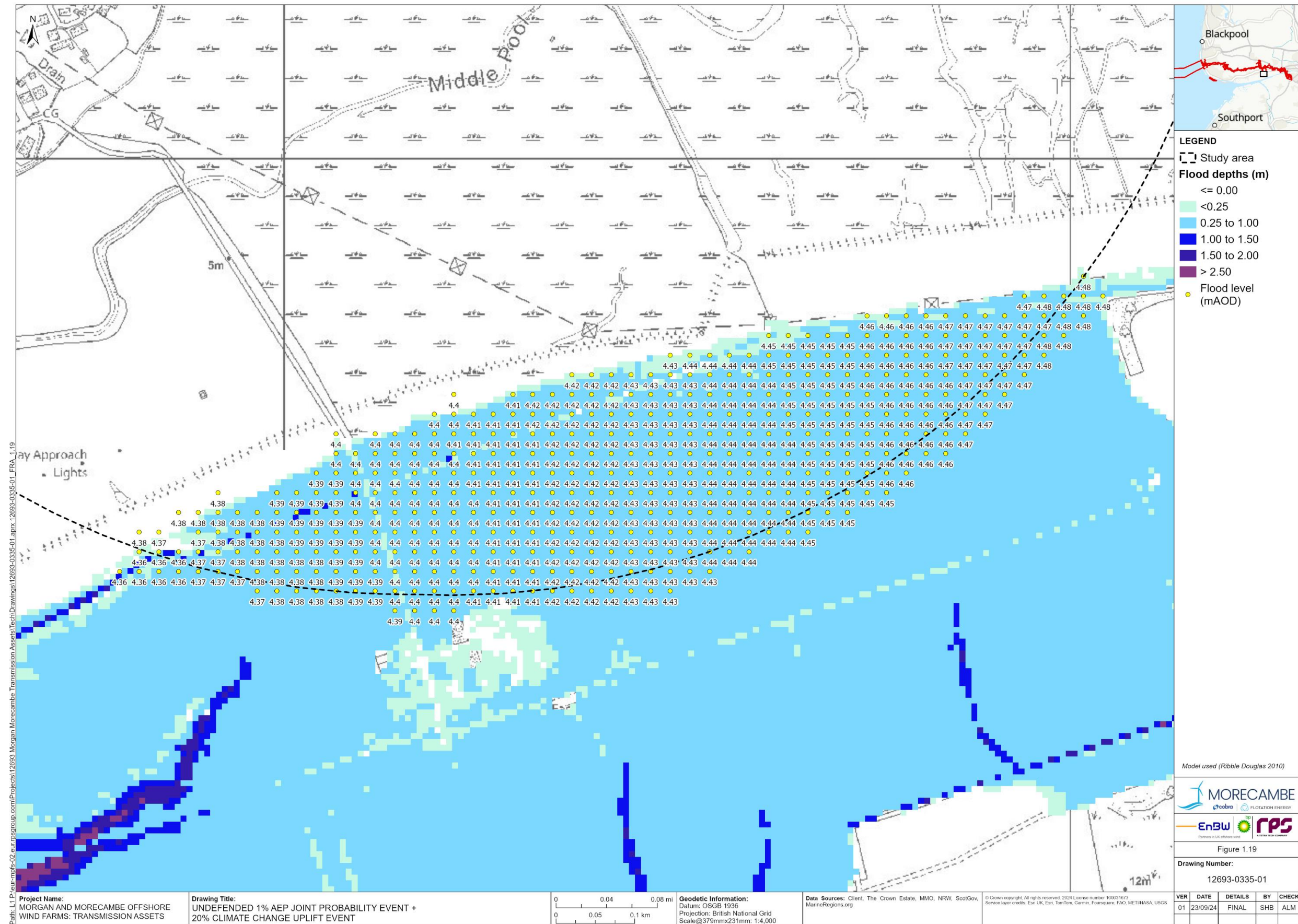


Figure 1.19a: Undefended 1% AEP joint probability event plus 20% climate change uplift event

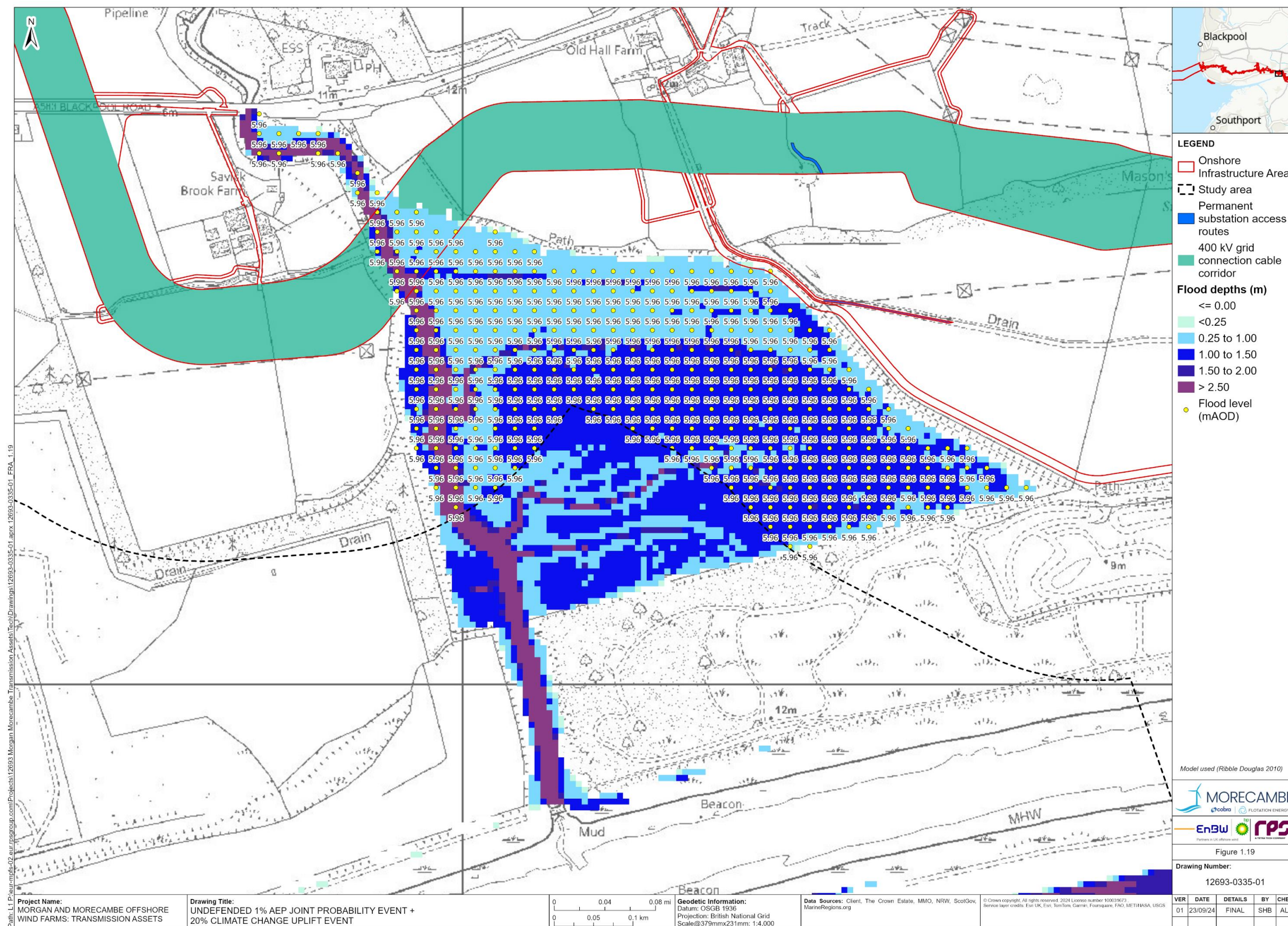


Figure 1.19a: Undefended 1% AEP joint probability event plus 20% climate change uplift event

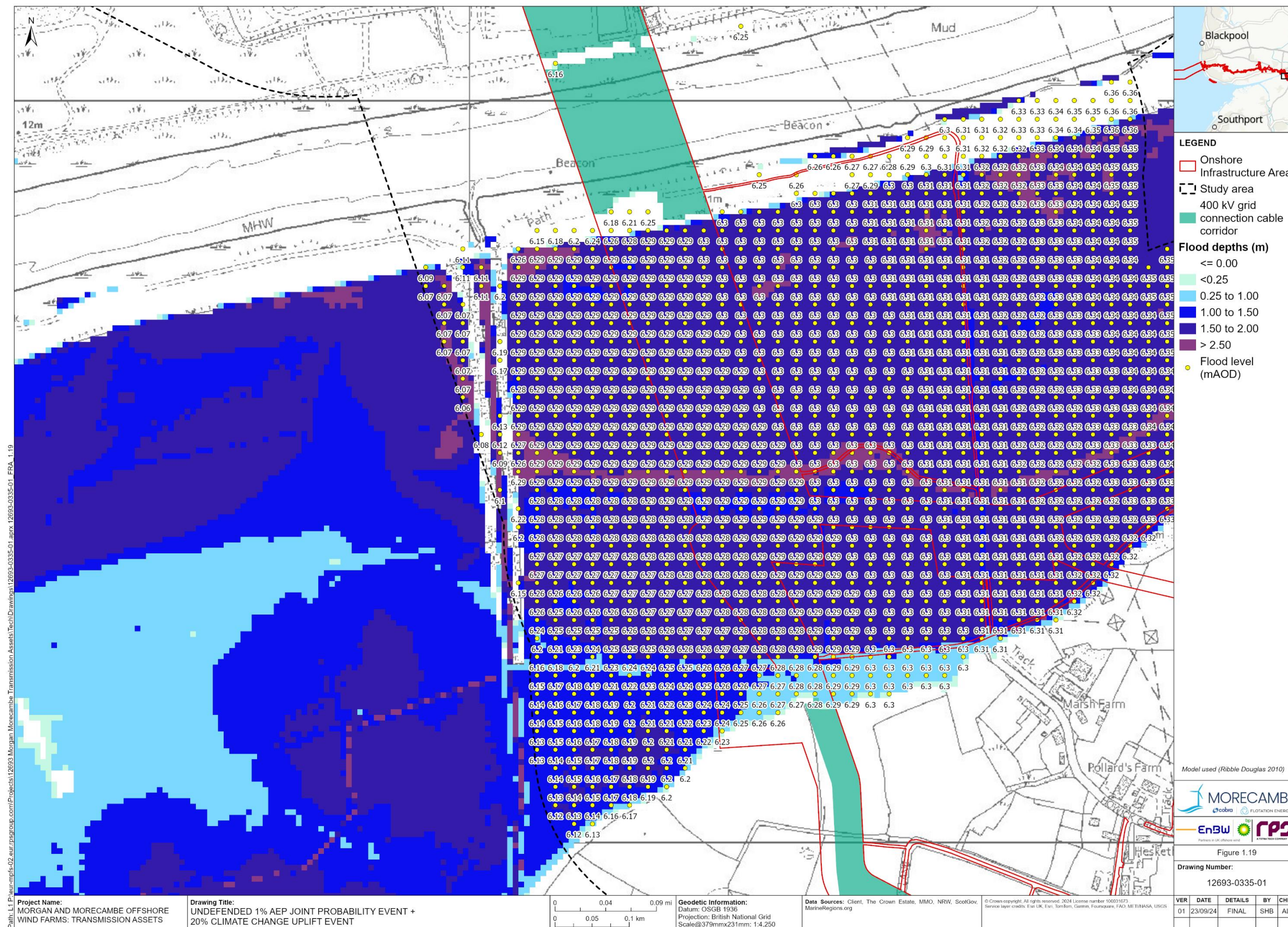
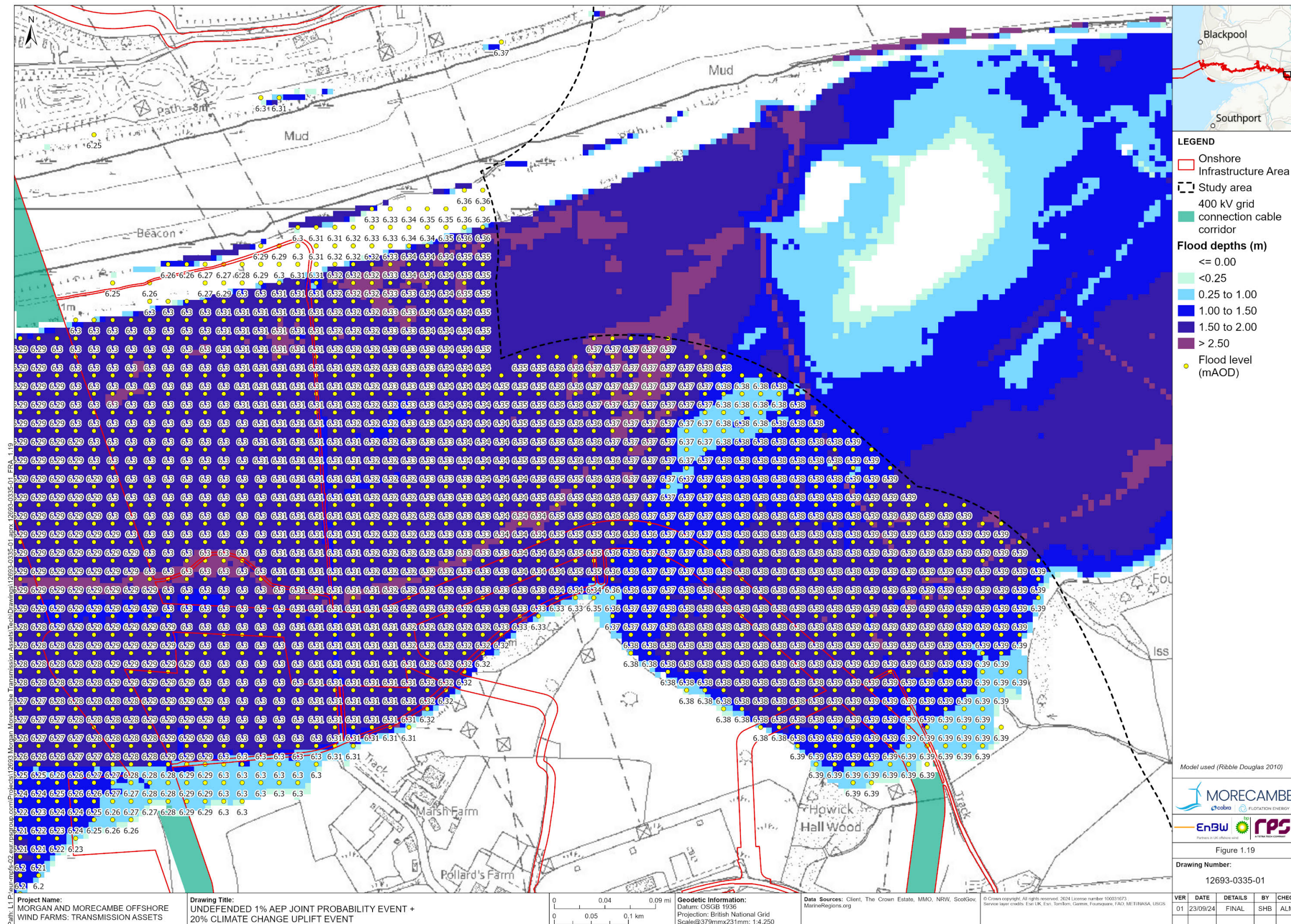


Figure 1.19a: Undefended 1% AEP joint probability event plus 20% climate change uplift event



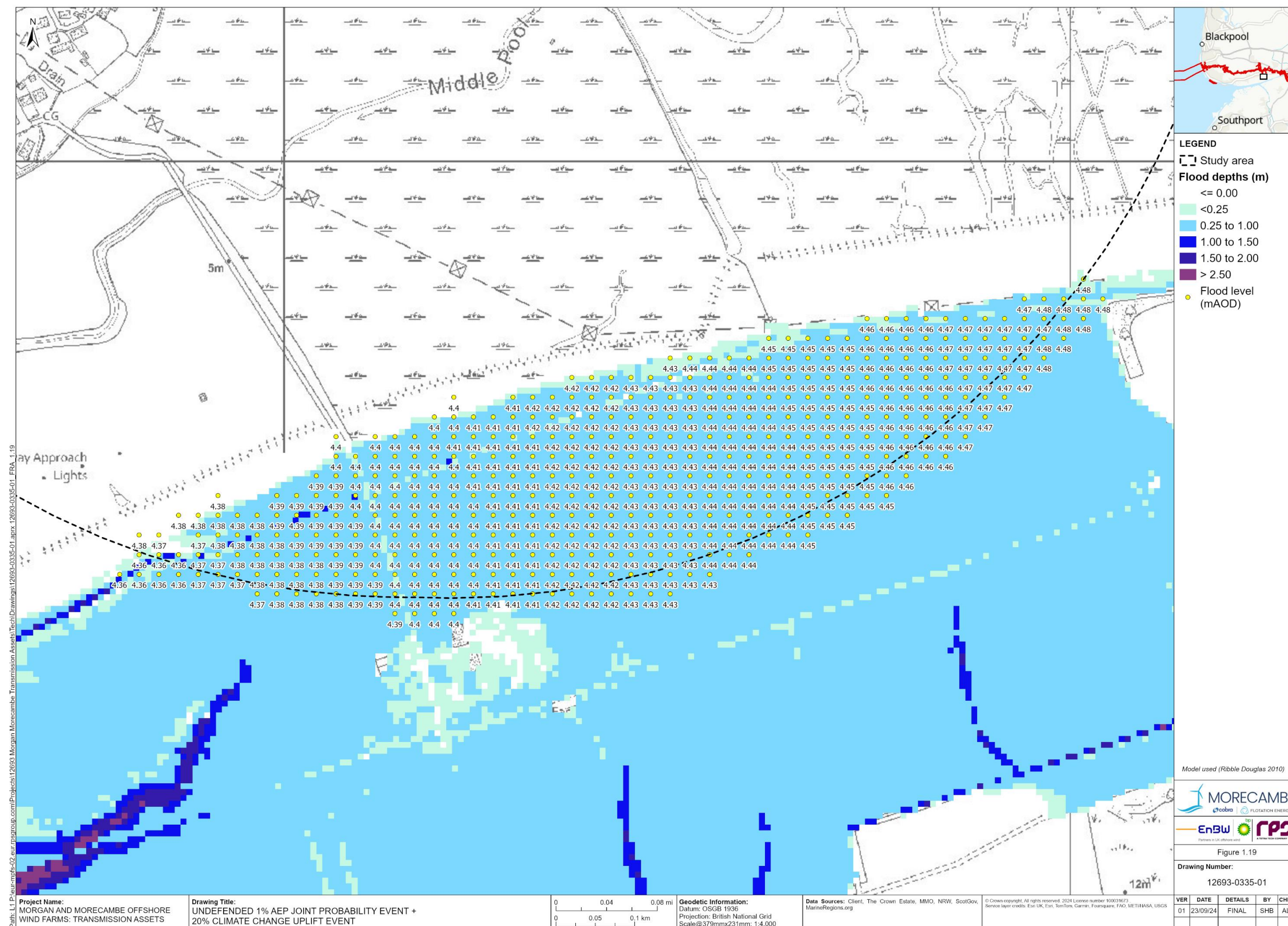


Figure 1.29: Undefended 1% AEP joint probability event plus 20% climate change uplift event

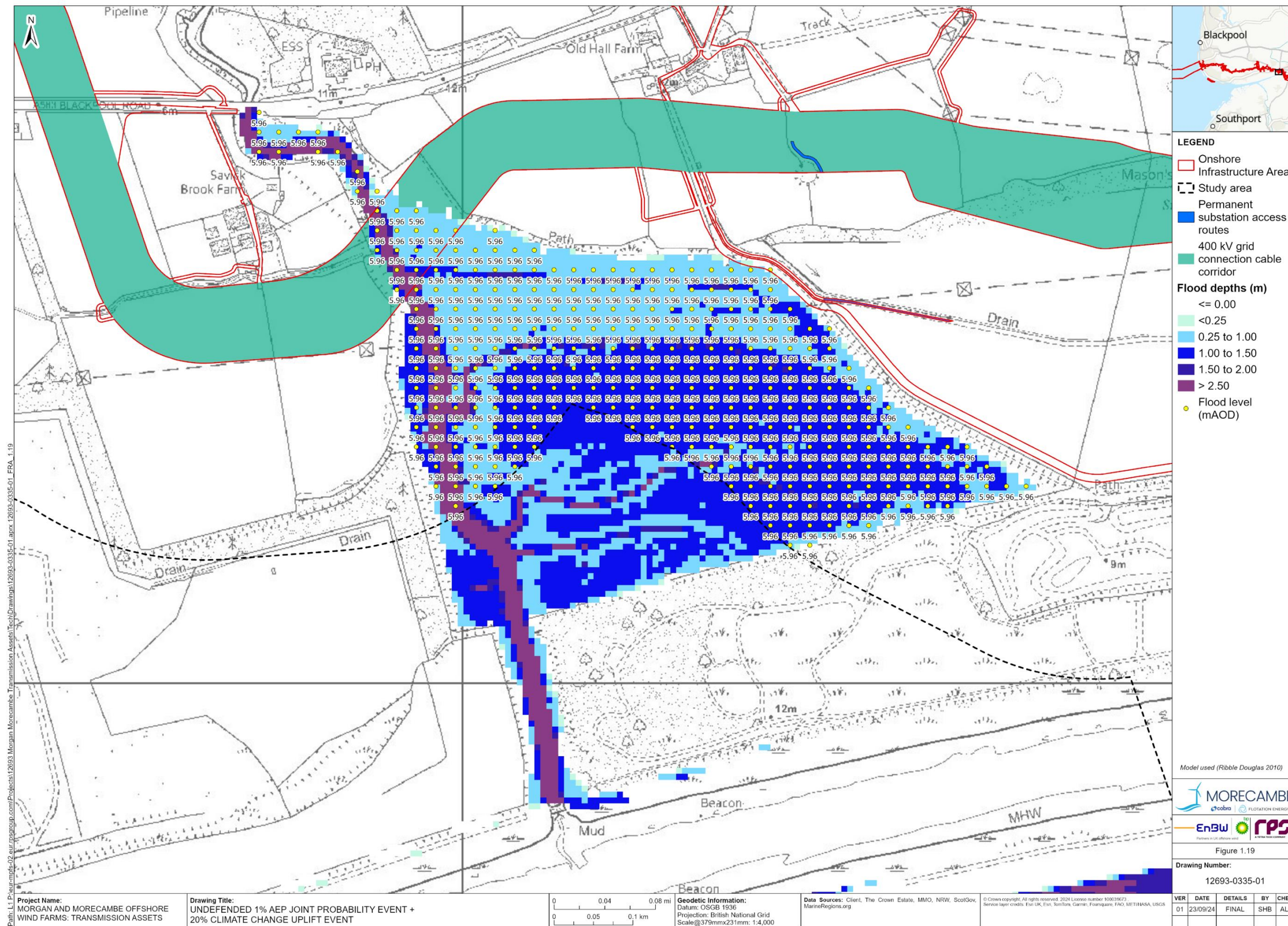


Figure 1.30: Undefended 1% AEP joint probability event plus 20% climate change uplift event

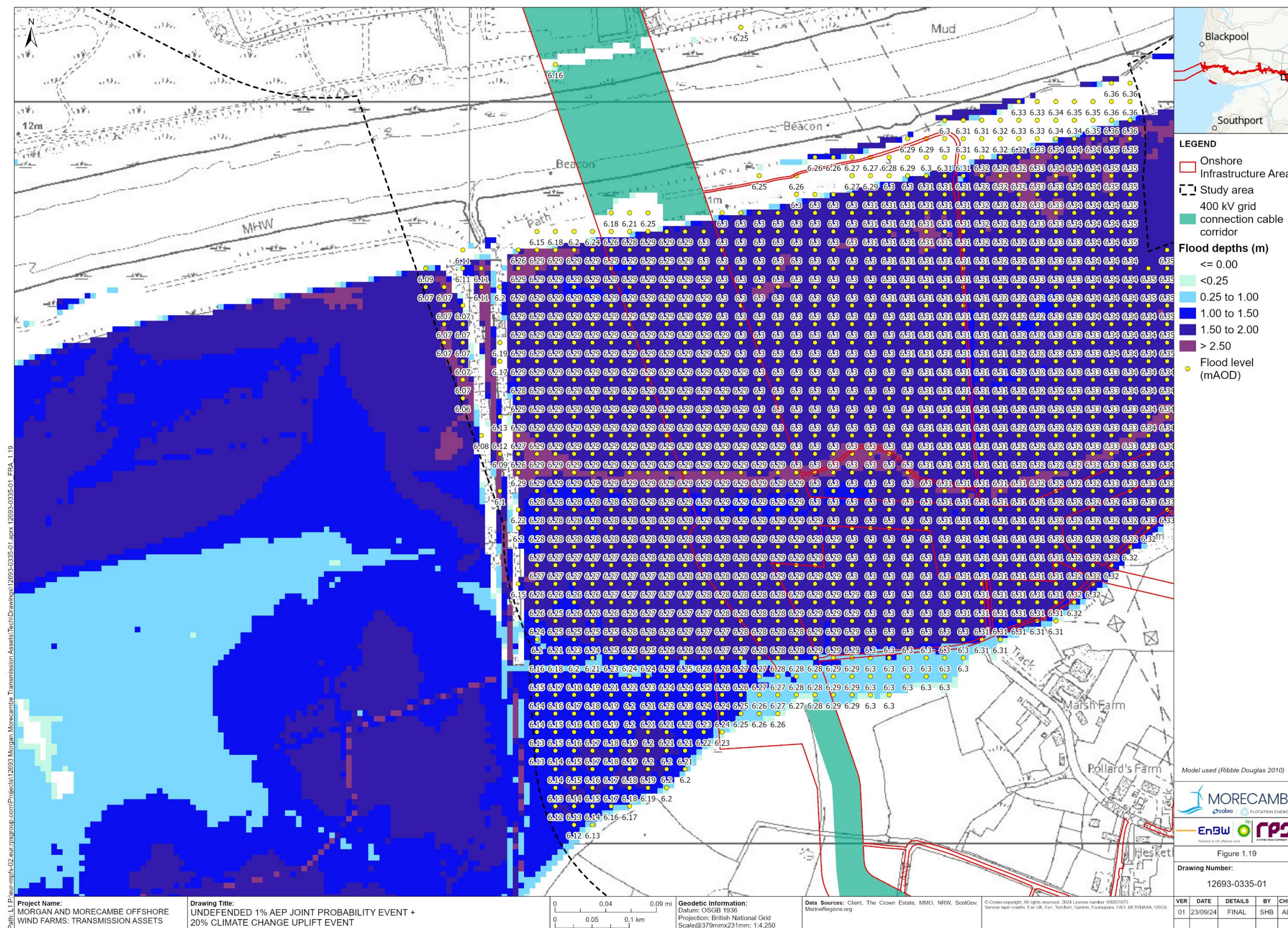


Figure 1.31: Undefended 1% AEP joint probability event plus 20% climate change uplift event

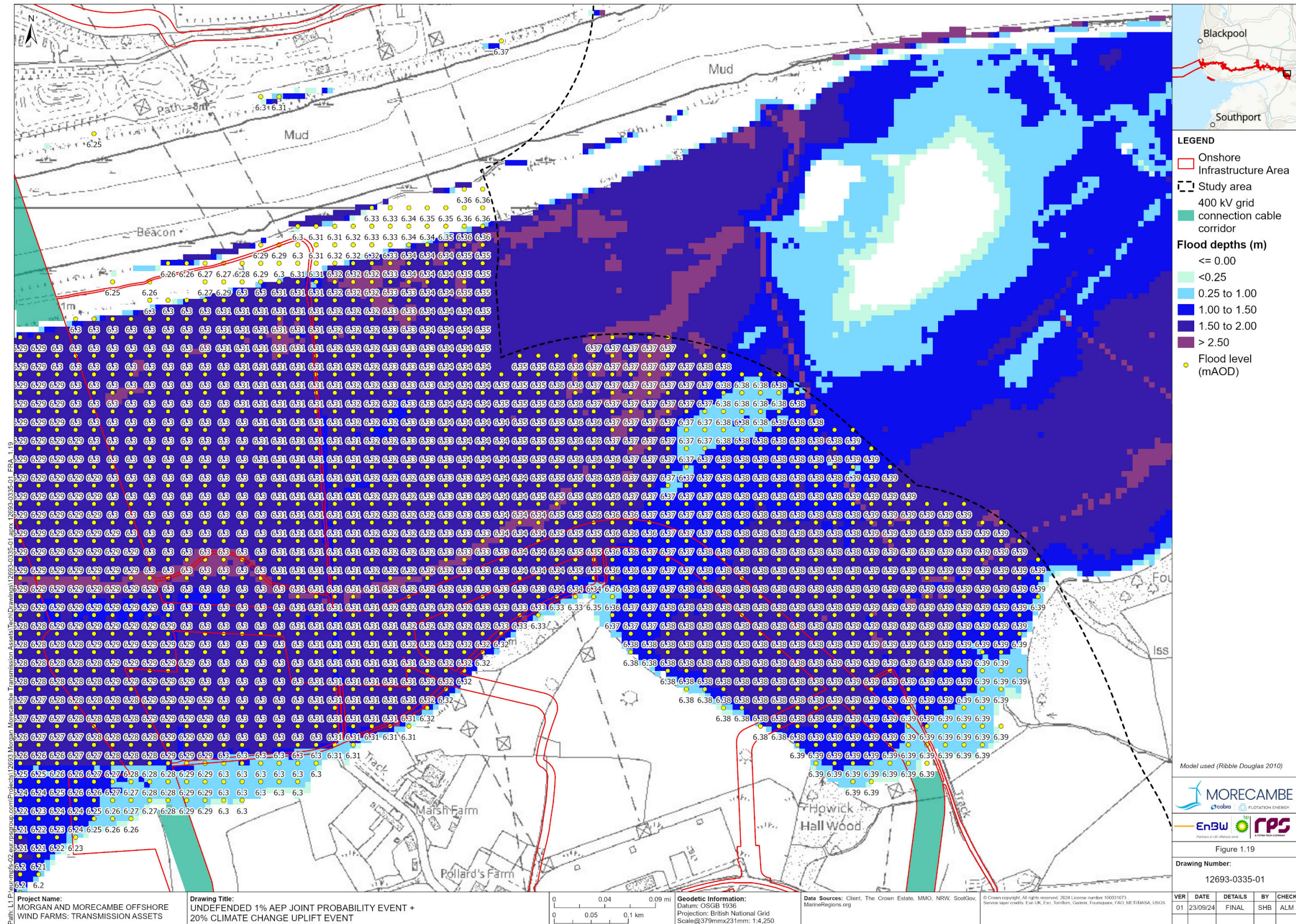


Figure 1.32: Undefended 1% AEP joint probability event plus 20% climate change uplift event

1.7.5 Groundwater flood risk

- 1.7.5.1 Groundwater flood risk mapping included within the Groundsure Enviro and Geo Insight report shows the western extent of the study area has a 'low' risk of groundwater flooding. The eastern extent of the study area has a 'moderate' to 'high' risk of groundwater flooding, associated with the water table being located closer to the surface within proximity to the Ribble Estuary.
- 1.7.5.2 Mitigation measures as identified in Volume 3, Chapter 1: Geology, hydrogeology and ground conditions of the ES limit the potential impact from this source. Any ingress of groundwater during excavation and trenching will be managed appropriately using dewatering as outlined in Volume 1, Chapter 3: Project description. With the mitigation, the overall risk of flooding from groundwater has been assessed to be very low.

Strategic Flood Risk Assessment

The Fylde Coast Authorities Strategic Flood Risk Assessment (2024)

- 1.7.5.3 Relevant information to groundwater flood risk from the FCA SFRA to the landfall, onshore export cables and 400 kV grid connection cables has been extracted and included as follows.
- Within the Blackpool Council area, the Environment Agency's 'Areas Susceptible to Groundwater Flooding' map shows considerable variability across Blackpool. The JBA groundwater emergence map shows most of Blackpool is at 'no risk' of groundwater emergence. Groundwater levels are highest in the south of the area, mainly between 0.025m and 0.5m below the ground surface.
 - Within the Fylde Council area, the Environment Agency's 'Areas Susceptible to Groundwater Flooding' map shows considerable variability across Fylde. The JBA groundwater emergence map shows large parts of Fylde are at 'no risk' of groundwater emergence. Groundwater levels are highest in the southwest of the area, across Lytham and St Annes, where they are mainly within 0.5m of the ground surface.

Central Lancashire Strategic Flood Risk Assessment (2007)

- 1.7.5.4 The CL SFRA reported occurrences of groundwater flooding from hard rock aquifers or superficial deposits in the north west Environment Agency region.

Mitigation measures (commitments)

- 1.7.5.5 Mitigation measures (commitments) presented below within **Table 1.39** are proposed to manage flood risk and vulnerability to site workers during the construction and decommissioning phase. No commitments relating to groundwater flooding are required during the operation and maintenance phase. Commitments are also presented within **Section 1.8, Table 1.44**. Commitments are to be secured through requirements of the DCO.

Table 1.39: Summary of CoT for groundwater flood risk

CoT	Summary	Reason	How CoT is to be secured
CoT09	The Outline Code of Construction Practice (CoCP) has been submitted as part of the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP includes information about drainage during construction.	To implement construction phase drainage to control runoff during this phase of the Transmission Assets.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT35	An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP will include measures to maintain and address: <ul style="list-style-type: none"> • [...] flood protection and control measures; • -water environment and drainage; and • pollution prevention [...] 	To implement control measures in regards to fluvial and tidal flooding, including: <ul style="list-style-type: none"> • Measures to prevent a reduction in the capacity of the fluvial floodplain which can increase flood risk downstream; • Measures regarding dewatering; Measures regarding restricting the placement of stockpiling, storage of fuels and chemicals and refuelling to Flood Zone 1 (where practical) and at least 8 m from ordinary watercourses and Main Rivers and 16m from tidal Main Rivers to reduce vulnerability to flood risk;	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT36	Onshore Decommissioning Plan(s) will be developed prior to decommissioning. The Onshore Decommissioning Plan(s) will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The Onshore Decommissioning Plan(s) will be in line with the latest relevant available guidance.	To manage flood risk during decommissioning	DCO Schedules 2A and 2B, Requirement 22 (Onshore decommissioning)

CoT	Summary	Reason	How CoT is to be secured
CoT41	Where the onshore export cable corridor or 400 kV grid connection cable corridor crosses sites of particular sensitivity (e.g. embanked Environment Agency surface watercourses, Sites of Special Scientific Interest or groundwater inner Source Protection Zones) hydrogeological risk assessment(s) will be undertaken to inform a site-specific crossing method statement(s) where required. These will be agreed with the relevant stakeholders prior to construction.	To inform groundwater flood risk	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)

Summary

1.7.5.6 With the implementation of commitments listed within **Table 1.39** the overall risk of flooding from groundwater is assessed to be very low.

1.7.6 Surface water flood risk

1.7.6.1 Surface water flooding occurs when the amount of rainfall exceeds the drainage or infiltration capacity of the surface it falls upon. Surface water runoff can coalesce into surface water flow pathways as it flows towards a drainage system or watercourse. Surface water can also pond within areas of inadequate drainage.

Environment Agency Long Term Flood Risk Mapping

1.7.6.2 The Environment Agency Long Term Flood Risk mapping includes Risk of Flooding from Surface Water mapping which was updated in January 2025 and is presented within **Figure 1.22**. [Figure 1.20](#). Mapping shows localised areas along the study area as having 'low' to 'high' chance of flooding from surface water and ordinary watercourses. Flooding is predominantly associated overland flow pathways flowing towards ordinary watercourses and out-of-bank flows from ordinary watercourses which form tributaries to main rivers.

Strategic Flood Risk Assessment

The Fylde Coast Authorities Strategic Flood Risk Assessment (2024)

1.7.6.3 Relevant information to fluvial and tidal flood risk from the FCA SFRA has been extracted and included as follows.

- Within the Blackpool Council area, surface water flood risk is very localised but is generally shown to follow the contours of the roads throughout the settlement, but with several areas of ponding affecting properties across the area. Flood risk is widespread, but key large areas

of ponding affect Anchorsholme in the north, South Shore, Hawes Side, Marton Moss, and Squires Gate in the south.

- Within the Fylde Council area, surface water flood risk is very localised but generally follows the main watercourses through the area and follows the roads through the settlements. There is considerable surface water flood risk across both St Anne's and Lytham in the west of the area, but all settlements across the area are affected by surface water risk.
- FCA details the following historical flood events recorded by councils:
 - Winter 1958, heavy rainfall caused flooding at Mere Road, Blackpool
 - At Carr Lane to the West of Warton to the north of Little Carr Side Farm and at the junction with West End Lane
 - Lytham Road and Bank Lane to the south west of Warton

Mitigation measures (commitments)

1.7.6.4 Mitigation measures (commitments) presented below within **Table 1.40** are proposed to manage flood risk and vulnerability to site workers during the construction and decommissioning phase. No commitments relating to surface water flooding are required during the operation and maintenance phase. Commitments are also presented within **Section 1.8, Table 1.44**. Commitments are to be secured through requirements of the DCO.

Table 1.40: Summary of CoT for surface water flood risk for landfall, the onshore export corridor and 400 kV grid connection cable corridor

CoT	Summary	Reason	How CoT is to be secured
CoT08	Post-construction, the working area will be reinstated to pre-existing condition as far as reasonably practical in line with the DEFRA Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (PB13298), Institute of Quarrying (IQ) Good Practice Guide for Handling Soils in Mineral Workings (IQ, 2021) and British Society of Soil Science (BSSS) Working with Soil Guidance Note on Benefitting from Soil Management in Development and Construction (BSSS, 2022).	To ensure working areas are reinstated to pre-existing conditions to not increase flood risk from surface water runoff as a result of increased impermeable areas	DCO Schedules 2A & 2B, Requirement 18 (Restoration of land temporarily used for construction); DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT09	The Outline Code of Construction Practice (CoCP) has been submitted as part of the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP includes information about drainage during construction.	To implement construction phase drainage to control runoff during this phase of the Transmission Assets.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)

CoT	Summary	Reason	How CoT is to be secured
CoT24	Where practicable, during construction, access routes within the onshore export cable corridor and 400 kV grid connection corridor (i.e. for example, the use of haul roads) will be used, to minimise potential impacts to the local road network.	To not increase impermeable areas associated with haul roads and in turn increase surface water runoff and flood risk from this source	DCO Schedules 2A & 2B, Requirement 9 (Traffic and Transport) Access to Works Plan
CoT27	All temporary compounds will be removed and sites will be reinstated when construction has been completed.	To not increase surface water runoff as a result of greater impermeable areas during the operation and maintenance phase	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice) DCO Schedules 2A & 2B, Requirement 16 (Restoration of land used temporarily for construction)
CoT35	An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP will include measures to maintain and address: <ul style="list-style-type: none"> • [...] flood protection and control measures; • -water environment and drainage; and • pollution prevention [...] 	To implement control measures in regards to fluvial and tidal flooding, including: <ul style="list-style-type: none"> • Measures to prevent a reduction in the capacity of the fluvial floodplain which can increase flood risk downstream; • Measures regarding dewatering; • Measures regarding restricting the placement of stockpiling, storage of fuels and chemicals and refuelling to Flood Zone 1 (where practical) and at least 8 m from ordinary watercourses and Main Rivers and 16m from tidal Main Rivers to reduce vulnerability to flood risk; 	DCO Schedules 2A & 2B, Requirement 22 (Onshore decommissioning)
CoT36	Onshore Decommissioning Plan(s) will be developed prior to decommissioning. The Onshore Decommissioning Plan(s) will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The Onshore Decommissioning Plan(s) will be in line with the latest relevant available guidance.	To manage flood risk during decommissioning	DCO Schedules 2A & 2B, Requirement 22 (Onshore decommissioning)

Summary

- 1.7.6.5 Commitments listed in **Table 1.40** above will ensure the landfall and onshore export cable corridor and 400 kV grid connection cable corridor will not be impacted by or cause any adverse effect on surface water flooding during the construction phase. As such, flood risk from this source is assessed to be low.

1.7.7 Reservoir flood risk

- 1.7.7.1 Reservoir flood maps show where water may go in the unlikely event of a dam or reservoir failure. EA reservoir flood risk mapping is presented within **Figure 1.9** shows that for a dry scenario (defined by the Environment Agency as where river levels are normal), flood water is expected to remain within the channels of the River Ribble and the Savick Brook.
- 1.7.7.2 During a wet scenario (defined by the Environment Agency as when there is also flooding from rivers) a significant portion of the study area is expected to become inundated. Water is shown to extend north and south from the River Ribble and encompass approximately 460 ha of land. There are additional small portions of land around the Main Drain in the west of the study area that are also shown to be affected during the wet scenario.
- 1.7.7.3 Due to the regular inspection and maintenance regime in place on large reservoirs, the likelihood of catastrophic failure and therefore risk of flooding to the site from this source is unlikely to occur.
- 1.7.7.4 Taking into account the above, the overall risk of flooding from a reservoir failure has been assessed to be low.

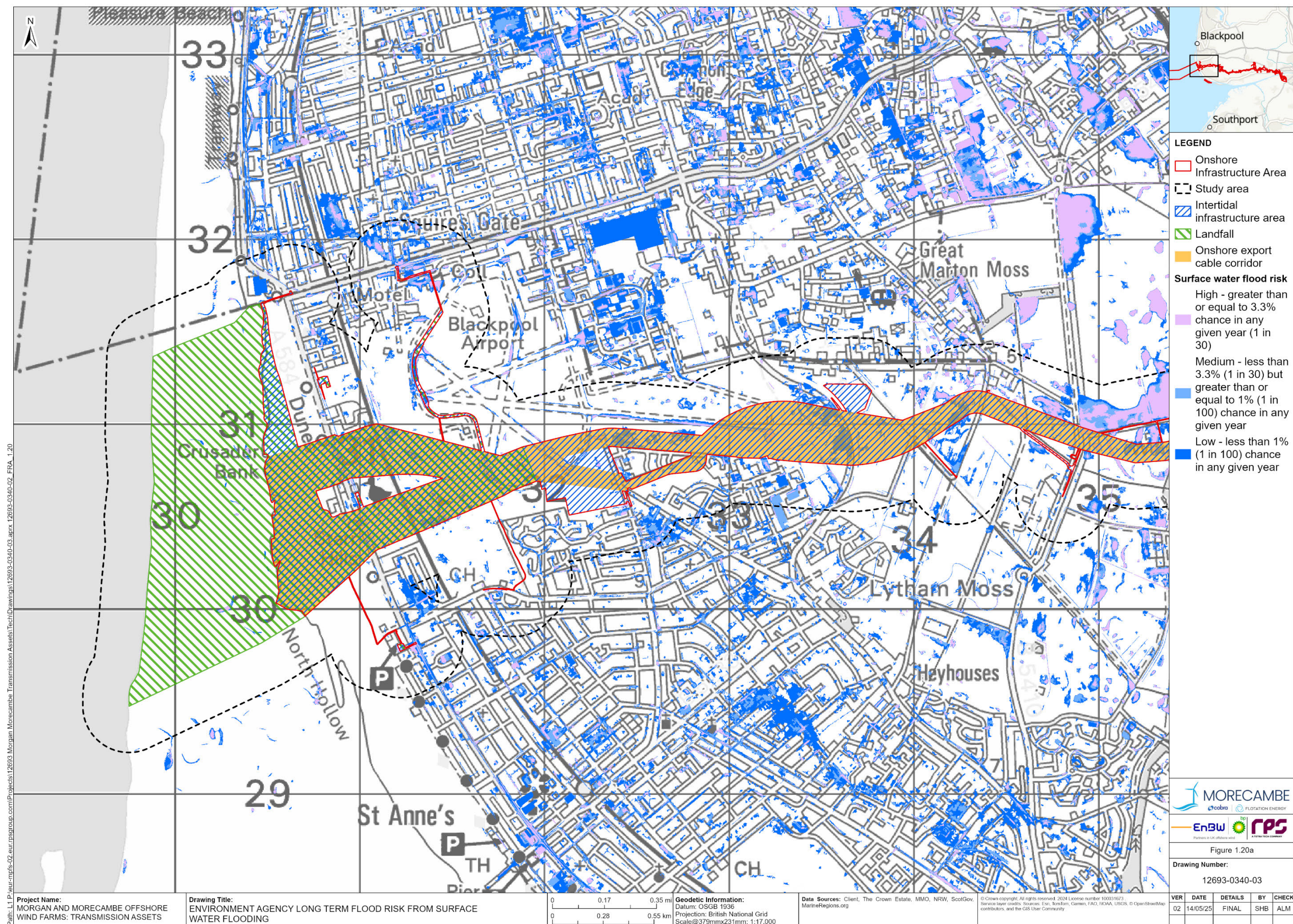


Figure 1.33a: Environment Agency Long term flood risk from surface water flooding

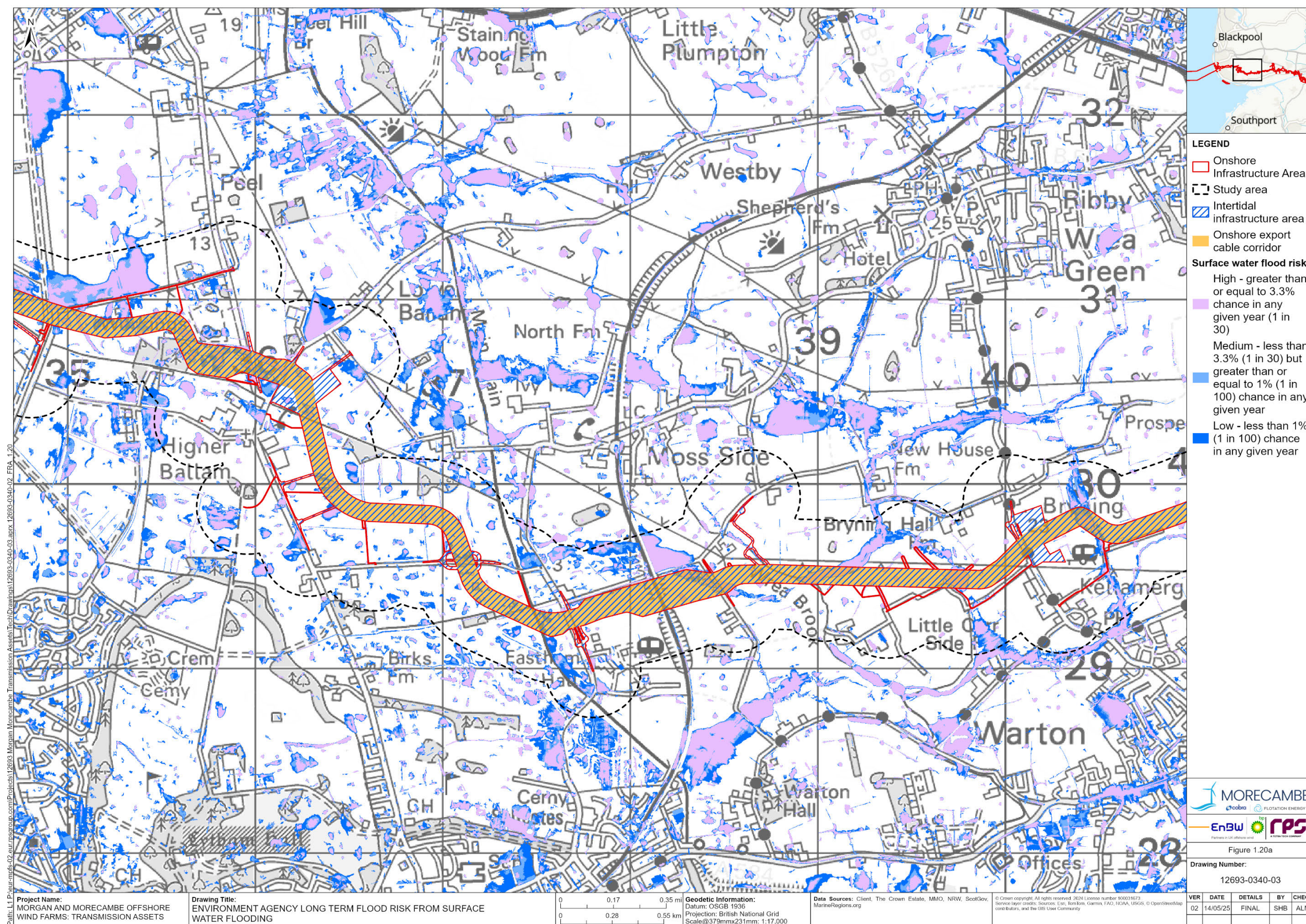


Figure 1.20a: Environment Agency Long term flood risk from surface water flooding

Figure 1.34: Environment Agency Long term flood risk from surface water flooding

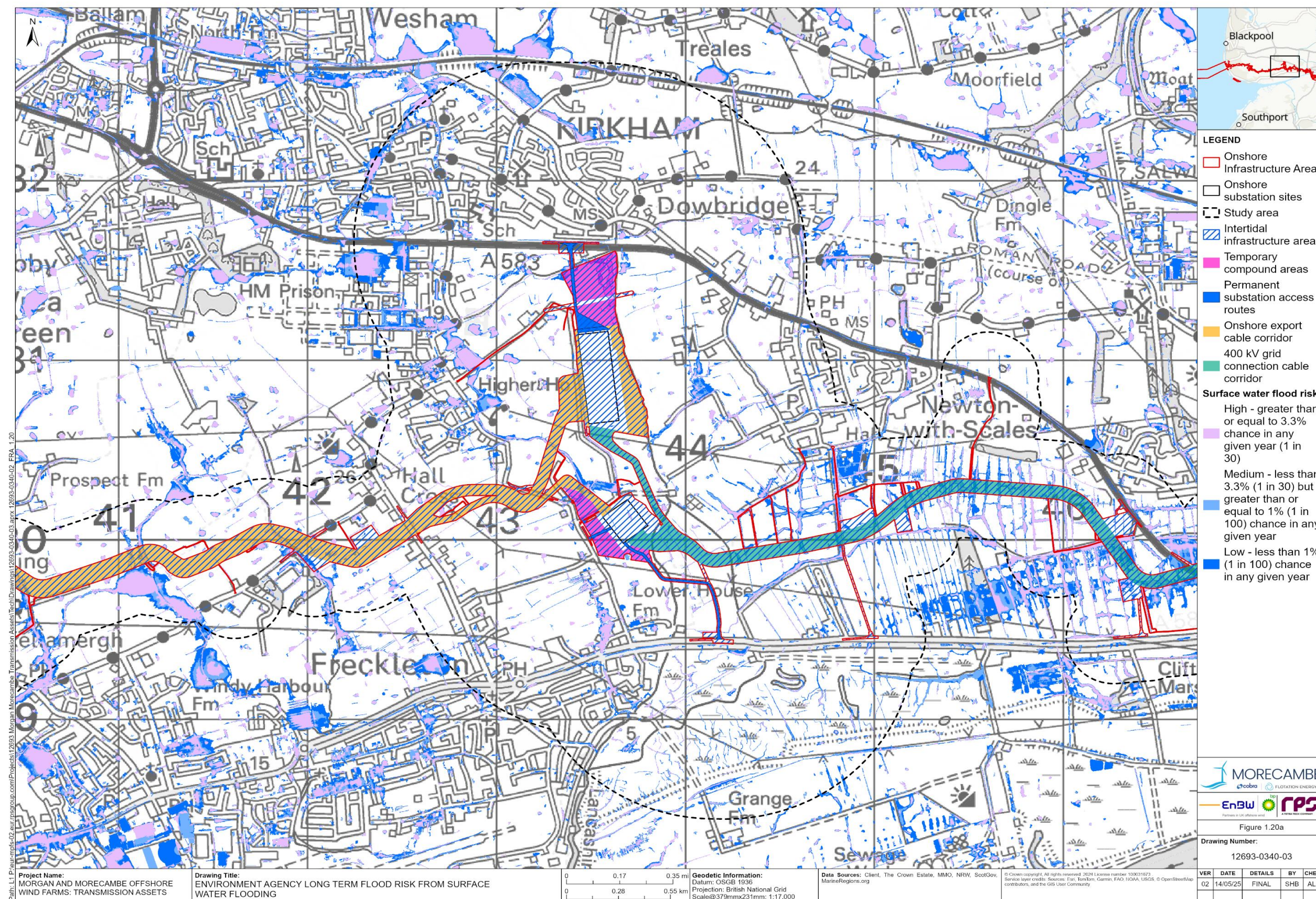


Figure 1.20a: Environment Agency Long term flood risk from surface water flooding

Figure 1.35: Environment Agency Long term flood risk from surface water flooding

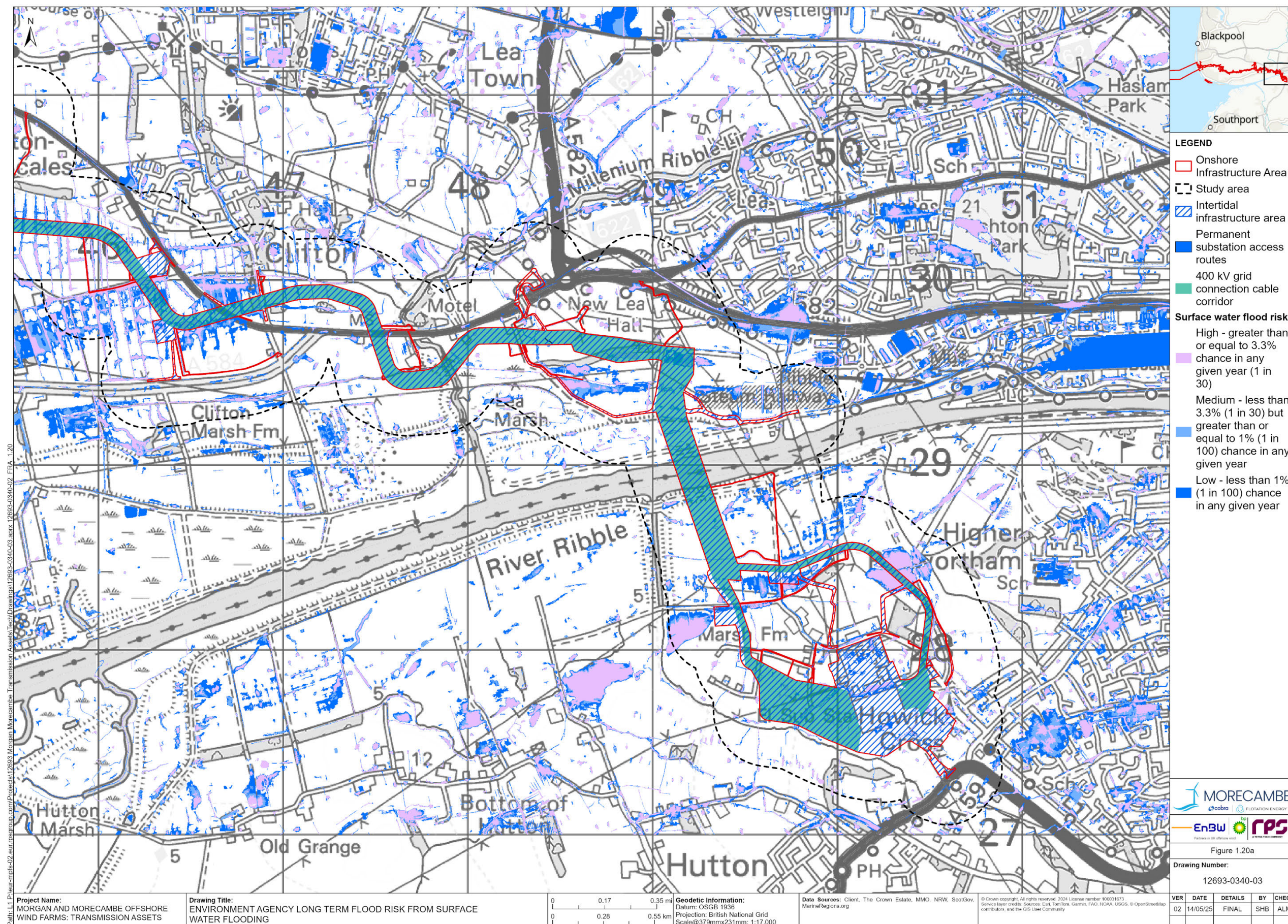


Figure 1.20a: Environment Agency Long term flood risk from surface water flooding

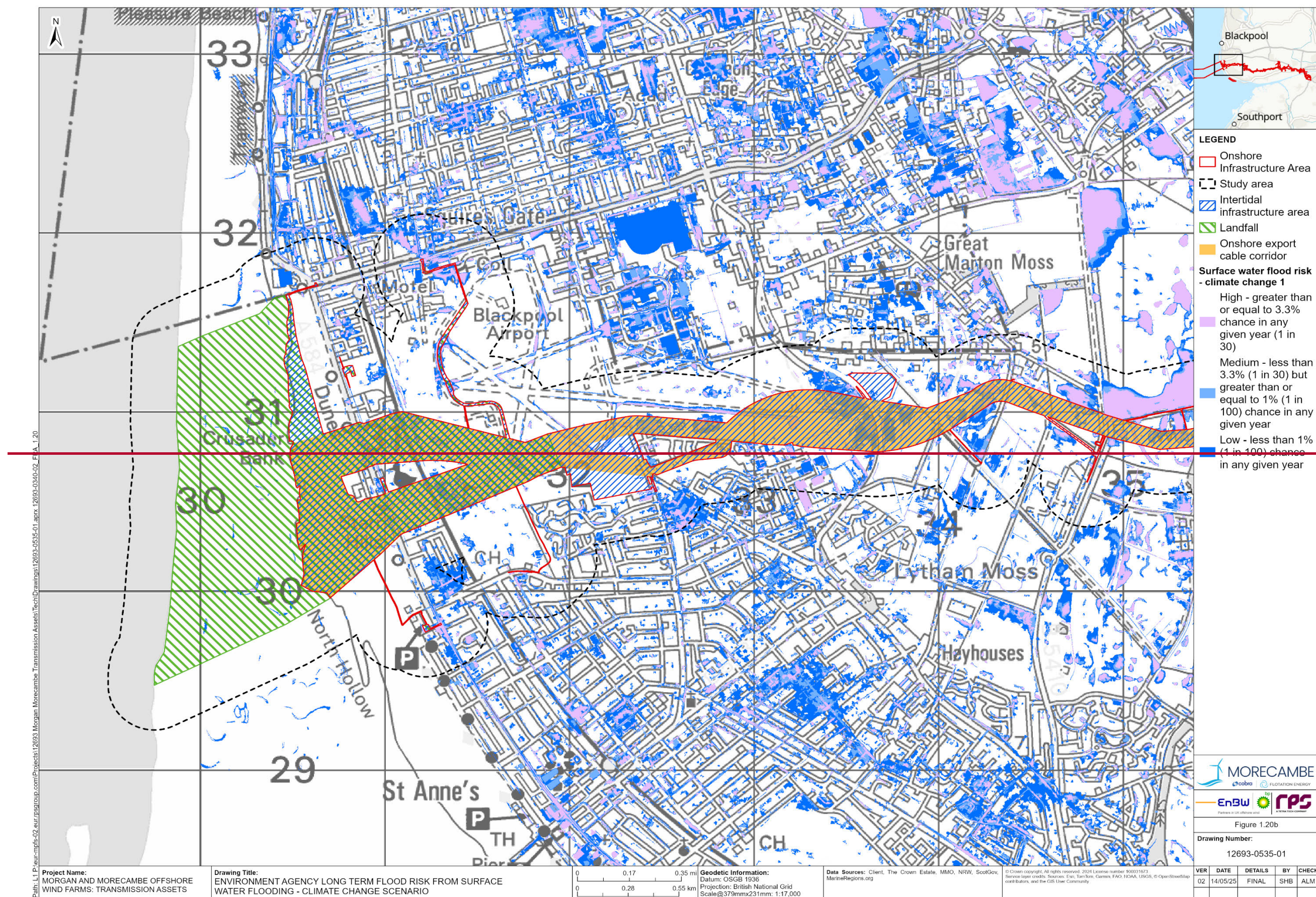


Figure 1.20a: Environment Agency Long term flood risk from surface water flooding **Figure 1.36: Environment Agency Long term flood risk from surface water flooding**

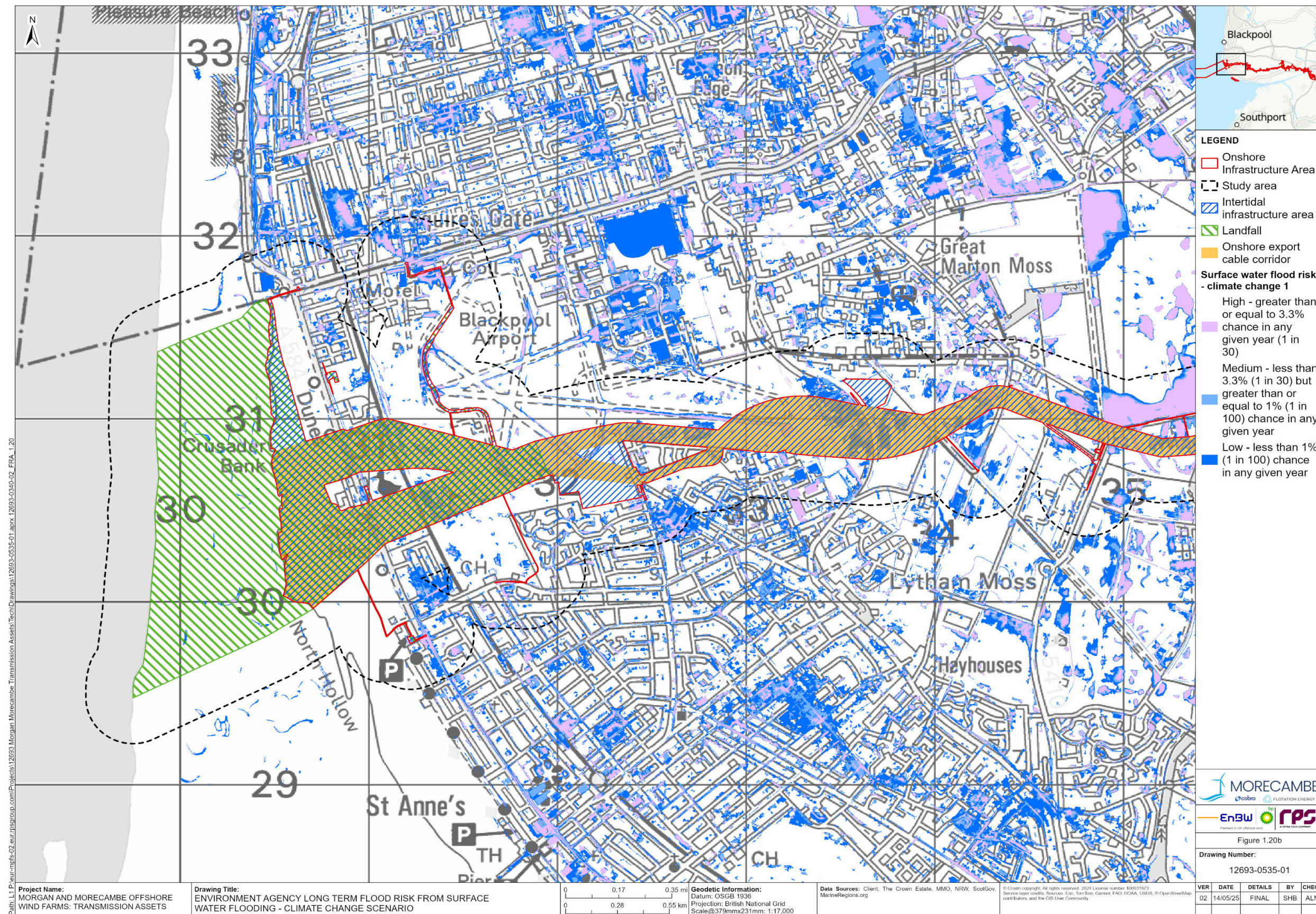


Figure 1.37: Environment Agency Long term flood risk from surface water flooding – climate change scenario

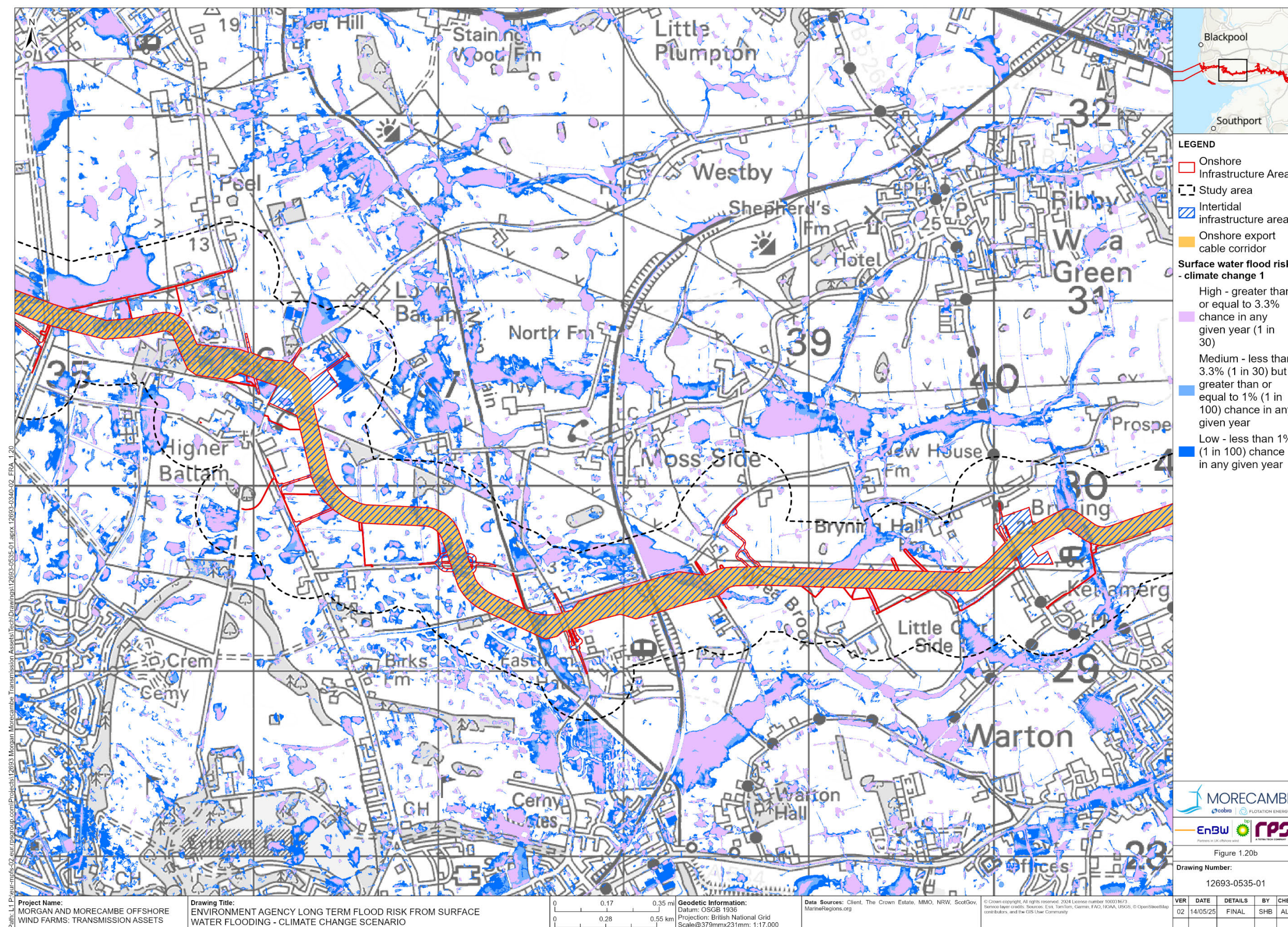
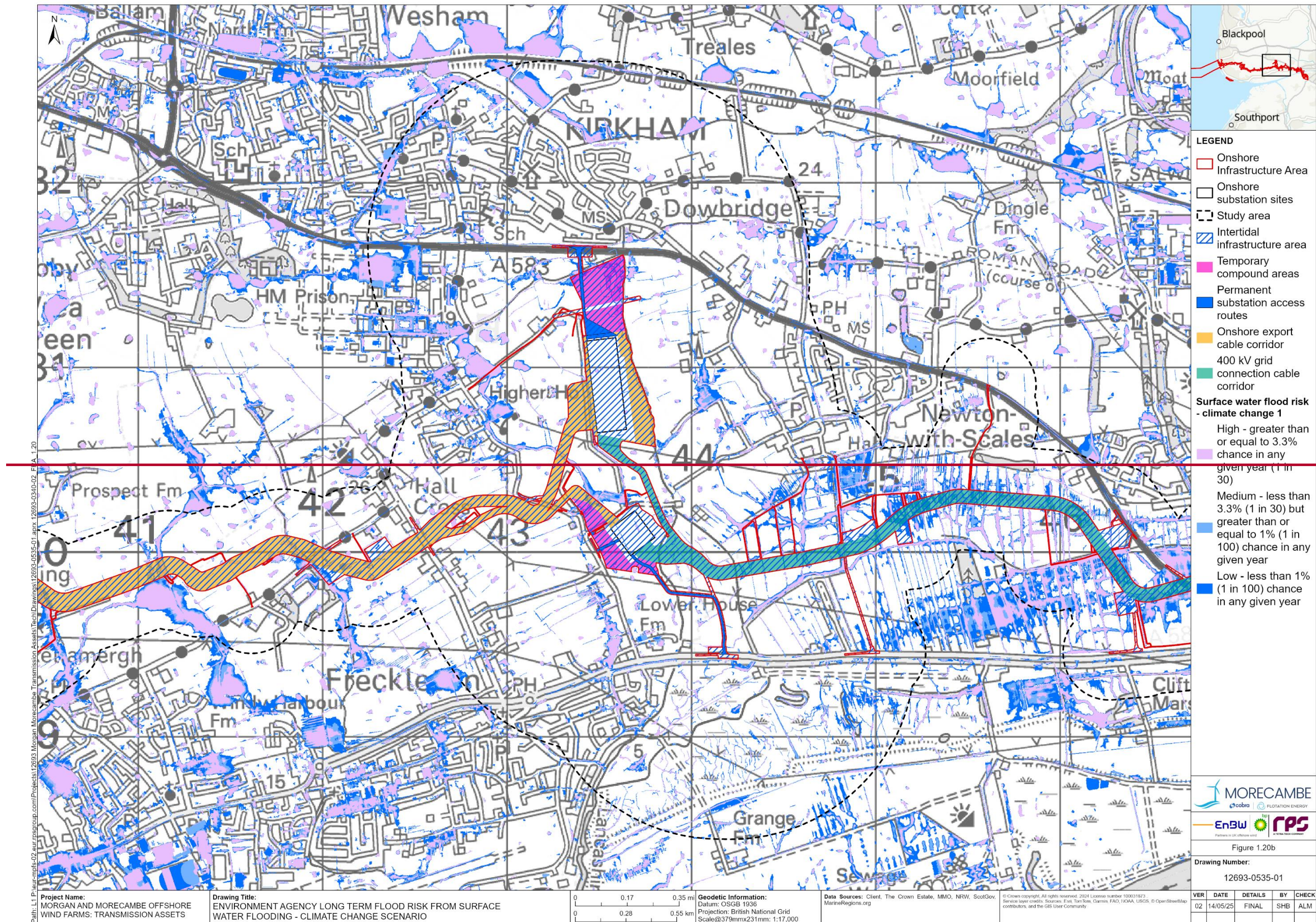


Figure 1.20a: Environment Agency Long term flood risk from surface water flooding – climate change scenario **Figure 1.38: Environment Agency Long term flood risk from surface water flooding – climate change scenario**



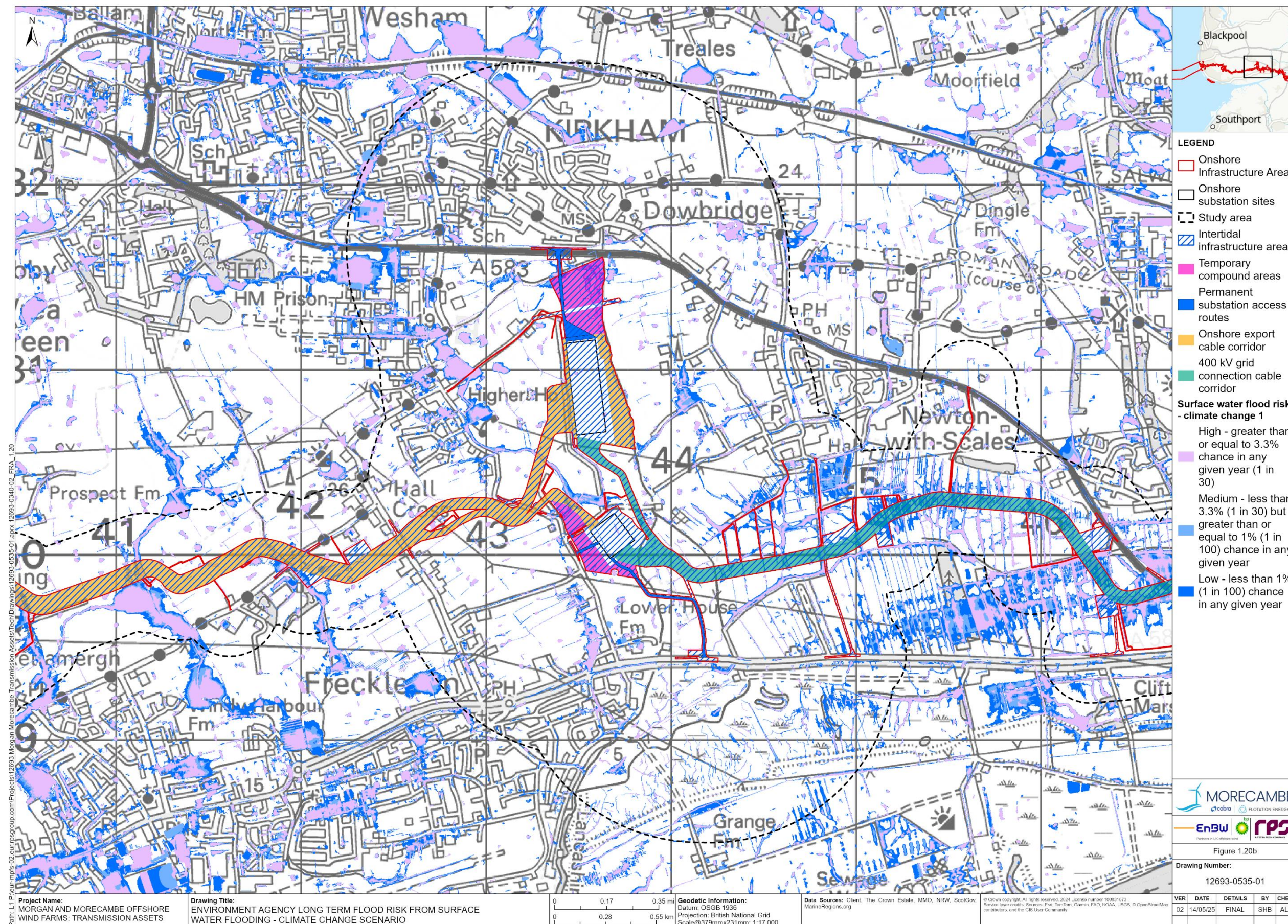


Figure 1.39: Environment Agency Long term flood risk from surface water flooding – climate change scenario

Figure 1.20a: Environment Agency Long term flood risk from surface water flooding

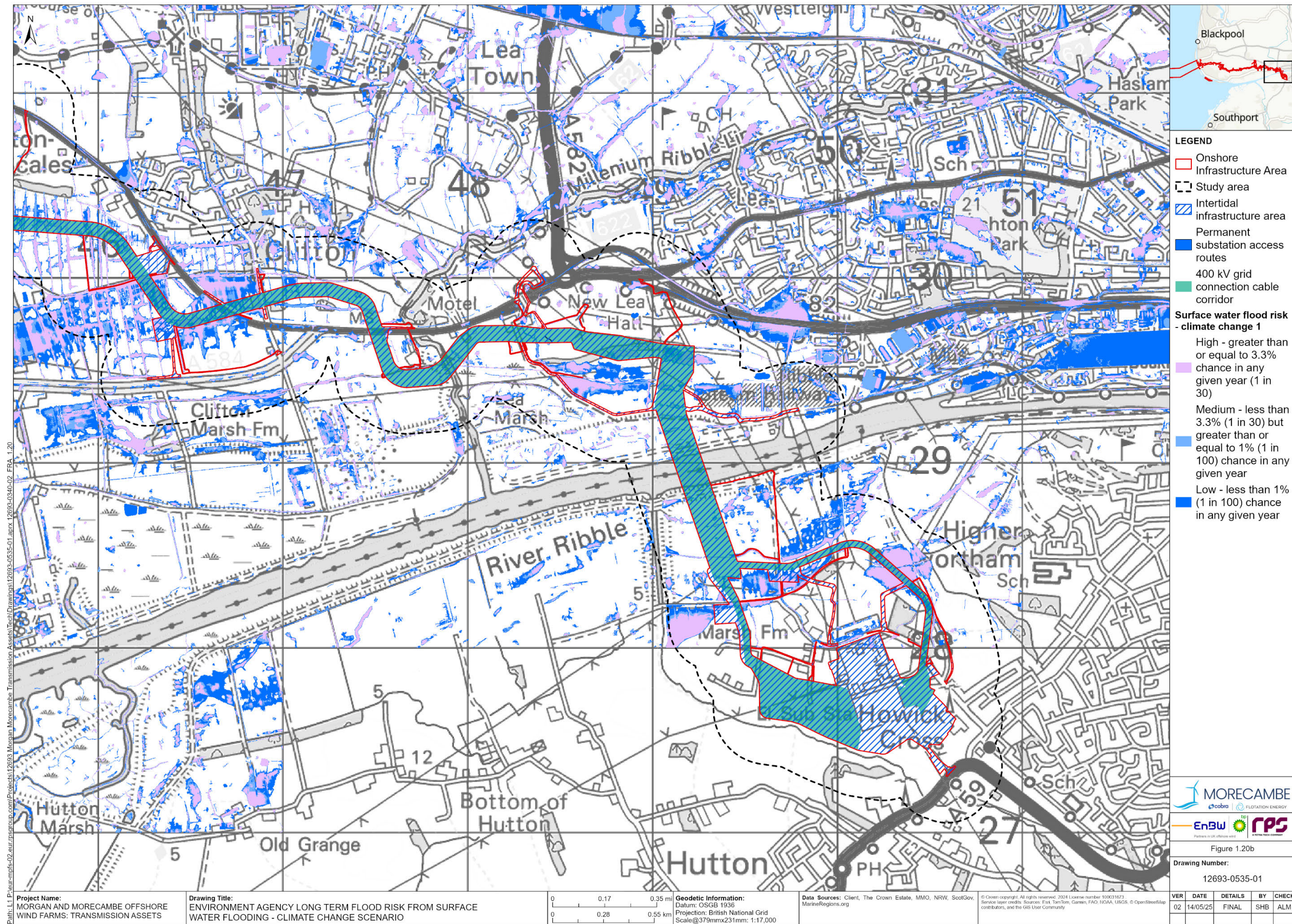


Figure 1.40: Environment Agency Long term flood risk from surface water flooding – climate change scenario

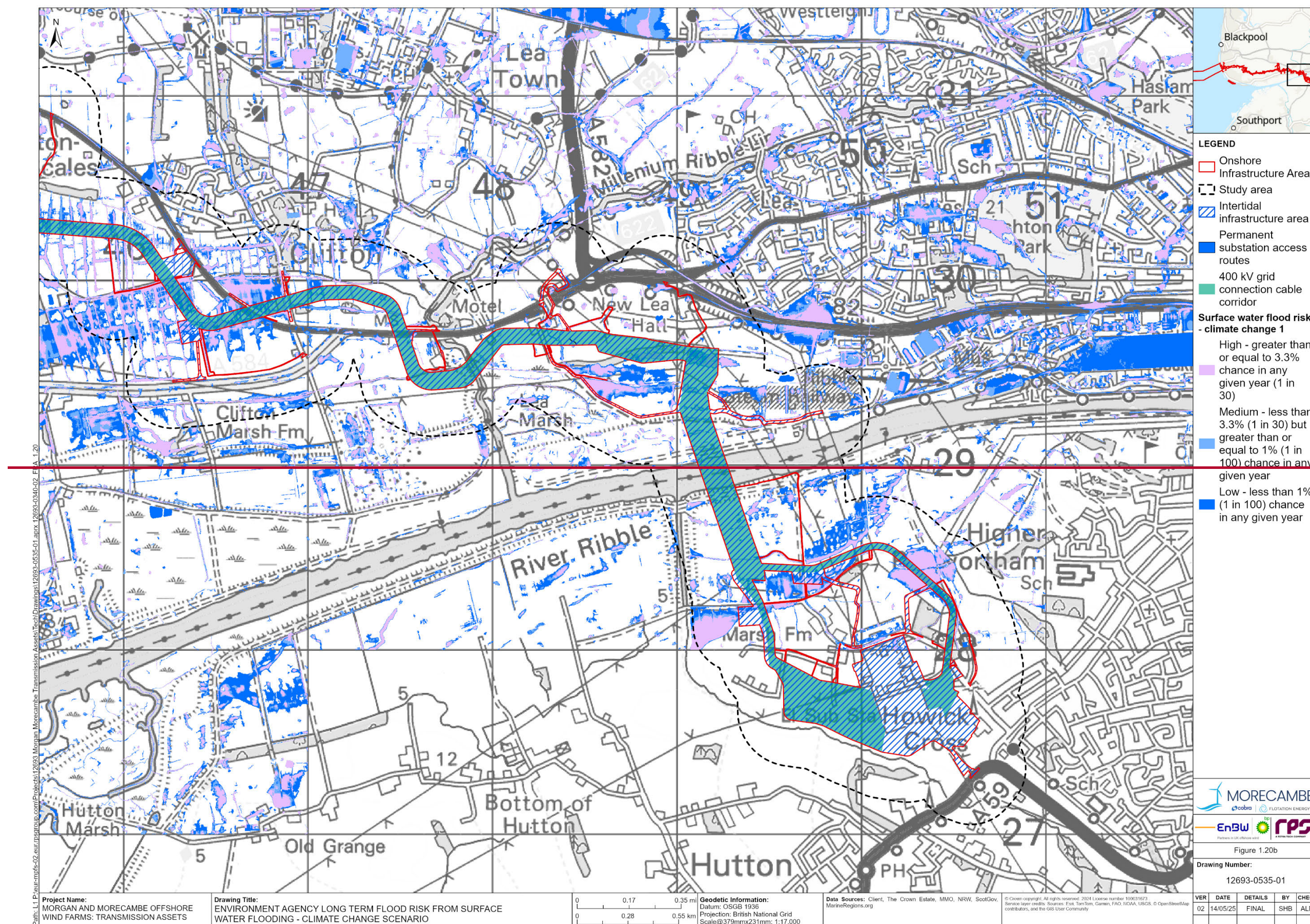


Figure 1.20a: Environment Agency Long term flood risk from surface water flooding—climate change scenario

1.7.8 Flood risk from sewer and water main failure

1.7.8.1 United Utilities operate public sewer assets and water supplies in the study area. Flooding from sewerage failure occurs when a rainfall event exceeds the maximum capacity of the surrounding network. The most common causes of flooding from sewers are inadequate flow capacity, blockages, pumping station failures, burst water mains, water inflow from rivers or the sea, tide locking, siltation, fats/greases, and sewer collapse. Should any of these events occur there is a risk of flooding within the vicinity of the sewer by surcharge where the flood is in excess of the sewer capacity (usually 1 in 30-year event or greater).

1.7.8.2 As per section 3.16.8 of Volume 1, Chapter 3: Project description of the ES, to ensure damage to sewers and water pipelines and thus flooding from this source is prevented during the construction phase, prior to the commencement of works, any construction activities will need to be undertaken in accordance with the water authorities design standards prior to gaining approval. This includes providing evidence to confirm the presence/lack of presence of any water authority assets (e.g. sewers and water mains) and if they are present, how final design and construction methods will be implemented to divert their assets (which will need additional approval) or avoid their assets.

Strategic Flood Risk Assessment

The Fylde Coast Authorities Strategic Flood Risk Assessment (2024)

1.7.8.3 Relevant information regarding flood risk from sewers from the FCA SFRA to the landfall, onshore export cables and 400 kV grid connection cables has been extracted and included as follows.

- Within the Blackpool Council area, the main postal districts covering Blackpool are FY1 - FY4. Across these postal districts a total of 328 sewer flooding incidents have been recorded by United Utilities in data provided from 2009 to October 2023. Almost half of these incidences occur within the FY2 postcode area which covers the urban area in the north, incorporating Bispham, Greenlands, Knowle, and Warbreck.
- Within the Fylde Council area, The main postal districts covering Fylde are FY4, FY6, FY8 and PR4. Across these postal districts a total of 521 sewer flooding incidents have been recorded by United Utilities in data provided from 2009 to October 2023. Over half of these incidences occurred within the FY6 postcode area which covers the northern part of the area at Singleton but also the large urban area of Poulton-le-Fylde within Wyre district.

Mitigation measures (commitments)

1.7.8.4 Mitigation measures (commitments) presented below within **Table 1.41** are proposed to manage flood risk and vulnerability to site workers during the construction and decommissioning phase. No commitments relating to groundwater flooding are required during the operation and maintenance

phase. Commitments are also presented within **Section 1.8, Table 1.44**. Commitments are to be secured through requirements of the DCO.

Table 1.41: Summary of CoT for flood risk from sewers for landfall, the onshore export corridor and 400 kV grid connection cable corridor

CoT	Summary	Reason	How CoT is to be secured
CoT09	The Outline Code of Construction Practice (CoCP) has been submitted as part of the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP includes information about drainage during construction.	To implement construction phase drainage to control runoff during this phase of the Transmission Assets.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT35	An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP will include measures to maintain and address: <ul style="list-style-type: none"> [...] flood protection and control measures; -water environment and drainage; and pollution prevention [...] 	To implement control measures in regards to fluvial and tidal flooding, including: <ul style="list-style-type: none"> Measures to prevent a reduction in the capacity of the fluvial floodplain which can increase flood risk downstream; Measures regarding dewatering; Measures regarding restricting the placement of stockpiling, storage of fuels and chemicals and refuelling to Flood Zone 1 (where practical) and at least 8 m from ordinary watercourses and Main Rivers and 16m from tidal Main Rivers to reduce vulnerability to flood risk; 	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT36	Onshore Decommissioning Plan(s) will be developed prior to decommissioning. The Onshore Decommissioning Plan(s) will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The Onshore Decommissioning Plan(s) will be in line with the	To manage flood risk during decommissioning	DCO Schedules 2A & 2B, Requirement 22 (Onshore decommissioning)

CoT	Summary	Reason	How CoT is to be secured
	latest relevant available guidance.		

Summary

1.7.8.5 With implementation of commitments listed within **Table 1.41**, flood risk from sewers is therefore assessed to be very low.

1.7.9 Flood risk from artificial sources

1.7.9.1 Field drainage is expected to be present within agricultural land within the study area and could pose localised sources of flooding if impacted during construction. Due to the nature of development associated with landfall, onshore export cable corridor and 400 kV grid connection cable corridor, which is predominantly to be buried below ground, development will not be impacted by or cause any adverse effect on field drainage following installation.

Mitigation measures (commitments)

1.7.9.2 Mitigation measures (commitments) presented below within **Table 1.42** are proposed to manage flood risk and vulnerability to site workers during the construction and decommissioning phase. No commitments relating to flooding from artificial sources are required during the operation and maintenance phase. Commitments are also presented within **Section 1.8, Table 1.44**. Commitments are to be secured through requirements of the DCO.

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

CoT	Summary	Reason	How CoT is to be secured
CoT09	The Outline Code of Construction Practice (CoCP) has been submitted as part of the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP includes information about drainage during construction.	To implement construction phase drainage to control runoff during this phase of the Transmission Assets.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT35	An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP will include measures to maintain and address: <ul style="list-style-type: none"> [...] flood protection and control measures; 	To implement control measures in regards to fluvial and tidal flooding, including: <ul style="list-style-type: none"> Measures to prevent a reduction in the capacity of the fluvial floodplain which can increase flood risk downstream; Measures regarding dewatering; 	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)

CoT	Summary	Reason	How CoT is to be secured
	<ul style="list-style-type: none"> -water environment and drainage; and pollution prevention [...] 	Measures regarding restricting the placement of stockpiling, storage of fuels and chemicals and refuelling to Flood Zone 1 (where practical) and at least 8 m from ordinary watercourses and Main Rivers and 16m from tidal Main Rivers to reduce vulnerability to flood risk;	
CoT36	Onshore Decommissioning Plan(s) will be developed prior to decommissioning. The Onshore Decommissioning Plan(s) will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The Onshore Decommissioning Plan(s) will be in line with the latest relevant available guidance.	To manage flood risk during decommissioning	DCO Schedules 2A & 2B, Requirement 22 (Onshore decommissioning)
CoT84	An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the Outline CoCP. In order to manage impacts to field drainage, the Outline CoCP stipulates field drainage plans will be developed in consultation with the relevant landowners. If required, additional field drainage will be installed to ensure the existing drainage of the land is maintained during and after construction.	To prevent flooding from field drainage	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)

Summary

1.7.9.3 With implementation of commitments listed within **Table 1.42**, flood risk from artificial sources is therefore assessed to be very low.

1.7.10 Historic flooding

1.7.10.1 The Environment Agency Historic Flood Map is presented within **Figure 1.10** and records historical flooding has occurred within the study area on the land north of the River Ribble, and around Savick Brook. Extents are approximately 95.4 ha. Additional details include:

- November 1977, flooding resulted from spring tide sequences and gale force south west to north west winds. Massive surge experienced on the Fylde and Morecambe Bay. It is noted that flood defences have been updated since 1978.
- February 1990, an 80 metre long breach in the earth embankment caused flooding of 500 acres of agricultural land and Grange Farm. The major sewage works was also flooded.

Strategic Flood Risk Assessment

The Fylde Coast Authorities Strategic Flood Risk Assessment (2024)

- 1.7.10.2 Relevant information to historical flood events from the FCA SFRA relevant to the landfall, onshore export cables and 400 kV grid connection cables has been extracted and included as follows.
- February and March 2020, overtopping of sea defences led to flooding of roads and properties within Blackpool.

Strategic Flood Risk Assessment Data

Strategic Flood Risk Assessment (Fylde Borough Council, 2011)

- 1.7.10.3 Relevant information from the Fylde Council SFRA has been extracted and included as follows.
- Fylde Borough Council do not hold any records of historical flooding.

1.7.11 Summary of flood risk

- 1.7.11.1 A summary of assessed flood risk is presented below within **Table 1.43**.

Table 1.43: Morecambe onshore substation flood risk summary

Source of flooding	Assessed risk to Morecambe onshore substation	Commitment measures to be adopted
Fluvial and tidal	Low	CoT02 CoT06, CoT08, CoT09 CoT10, CoT12, CoT14 CoT27 CoT35, CoT36, CoT95 and CoT97
Groundwater	Very low	CoT09 CoT35 CoT36, CoT41
Surface water	Low	CoT08, CoT09, CoT24, CoT27, CoT35, CoT36
Reservoir	Very low	None
Sewer	Very low	CoT09 CoT35 CoT36,
Artificial Sources	Very low	CoT09 CoT35 CoT36 CoT84

1.8 Flood Risk Management

1.8.1 Measures adopted as part of the Transmission Assets (Commitments)

- 1.8.1.1 Embedded and secondary measures relevant to flood risk of the Transmission Assets that will form part of the final design (and/or are established legislative requirements/good practice) have been taken into account as part of the flood risk assessment presented in **section 1.5.4** and below within **Table 1.44**.

Table 1.44: Mitigation measures and commitments

Commitment number	Mitigation measure	How will this commitment be secured?
Embedded measures		
CoT02	<p>The following features will be crossed by trenchless techniques, as set out in the Onshore Crossing Schedule submitted as part of the application for development consent:</p> <ul style="list-style-type: none"> • A, B and Classified unnumbered roads (known as C roads) (including the Preston Western Distributor Road, A582 South Ribble Western Distributor Upgrade and M55 Heyhouses Link Road; excluding Leech Lane); • All Environment Agency Main Rivers, including: Moss Sluice, east of Midgeland Road along Pegs Lane; Savick Brook, south of A583; Wrea Brook southeast of Cartmell Lane; Dow Brook east of Lower Lane between the A584 and the A583; Middle Pool north of Lund Way; and • All Network Rail crossings, including along the line which runs between Blackpool North and Preston, south of Cartmell Lane; and at the Network Rail crossing along the line which runs to Blackpool North, south east of Squires Gate, parallel to the A584. 	DCO Schedules 2A & 2B, Requirement 5(2) (Detailed design parameters onshore); DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)"
CoT06	<p>The construction area associated with onshore export cable corridor will be 100 m working width and the 400 kV grid connection cable corridor will be working width 76 m to minimise the construction footprint, except at complex trenchless technique crossings, including, but not limited to:</p> <ul style="list-style-type: none"> • Network Railway Crossings; • A, B and Classified unnumbered roads (known as C roads), including B5261 (Queensway); • the approach to landfall; • river and water course crossings; and • sensitive utility assets (e.g. high pressure gas pipelines). <p>The widths of both the onshore export cable corridor and 400 kV grid connection cable corridor also increases up to 270 m in width, on the access and egress to the onshore substations, to facilitate consideration of trenchless crossings as well as being subject to detailed design. These increased widths and crossing methodologies are set out in the Onshore Crossing Schedule and Works Plans-Onshore and Intertidal.</p>	DCO Schedules 2A & 2B, Requirement 5 (Detailed design parameters onshore); Works Plans - Onshore and Intertidal
CoT08	<p>Post-construction, the working area will be reinstated to pre-existing condition as far as reasonably practical in line with the DEFRA Construction Code of Practice for the Sustainable Use of Soils on Construction Sites (PB13298), Institute of Quarrying (IQ) Good Practice Guide for Handling Soils in</p>	DCO Schedules 2A & 2B, Requirement 18 (Restoration

Commitment number	Mitigation measure	How will this commitment be secured?
	Mineral Workings (IQ, 2021) and British Society of Soil Science (BSSS) Working with Soil Guidance Note on Benefitting from Soil Management in Development and Construction (BSSS, 2022).	of land temporarily used for construction); DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT09	The Outline Code of Construction Practice (CoCP) has been submitted as part of the application for development consent. Detailed CoCP(s) will be developed in accordance with the outline CoCP. The Outline CoCP includes information about drainage during construction.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT10	Where trenchless techniques are proposed for Environment Agency Main Rivers, the following distances will be used: <ul style="list-style-type: none"> • 8 m from the bank of the Environment Agency Main River or landward toe of any associated flood defence structure; • 16 m from tidal Environment Agency Main Rivers or the landward toe of any flood defences, where the Main River is a sea defence structure; and • a minimum of 2 m vertical clearance will be maintained below the hard bed of all Environment Agency Main Rivers, including the landward toe of any associated flood defences. Final vertical clearance depths beneath Environment Agency Main Rivers will be identified during detailed design stage, in consultation with the Environment Agency, to ensure the export cables remain buried for the operational lifetime of the project.	DCO Schedules 2A and 2B, Requirement 8 (Code of Construction Practice)
CoT11	An Outline Operational Drainage Management Plan for the substation sites has been prepared and submitted with the application for development consent. The Plan will include measures to ensure that existing land drainage is reinstated and/or maintained. This will include measures to limit discharge rates and attenuate flows to maintain greenfield runoff rates at the onshore substations. It will also include measures to control surface water runoff, including measures to prevent flooding of the working areas or offsite and to ensure any runoff is treated appropriately. Detailed Operational Drainage Management Plan(s) will be developed in accordance with the Outline Operational Drainage Management Plan and in line with the latest relevant drainage guidance notes in consultation with the Environment Agency and the Lead Local Flood Authority (Lancashire County Council).	DCO Schedules 2A & 2B, Requirement 20 (Outline Operational Drainage Management Plan)
CoT12	The onshore export cables and the 400 kV grid connection cables will be completely buried underground for the entire length. No overhead pylons will be installed as part of the Transmission Assets.	DCO Schedule 1, Part 1, Authorised Development

Commitment number	Mitigation measure	How will this commitment be secured?
CoT14	Joint bays will be completely buried, with the land above reinstated. An inspection cover will be provided on the surface for link boxes for access during operation and maintenance phase.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT24	Where practicable, during construction, access routes within the onshore export cable corridor and 400 kV grid connection corridor (i.e. for example, the use of haul roads) will be used, to minimise potential impacts to the local road network.	DCO Schedules 2A & 2B, Requirement 9 (Traffic and Transport) Access to Works Plan
CoT27	All temporary compounds will be removed and sites will be reinstated when construction has been completed.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice) DCO Schedules 2A & 2B, Requirement 16 (Restoration of land used temporarily for construction)
CoT35	An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the Outline CoCP. The Outline CoCP includes measures to maintain and address: <ul style="list-style-type: none"> • [...]flood protection and control measures; • water environment and drainage[...] 	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT36	Onshore Decommissioning Plan(s) will be developed prior to decommissioning. The Onshore Decommissioning Plan(s) will include provisions for the removal of all onshore above ground infrastructure and the decommissioning of below ground infrastructure (if and where relevant and practicable), and details relevant to flood risk, pollution prevention and avoidance of ground disturbance. The Onshore Decommissioning Plan(s) will be in line with the latest relevant available guidance.	DCO Schedules 2A & 2B, Requirement 22 (Onshore decommissioning)
CoT39	Fences, walls, ditches and drainage outfalls will be retained at the landfall and along the onshore export cable corridor and 400 kV grid connection cable corridor, where possible. Where it is not reasonably practicable to retain them, any damage will be repaired and reinstated as soon as reasonably practical. The Environment Agency must be notified if damage occurs to any Environment Agency main river or related flood infrastructure.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)

Commitment number	Mitigation measure	How will this commitment be secured?
CoT44	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the installation of the offshore export cables under Lytham St Annes SSSI and the St Annes Old Links Golf Course will be undertaken by direct pipe trenchless installation technique. The exit pits associated with the direct pipe installation will be at least 100 m seaward of the western boundary of the SSSI.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT82	Where trenchless techniques are proposed for crossing ordinary watercourses, the entry and exit pits will be set back a minimum of 8 m from the bank of the watercourse. These crossings are detailed in the Onshore Crossing Schedule. Where required, geomorphological surveys will be undertaken on ordinary watercourses that may be crossed by trenched techniques. These will be used to inform detailed designs prior to construction.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice); DCO Schedule 10
CoT84	An Outline Code of Construction Practice (CoCP) has been prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the Outline CoCP. In order to manage impacts to field drainage, the Outline CoCP stipulates field drainage plans will be developed in consultation with the relevant landowners. If required, additional field drainage will be installed to ensure the existing drainage of the land is maintained during and after construction.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT86	An Outline Code of Construction Practice (CoCP) will be prepared and submitted with the application for development consent. Detailed CoCP(s) will be developed in accordance with the Outline CoCP. Where required, trenched techniques may be used for minor ditches or smaller watercourses that are frequently dry. In these cases, measures will be implemented to protect water quality and flow and these will be detailed within the Outline CoCP.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT90	The Project Description (Volume 1, Chapter 3 of the Environmental Statement) sets out that the installation of the 400 kV Grid Connection Cable Corridor beneath the River Ribble will be undertaken by direct pipe or micro tunnel trenchless installation techniques.	DCO Schedules 2A & 2B, Requirement 5(3)(Detailed design parameters onshore); and Requirement 8 (Code of Construction Practice)"

Commitment number	Mitigation measure	How will this commitment be secured?
CoT95	The Outline Code of Construction Practice (CoCP) has been submitted as part of the application for development consent. Detailed CoCP(s) will be developed in accordance with the Outline CoCP. The Outline CoCP includes that during the construction phase the Principal Contractor(s) will sign up to the Flood Warning Service and will be alerted by a phone call or text when a Flood Warning becomes active. The flood warning will be applied to the entire Onshore Infrastructure Area located within Flood Zones 2 and 3 to enable site personnel to be evacuated from the site in a timely manner prior to a flood event occurring, if appropriate.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
CoT97	The Outline Code of Construction Practice (CoCP) has been submitted as part of the application for development consent. Detailed CoCP(s) will be developed in accordance with the Outline CoCP. The Detailed CoCPs detail that where necessary at the compounds located within the landfall area, construction measures will be adopted to maintain the existing level of flood protection during construction. These measures will be discussed with the Environment Agency. If applicable, these measures could include scheduling work windows against tide times and briefing site personnel regarding weather conditions, tide times and heights. If a Flood Warning/Flood Alert is issued for the 'Lancashire coastline at Lytham St. Annes, along the coast from Squires Gate to Warton Bank' Flood Warning Area (reference 012FWCTL13A) and the 'Coast at Lytham St Annes' Flood Alert area (reference 012WACLS) works within the relevant areas within the landfall area would also be stopped whilst the Flood Warning/Flood Alert is active.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)
Secondary measures		
CoT41	Where the onshore export cable corridor or 400 kV grid connection cable corridor crosses sites of particular sensitivity (e.g. embanked Environment Agency surface watercourses, Sites of Special Scientific Interest or groundwater inner Source Protection Zones) hydrogeological risk assessment(s) will be undertaken to inform a site-specific crossing method statement(s) where required. These will be agreed with the relevant stakeholders prior to construction.	DCO Schedules 2A & 2B, Requirement 8 (Code of Construction Practice)

1.9 Sequential test and exception test

1.9.1 Site Vulnerability

- 1.9.1.1 In accordance with the Development Vulnerability Categories within Annex 3: The Transmission Assets are classified as 'essential infrastructure'.
- 1.9.1.2 The NPS and NPPF requires the Local Authority to apply the Sequential and Exception Test in consideration of new development. The aim of the test is to steer new development to areas at the lowest probability of flooding.
- 1.9.1.3 According to Annex 3: Flood risk vulnerability classification of the NPPF, the Morecambe onshore substation 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.

1.9.2 Sequential test

Morgan onshore substation

- 1.9.2.1 The site selection process for the onshore substations is detailed within Volume 1, Annex 4.3: Selection and Refinement of Onshore Infrastructure of the ES. A sequential approach has been applied to Morgan onshore substation whereby the onshore substation development platform plus surface water attenuation is located within Flood Zone 1 and has a low risk of flooding from all assessed sources. In relation to the Morgan onshore substation development platform, the sequential test is considered to be passed.
- 1.9.2.2 During the initial route selection process the Morgan onshore substation access track was located on land assessed as Flood Zone 1, and at low risk of other forms of flooding (surface water, reservoir etc.). Following the publication of the updated Environment Agency's Flood Map for Planning in March 2025, a section of the Morgan onshore substation temporary and permanent access tracks is now located in an area of Flood Zone [3a3](#) and [proxy 3b](#). The updated Flood Zone is associated with out of bank flooding from a tributary of Dow Brook. The access track provides the most direct route to the Morgan onshore substation, which has itself been sited to avoid areas of higher flood risk and is wholly located within Flood Zone 1. Alternative routes would be longer in length (requiring additional land take) and would still require a crossing of the aforementioned flood zone.
- 1.9.2.3 Due to existing development bounding the west 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 access track being located in an area of Flood Zone [3a3](#) and [proxy 3b](#) does not change the outcomes and as such, these elements of the Morgan onshore substation are considered to pass the sequential test.
- 1.9.2.4 The temporary construction compounds are located Flood Zone 1, 2 and [3a3](#) and are required to enable construction of the onshore substation. The temporary compounds will be decommissioned prior to 2036 when the Morgan Offshore Wind Project and the Morecambe Offshore Windfarm intend to be

fully operational. Due to the nature of temporary construction compounds, there are no other reasonable available sites which provide access to the construction activities. As such, this aspect of enabling works is considered to pass the sequential test.

Morecambe onshore substation

- 1.9.2.5 The site selection process for the onshore substations is detailed within Volume 1, Annex 4.3: Selection and Refinement of Onshore Infrastructure of the ES. A sequential approach has been applied to Morecambe onshore substation whereby the onshore substation development platform, associated surface water attenuation and temporary construction compounds are located within Flood Zone 1 and have a low risk of flooding from all other sources. The sequential test is considered to be passed for these elements of the Morecambe onshore substation.
- 1.9.2.6 The Morecambe onshore substation temporary and permanent access tracks are routed across Flood Zone 3a and 3b. 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. As such, these elements of the Morecambe onshore substation are considered to pass the sequential test.

Landfall, onshore cable corridor and 400 kV export cable corridor

- 1.9.2.7 The site selection process for the onshore substations is detailed within Volume 1, Annex 4.3: Selection and Refinement of Onshore Infrastructure of the ES. Existing development including infrastructure, industry, commercial and residential buildings are located throughout the wider area and due to the linear nature of the project, the site selection process has been sequentially steered away from these areas to prevent disruption to infrastructure, services and occupants of the wider area. The landfall and National Grid substation at Penwortham are required to be connected by the onshore export cable corridor and 400 kV grid connection cable corridor and there are no reasonably available routes available in which cables can traverse without crossing areas of Flood Zone 3 (Flood Zones 3a and 3b).
- 1.9.2.8 Furthermore, no permanent above ground development will occur as a result of construction activities associated with landfall, the onshore export cable corridor and 400 kV grid connection cable corridor and flood risk will only be temporarily increased until 2036 when the construction phase ends. The sequential test for the landfall, onshore export cable corridor and 400 kV are therefore considered passed.

1.9.3 Exception test

- 1.9.3.1 According to Table 3: Flood risk vulnerability and flood zone compatibility of the NPPF, 'essential infrastructure' is acceptable within Flood Zones 1 and 2. The exception test is required if development is proposed within Flood Zone 3.

- 1.9.3.2 the onshore substation development platform plus associated access/egress and surface water attenuation is located within Flood Zone 1 and has a low risk of flooding from all other sources and as such the application of the exception test is not required for this aspect of development.
- 1.9.3.3 The PPG advises that 'essential infrastructure' development can be considered appropriate in Flood Zone 3a and 3b, following satisfactory application of the exception test. The Exception test aims to ensure that more vulnerable property types are not allocated to areas at high risk of flooding. For the exception test to be passed the following must be met.
- It must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk, informed by a SFRA where one has been prepared.
 - A site-specific flood risk assessment must demonstrate that 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.
- 1.9.3.4 With reference to point (a), the Transmission Assets are required to connect two nationally significant offshore wind farms to the national grid and will contribute towards meeting the UK Government's targets for generating energy from a renewable energy source; please see Section 3.3 of Volume 1, Chapter 3: Project description of the ES.
- 1.9.3.5 Furthermore, the Transmission Assets will contribute towards meeting the UK Government's targets for generating energy from a renewable energy source; they will generate increased employment opportunities and supply chain demand during its construction phase and operation and maintenance phase. For more information, please see Volume 4, Chapter 2: Socio-economics of the ES. Therefore, point (a) of the exception test is considered to be satisfied.
- 1.9.3.6 Point (b) is discussed within the substations below.

Morgan onshore substation

- 1.9.3.7 With reference to point (b), the temporary and permanent access track and temporary construction compounds to enable the construction of the Morgan onshore substation are located within Flood Zone 1, 2, 3a and 3b.
- 1.9.3.8 Flood risk is fluvial in nature from the Dow Brook. To ensure the fluvial floodplain capacity is maintained and flow conveyance is unaffected by development, no profiling of ground levels within the Environment Agency Flood Map for Planning Flood Zone 3 (further assessed as Flood Zone 3a and 3b) in association with temporary construction compounds and temporary and permanent access tracks. Additional commitments to be implemented during the construction phase are referenced within **Table 1.18** and set out in Outline Code of Construction Practice (document reference J1) that will be submitted to the LPAs for approval with consultation with the Environment Agency and LLFA prior to the commencement of works.

Morecambe onshore substation

- 1.9.3.9 With reference to point (b), the temporary and permanent Morecambe onshore substation access and egress is located within Flood Zone 1, 2, 3a and 3b. An egress to the existing highways network is required to enable access to the Morecambe onshore substation by HGVs. The permanent and temporary access tracks are therefore unable to be routed between the Morecambe onshore substation and Preston New Road (A584) without crossing areas within Flood Zone 3a and 3b.
- 1.9.3.10 Flood risk is both fluvial and tidal. To ensure the fluvial floodplain capacity is maintained and flow conveyance is unaffected by development, no profiling of ground levels within the Environment Agency Flood Map for Planning Flood Zone 3 is proposed in association with temporary and permanent access tracks.
- 1.9.3.11 The permanent and temporary access track via Preston New Road is located within Flood Zones 1, 2, 3a and 3b and is to serve as access to the Morecambe onshore substation for HGVs. During construction, If a Flood Warning/Flood Alert is issued for the 'Lancashire coastline at Lytham St. Annes, along the coast from Squires Gate to Warton Bank' Flood Warning Area (reference 012FWCTL13A) and the 'Coast at Lytham St Annes' Flood Alert area (reference 012WACLS) works within the relevant areas within the landfall area would also be stopped whilst the Flood Warning/Flood Alert is active (CoT97). The permanent use would be for heavy goods vehicle and abnormal loads deliveries only and therefore operational use would be rare and an outline operational drainage management plan (document reference J10) has been submitted with the application.
- 1.9.3.12 Additional commitments are referenced within **Table 1.27** and set out in Outline Code of Construction Practice (document reference J1) that will be submitted to the LPAs for approval with consultation with the Environment Agency and LLFA prior to the commencement of works.

Landfall, onshore export cable corridor and 400 kV grid connection cable corridor

- 1.9.3.13 With reference to point (b) (in **paragraph 1.9.3.3**), the development is to connect the offshore wind farms to the national grid and therefore is unable to be routed without crossing areas within Flood Zone 3a and 3b. The following components located are shown to be located within ~~Flood Zone 3 have been further assessed to be partially located within~~ the proxy Flood Zone 3b:
- The onshore export cable corridor;
 - The 400kv grid connection cable corridor;
 - Areas of temporary construction; and operational access tracks; and
 - Temporary construction compounds; and
- 1.9.3.14 The installation of below ground cables will be undertaken during the construction stage, with no permanent above ground structures proposed. The majority of the construction works are within agricultural land however, there will be no changes to existing land use once cables are installed, as per

CoT14. Once installed, the landfall and onshore cable corridors do not increase flood risk to the surrounding area and has negligible risk of flooding to and from the development.

- 1.9.3.15 Any alterations in the existing surface water drainage regime associated with the installation of the below ground cables are expected to be only during the construction stage and thus temporary in nature. Any increase in runoff from the onshore cable corridors during construction will be managed through commitments listed within **Table 1.44** and set out in Outline Code of Construction Practice (document reference J1) that will be submitted to the LPAs for approval with consultation with the Environment Agency and LLFA prior to the commencement of works.
- 1.9.3.16 Site workers will be present within areas of the landfall, onshore export cable corridor and 400 kV grid connection cable corridor at risk of fluvial and tidal flooding (Flood Zone 2 and 3a and 3b) during the construction phase of the development. Occasional operation and maintenance activities are also expected to take place at the landfall, onshore export cable corridor and 400 kV grid connection cable corridor. As outline in the outline operational drainage management plan (document reference J10), the onshore export cables and 400 kV grid connection cables will be installed below ground, and the existing land cover will be reinstated at surface level, in line with best practice, during the construction phase. On this basis it is not considered necessary to provide permanent surface water management measures for the onshore cable route.
- 1.9.3.17 Additional commitments are referenced within **Table 1.27** and set out in Outline Code of Construction Practice (document reference J1) that will be submitted to the LPAs for approval with consultation with the Environment Agency and LLFA prior to the commencement of works.

Exception test part (b)– conclusion

- 1.9.3.18 This FRA and the mitigation measures proposed demonstrates that the development will be safe, without increasing flood risk elsewhere. Therefore, point (b) of the exception test for the temporary construction compounds is considered to be satisfied.

1.10 Summary and conclusions

1.10.1 Summary

1.10.1.1 A site-specific FRA in accordance with NPS EN-1, the NPPF and associated PPG has been undertaken for the study area which incorporates the following aspects of the Transmission Assets.

- 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 cables: 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.

1.10.1.2 In accordance with the guidance on development and flood risk (PPG Flood risk and coastal change), this FRA demonstrates the following.

1.10.2 Fluvial and tidal flood risk

1.10.2.1 The updated Flood Map for Planning shows a proportion of the development is located within Flood Zone 1 (low risk). However, partial extents of the development are located within Flood Zone 2 (medium risk) and Flood Zone 3 (including Flood Zones 3a and 3b) (high risk). Areas of risk are associated with tidal flooding from the Ribble Estuary causing flooding to main rivers and ordinary watercourses that run through the onshore infrastructure area. Within the intertidal infrastructure area, the Irish Sea poses flood risk via tidal flooding along the coastline.

1.10.2.2 The majority of main rivers are bounded by Environment Agency flood defences which provide varying levels of protection to the development.

1.10.2.3 Phasing between the Transmission Assets and Penwortham Flood Defence Scheme have been confirmed to be different, minimising the chance of interaction between the schemes.

1.10.2.4 In summary:

- the landfall is assessed to partially be at risk of tidal flooding during construction;
- the onshore export cable corridor is at risk of tidal flooding during construction,
- the access tracks serving Morgan onshore substation is assessed to partially be at risk of fluvial flooding during the construction and operation and maintenance phases;
- the access tracks serving Morecambe onshore substation is assessed at to partially be at risk of fluvial and tidal flooding during the construction and operation and maintenance phases; and
- 400 kV grid connection cable corridor are at risk from tidal and fluvial flooding during construction.

1.10.2.5 However, with mitigation measures CoT02 CoT06, CoT08, CoT09 CoT10, CoT12, CoT14 CoT27 CoT35, CoT36, CoT95 and CoT97 (as presented within **Section 1.8, Table 1.44** and to be secured through requirements of the DCO) fluvial and/or tidal risk to the Transmission Assets is considered to be low.

1.10.3 Groundwater flood risk

1.10.3.1 Groundwater flood risk mapping included within the Groundsure Enviro and Geo Insight report shows the western extent of the study area has a 'low' risk of groundwater flooding. The eastern extent of the Transmission Assets has a 'moderate' to 'high' risk of groundwater flooding, associated with the water table being located closer to the surface within proximity to the Ribble Estuary.

1.10.3.2 Considering the implementation of commitments CoT09, CoT35, CoT36 and CoT41 (as presented within **Section 1.8, Table 1.44** and to be secured through requirements of the DCO) the overall risk of flooding from groundwater has been assessed to be low for the onshore substation sites and very low for the landfall, onshore export cable corridor and 400 kV grid connection cable corridor.

1.10.4 Surface water flood risk

1.10.4.1 As shown within the Environment Agency Long Term Flood Risk mapping, areas within the study area have been identified as being at low to high risk of surface water flooding. These areas are associated with out-of-bank flows from ordinary watercourses and surface water ponding.

1.10.4.2 During the construction phase of the onshore export cable corridor and 400 kV grid connection cable corridor, CoT08, CoT09, CoT24, CoT27, CoT35 and CoT36 (as presented within **Section 1.8, Table 1.44** and to be secured through requirements of the DCO) will ensure surface water will not be adversely affected. As such, flood risk from surface water sources is considered to be low.

1.10.5 Reservoir flood risk

- 1.10.5.1 Environment Agency reservoir mapping shows that during a wet scenario, a significant portion of the study area is expected to become inundated. Water is shown to extend north and south from the River Ribble and encompass approximately 460 ha of land. There are additional small portions of land around the Main Drain in the west of the study area that are also shown to be affected during the wet scenario.
- 1.10.5.2 Due to the regular inspection and maintenance regime in place on large reservoirs, the likelihood of catastrophic failure and therefore risk of flooding to the site from this source is unlikely to occur. For this reason, risk of flooding from reservoirs is considered to be very low.

1.10.6 Flood risk from sewers and water main failure

- 1.10.6.1 United Utilities operate public sewer assets and water supplies in the study area. However, the majority of the cable corridor is predominantly located within agricultural land. With the implementation of CoT09, CoT35 and CoT36 (as presented within **Section 1.8, Table 1.44** and to be secured through requirements of the DCO), flood risk from this source is assessed to be very low.

1.10.7 Flood risk from artificial sources

- 1.10.7.1 Field drainage is expected to be present within agricultural land within the study area and could pose localised sources of flooding if impacted during construction. CoT09, CoT35, CoT36 and CoT84 (as presented within **Section 1.8, Table 1.44** and to be secured through requirements of the DCO) are expected to prevent impacts to field drainage. The landfall and onshore cable corridor will not be impacted by or cause any adverse effect on field drainage following installation. As such, the risk of flooding from artificial sources is assessed to be very low.

1.10.8 Sequential and exception tests

- 1.10.8.1 The Transmission Assets are defined as 'essential infrastructure' in Table 2 of Planning Practice Guidance ID7 and is suitable for the present Flood Zone and the zone including climate change, subject to an exception test.
- 1.10.8.2 The Morgan onshore substation temporary and permanent access tracks and temporary construction compounds are partially located within Flood Zone 3a and 3b. There are no other reasonable available sites which the temporary construction compounds can be located to provide access to the construction activities. As such, these elements of the Morgan onshore substation are considered to pass the sequential test.
- 1.10.8.3 The exception test has been undertaken and based on sustainability grounds and demonstration that the temporary construction compounds will not increase flood risk elsewhere during construction activities, and appropriate mitigation measures are implemented, the exception test is deemed to be passed.

- 1.10.8.4 The Morecambe onshore substation temporary and permanent access tracks are routed across Flood Zone 3a and 3b. The permanent use would be for heavy goods vehicle and abnormal loads deliveries only and therefore operational use would be rare. 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. As such, these elements of the Morecambe onshore substation are considered to pass the sequential test.
- 1.10.8.5 The exception test has been undertaken and based on sustainability ground and demonstration that the temporary and permanent access tracks will not increase flood risk elsewhere for the lifetime of development, and appropriate mitigation measures are implemented, the exception test is deemed to be passed.
- 1.10.8.6 The Transmission Assets onshore export cable corridor and 400 kV grid connection cable corridor will connect the offshore wind farms from landfall to the National Grid Penwortham substation and therefore are unable to be routed without crossing areas within Flood Zone 3a and 3b. This does not increase flood risk to the surrounding area and has negligible risk of flooding on the development. On this basis, the sequential test and exception test are determined to be passed.

1.10.9 Surface water drainage

- 1.10.9.1 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.

1.10.10 Conclusion

- 1.10.10.1 Proposed mitigation measures will reduce any adverse impacts caused by the construction of the Transmission Assets. As a result, these aspects of the Transmission Assets have a low to very low risk of flooding, and flood risk will not be increased as a result of development.
- 1.10.10.2 The FRA and supporting documentation demonstrate that the Onshore Infrastructure Area study area meets the requirements of the NPS EN-1, the NPPF and the associated PPG.

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