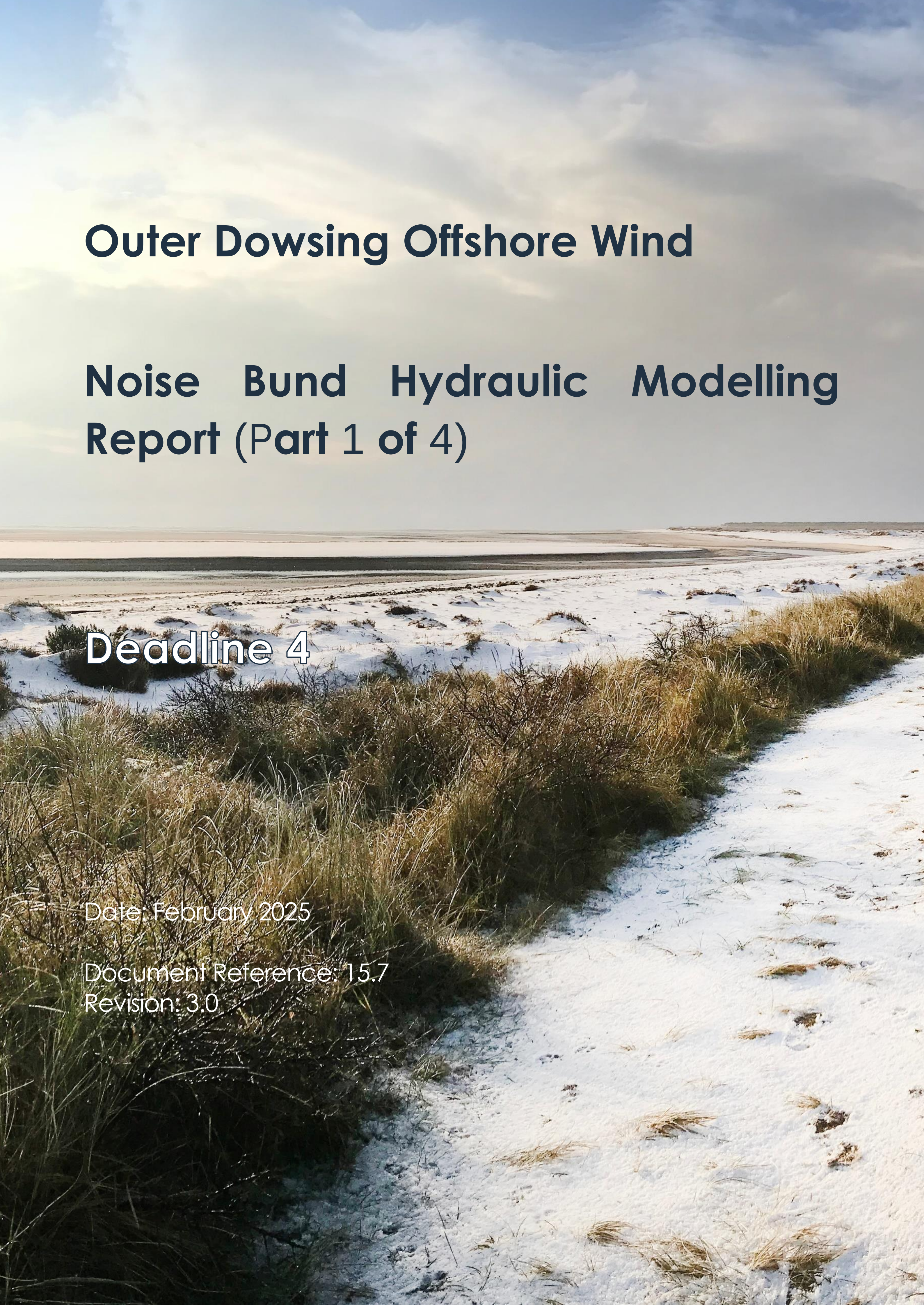

Outer Dowsing Offshore Wind

Noise Bund Hydraulic Modelling Report (Part 1 of 4)

Deadline 4

Date: February 2025

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Noise Bund Hydraulic Modelling Report

Outer Dowsing Offshore Wind

GT R4 Limited

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SLR Project No.: 410.065702.00001

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3 February 2025

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Basis of Report

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Appendices

1.0 Introduction and Background

1. This report outlines the hydraulic modelling and results of the flood risk impacts from the installation of a proposed temporary noise bund at landfall as part of the Outer Dowsing Offshore Wind (ODOW) Project. This modelling has been requested by the Environment Agency as part of the Flood Risk Assessment (FRA) of the Export Cable Corridor (ECC), in order to understand whether the temporary noise bund has any potential impact upon flood risk. This report is therefore presented as a clarification of the ECC and 400kV FRA (document reference 6.3.24.2).

2. The primary purpose of the bund is to mitigate noise impacts to Anderby Marsh, located adjacent to the drill pit. The bund is situated within an area shown to be at a residual risk of flooding from breach of the coastal defences (dunes)[1]. The noise bund is located near Anderby Creek, on the west side of Roman Bank. This is a low-lying coastal area surrounded by agricultural fields and a series of ditches with embankments to prevent tidal flooding. Figure 1-1 shows the location and orientation of the noise bund.

Figure 1-1: Location of Noise Bund

3. The noise bund tidal model has been constructed using the TUFLOW hydraulic modelling package (Build: 2023-03-AE-iSP-w64).

4. The TUFLOW HPC module was selected as the numerical solver for the development of the coastal 2D hydraulic model. The High-Performance Compute (HPC) module solves the full 2D shallow water equations, including inertia and turbulence, and is suited to floodplain, open channel, and pipe hydraulics. The HPC solver also enables adaptive

[1] https://flood-map-for-planning.service.gov.uk/

time-stepping in conjunction with smaller grid resolutions for greater granularity of results and topographic features where this is required. This package, which is distributed by BMT is widely used in the UK and has been benchmarked by the Environment Agency.

1.1 Consultation

5. A technical note explaining the methodology was submitted to the Environment Agency prior commencement of the modelling. This was reviewed and the methodology was amended to address the comments received. The methodology technical note and Environment Agency response is appended as Appendix A. Addressed comments and responses are summarised in Table 1-1.

Table 1-1: Technical note review comments/responses matrix

Environment Agency Comment	Response
Section 2.1 Hydrology, bullet point 4 states that 'the climate change uplift has been calculated as 70mm'. However, the climate change allowance for 2018 to 2030 is 84mm and this is the uplift included in Table 1. We consider that the climate change uplift of 84mm and tabulated levels presented in the methodology are appropriate to represent the temporary nature of the noise bund, calculated from the base year of 2018 to the year 2030.	Climate change allowances in the report have been updated. **Climate change allowances:** *2018 – 2030 – 12yrs x 7mm = 84mm (end of project life span)* *2018 – 2024 – 6yrs x 7mm = 42mm (present day)*
Time to closure - In line with the Requirements for Hazard Mapping v8, the time to closure for open coast is 72 hours, rather than 70 hours. The model simulation time should be long enough to allow maximum spreading of flood water.	Model has been run for 80 hours allowing maximum spreading of flood water.
Breach widths - The Environment Agency Tidal Hazard Mapping ran a multiple breach scenario at location E20 where the breach width was 100m for the coast and 50m for Roman Bank.	These have been amended accordingly.
Flood progression maps are not proposed. These would be beneficial to show the impacts of any land raising on the surrounding area and third parties as the breach progresses.	Flood animations have been produced for critical events and scenarios.
The methodology confirms that sensitivity runs will be completed for cell size, material roughness, model inflows and design tidal curve. No details of the sensitivity run are provided.	Sensitivity analysis details have been provided in Section 4.0 of this report.
It's not clear from the methodology what the baseline will be based on. Is it CFB 2018 or present day?	Baseline hydrology is based on present day (2024). The CFB boundaries have been adjusted to reflect this.
The methodology doesn't detail how land use will be considered within the 2D Domain i.e., Manning's roughness. The consultant should delineate areas of land use and apply appropriate roughness values.	Land use is based on the UK Land Cover Map 2021 (LCM2021) provided by the UK Centre for Ecology & Hydrology (UKCEH). Details of this have been provided in Section 2.7 of this report.
The methodology doesn't detail any further proposed topographical changes that could	No topographical survey has been completed for the Site. 12.5cm aerial survey photogrammetry

Environment Agency Comment	Response
influence flow pathways and flood mechanisms within the Site. Has any topographical survey been undertaken within the Site that can be modelled to increase confidence in ground elevations? If so, it is recommended that survey is incorporated.	data has been gathered as part of the wider project and has been used for an increase in resolution of the topography where available.
The figures do not show the proposed 2D domain extent, although the Methodology states 'The model will extend significantly far inland from the site, so the key flooding mechanisms are not affected by any model boundary conditions. The 2D domain should be sufficiently large to prevent glass walling and allow flood propagation.	This has been amended accordingly.
The methodology shows that the peak tidal curves occur at the start of the simulation with subsequent tidal peaks subsiding. Normal practice is to apply the highest peak in the middle of the simulation.	The tidal curve has been updated with the highest peak in the middle of the simulation.
Defence crests will be represented using Z lines with crests informed from the 'EA Spatial Flood Defences Including Standardised Attributes' layer and cross referenced against LiDAR. This is considered an appropriate methodology. Z Line node locations should be of sufficient frequency in order to represent variations in crest height along its length.	This has been amended accordingly.
Sensitivity runs on the boundary parameters, should 2D flow boundaries be used.	Sensitivity runs on model inflow boundary conditions have been carried out. Details of this have been provided in Section 2.7 of this report.

6. Version 1.0 of the Noise Bund Hydraulic Modelling Report was submitted to the Environment Agency on 19th September 2024 for formal review and audit. The audit spreadsheet, received on 15th November 2024, outlined a number of comments on the modelling. The model has been duly adjusted and re-run in order to address these comments. The two main changes to the model, which have resulted in a difference in flood extents are:
   - Removal of a 2d_zsh line along the beach which acted to artificially raise ground levels; and
   - Revision of the tidal curve to ensure it is appropriate for the noise bund location.
7. The results from the updated model are presented in this report (Version 3.0) and Version 2.0. Version 2.0 of this report was submitted to the Environment Agency in December 2024, and Version 3.0 has been produced to clarify the positioning of the noise bund on figures. The hydraulic model audit spreadsheet has been received from the Environment Agency on 31st January 2025 following a review of the Version 2.0 report. This latest review highlighted a single point seeking clarification on an element of data used in the model. A response to this request for information has been issued back to the Environment Agency at the time of reporting.

2.0 Methodology

8. This section of the report summarises the construction of the 2-Dimensional (2D) hydraulic model.
9. The construction of 2D hydraulic models requires several data sets and parameters, of which the key items are summarised below:
    - Model extent;
    - Floodplain topography in the form of a digital terrain model (DTM);
    - Cell size;
    - Topography edits;
    - Hydraulic structures;
    - Hydraulic boundaries; and
    - Roughness (Manning's n).

2.1 Model Extent

10. The hydraulic model domain extends along the beach from Anderby Creek to Chapel St. Leonards. The A52 High Road borders the model on the south and west sides, while the minor road, Sea Road, delineates the northern boundary. To avoid glass walling due to the flat terrain, the model extent has been extended inland. The model extent is illustrated in Figure 2-1.

2.2 Topography (DTM)

11. The underlying base topography for the hydraulic model of the study area has been generated from the filtered aerial photogrammetry (LiDAR) data obtained from the Defra website[2]. This 2022 LiDAR dataset adequately represents the floodplain topography, allowing for accurate flood routing for out of bank 2D flow, while also providing coverage of the full model extents as shown in Figure 2-1 below.

2.3 Topography Edits

12. The following key components were also added to the baseline LiDAR DTM to add more detail to the 2D domain of the flood model:
    - In accordance with Environment Agency guidance[3], building footprints within the model extent have been raised by 0.3 meters. A combination of manual annotations from aerial imagery and data from OS Open Map – Local (OML)[4] were used to represent the building footprints in the hydraulic model using a 2D_zsh layer.
    - In addition to the LiDAR data, 12.5cm aerial survey photogrammetry data gathered as part of the wider Project has been used where available across the model extent for an increase in resolution of the topography, particularly around the proposed noise bund area. The difference between LiDAR data and the aerial survey is between -0.3m to +0.1m. Since we are using 10m grid cell size, these data sets were incorporated in the model.

[2] Defra Data Services Platform, June 2024. https://environment.data.gov.uk/DefraDataDownload/?Mode=survey

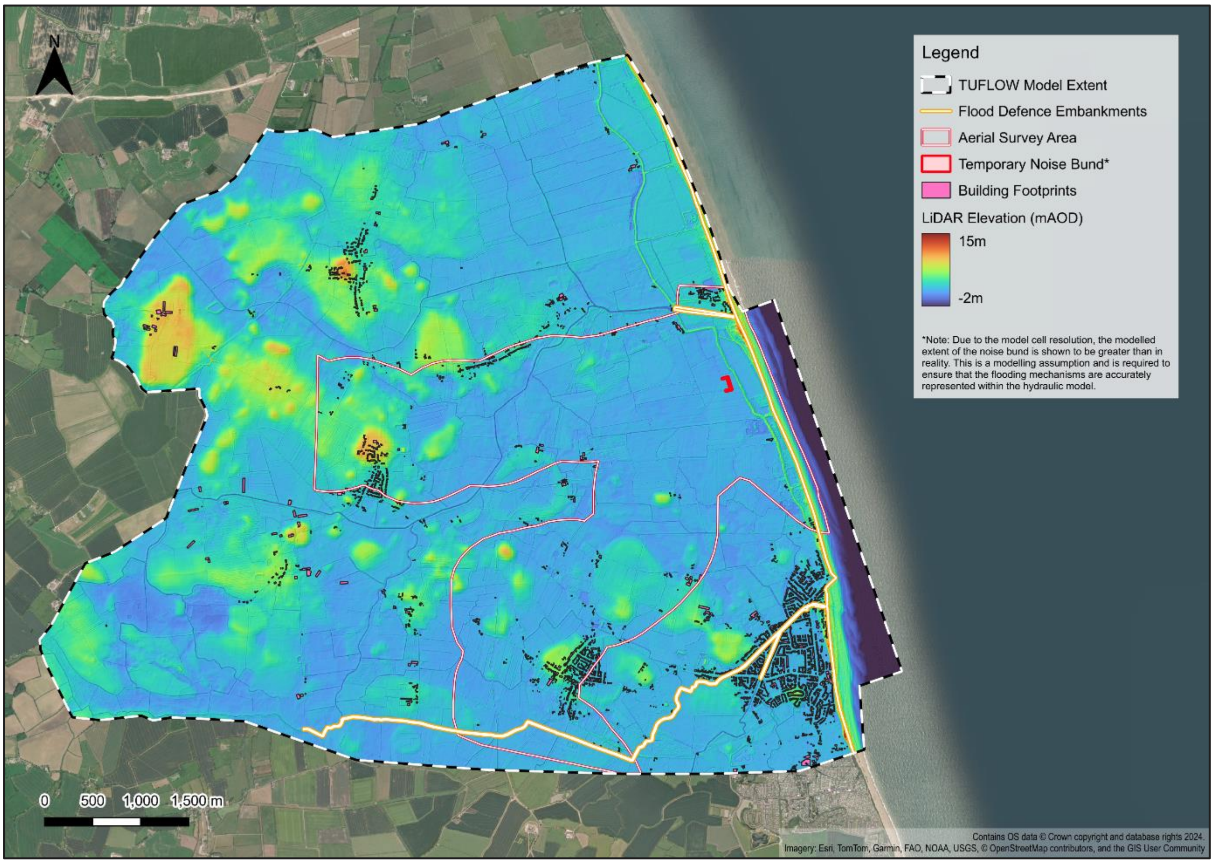
[3] Environment Agency, Anglian Region, Northern Area Requirements for Hazard Mapping. January 2014

[4] Ordnance Survey Platform, June 2024, https://www.ordnancesurvey.co.uk/products/os-open-map-local

- The heights of spatial flood defences in the modelled area will be defined by a series of ZSH polylines in the TUFLOW 2D domain. The elevations used for the defences were obtained from the AIMS Spatial Flood Defences[5] data.
- For the proposed development model scenario, the footprint temporary noise bund has been raised using a 2D_zsh to the design level of 11.4 mAOD.

13. The above key topographical edits are also indicated in Figure 2-1 below.

Figure 2-1: 2D Model parameters



2.4 Cell Size

14. A 10m model grid cell size was utilized considering the floodplains expansive area and likely flow paths, relatively minimal variation in regional topography and largely rural nature. This cell size has also been determined to be sufficient for incorporating crucial details such as channel width, breach length, flood embankment width, and the width of main roads surrounding the study area. These factors were carefully considered to provide an accurate evaluation of the flood risk model grid cell size, ensuring a thorough and robust assessment of potential vulnerabilities and hazards. Sub-grid sampling was used to utilise the high resolution DTM data regardless of the TUFLOW grid cell size being used. By utilising the underlying sub-grid scale topography, it is possible to more accurately represent the storage and conveyance that is possible within the system being modelled.

[5] AIMS Spatial Flood Defences (inc. standardised attributes), June 2024, https://www.data.gov.uk/dataset/cc76738e-fc17-49f9-a216-977c61858dda/aims-spatial-flood-defences-inc-standardised-attributes

2.5 Breach Locations

15. Two primary breach scenarios were considered:

- Breach 1:
    - Dune breach – 1st tidal cycle (100m)
    - Roman bank – No breach
- Breach 2:
    - Dune breach – 1st tidal cycle (100m)
    - Roman bank – 2nd tidal cycle (50m).

16. These breach locations were selected based on the distance to the proposed noise bund location, watercourses surrounding the study area and regional topography. Each breach was triggered to occur one hour before the peak water level of the first and second tidal cycle of the model simulation, as per Environment Agency Guidance[6] and were represented in TUFLOW using variable (2d_vzsh) shapefiles. Breach levels were set from the lowest DTM levels in and around each of these flood defences. The location of the breaches are shown in Figure 2-2.

Figure 2-2: Breach Locations

[6] Environment Agency, Anglian Region, Northern Area Requirements for Hazard Mapping. January 2014

2.6 Hydraulic Boundaries

17. The boundary condition applied to the TUFLOW model was a Head-Time (HT) boundary placed on the model boundary along the sea. This boundary is used to assign the tidal curves for the 1 in 200 annual chance (0.5% Annual Exceedance Probability (AEP)), 1 in 1,000 annual chance (0.1% AEP), 1 in 200 annual chance plus an allowance for climate change (0.5% AEP + CC) and 1 in 1,000 annual chance plus an allowance for climate change (0.1% AEP + CC). This study focuses solely on coastal / tidal flooding mechanisms.

18. Following Environment Agency Guidance[7], a base spring astronomical tide for Skegness was selected based on the proximity to the site. Peak tidal levels were appropriately checked against HAT and MHWS levels to ensure that the selected base curve was representative of typical high-tide conditions that are likely to interact with extreme surge events. The surge profile for Immingham was then scaled to align with the difference between base and target extreme sea levels before being combined with the base tide curve to derive a design tide.

19. These tidal curves have been scaled to fit the extreme sea levels from CFB chainage at 3948[8] (*CFB conditions for the UK 2018 for 'Location: Chainage: _3948*). CFB 97.5% confidence levels has been selected to minimise the uncertainty. The CFB level were adjusted to present day level (2024) by increasing the water levels by 42mm.

20. Climate change allowances for sea level rise have been calculated from a base year of 2018 using the current guidance from the Environment Agency for the Anglian Region for the Upper End Scenario (Flood risk assessments climate change allowances).

21. As the noise bund is a temporary structure for the construction phase only, the expected design life of the structure is 4 years. Therefore, the climate change uplift has been calculated as 84mm (2018 to 2030 – accounting for the adjustment for sea level rise to present day and the addition of 4 years from anticipated construction date (2026) to account for the life span of the development).

22. The resultant design tidal curves for the 1 in 200 year and 1 in 1000 year events have been shown alongside the base astronomical tide curve for Skegness within Figure 2-3. Peak tidal levels are summarised in Table 2-1.

23. Full tidal curve calculations can be found in Appendix B.

7 Coastal flood boundary conditions for the UK: update 2018, User Guide

8 2018, Environment Agency: Coastal Flood Boundary Extreme Sea Levels

Figure 2-3: Scaled Tidal Curve

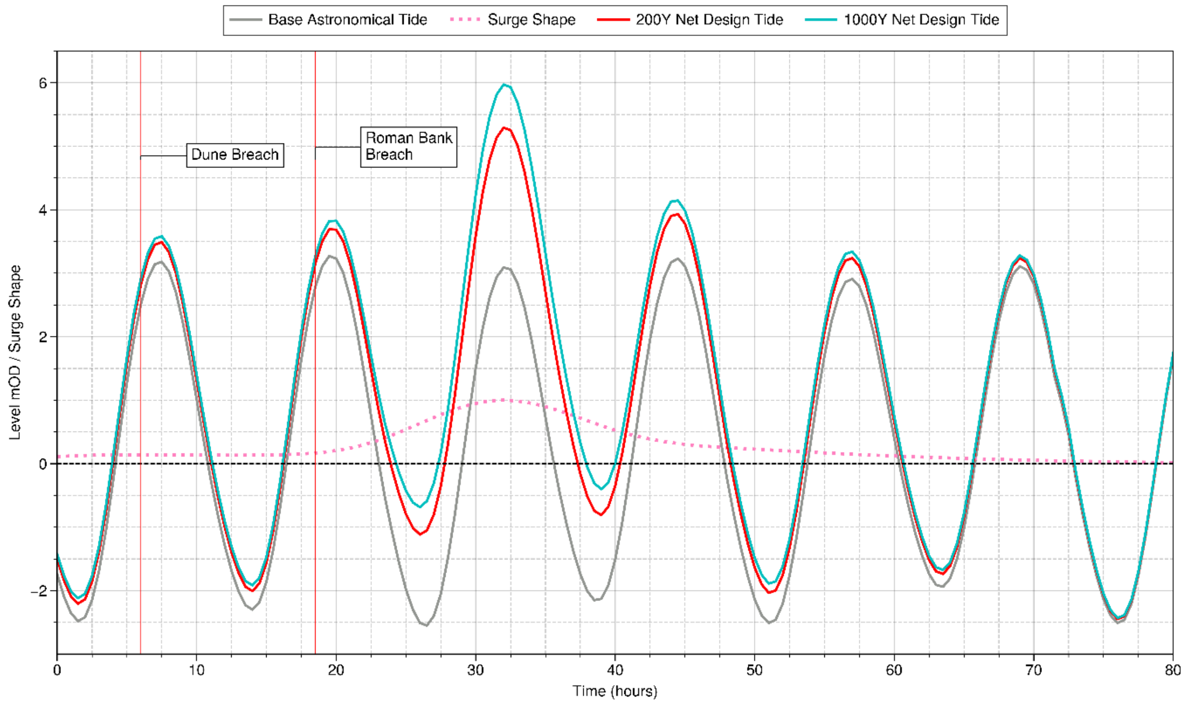


Table 2-1: Summary of Peak Tidal Levels

AEP%	CFB (97.5% CL) (mAOD) 2018	CFB (97.5% CL) (mAOD) 2024	TUFLOW Modelled Peak HT boundary (mAOD)
0.5% AEP	5.250	5.292 (+42mm)	5.292
0.1% AEP	5.930	5.972 (+42mm)	5.972
0.5% AEP + CC		5.334 (+84mm)	5.334
0.1% AEP + CC		6.014 (+84mm)	6.014

Climate change allowances:

2018 – 2030 – 12yrs x 7mm = 84mm (end of project life span)

2018 – 2024 – 6yrs x 7mm = 42mm (present day)

2.7 Manning's n

24. The definition of the extent of each of the roughness values in the 2D domain was determined using the Land Cover Map 2021 (LCM2021) provided by the UK Centre for Ecology & Hydrology (UKCEH). This was correlated with aerial photography to delineate different land use areas based on ground surface characteristics (Table 2-2). Each land use type was assigned a corresponding Manning's n value in the TUFLOW Materials File as shown below in Table 2-2, with a set default Manning's value of 0.04 (99).

25. In accordance with Environment Agency guidance, the roughness value within the model for building footprints has been increased to 0.1.

26. The material roughness across the model domain has been read into the hydraulic model using a standard TUFLOW Materials.csv with Manning's n values derived from Chow[9].

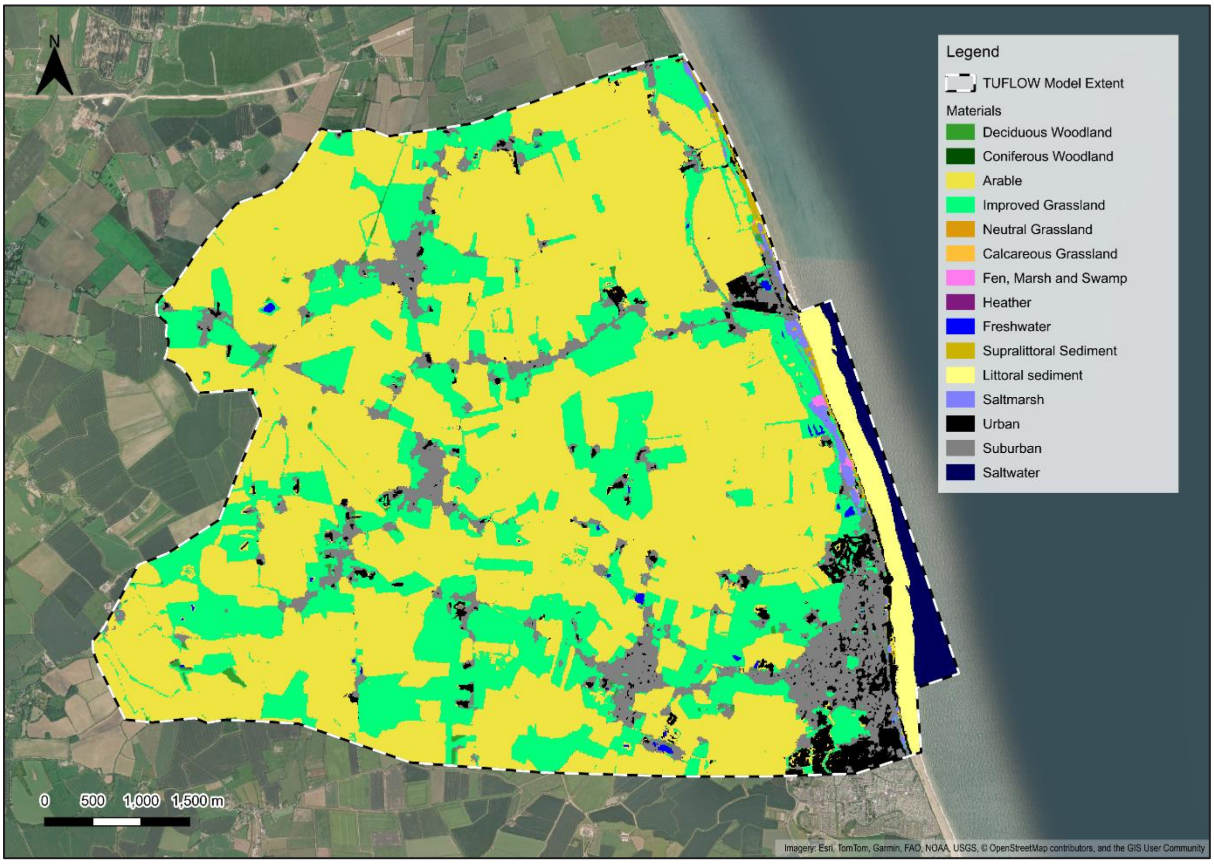
Table 2-2: Modelled Material Properties

Material ID as referenced in GIS layer	Manning's n value	Land use type
1	0.100	Deciduous woodland
2	0.060	Coniferous woodland
3	0.035	Arable
4	0.030	Improve grassland
5	0.035	Neutral grassland
6	0.035	Calcareous grassland
7	0.030	Acid grassland
8	0.035	Fen
9	0.050	Heather
10	0.050	Heather grassland
11	0.035	Bog
12	0.040	Inland rock
13	0.025	Saltwater
14	0.025	Freshwater
15	0.040	Supralittoral rock
16	0.040	Supralittoral sediment
17	0.050	Littoral rock
18	0.040	Littoral sediment
19	0.035	Saltmarsh
20	0.100	Urban
21	0.060	Suburban
22	0.100	Buildings
99	0.040	Default value

27. Figure 2-4 below shows the applied Manning's n roughness values applied to varying land uses within the model.

[9] Chow, V.T., (1959). Open-channel hydraulics, McGraw-Hill, New York

Figure 2-4: Hydraulic Model Material Roughness



2.8 Software Version

28. In line with industry practice, the TUFLOW model was constructed using the latest commercially available software version at project outset: TUFLOW HPC 2023-03-AE (single precision).

2.9 Modelling Parameters

29. The underlying 2D digital terrain model (DTM) was generated using the base 1m LiDAR grid described in Section 2.2. Sub-grid sampling (SGS) testing was undertaken during the initial model build. It was decided to continue using HPC with SGS functionality in 10m grid cell size.

30. All modelled scenarios have been simulated for 80 hours to allow for the inflow boundaries to peak across the model domain. The computational timesteps used by HPC are adaptive over the course of the simulation, with 2D time-varying outputs generated every 15 minutes.

2.10 Model Operation

31. The hydraulic model was simulated using the HPC Solver for TUFLOW build 2023-03-AE single precision (iSP). Initialisation of the TUFLOW model utilised a standard Windows Batch file linking the TUFLOW executable, TUFLOW control file (.tcf) and relevant event and scenario logic, as defined in Table 2-3 below.

Table 2-3: Model Scenario Definitions

Run Reference:	ONB_~e1~_~s1~_~s2~_~s3~_010.tcf	
Scenario Description (-s1)	10m (10m cell size) 05m 15m	
Scenario Description (-s2)	OVP- Overtopping BR1 - Breach 1 BR2 - Breach 2	
Scenario Description (-s3)	EXG (Existing/baseline) PRO (Proposed)	
Return Periods (-e1)	0200R 0200R_CC 1000R 1000R_CC	0.5% AEP 0.5% AEP + Climate Change 0.1% AEP 0.1% AEP + Climate Change

3.0 Model Results

Maximum flood depths, velocities, and hazard rating results for the areas in and around the noise bund are presented in Appendix C (document reference 15.7A). For reference,

Figure 3-1 to Figure 3-7 below contain peak flood depths and flood level difference outputs for the proposed and baseline model scenarios.

3.1 Scenarios and Events

32. Across all return periods, peak flood events do not result in flood water reaching the site under any of the overtopping scenarios considered.
33. Flood inundation is indicated at the Site across all modelled return periods for the Breach 1 (Dune Breach only) scenario. The overall extent and depths are, as expected, found to increase with rising return period severity with the 0.1% AEP + climate change event indicating depths of 1.26m directly north of the noise bund. Water is largely held back by the Roman Bank, with depths directly to the east of the embankment in excess of 3m in some areas.
34. Flood inundation is also indicated at the Site for the Breach 2 (Dune and Roman Bank Breach) scenario across all modelled return periods. Peak flood extents for baseline conditions are similarly found to be largest in the 0.1% AEP + climate change event. Maximum flood depths are reported to be 1.35m directly to the north of the noise bund.
35. Under the proposed conditions, for the 0.1% AEP + climate change Breach 2 scenario (worst-case), an increase in flood levels can be noticed directly to the east and north of the site, and a reduction can be observed to the west. Large amounts of flood water from the Roman Bank breach is redirected to the north and east side of the bund under this scenario. This causes local increases in flood level on the east side and decreases in flood level in the west. In the area of the floodplain where changes in flood level are observed local to the noise bund, the differences are between -10mm to 10mm. It is considered this difference is negligible and therefore will not increase flood risk to any sensitive receptors. There are no sensitive receptors in these locations where peak water levels are increased, with the majority of the areas being agricultural fields.
36. In some areas of the modelled floodplain away from the site, in the 0.1% AEP _+ climate change Breach 2 scenario, small increases in flood levels between 15mm - 60mm are observed due to the installation of the noise bund. However, it is important to note that these increases are low, are only found in-channel of local water features and are largely more than 2.5km away from the noise bund. It is not anticipated that these effects will lead to an increase in risk of flooding for any receptors.
37. Flood depth difference mapping for the 0.1% AEP + climate change Breach 2 proposed scenario is shown in Figure 3-7.

Figure 3-1: Maximum Flood Depths Baseline Overtopping 0.1% AEP+CC

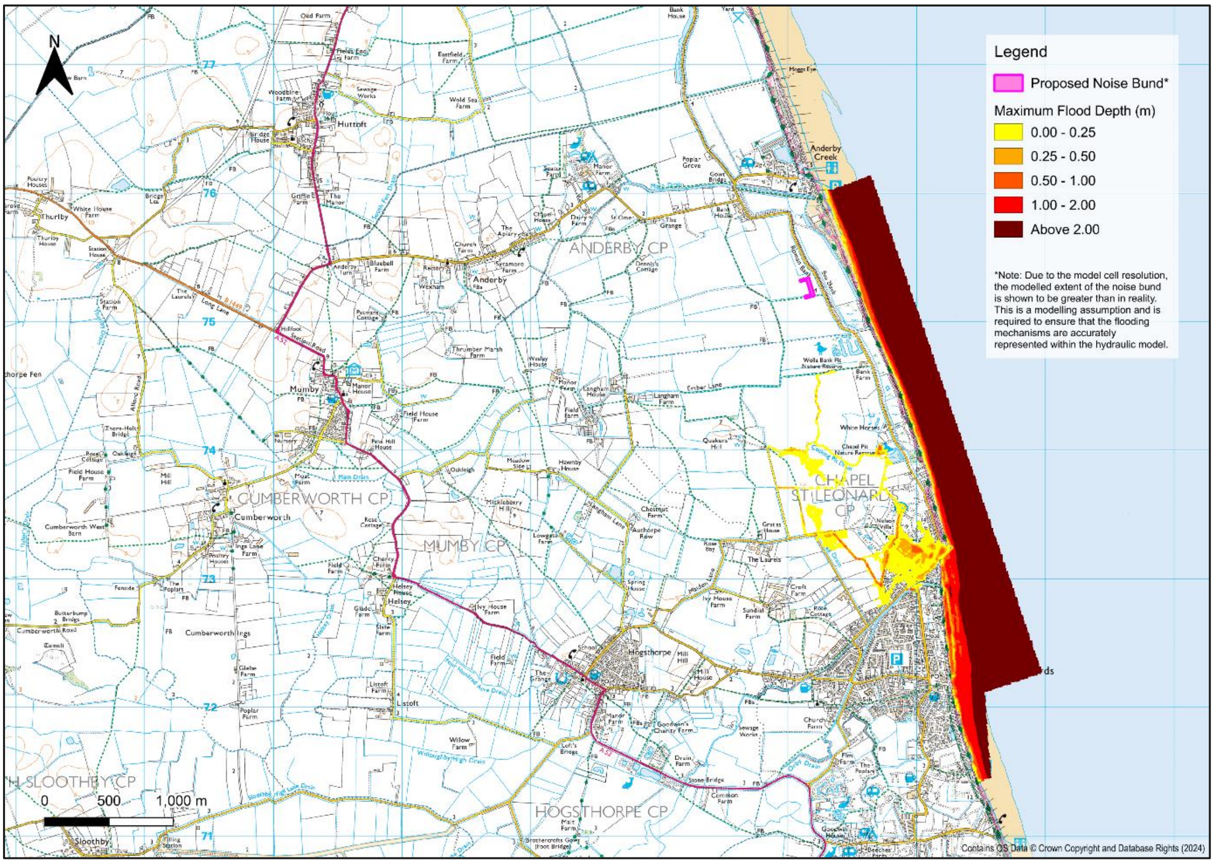


Figure 3-2: Maximum Flood Depths Baseline Breach 1 - 0.1% AEP+CC

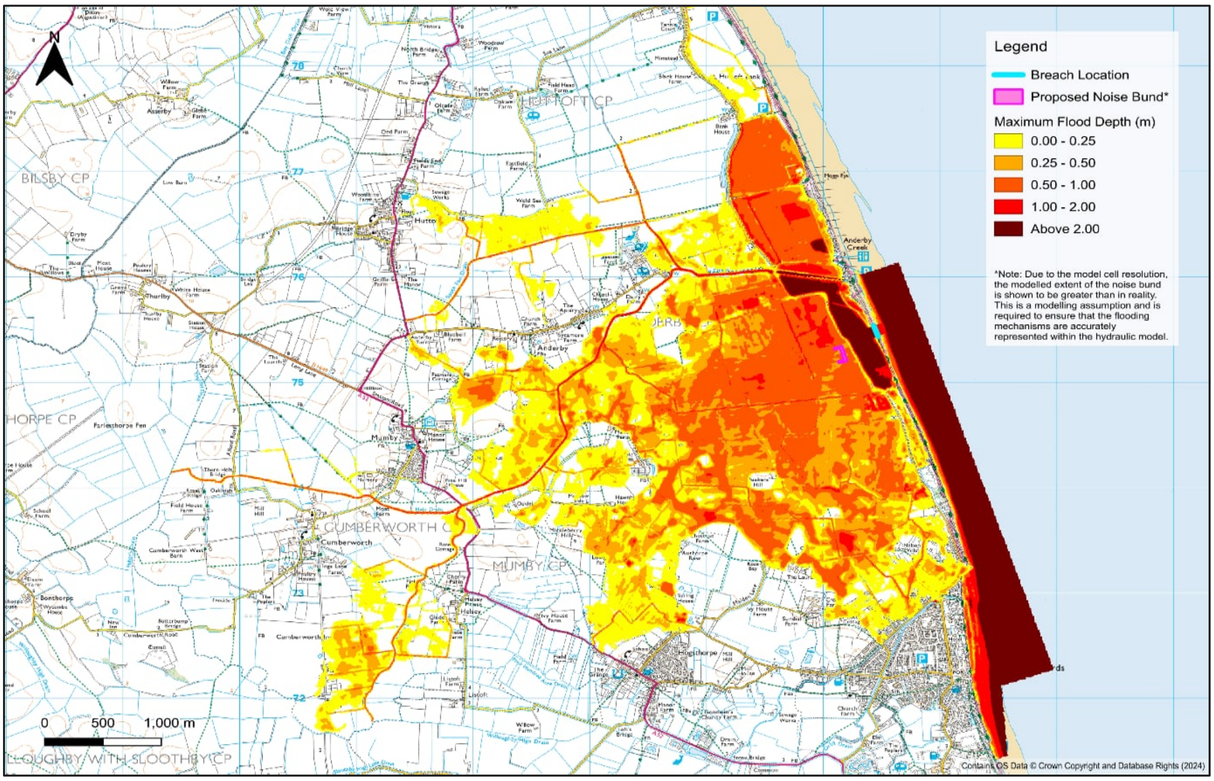


Figure 3-3: Maximum Flood Depths Baseline Breach 2 - 0.1% AEP+CC

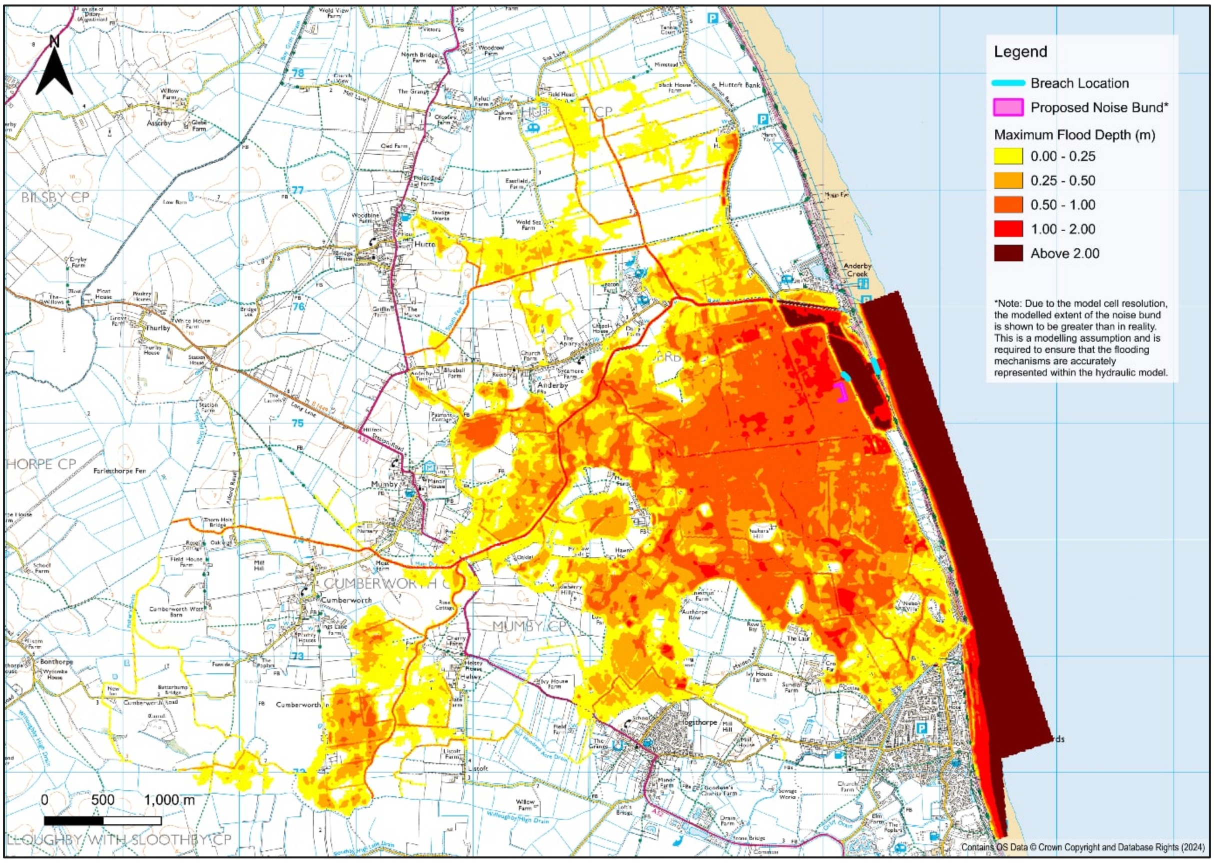


Figure 3-4: Maximum Flood Depths Proposed Breach 1 – 0.1% AEP+CC

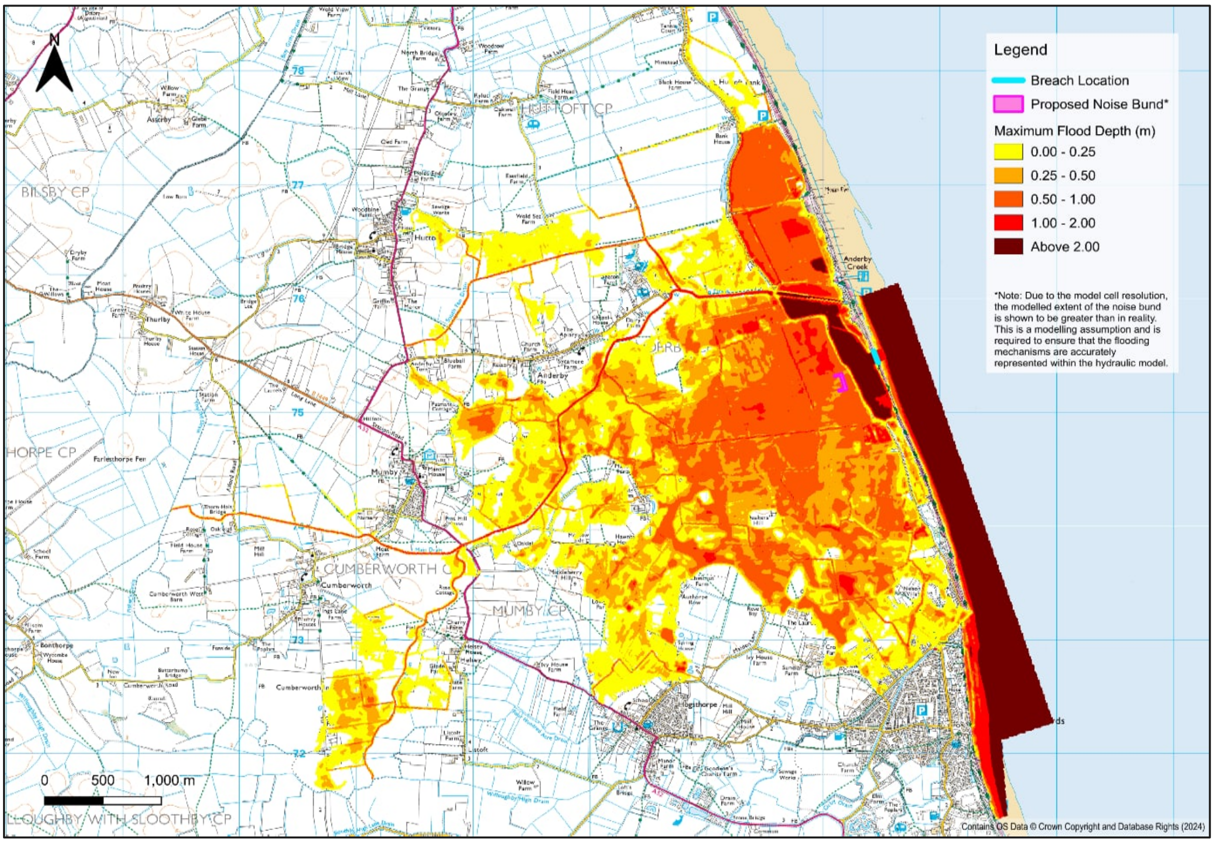


Figure 3-5: Maximum Flood Depths Proposed Breach 2 - 0.1% AEP+CC

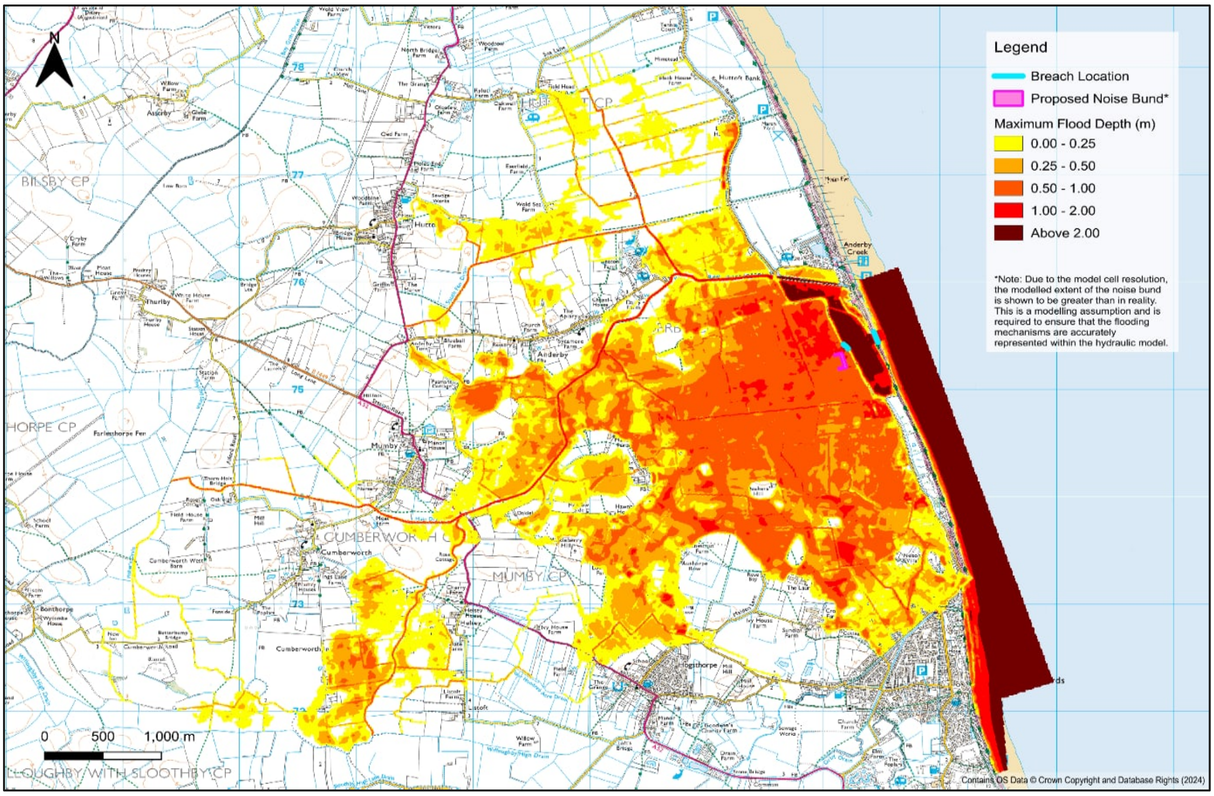


Figure 3-6: Flood Level Difference Proposed vs Baseline Breach 1 – 0.1% AEP+CC

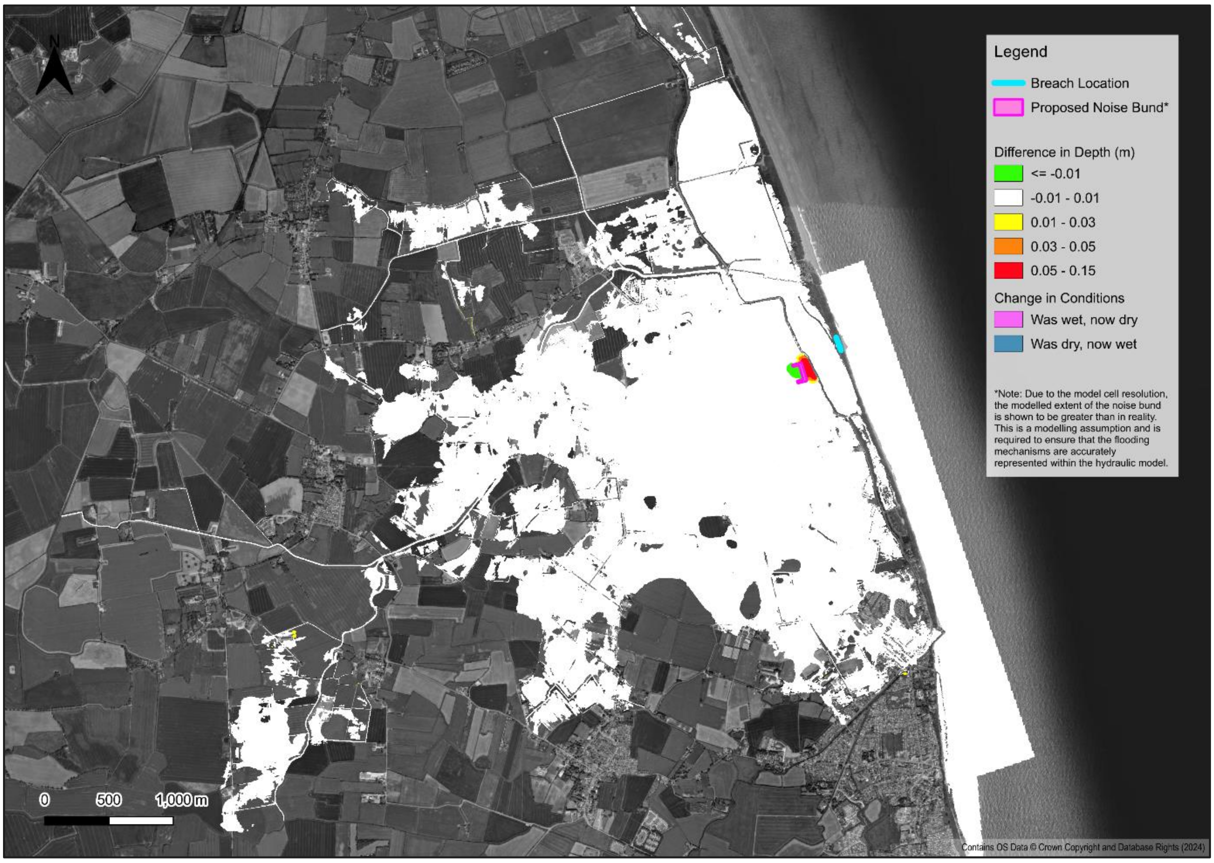
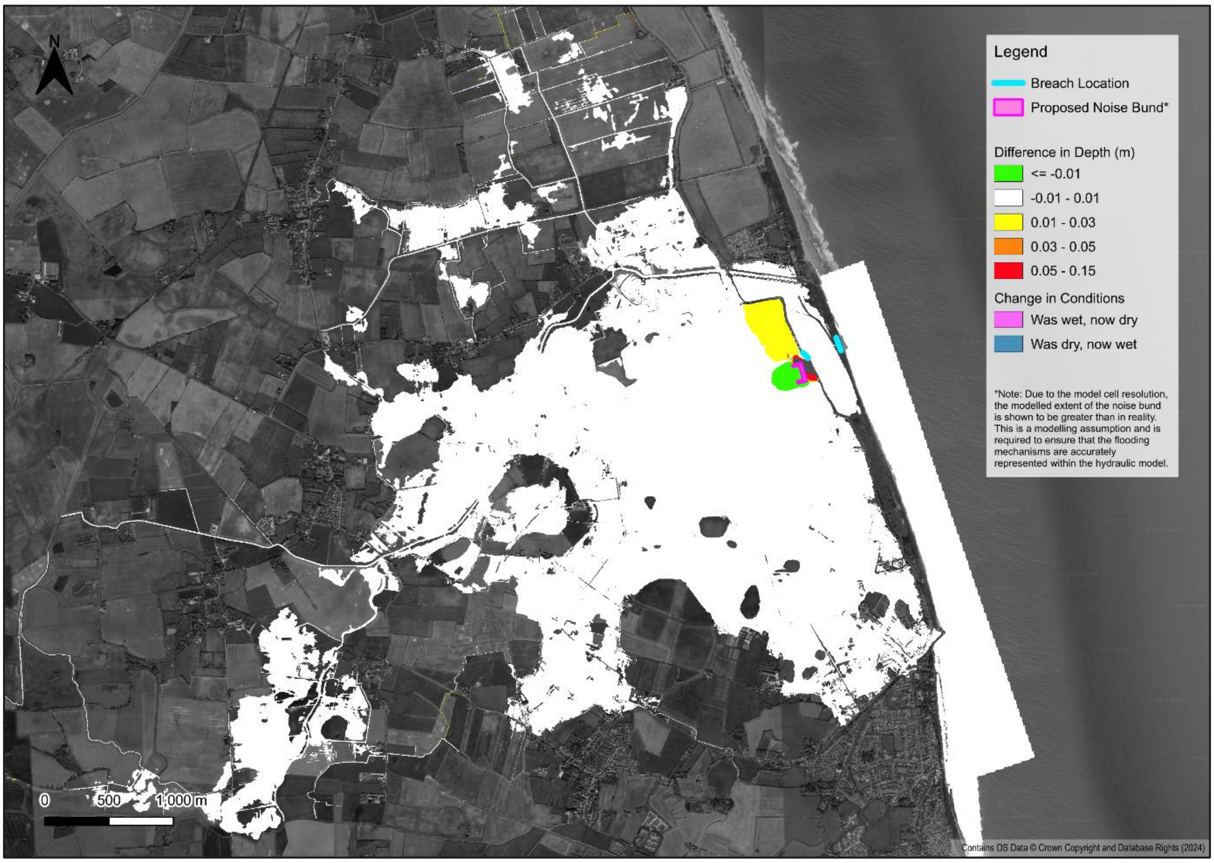


Figure 3-7: Flood Level Difference Proposed vs Baseline Breach 2 - 0.1% AEP+CC



3.2 Quality Assurance

38. This section outlines the Quality Assurance (QA) measures undertaken in developing the hydraulic model.

39. Part of the general model QA process involves reviewing the TUFLOW messages generated during the model compilation stage and resolving any issues. Warnings produced by TUFLOW during the run are also investigated. Locations causing recurring warnings were identified and a solution implemented to reduce or remove the source of the issue. Model logs have also been utilised to record the key decisions made when developing the model, allowing for traceability and aid in the transfer of the models between different users. The main components of the model build, configuration and application were recorded and have been reviewed and signed-off by a senior hydraulic modeller.

40. Further QA over the course of the model build was undertaken, including:

- Material roughness was checked by importing and thematically mapping the grd_check file to ensure surface resistance was applied correctly with respect to aerial images.
- The extent of the 2D domain was reviewed to ensure it was not limiting flood extents in the larger flood events within the area of interest.
- Minimum dT values across the 2D domain were reviewed to highlight any troublesome areas that were slowing down overall run time; and
- Flow rates within the river channel were reviewed to check for high velocities and potential instabilities.

3.3 Model Stability

41. The model has been reviewed and found to be generally stable and appropriate for its intended use. TUFLOW HPC is inherently stable by nature of the adaptive time-stepping, with low time-steps (dT) typically occurring along or near the 2D HT boundary where high velocities are passing through 2D cells. As seen within Figure 3-8, Nu, Nc, Nd and dt output for HPC indicated that the model runs were all within the suitable stability threshold (Nu<1.0, Nc<1.0, Nd<0.03). CHECK 3524 message (Flat cells/faces will be used for VARIABLE Z SHAPE in SGS) was shown for the each of the breaches. Since the breach level has been set to be at lowest DTM level around the breach, this will not affect the final results.

Figure 3-8: Values of HPC run parameters.

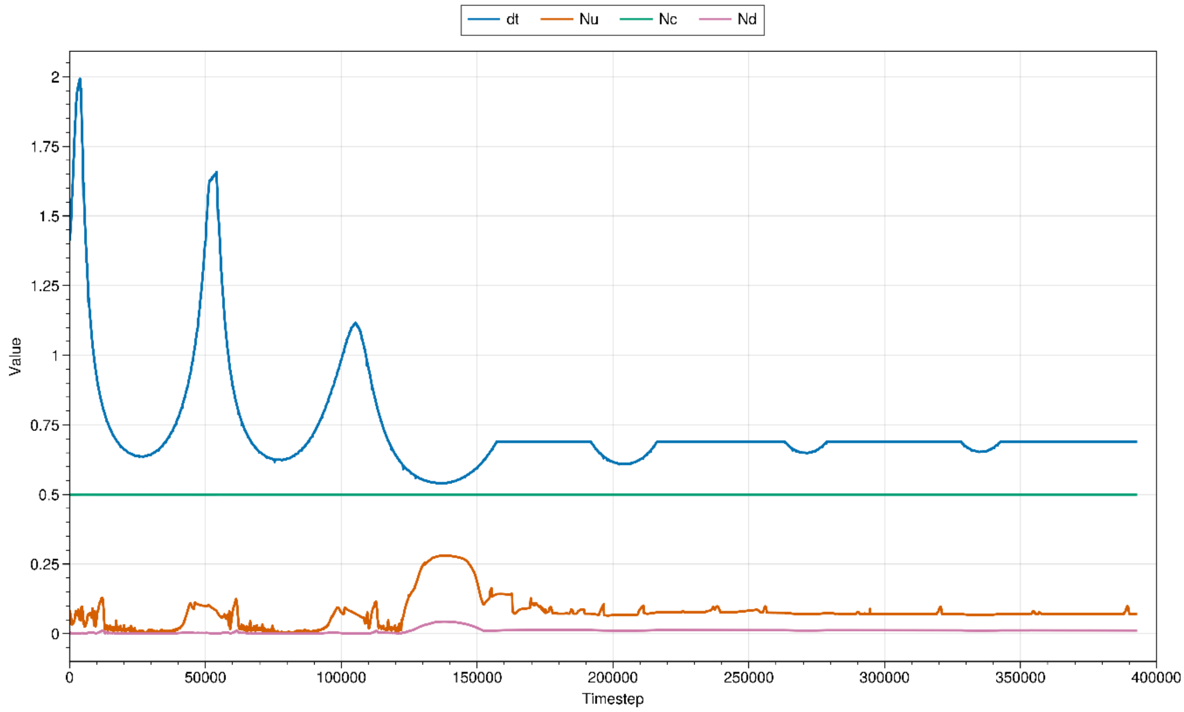
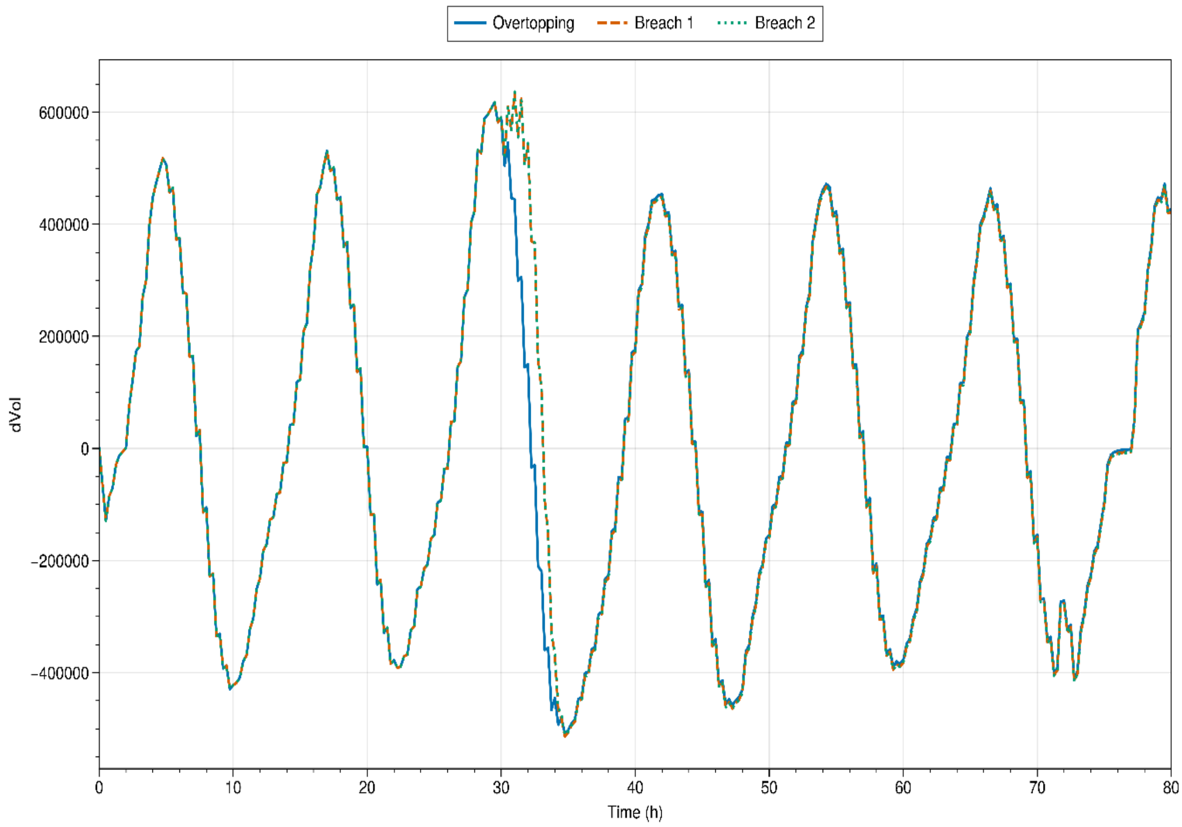


Figure 3-9: Comparison of dVol for Overtopping and Breach Scenarios



3.4 Model Limitations

42. This model has been developed to take advantage of the most accurate available data to help inform flood risk at the site. There are however several limitations to the hydraulic model worth noting:

- The breach base levels were determined solely on ground profiles on a hypothetical basis, which is likely to provide conservative results. No consideration was given to the structural integrity and probability of failure of the defences and embankments.
- The fluvial inflows have not been considered in this study.
- Structures such as culverts, pipes and bridges have not been considered within the model.

4.0 Sensitivity Analysis

43. Sensitivity analysis is the study of how the variation in the output of the model (depth) can be apportioned, qualitatively or quantitatively, to difference changes in the model inputs (model variables, boundary conditions and parameters). Appendix C (document reference 15.7A) contains figures of selected sensitivity results.

44. Sensitivity analysis is used to identify:

- The factors that potentially have the most influence on the model outputs.
- The factors that need further investigation to improve confidence in the model; and
- Regions in space where the variation in the model output is greatest.

45. In line with industry practice, the following parameters, and variables for the hydraulic model have been varied in accordance with the % uplift / parameter change specified below. All the sensitivity runs have been carried out for the 0.1% AEP + climate change event baseline scenario.

Table 4-1: Sensitivity Analysis Variables

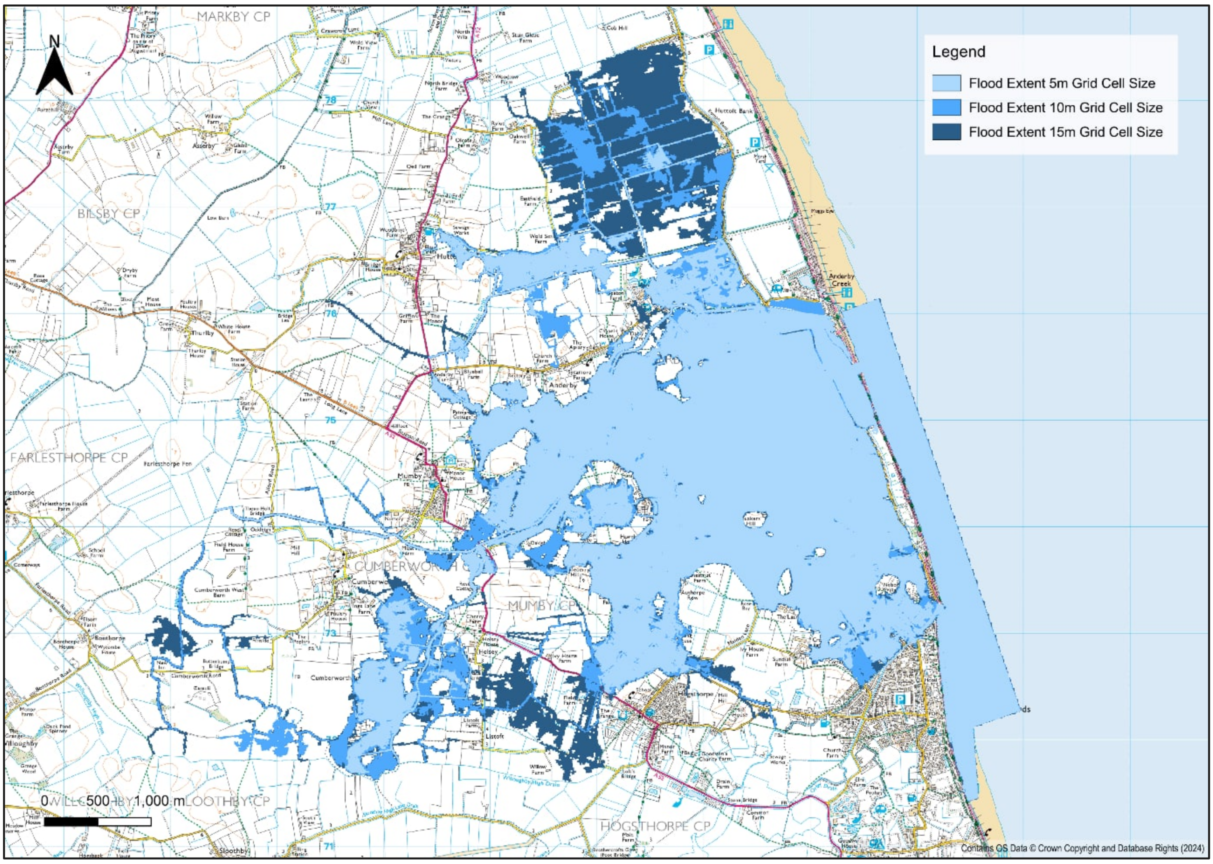
Parameter	Value change
Model Cell Size	15m and 5m
Channel and floodplain roughness	± 20 %

4.1 Model Cell Size

46. The initial run was conducted with a 10m cell size. Subsequent sensitivity tests were carried out with 15m and 5m cell sizes. The flood extents of the sensitivity test are as expected, as the 5m grid has the smallest flood extent and 15m grid has the largest while 10m grid flood extent in the middle.

47. These findings indicate that the 10m cell size strikes a balance, effectively capturing important features in the floodplain whilst reducing model run time without compromising result quality. Peak depth results for 15m and 5m can be seen in Appendix C (document reference 15.7A). Within key areas, peak difference of ± 150mm between each cell size scenario can be observed. The flood extent of model cell size sensitivity runs is presented in Figure 4-1.

Figure 4-1: Flood Extent of Difference Cell Size Sensitivity Runs



4.2 Channel and Floodplain Roughness

48. A universal separate increase and decrease of 20% to the Manning's roughness values was applied across the entirety of the model domain. Generally, the model results demonstrated little difference in the extents of the flooding resulting from these changes. This is due to the generally even nature of the topography. Within key areas, peak differences of ± 100mm between each roughness scenario can be observed.

49. As such the hydraulic model is seen to be moderately insensitive to changes in Manning's roughness, which is expected with the flat terrain of the model extent.

Figure 4-2: Peak Water Level Difference -20% Manning's Roughness (vs Baseline)

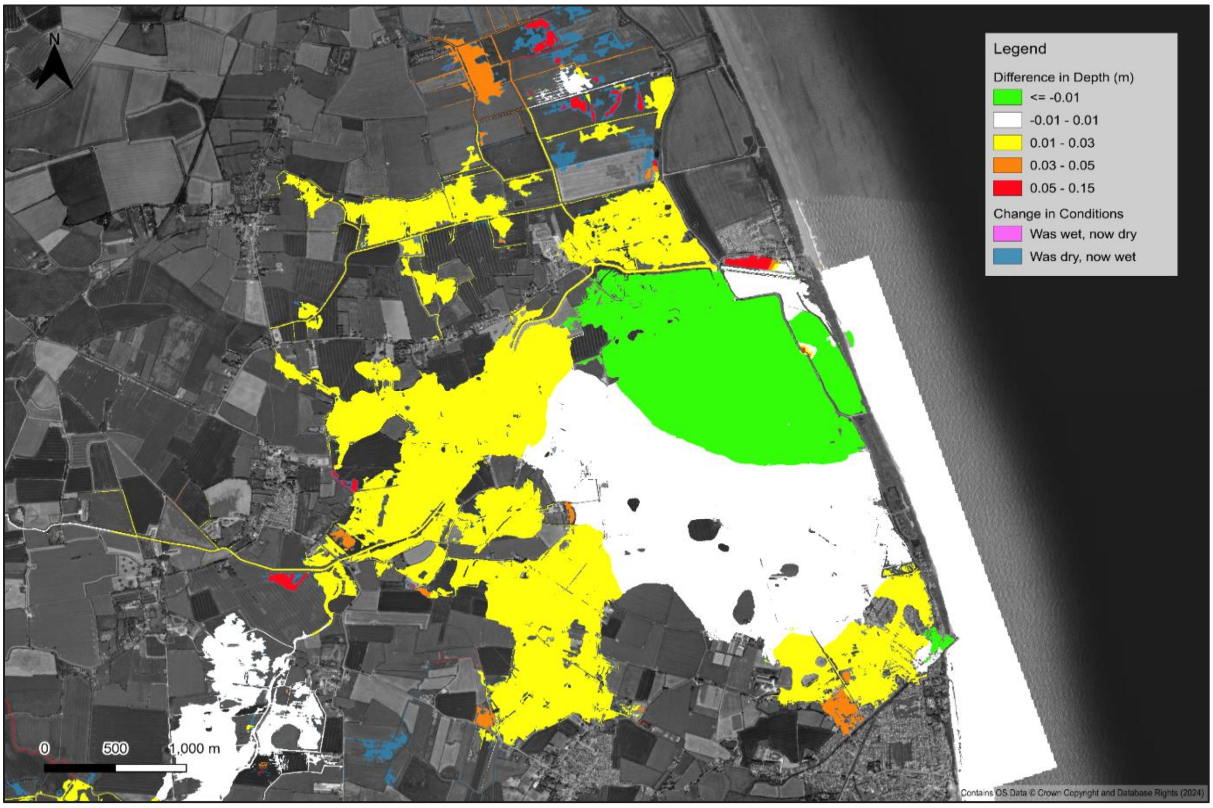
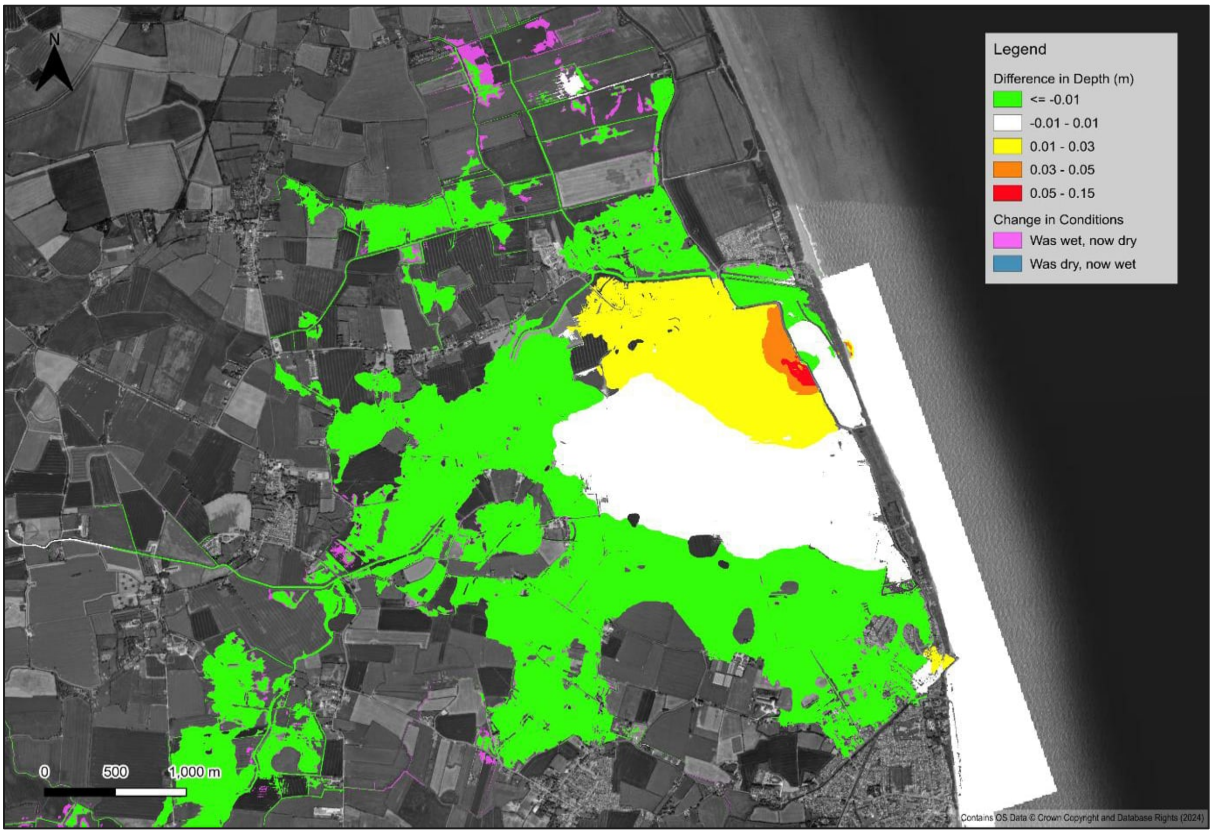


Figure 4-3: Peak Water Level Difference +20% Manning's Roughness (vs Baseline)



5.0 Conclusion

50. This report outlines the hydraulic modelling used to quantify the impact on flood risk by the proposed noise bund using the latest available information.

51. The detailed hydraulic modelling has confirmed that flood water does not reach the proposed noise bund during an overtopping scenario, however reaches the site during both Breach 1 and Breach 2 scenarios for all modelled events.

52. In both breach scenarios, increases associated with the installation of the noise bund in flood levels are noted to the north and east of the bund during the 0.1% AEP + climate change event. These increases are away from potential receptors and are not deemed to pose an increase in flood risk to receptors.

53. The results are discussed further in the Onshore Electrical Cable Corridor (ECC) and 400kV cable Flood Risk Assessment (FRA) (Document 6.3.24.2, Section 24.5.1.3).

Appendix A Methodology Technical Note and Environment Agency Correspondence

For further guidance on modelling for FRAs, please refer to: https://www.gov.uk/guidance/using-modelling-for-flood-risk-assessments#when-to-consider-using-modelling

For guidance on what we will expect to see included within the model scope please refer to: Hydraulic modelling: best practice (model approach) - GOV.UK (www.gov.uk)

Please let me know if you have any further queries,

Kind regards,

Rebecca

Rebecca Sylvester
Flood and Coastal Risk Management Advisor

Environment Agency | **Partnership & Strategic Overview Team** | **Lincolnshire and Northamptonshire** | **South Humber and East Coast**
[redacted]

[redacted]

From: Katrina Riches [redacted]
Sent: Friday, June 28, 2024 4:11 PM
To: Sylvester, Rebecca [redacted]; Hewitson, Annette [redacted]; Tysoe, Heather [redacted]
Cc: Sophie Brown [redacted]; Martin Baines [redacted]; Andy Gregory [redacted]; Jon Ongley [redacted] Hugh Morris [redacted]
Subject: RE: ODOW : Noise Bund Modelling Criteria - Technical Note

Hi Rebecca,

Please find attached our technical note and associated documents summarising the proposed methodology for the flood modelling of the temporary noise bund at landfall.

If you have any questions please do not hesitate to contact us,

Katrina

Katrina Riches [redacted]
Senior Hydrologist - Hydrology & Hydrogeology

[redacted]

SLR Consulting Limited
5th Floor, 35 Dale Street, Manchester, United Kingdom M1 2HF

Katrina Riches

From: Sylvester, Rebecca [redacted]
Sent: 12 July 2024 12:55
To: Katrina Riches
Cc: Hewitson, Annette; Tysoe, Heather; Hugh Morris
Subject: RE: ODOW : Noise Bund Modelling Criteria - Technical Note

Dear Katrina,

Thank you for providing the proposed methodology for the flood modelling of the temporary noise bund at landfall for our review.

The technical note for the noise bund breach modelling is based on the OnSS modelling technical note which has previously been reviewed by our E&R team. As such, PSO have made comments on the technical note, and it has not been submitted to our E&R team for their formal review. We also understand the modelling is underway.

We have highlighted several clarifications and recommendations that should be carried forward into the modelling assessment.

- Section 2.1 Hydrology, bullet point 4 states that 'the climate change uplift has been calculated as 70mm'. However, the climate change allowance for 2018 to 2030 is 84mm and this is the uplift included in Table 1. We consider that the climate change uplift of 84mm and tabulated levels presented in the methodology are appropriate to represent the temporary nature of the noise bund, calculated from the base year of 2018 to the year 2030.
- Time to closure - In line with the Requirements for Hazard Mapping v8, the time to closure for open coast is 72 hours, rather than 70 hours. The model simulation time should be long enough to allow maximum spreading of flood water.
- Breach widths - The Environment Agency Tidal Hazard Mapping ran a multiple breach scenario at location E20 where the breach width was 100m for the coast and 50m for Roman Bank.
- Flood progression maps are not proposed. These would be beneficial to show the impacts of any land raising on the surrounding area and third parties as the breach progresses.
- The methodology confirms that sensitivity runs will be completed for cell size, material roughness, model inflows and design tidal curve. No details of the sensitivity run are provided.
- Its not clear from the methodology what the baseline will be based on. Is it CFB 2018 or present day?

As per comments on the OnSS technical note:
- The methodology doesn't detail how land use will be considered within the 2D Domain i.e., Manning's roughness. The consultant should delineate areas of land use and apply appropriate roughness values.
- The methodology doesn't detail any further proposed topographical changes that could influence flow pathways and flood mechanisms within the Site. Has any topographical survey been undertaken within the Site that can be modelled to increase confidence in ground elevations? If so, it is recommended that survey is incorporated.
- The figures do not show the proposed 2D domain extent, although the Methodology states 'The model will extend significantly far inland from the site so the key flooding mechanisms are not affected by any model boundary conditions'. The 2D domain should be sufficiently large to prevent glass walling and allow flood propagation.
- The methodology shows that the peak tidal curves occurs at the start of the simulation with subsequent tidal peaks subsiding. Normal practice is to apply the highest peak in the middle of the simulation.
- Defence crests will be represented using Z lines with crests informed from the 'EA Spatial Flood Defences Including Standardised Attributes' layer and cross referenced against LiDAR. This is considered an appropriate methodology. Z Line node locations should be of sufficient frequency in order to represent variations in crest height along its length.
- Sensitivity runs on the boundary parameters, should 2D flow boundaries be used.

Technical Memorandum

To:	Rebecca Sylvester	**From:**	Katrina Riches
Company:	Environment Agency	**SLR Consulting Limited**	
cc:	Heather Tysoe, Annette Hewitson	**Date:**	28 June 2024
		Project No.	410.065702.00001

RE: Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

1.0 Introduction and Background

This technical note outlines the hydraulic modelling methodology SLR proposes to take with regard to assessing the flood risk impacts from the installation of a temporary noise bund, proposed as part of the Outer Dowsing Offshore Wind (ODOW) Project.

The primary purpose of the bund is to mitigate noise impacts on a nature area adjacent to the drill pit. The bund is situated within an area shown to be at a residual risk of flooding from breach of the coastal defences (dunes). The development site is located near Anderby Creek, on the west side of Roman Bank. This is a low-lying coastal area surrounded by agricultural fields and a series of ditches with embankments to prevent flooding from seawater. Figure 1 shows the location and orientation of the noise bund.

Figure 1: Location of Noise Bund

A data request was submitted to the Environment Agency for model data relating to the onshore element of the Project. The 2010 NTM (Nearshore Transformation Model) Breach and Overtopping data was received with regard to scenarios for coastal areas and for the tidal reach of the River Welland.

The Environment Agency recommend that the FRA supporting the DCO application must include an appropriate assessment to demonstrate the impacts of any land raising and set out any mitigation required. Factors such as breach parameters, expected depths and nearby receptors must be reviewed and considered before concluding the level of assessment required. The baseline and post-development (with noise bund) should be assessed before determining what mitigation is required.

The Environment Agency have provided guidelines for undertaking breach modelling which are appended to this note (Environment Agency, Anglian Region, Northern Area Requirements for Hazard Mapping, Version 8, Jan 2014).

2.0 Proposed Breach Modelling Methodology

The proposed approach is consistent with the agreed methodology accepted for the River Welland Breach Modelling (Appendix 24.3 Annex 1) submitted as part of the DCO to support the Onshore Substation (OnSS) for the Project.

2.1 Hydrology

- The shape of the astronomical tidal curves to be used in the modelling will be taken from Environment Agency Flood Risk Mapping and Data Management: Anglian Region Report (2016). These have been scaled to fit extreme sea levels from CFB chainage at 3948. This is consistent with the agreed approach taken to assess the River Welland Breach modelling at the OnSS location.
- These tidal curves will be scaled to fit the extreme water levels (CFB conditions for the UK 2018 for 'Location: Chainage: _3948).
- The climate change allowances for the sea level will be calculated from a base year of 2018 using the current Guidance from EA for the Anglian Region for Upper End Scenario (Flood risk assessments climate change allowances[1]).
- As the noise bund is a temporary structure for the drilling phase only, the expected design life of the structure is 4 years. Therefore, the climate change uplift has been calculated as 70mm (2018 to 2030 – accounting for the adjustment for sea level rise to present day and the addition of 4 years from anticipated construction date (2026) to account for the life span of the development).
- CFB 97.5% confidence level will be used for the hydraulic modelling and will assess all return periods noted in Table 1.
- The proposed peak tidal levels are summarised in Table 1 below.

[1] https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#sea-level-allowances

Table 1: Proposed Tidal Levels

AEP %	EA Report (m)	CFB 2018 (m)	CFB 2018 (97.5% confidence levels)
0.5%	5.99	4.83	5.26
0.1%	6.69	5.24	5.93
0.5%+CC	7.13	4.91	5.34
0.1%+CC	7.83	5.32	6.01

Climate change allowances

2018 – 2030 – 12 yrs x 7mm = 84mm

Full head time boundary conditions can be found in the accompanying excel sheet.

2.2 Hydraulic Modelling

The following is proposed for the hydraulic breach modelling:

- The proposed breach locations along the AIMS spatial flood defences assets have been located to align with existing watercourse, which will allow for worst case flood events to the Proposed Development. These locations have high levels of hydraulic connectivity to the site due to proximity to the existing watercourse. The breach locations are shown in Figure 1.
- Figure 2 shows the topography of the area. The sand dune flood defence assets are at a higher elevation than the extreme tidal level of 6m with over 1.6m freeboard, so the site will only be at risk in the event of a breach of the defences.
- Modelling will be completed using 2D TUFLOW software with a grid size of 10m. Use of HPC and SGS to allow for underlying 1m LiDAR to be taken into account.
- LiDAR Composite DTM (1m 2022) will be used (Example tile: LIDAR-DTM-1m-2022-TF57nw).
- The heights of spatial flood defences in the modelled area will be defined by a series of ZSH polylines in the TUFLOW 2D domain.
- A Head Time boundary will be applied at the seaward side of the current defences.
- The Head Time boundary will simulate four tidal cycles with the largest cycle occurring on the first tidal peak.
- The model will extend significantly far inland from the site so the key flooding mechanisms are not affected by any model boundary conditions.
- The crest elevations for the defences will be obtained from ‘EA Spatial Flood Defences Including Standardised Attributes’ layer and cross referenced against LiDAR.
- Breach of flood defences will be represented in TUFLOW using variable shapefiles.
- Breach criteria (as per EA guidance):
  - Ground level behind defence extracted to Lidar.
  - Breach width = 100m
  - Breach duration 70hr
- Table 2 summaries the model run scenarios and model will be run for the following events.
  - 0.5% AEP
  - 0.5% AEP + CC
  - 0.1% AEP
  - 0.1% AEP + CC

- Hazard, Depth and Velocity Mapping will be completed in line with the EA guidance.
- Sensitivity runs will be completed for cell size, material roughness, model inflows and design tidal curve.
- Results will be reported in a standalone modelling report.

Figure 2: LiDAR Elevation (m AOD)

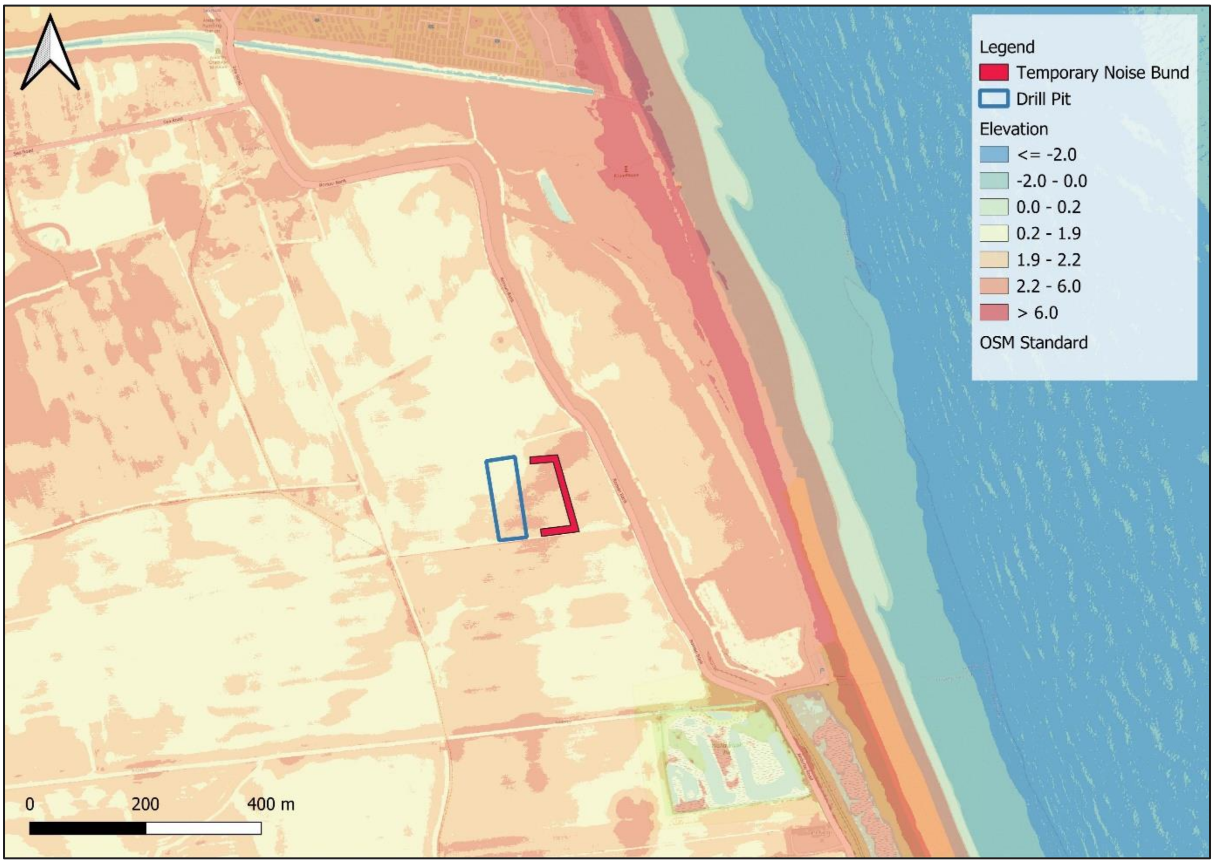


Table 2: Model Run Scenarios

Run #	Scenario 1	Scenario 2
1	Baseline	Dunes breached 1st tidal cycle Roman bank – No breach
2		Dunes breached 1st tidal cycle Roman bank – 2nd tidal cycle
3	Proposed	Dunes breached 1st tidal cycle Roman bank – No breach
4		Dunes breached 1st tidal cycle Roman bank – 2nd tidal cycle

Appendix B Tidal Calculation

Time (hr)	Skegness Base Tide	Immingham Surge	Surge T200	T200 Design Tide	Surge T1000	T1000 Design Tide	Surge T200CC	T200CC Design Tide	Surge T1000 CC	T1000CC Design Tide
0.00	-1.74	0.11	0.24	-1.50	0.31	-1.43	0.25	-1.49	0.32	-1.42
0.50	-2.10	0.12	0.25	-1.85	0.33	-1.77	0.26	-1.84	0.34	-1.76
1.00	-2.36	0.12	0.27	-2.09	0.35	-2.01	0.27	-2.09	0.35	-2.01
1.50	-2.48	0.12	0.28	-2.20	0.36	-2.12	0.28	-2.20	0.37	-2.11
2.00	-2.42	0.13	0.28	-2.14	0.37	-2.05	0.29	-2.13	0.38	-2.04
2.50	-2.15	0.13	0.29	-1.86	0.38	-1.77	0.30	-1.85	0.39	-1.76
3.00	-1.69	0.13	0.30	-1.39	0.39	-1.30	0.30	-1.39	0.39	-1.30
3.50	-1.05	0.14	0.30	-0.75	0.39	-0.66	0.31	-0.74	0.40	-0.65
4.00	-0.29	0.14	0.30	0.01	0.40	0.11	0.31	0.02	0.40	0.11
4.50	0.50	0.14	0.31	0.81	0.40	0.90	0.31	0.81	0.41	0.91
5.00	1.27	0.14	0.31	1.58	0.40	1.67	0.31	1.58	0.41	1.68
5.50	1.96	0.14	0.31	2.27	0.41	2.37	0.32	2.28	0.41	2.37
6.00	2.51	0.14	0.31	2.82	0.41	2.92	0.32	2.83	0.41	2.92
6.50	2.91	0.14	0.31	3.22	0.41	3.32	0.32	3.23	0.41	3.32
7.00	3.14	0.14	0.31	3.45	0.40	3.54	0.31	3.45	0.41	3.55
7.50	3.18	0.14	0.31	3.49	0.40	3.58	0.31	3.49	0.41	3.59
8.00	3.03	0.14	0.31	3.34	0.40	3.43	0.31	3.34	0.41	3.44
8.50	2.71	0.14	0.30	3.01	0.40	3.11	0.31	3.02	0.40	3.11
9.00	2.23	0.14	0.30	2.53	0.39	2.62	0.31	2.54	0.40	2.63
9.50	1.65	0.14	0.30	1.95	0.39	2.04	0.31	1.96	0.40	2.05
10.00	1.01	0.13	0.30	1.31	0.39	1.40	0.30	1.31	0.39	1.40
10.50	0.37	0.13	0.30	0.67	0.39	0.76	0.30	0.67	0.39	0.76
11.00	-0.24	0.13	0.29	0.05	0.38	0.14	0.30	0.06	0.39	0.15
11.50	-0.79	0.13	0.29	-0.50	0.38	-0.41	0.30	-0.49	0.39	-0.40
12.00	-1.28	0.13	0.29	-0.99	0.38	-0.90	0.30	-0.98	0.39	-0.89
12.50	-1.69	0.13	0.29	-1.40	0.38	-1.31	0.30	-1.39	0.39	-1.30
13.00	-2.01	0.13	0.29	-1.72	0.38	-1.63	0.30	-1.71	0.39	-1.62
13.50	-2.23	0.13	0.29	-1.94	0.38	-1.85	0.30	-1.93	0.39	-1.84
14.00	-2.30	0.13	0.29	-2.01	0.38	-1.92	0.30	-2.00	0.39	-1.91
14.50	-2.18	0.13	0.29	-1.89	0.39	-1.79	0.30	-1.88	0.39	-1.79
15.00	-1.86	0.14	0.30	-1.56	0.39	-1.47	0.30	-1.56	0.40	-1.46
15.50	-1.34	0.14	0.30	-1.04	0.40	-0.94	0.31	-1.03	0.40	-0.94
16.00	-0.66	0.14	0.31	-0.35	0.40	-0.26	0.31	-0.35	0.41	-0.25
16.50	0.11	0.14	0.31	0.42	0.41	0.52	0.32	0.43	0.42	0.53
17.00	0.90	0.15	0.32	1.22	0.42	1.32	0.33	1.23	0.43	1.33
17.50	1.64	0.15	0.34	1.98	0.44	2.08	0.34	1.98	0.45	2.09
18.00	2.28	0.16	0.35	2.63	0.46	2.74	0.36	2.64	0.47	2.75
18.50	2.78	0.17	0.37	3.15	0.48	3.26	0.38	3.16	0.49	3.27
19.00	3.11	0.18	0.39	3.50	0.51	3.62	0.40	3.51	0.52	3.63
19.50	3.27	0.19	0.42	3.69	0.55	3.82	0.43	3.70	0.56	3.83
20.00	3.23	0.21	0.45	3.68	0.60	3.83	0.46	3.69	0.60	3.83
20.50	3.01	0.22	0.49	3.50	0.65	3.66	0.50	3.51	0.66	3.67
21.00	2.61	0.25	0.54	3.15	0.71	3.32	0.55	3.16	0.72	3.33
21.50	2.07	0.27	0.60	2.67	0.78	2.85	0.61	2.68	0.79	2.86

22.00	1.43	0.30	0.66	2.09	0.86	2.29	0.67	2.10	0.87	2.30
22.50	0.75	0.33	0.73	1.48	0.95	1.70	0.74	1.49	0.97	1.72
23.00	0.08	0.37	0.81	0.89	1.06	1.14	0.82	0.90	1.07	1.15
23.50	-0.54	0.41	0.89	0.35	1.17	0.63	0.91	0.37	1.19	0.65
24.00	-1.07	0.45	0.99	-0.08	1.29	0.22	1.01	-0.06	1.31	0.24
24.50	-1.56	0.49	1.08	-0.48	1.42	-0.14	1.11	-0.45	1.44	-0.12
25.00	-1.98	0.54	1.19	-0.79	1.55	-0.43	1.21	-0.77	1.57	-0.41
25.50	-2.30	0.59	1.29	-1.01	1.69	-0.61	1.31	-0.99	1.71	-0.59
26.00	-2.51	0.63	1.39	-1.12	1.82	-0.69	1.42	-1.09	1.85	-0.66
26.50	-2.55	0.68	1.50	-1.05	1.96	-0.59	1.53	-1.02	1.99	-0.56
27.00	-2.40	0.73	1.60	-0.80	2.09	-0.31	1.63	-0.77	2.12	-0.28
27.50	-2.05	0.77	1.70	-0.35	2.22	0.17	1.73	-0.32	2.25	0.20
28.00	-1.50	0.81	1.79	0.29	2.34	0.84	1.82	0.32	2.38	0.88
28.50	-0.81	0.85	1.88	1.07	2.46	1.65	1.91	1.10	2.49	1.68
29.00	-0.03	0.89	1.96	1.93	2.56	2.53	2.00	1.97	2.60	2.57
29.50	0.76	0.92	2.03	2.79	2.66	3.42	2.07	2.83	2.69	3.45
30.00	1.50	0.95	2.09	3.59	2.73	4.23	2.13	3.63	2.77	4.27
30.50	2.13	0.97	2.14	4.27	2.80	4.93	2.18	4.31	2.84	4.97
31.00	2.62	0.99	2.17	4.79	2.85	5.47	2.22	4.84	2.89	5.51
31.50	2.94	1.00	2.20	5.14	2.87	5.81	2.24	5.18	2.92	5.86
32.00	**3.09**	**1.00**	**2.20**	**5.29**	**2.88**	**5.97**	**2.24**	**5.33**	**2.92**	**6.01**
32.50	3.06	1.00	2.19	5.25	2.87	5.93	2.24	5.30	2.91	5.97
33.00	2.84	0.99	2.17	5.01	2.84	5.68	2.21	5.05	2.88	5.72
33.50	2.46	0.97	2.14	4.60	2.80	5.26	2.18	4.64	2.84	5.30
34.00	1.95	0.95	2.09	4.04	2.74	4.69	2.13	4.08	2.78	4.73
34.50	1.36	0.93	2.04	3.40	2.67	4.03	2.08	3.44	2.71	4.07
35.00	0.73	0.90	1.98	2.71	2.59	3.32	2.01	2.74	2.62	3.35
35.50	0.12	0.87	1.91	2.03	2.50	2.62	1.94	2.06	2.53	2.65
36.00	-0.44	0.83	1.83	1.39	2.40	1.96	1.87	1.43	2.43	1.99
36.50	-0.94	0.79	1.75	0.81	2.29	1.35	1.78	0.84	2.32	1.38
37.00	-1.38	0.76	1.67	0.29	2.18	0.80	1.70	0.32	2.21	0.83
37.50	-1.74	0.72	1.58	-0.16	2.07	0.33	1.61	-0.13	2.10	0.36
38.00	-2.01	0.68	1.49	-0.52	1.95	-0.06	1.52	-0.49	1.98	-0.03
38.50	-2.15	0.64	1.41	-0.74	1.84	-0.31	1.43	-0.72	1.87	-0.28
39.00	-2.13	0.60	1.32	-0.81	1.73	-0.40	1.35	-0.78	1.75	-0.38
39.50	-1.92	0.56	1.24	-0.68	1.62	-0.30	1.26	-0.66	1.64	-0.28
40.00	-1.51	0.53	1.16	-0.35	1.52	0.01	1.18	-0.33	1.54	0.03
40.50	-0.93	0.49	1.09	0.16	1.42	0.49	1.11	0.18	1.44	0.51
41.00	-0.23	0.46	1.02	0.79	1.33	1.10	1.04	0.81	1.35	1.12
41.50	0.53	0.44	0.96	1.49	1.25	1.78	0.98	1.51	1.27	1.80
42.00	1.28	0.41	0.90	2.18	1.18	2.46	0.92	2.20	1.20	2.48
42.50	1.96	0.39	0.85	2.81	1.12	3.08	0.87	2.83	1.13	3.09
43.00	2.52	0.37	0.81	3.33	1.06	3.58	0.82	3.34	1.07	3.59
43.50	2.93	0.35	0.77	3.70	1.00	3.93	0.78	3.71	1.02	3.95
44.00	3.17	0.33	0.73	3.90	0.96	4.13	0.74	3.91	0.97	4.14
44.50	3.23	0.32	0.70	3.93	0.91	4.14	0.71	3.94	0.93	4.16
45.00	3.11	0.30	0.67	3.78	0.88	3.99	0.68	3.79	0.89	4.00

45.50	2.81	0.29	0.64	3.45	0.84	3.65	0.66	3.47	0.86	3.67
46.00	2.35	0.28	0.62	2.97	0.81	3.16	0.63	2.98	0.83	3.18
46.50	1.77	0.27	0.60	2.37	0.79	2.56	0.61	2.38	0.80	2.57
47.00	1.12	0.27	0.58	1.70	0.76	1.88	0.60	1.72	0.78	1.90
47.50	0.45	0.26	0.57	1.02	0.74	1.19	0.58	1.03	0.75	1.20
48.00	-0.22	0.25	0.55	0.33	0.72	0.50	0.56	0.34	0.73	0.51
48.50	-0.80	0.24	0.54	-0.26	0.71	-0.09	0.55	-0.25	0.72	-0.08
49.00	-1.32	0.24	0.53	-0.79	0.69	-0.63	0.54	-0.78	0.70	-0.62
49.50	-1.77	0.23	0.51	-1.26	0.67	-1.10	0.52	-1.25	0.68	-1.09
50.00	-2.14	0.23	0.50	-1.64	0.65	-1.49	0.51	-1.63	0.66	-1.48
50.50	-2.39	0.22	0.49	-1.90	0.64	-1.75	0.50	-1.89	0.65	-1.74
51.00	-2.51	0.22	0.47	-2.04	0.62	-1.89	0.48	-2.03	0.63	-1.88
51.50	-2.46	0.21	0.46	-2.00	0.60	-1.86	0.47	-1.99	0.61	-1.85
52.00	-2.21	0.20	0.45	-1.76	0.59	-1.62	0.46	-1.75	0.60	-1.61
52.50	-1.76	0.20	0.44	-1.32	0.57	-1.19	0.44	-1.32	0.58	-1.18
53.00	-1.16	0.19	0.42	-0.74	0.55	-0.61	0.43	-0.73	0.56	-0.60
53.50	-0.44	0.19	0.41	-0.03	0.54	0.10	0.42	-0.02	0.55	0.11
54.00	0.32	0.18	0.40	0.72	0.52	0.84	0.41	0.73	0.53	0.85
54.50	1.05	0.18	0.39	1.44	0.51	1.56	0.39	1.44	0.51	1.56
55.00	1.70	0.17	0.37	2.07	0.49	2.19	0.38	2.08	0.50	2.20
55.50	2.24	0.16	0.36	2.60	0.47	2.71	0.37	2.61	0.48	2.72
56.00	2.63	0.16	0.35	2.98	0.46	3.09	0.36	2.99	0.47	3.10
56.50	2.86	0.15	0.34	3.20	0.44	3.30	0.35	3.21	0.45	3.31
57.00	2.91	0.15	0.33	3.24	0.43	3.34	0.33	3.24	0.43	3.34
57.50	2.79	0.14	0.32	3.11	0.41	3.20	0.32	3.11	0.42	3.21
58.00	2.50	0.14	0.31	2.81	0.40	2.90	0.31	2.81	0.41	2.91
58.50	2.08	0.13	0.29	2.37	0.39	2.47	0.30	2.38	0.39	2.47
59.00	1.55	0.13	0.28	1.83	0.37	1.92	0.29	1.84	0.38	1.93
59.50	0.98	0.12	0.27	1.25	0.36	1.34	0.28	1.26	0.36	1.34
60.00	0.40	0.12	0.26	0.66	0.35	0.75	0.27	0.67	0.35	0.75
60.50	-0.15	0.12	0.25	0.10	0.33	0.18	0.26	0.11	0.34	0.19
61.00	-0.65	0.11	0.25	-0.40	0.32	-0.33	0.25	-0.40	0.33	-0.32
61.50	-1.09	0.11	0.24	-0.85	0.31	-0.78	0.24	-0.85	0.31	-0.78
62.00	-1.45	0.10	0.23	-1.22	0.30	-1.15	0.23	-1.22	0.30	-1.15
62.50	-1.74	0.10	0.22	-1.52	0.29	-1.45	0.22	-1.52	0.29	-1.45
63.00	-1.91	0.10	0.21	-1.70	0.28	-1.63	0.22	-1.69	0.28	-1.63
63.50	-1.94	0.09	0.20	-1.74	0.27	-1.67	0.21	-1.73	0.27	-1.67
64.00	-1.81	0.09	0.20	-1.61	0.26	-1.55	0.20	-1.61	0.26	-1.55
64.50	-1.50	0.09	0.19	-1.31	0.25	-1.25	0.19	-1.31	0.25	-1.25
65.00	-1.02	0.08	0.18	-0.84	0.24	-0.78	0.18	-0.84	0.24	-0.78
65.50	-0.40	0.08	0.17	-0.23	0.23	-0.17	0.18	-0.22	0.23	-0.17
66.00	0.30	0.08	0.17	0.47	0.22	0.52	0.17	0.47	0.22	0.52
66.50	1.01	0.07	0.16	1.17	0.21	1.22	0.16	1.17	0.21	1.22
67.00	1.68	0.07	0.15	1.83	0.20	1.88	0.16	1.84	0.20	1.88
67.50	2.25	0.07	0.15	2.40	0.19	2.44	0.15	2.40	0.19	2.44
68.00	2.69	0.06	0.14	2.83	0.18	2.87	0.14	2.83	0.19	2.88
68.50	2.98	0.06	0.13	3.11	0.18	3.16	0.14	3.12	0.18	3.16
69.00	3.11	0.06	0.13	3.24	0.17	3.28	0.13	3.24	0.17	3.28

69.50	3.05	0.06	0.12	3.17	0.16	3.21	0.12	3.17	0.16	3.21
70.00	2.83	0.05	0.12	2.95	0.15	2.98	0.12	2.95	0.16	2.99
70.50	2.45	0.05	0.11	2.56	0.15	2.60	0.11	2.56	0.15	2.60
71.00	1.95	0.05	0.11	2.06	0.14	2.09	0.11	2.06	0.14	2.09
71.50	1.36	0.05	0.10	1.46	0.13	1.49	0.10	1.46	0.13	1.49
72.00	0.95	0.04	0.10	1.05	0.13	1.08	0.10	1.05	0.13	1.08
72.50	0.45	0.04	0.09	0.54	0.12	0.57	0.09	0.54	0.12	0.57
73.00	-0.22	0.04	0.09	-0.13	0.11	-0.11	0.09	-0.13	0.11	-0.11
73.50	-0.80	0.04	0.08	-0.72	0.11	-0.69	0.08	-0.72	0.11	-0.69
74.00	-1.32	0.03	0.08	-1.24	0.10	-1.22	0.08	-1.24	0.10	-1.22
74.50	-1.77	0.03	0.07	-1.70	0.09	-1.68	0.07	-1.70	0.10	-1.67
75.00	-2.14	0.03	0.07	-2.07	0.09	-2.05	0.07	-2.07	0.09	-2.05
75.50	-2.39	0.03	0.06	-2.33	0.08	-2.31	0.07	-2.32	0.09	-2.30
76.00	-2.51	0.03	0.06	-2.45	0.08	-2.43	0.06	-2.45	0.08	-2.43
76.50	-2.46	0.03	0.06	-2.40	0.07	-2.39	0.06	-2.40	0.08	-2.38
77.00	-2.21	0.02	0.05	-2.16	0.07	-2.14	0.05	-2.16	0.07	-2.14
77.50	-1.76	0.02	0.05	-1.71	0.07	-1.69	0.05	-1.71	0.07	-1.69
78.00	-1.16	0.02	0.05	-1.11	0.06	-1.10	0.05	-1.11	0.06	-1.10
78.50	-0.44	0.02	0.04	-0.40	0.06	-0.38	0.04	-0.40	0.06	-0.38
79.00	0.32	0.02	0.04	0.36	0.05	0.37	0.04	0.36	0.05	0.37
79.50	1.05	0.02	0.04	1.09	0.05	1.10	0.04	1.09	0.05	1.10
80.00	1.70	0.02	0.03	1.73	0.04	1.74	0.04	1.74	0.05	1.75

Area of England	Allowance	2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 (metres)
Anglian	Higher central	5.8 (203)	8.7 (261)	11.6 (348)	13 (390)	1.20
Anglian	Upper end	7 (245)	11.3 (339)	15.8 (474)	18.1 (543)	1.60

AEP	CFB 97.5% CL (2018)	CFB 97.5% CL (2024)
0.5%	5.25	5.292
0.1%	5.93	5.972
0.5% + CC		5.334
0.1% + CC		6.014

Climate change allowances	
2018 – 2030 – 12yrs x 7mm = 84mm	0.084
2018 – 2024 – 6yrs x 7mm = 42mm	0.042

Surge Scaling Factors	(Target Extreme CFB 2024 Level - Base Astronomical Tide Peak)
T200	2.202
T1000	2.882
T200CC	2.244
T1000CC	2.924

Appendix C Flood Maps (Document Reference 15.7A)

Appendix C – Figure Index

Figure Number	Description
1	0.1% AEP Overtopping Existing Scenario – Maximum Flood Depths
2	0.1% AEP Overtopping Existing Scenario – Maximum Flood Velocity
3	0.1% AEP Overtopping Existing Scenario – Flood Hazard Rating
4	0.1% AEP + CC Overtopping Existing Scenario – Maximum Flood Depths
5	0.1% AEP + CC Overtopping Existing Scenario – Maximum Flood Velocity
6	0.1% AEP + CC Overtopping Existing Scenario – Flood Hazard Rating
7	0.5% AEP Breach 1 Existing Scenario – Maximum Flood Depths
8	0.5% AEP Breach 1 Existing Scenario – Maximum Flood Velocity
9	0.5% AEP Breach 1 Existing Scenario – Flood Hazard Rating
10	0.5% AEP + CC Breach 1 Existing Scenario – Maximum Flood Depths
11	0.5% AEP + CC Breach 1 Existing Scenario – Maximum Flood Velocity
12	0.5% AEP + CC Breach 1 Existing Scenario – Flood Hazard Rating
13	0.1% AEP Breach 1 Existing Scenario – Maximum Flood Depths
14	0.1% AEP Breach 1 Existing Scenario – Maximum Flood Velocity
15	0.1% AEP Breach 1 Existing Scenario – Flood Hazard Rating
16	0.1% AEP + CC Breach 1 Existing Scenario – Maximum Flood Depths
17	0.1% AEP + CC Breach 1 Existing Scenario – Maximum Flood Velocity
18	0.1% AEP + CC Breach 1 Existing Scenario – Flood Hazard Rating
19	0.5% AEP Breach 2 Existing Scenario – Maximum Flood Depths
20	0.5% AEP Breach 2 Existing Scenario – Maximum Flood Velocity
21	0.5% AEP Breach 2 Existing Scenario – Flood Hazard Rating
22	0.5% AEP + CC Breach 2 Existing Scenario – Maximum Flood Depths
23	0.5% AEP + CC Breach 2 Existing Scenario – Maximum Flood Velocity
24	0.5% AEP + CC Breach 2 Existing Scenario – Flood Hazard Rating
25	0.1% AEP Breach 2 Existing Scenario – Maximum Flood Depths
26	0.1% AEP Breach 2 Existing Scenario – Maximum Flood Velocity
27	0.1% AEP Breach 2 Existing Scenario – Flood Hazard Rating
28	0.1% AEP + CC Breach 2 Existing Scenario – Maximum Flood Depths
29	0.1% AEP + CC Breach 2 Existing Scenario – Maximum Flood Velocity
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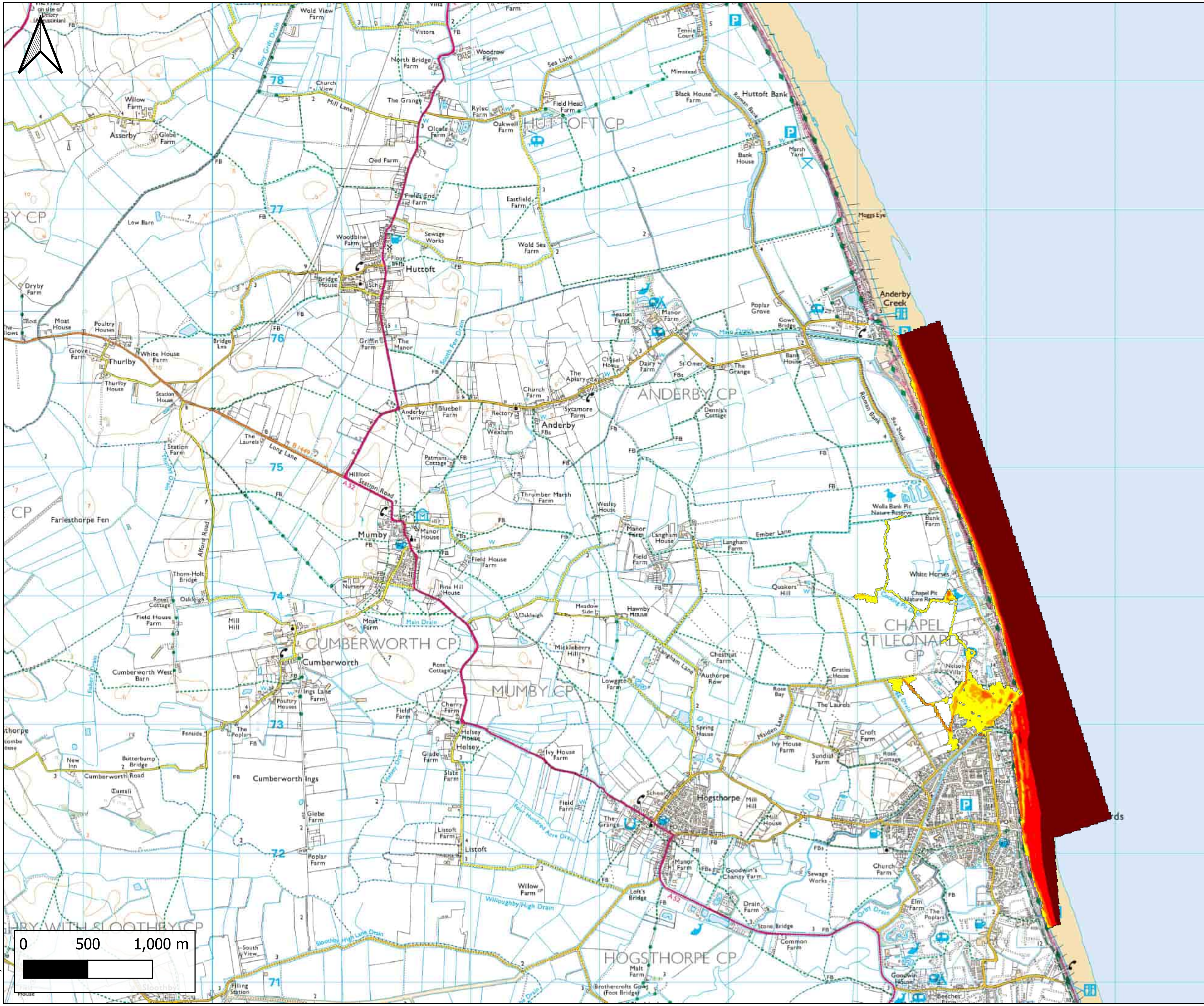
31	0.5% AEP Breach 1 Proposed Scenario – Maximum Flood Depths
32	0.5% AEP Breach 1 Proposed Scenario – Maximum Flood Velocity
33	0.5% AEP Breach 1 Proposed Scenario – Flood Hazard Rating
34	0.5% AEP Breach 1 Proposed Scenario – Difference Grid (vs Existing)
35	0.5% AEP + CC Breach 1 Proposed Scenario – Maximum Flood Depths

Figure Number	Description
36	0.5% AEP + CC Breach 1 Proposed Scenario – Maximum Flood Velocity
37	0.5% AEP + CC Breach 1 Proposed Scenario – Flood Hazard Rating
38	0.5% AEP + CC Breach 1 Proposed Scenario – Difference Grid (vs Existing)
39	0.1% AEP Breach 1 Proposed Scenario – Maximum Flood Depths
40	0.1% AEP Breach 1 Proposed Scenario – Maximum Flood Velocity
41	0.1% AEP Breach 1 Proposed Scenario – Flood Hazard Rating
42	0.1% AEP Breach 1 Proposed Scenario – Difference Grid (vs Existing)
43	0.1% AEP + CC Breach 1 Proposed Scenario – Maximum Flood Depths
44	0.1% AEP + CC Breach 1 Proposed Scenario – Maximum Flood Velocity
45	0.1% AEP + CC Breach 1 Proposed Scenario – Flood Hazard Rating
46	0.1% AEP + CC Breach 1 Proposed Scenario – Difference Grid (vs Existing)
47	0.5% AEP Breach 2 Proposed Scenario – Maximum Flood Depths
48	0.5% AEP Breach 2 Proposed Scenario – Maximum Flood Velocity
49	0.5% AEP Breach 2 Proposed Scenario – Flood Hazard Rating
50	0.5% AEP Breach 2 Proposed Scenario – Difference Grid (vs Existing)
51	0.5% AEP + CC Breach 2 Proposed Scenario – Maximum Flood Depths
52	0.5% AEP + CC Breach 2 Proposed Scenario – Maximum Flood Velocity
53	0.5% AEP + CC Breach 2 Proposed Scenario – Flood Hazard Rating
54	0.5% AEP + CC Breach 2 Proposed Scenario – Difference Grid (vs Existing)
55	0.1% AEP Breach 2 Proposed Scenario – Maximum Flood Depths
56	0.1% AEP Breach 2 Proposed Scenario – Maximum Flood Velocity
57	0.1% AEP Breach 2 Proposed Scenario – Flood Hazard Rating
58	0.1% AEP Breach 2 Proposed Scenario – Difference Grid (vs Existing)
59	0.1% AEP + CC Breach 2 Proposed Scenario – Maximum Flood Depths
60	0.1% AEP + CC Breach 2 Proposed Scenario – Maximum Flood Velocity
61	0.1% AEP + CC Breach 2 Proposed Scenario – Flood Hazard Rating
62	0.1% AEP + CC Breach 2 Proposed Scenario – Difference Grid (vs Existing)
63	0.1% AEP + CC Breach 2 Existing Scenario – 15m Grid Sensitivity Testing – Maximum Flood Depth
64	0.1% AEP + CC Breach 2 Existing Scenario – 05m Grid Sensitivity Testing – Maximum Flood Depth
65	0.1% AEP + CC Breach 2 Existing Scenario – Manning’s -20% Sensitivity Testing – Maximum Flood Depth
66	0.1% AEP + CC Breach 2 Existing Scenario – Manning’s +20% Sensitivity Testing – Maximum Flood Depth



Legend

Maximum Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

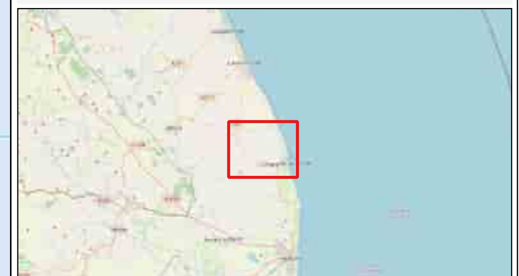


Figure No. 1

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

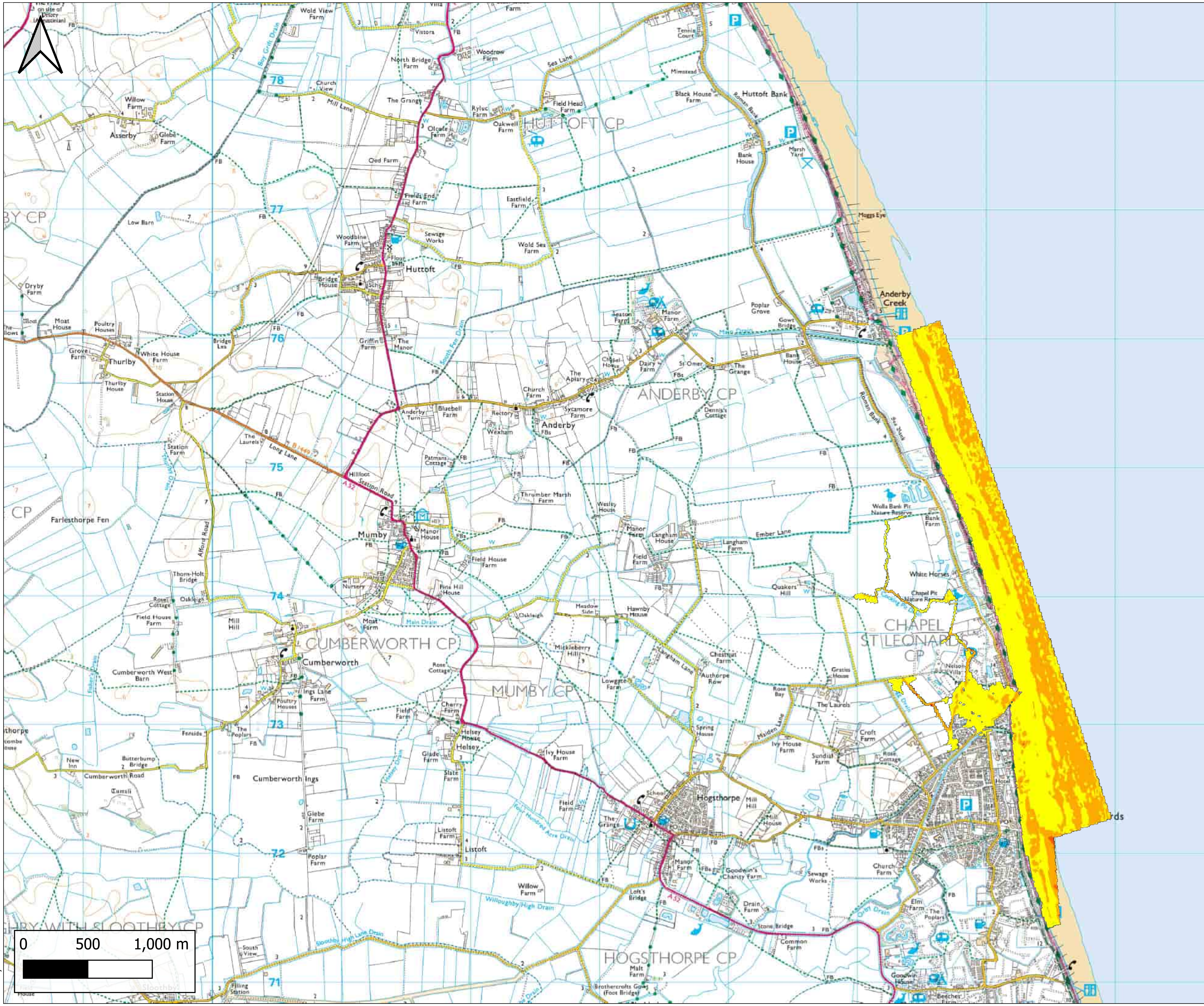
Outer Dowsing Offshore Wind

SLR
6 PRINCESS STREET
MANCHESTER
M1 6NG
www.slrconsulting.com

Maximum Flood Depths
0.1% AEP Overtopping
Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Maximum Flood Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- Above 2.50

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

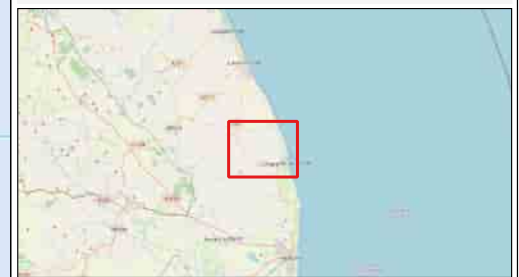


Figure No. 2

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

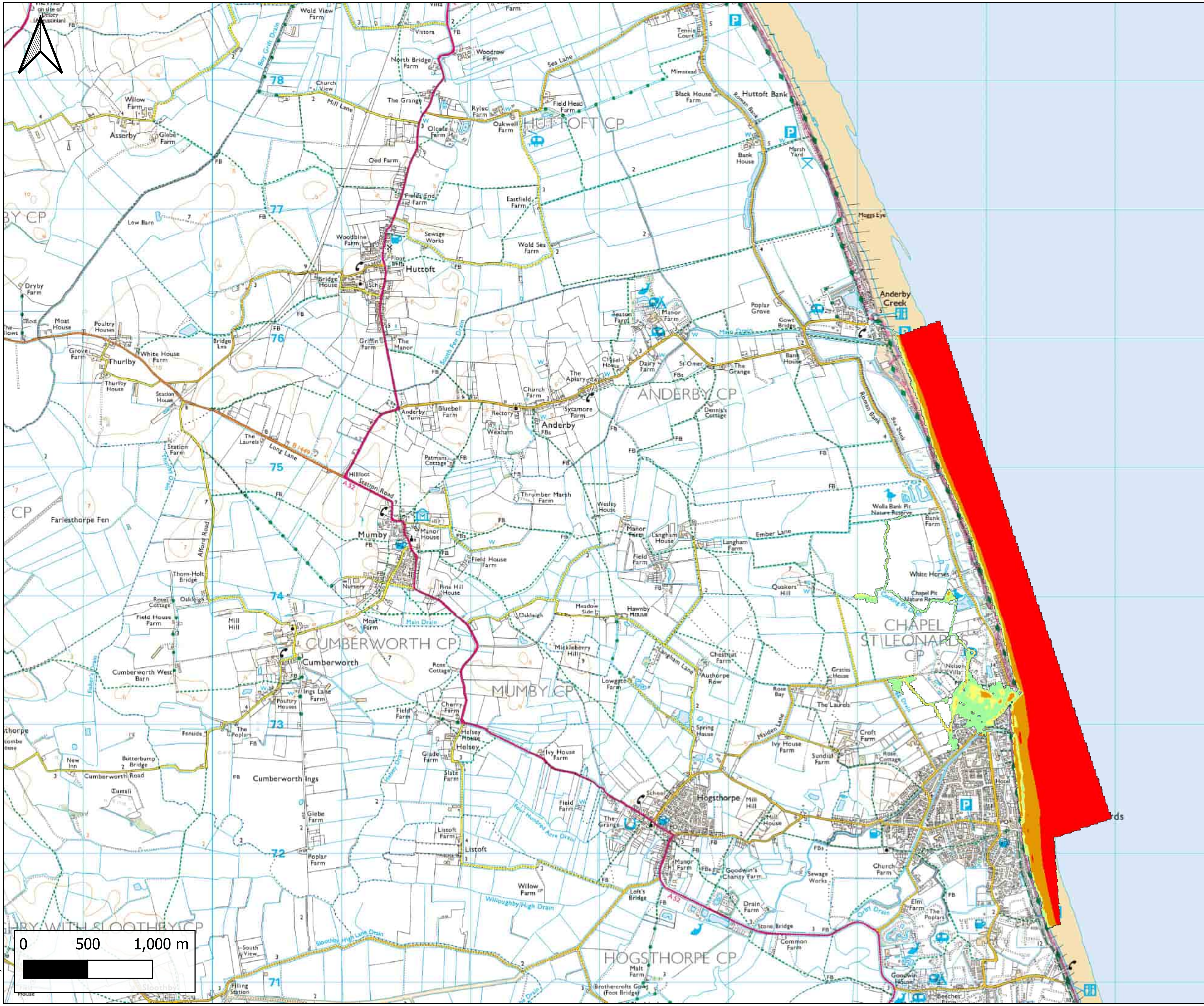
Outer Dowsing Offshore Wind

SLR
6 PRINCESS STREET
MANCHESTER
M1 6NG
www.slrconsulting.com

Maximum Flood Velocity 0.1% AEP Overtopping Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Flood Hazard Rating

- 0.00 - 0.75
- 0.75 - 1.25
- 1.25 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

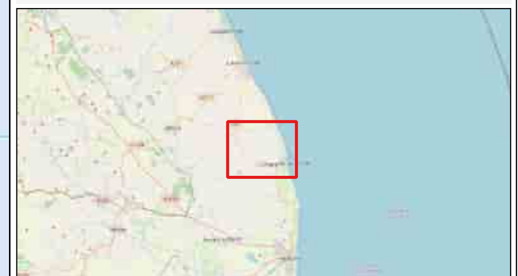


Figure No. 3

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

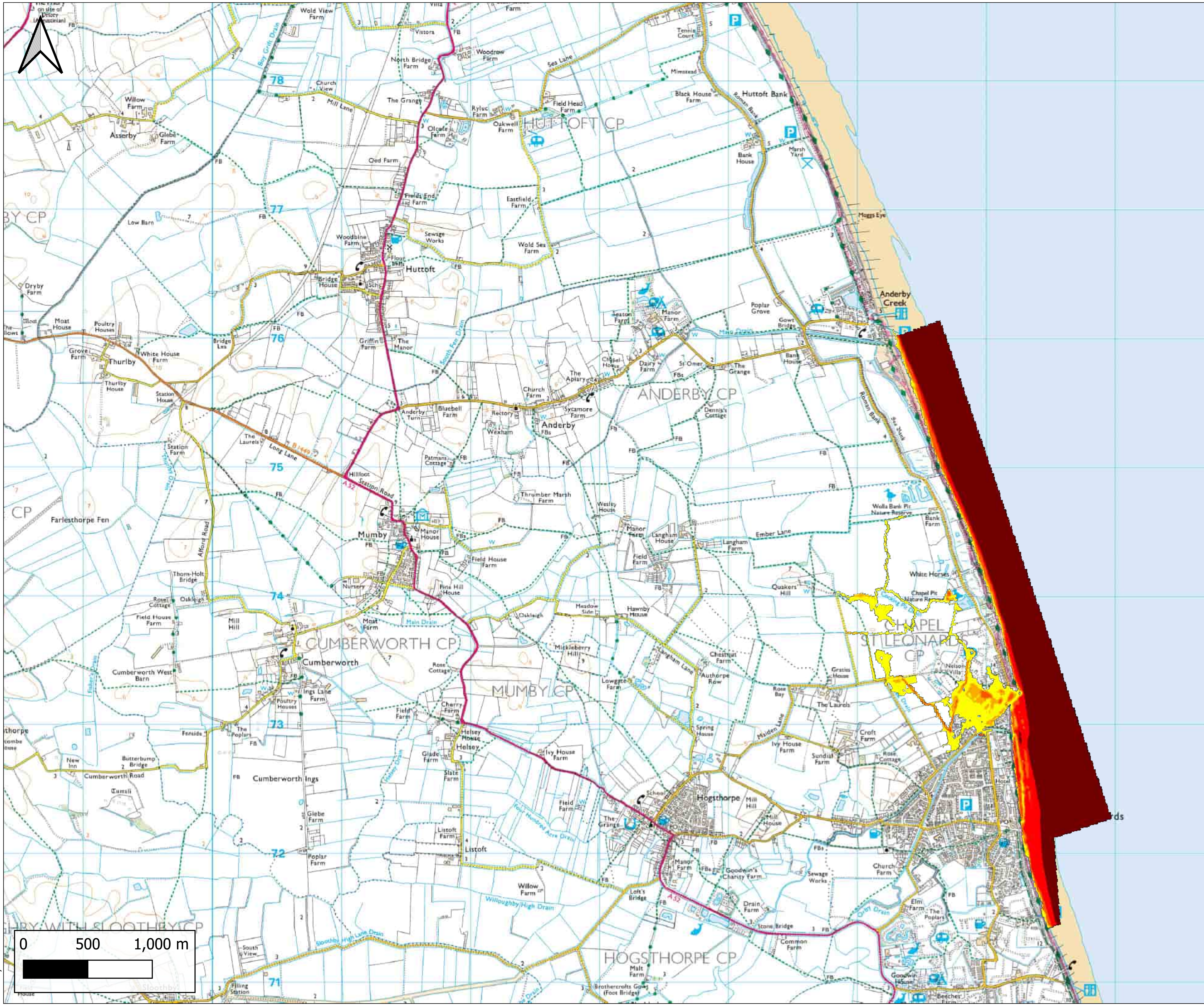
SLR

6 PRINCESS STREET
MANCHESTER
M1 6NG

www.slrconsulting.com

Maximum Flood Hazard 0.1% AEP Overtopping Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025



Legend

Maximum Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

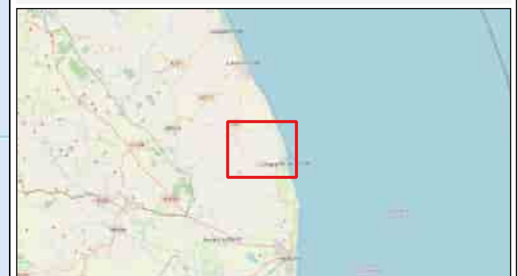


Figure No. 4

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

SLR

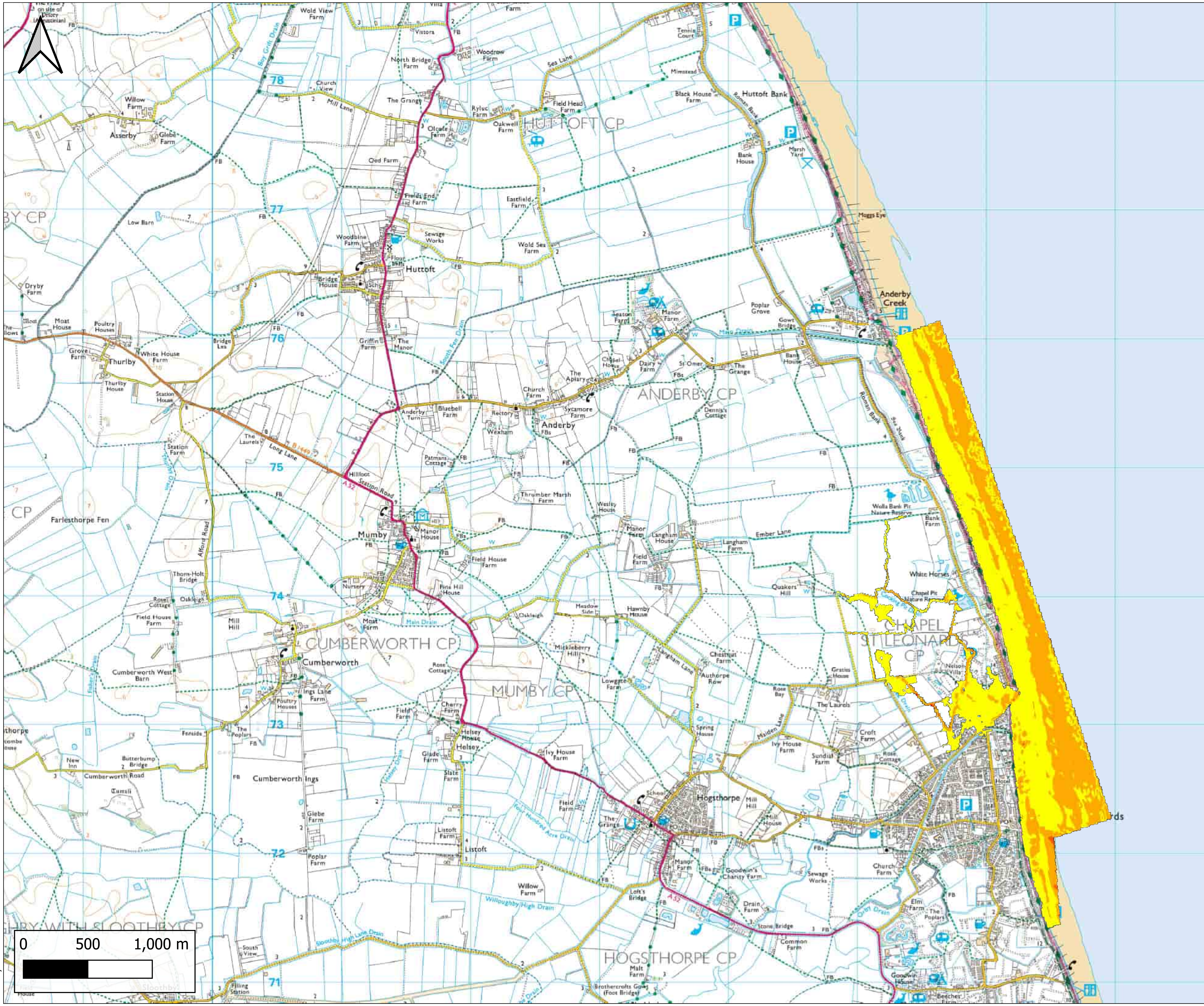
6 PRINCESS STREET
MANCHESTER
M1 6NG

www.slrconsulting.com

Maximum Flood Depths
0.1% AEP + CC Overtopping
Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Maximum Flood Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- Above 2.50

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

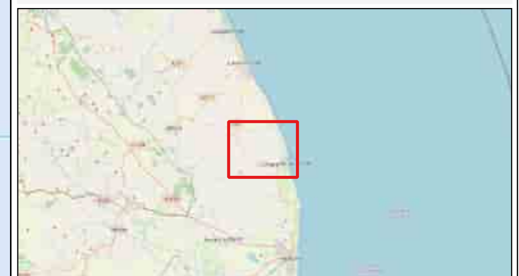


Figure No. 5

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

SLR

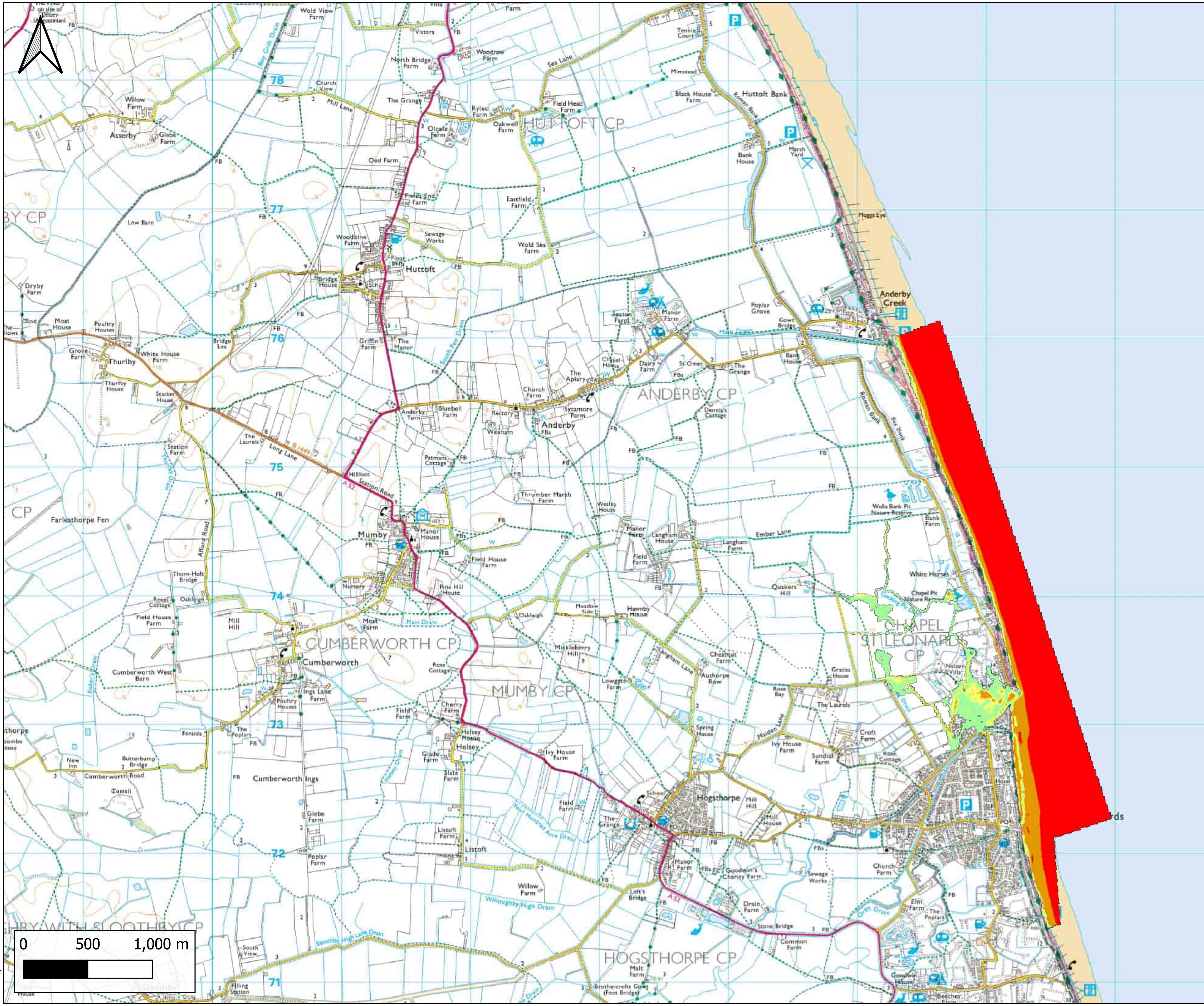
6 PRINCESS STREET
MANCHESTER
M1 6NG

www.slrconsulting.com

**Maximum Flood Velocity
0.1% AEP + CC Overtopping
Baseline Scenario**

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Flood Hazard Rating

- 0.00 - 0.75
- 0.75 - 1.25
- 1.25 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

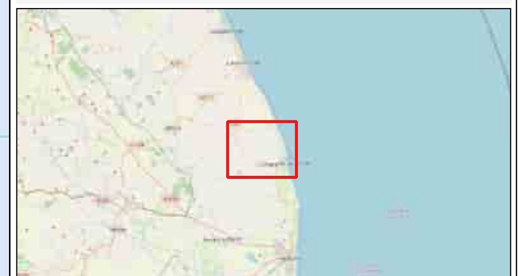


Figure No. 6

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

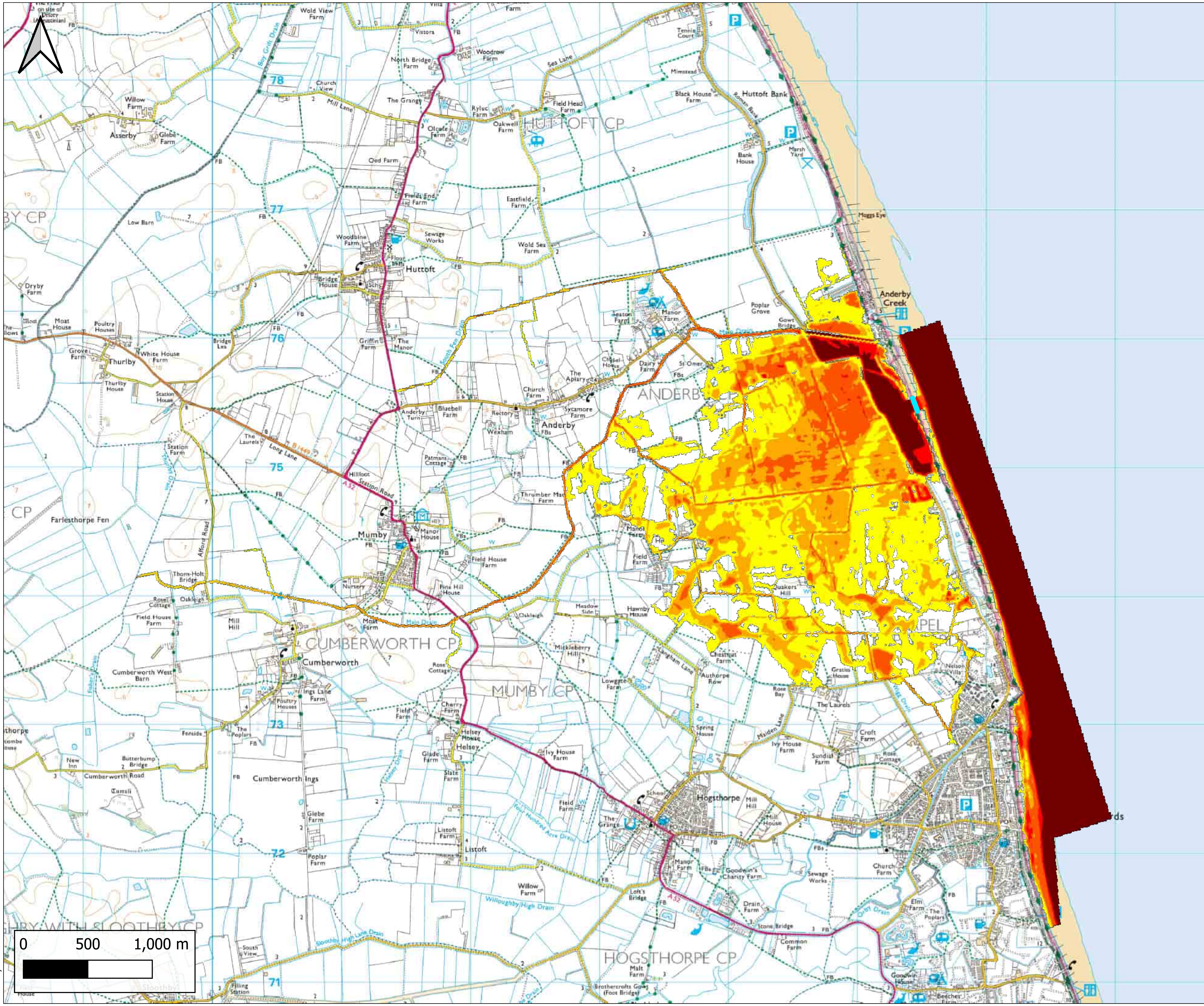
Outer Dowsing Offshore Wind

SLR

6 PRINCESS STREET
MANCHESTER
M1 6NG
www.slrconsulting.com

Maximum Flood Hazard 0.1% AEP + CC Overtopping Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025



Legend

Breach Location

Maximum Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

Figure No. 7

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

SLR

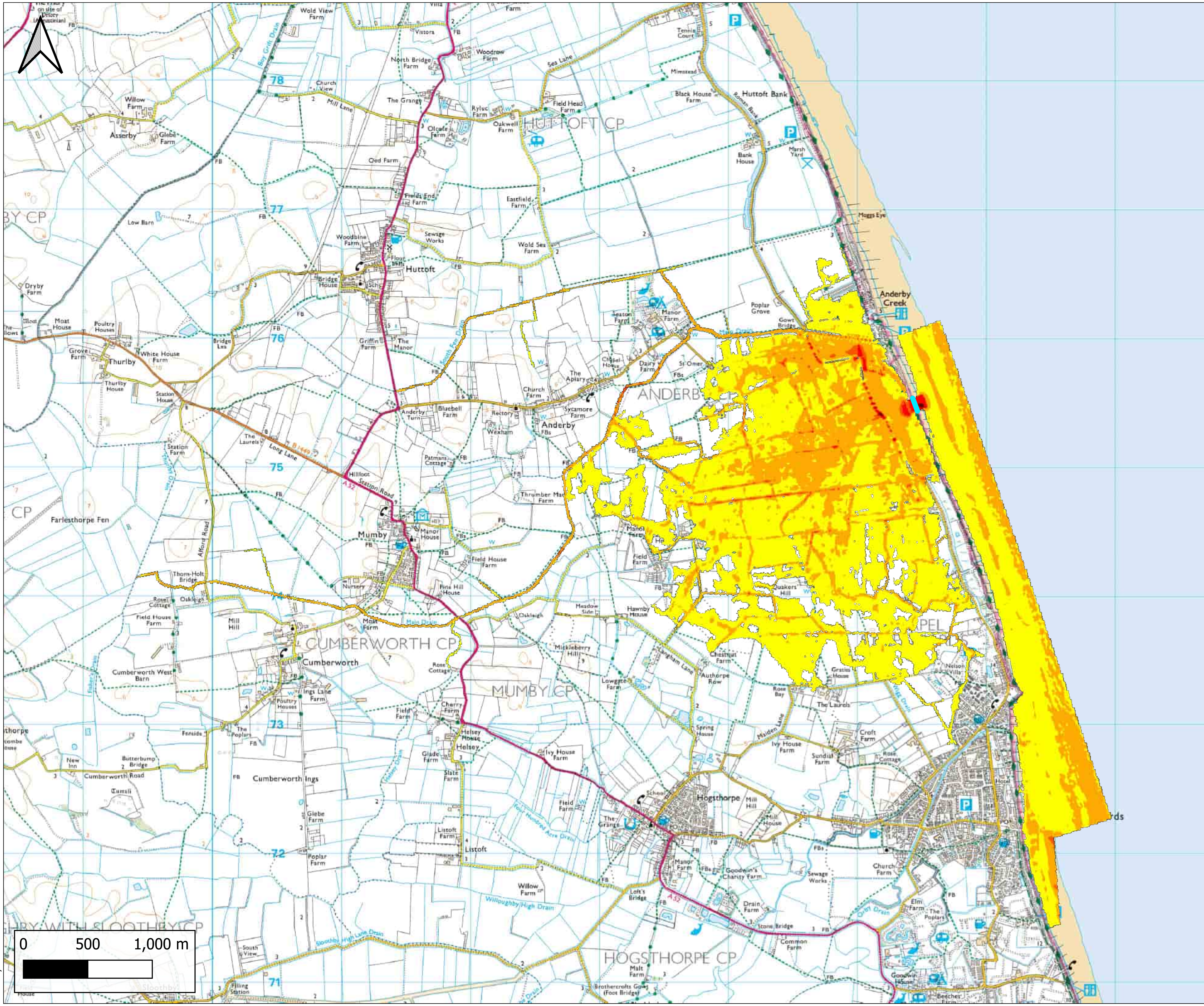
6 PRINCESS STREET
MANCHESTER
M1 6NG

www.slrconsulting.com

Maximum Flood Depths
0.5% AEP Breach 1
Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Breach Location

Maximum Flood Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- Above 2.50

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

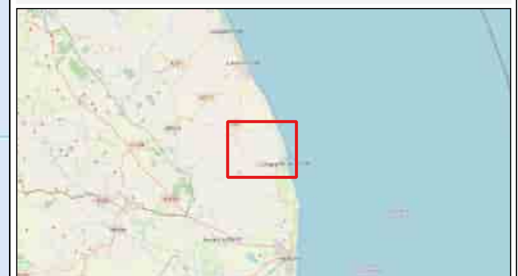


Figure No. 8

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

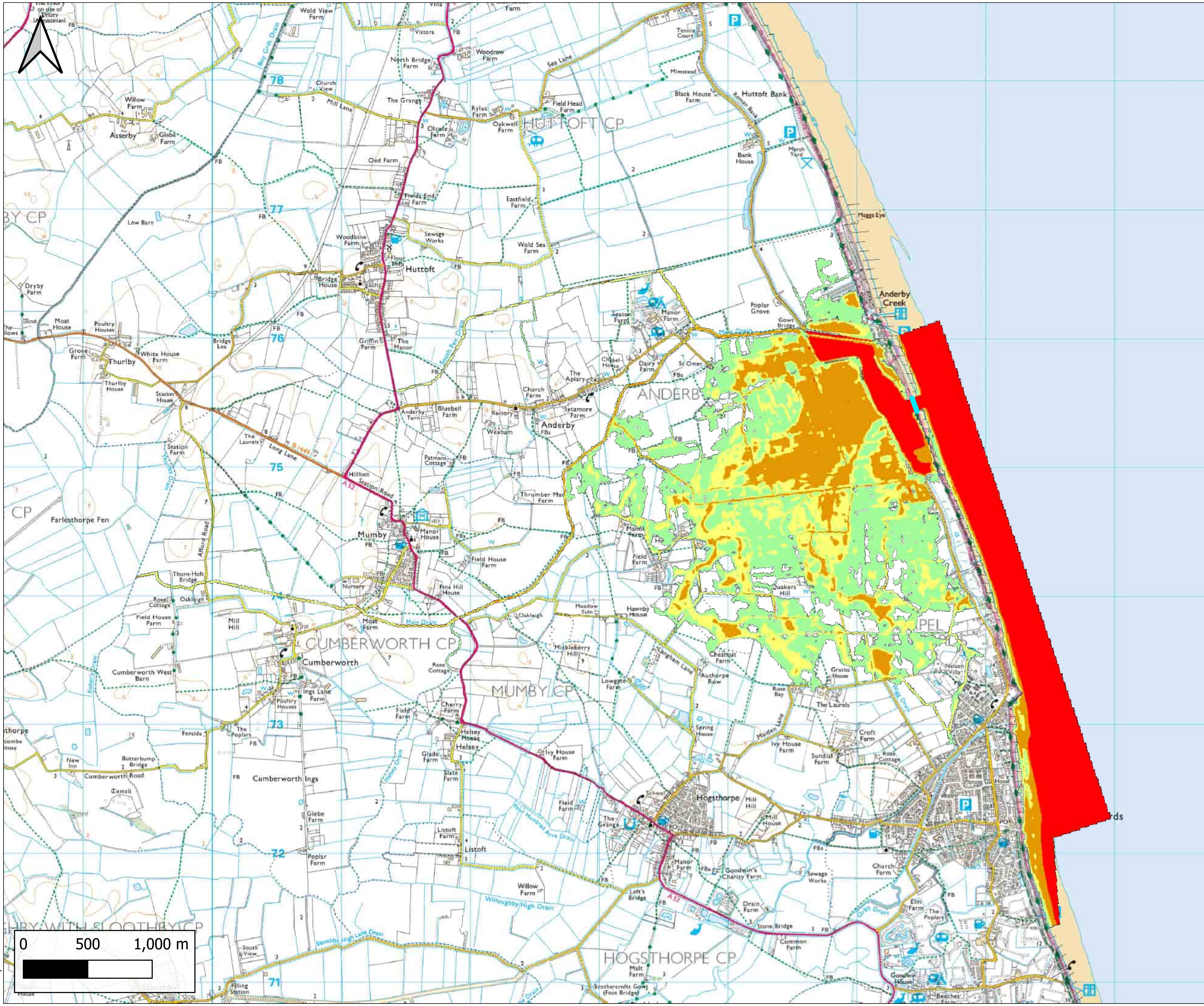
SLR

6 PRINCESS STREET
MANCHESTER
M1 6NG
www.slrconsulting.com

Maximum Flood Velocity
0.5% AEP Breach 1
Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Breach Location

Flood Hazard Rating

- 0.00 - 0.75
- 0.75 - 1.25
- 1.25 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

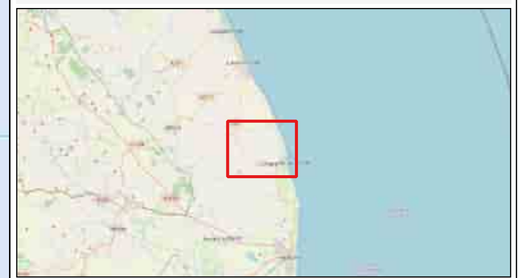


Figure No. 9

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

SLR

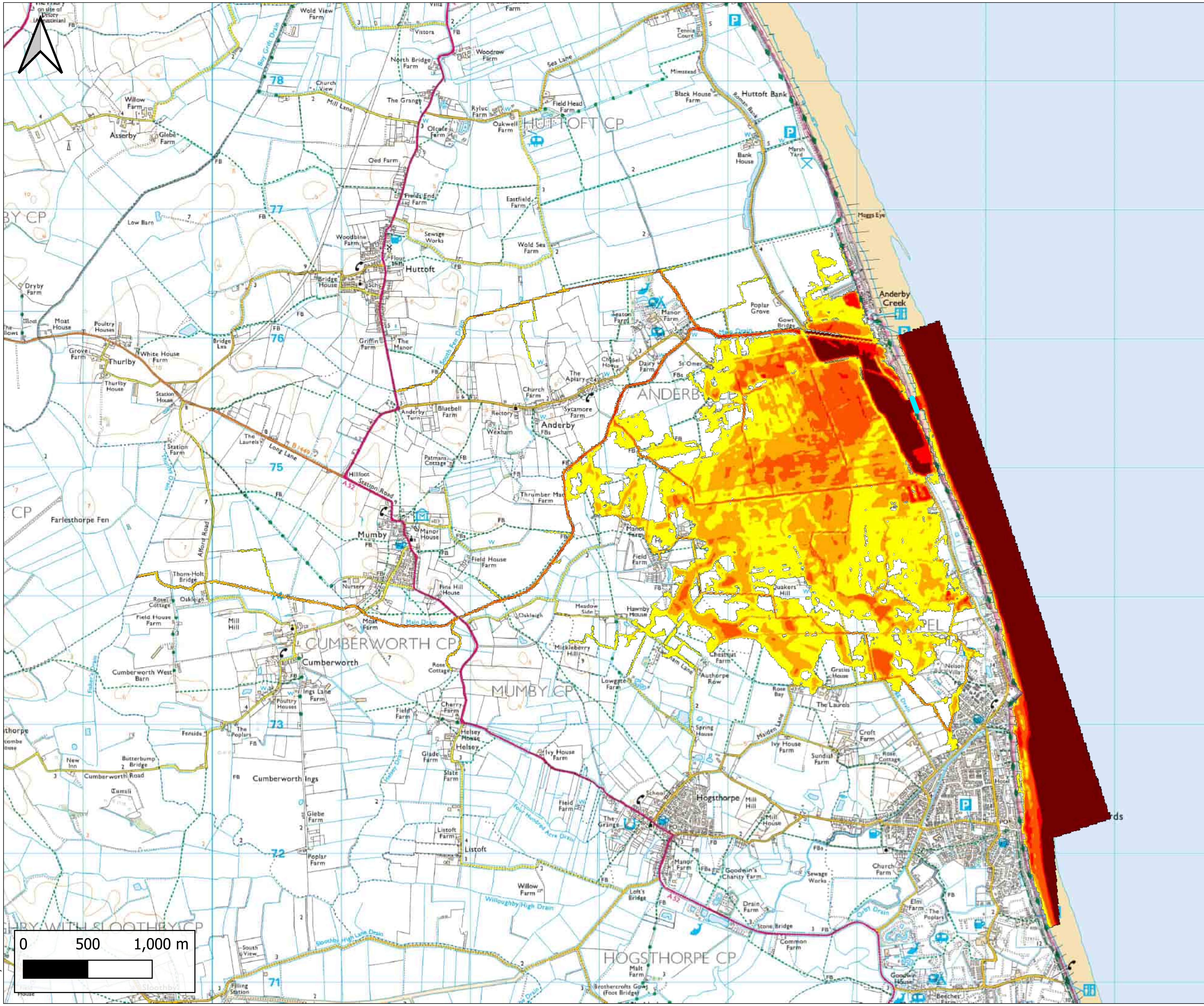
6 PRINCESS STREET
MANCHESTER
M1 6NG

www.slrconsulting.com

Maximum Flood Hazard 0.5% AEP Breach 1 Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Breach Location

Maximum Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

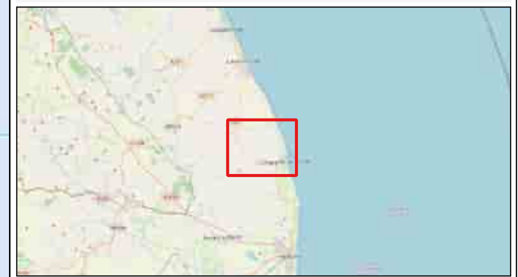


Figure No. 10

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

SLR

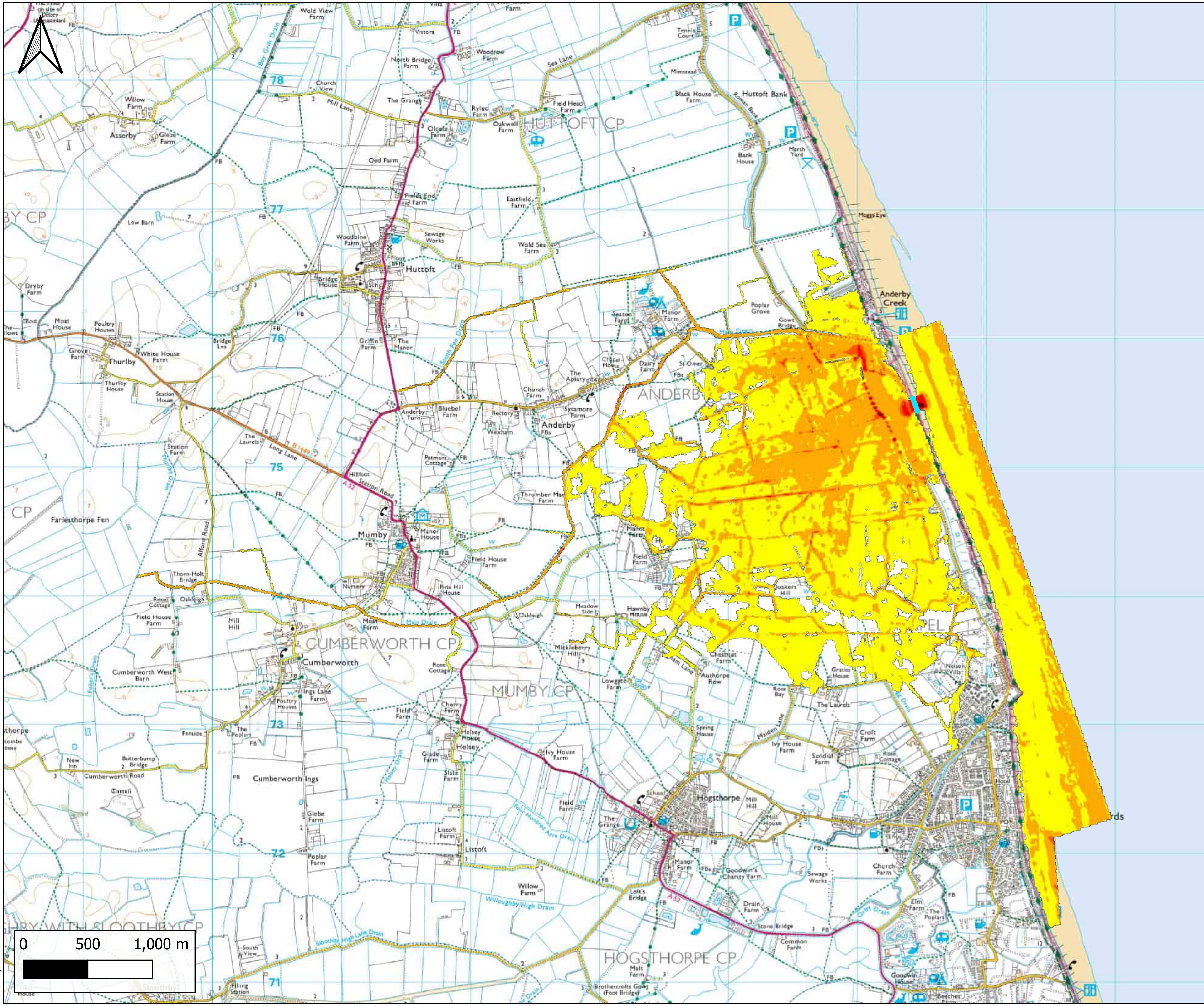
6 PRINCESS STREET
MANCHESTER
M1 6NG

www.slrconsulting.com

Maximum Flood Depths 0.5% AEP + CC Breach 1 Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Breach Location

Maximum Flood Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- Above 2.50

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

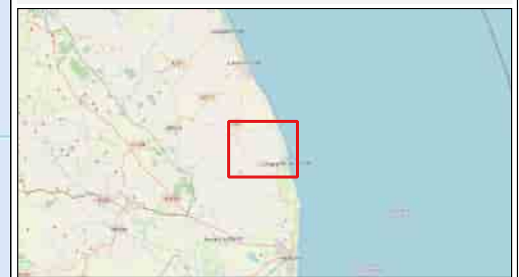


Figure No. 11

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

SLR

6 PRINCESS STREET
MANCHESTER
M1 6NG

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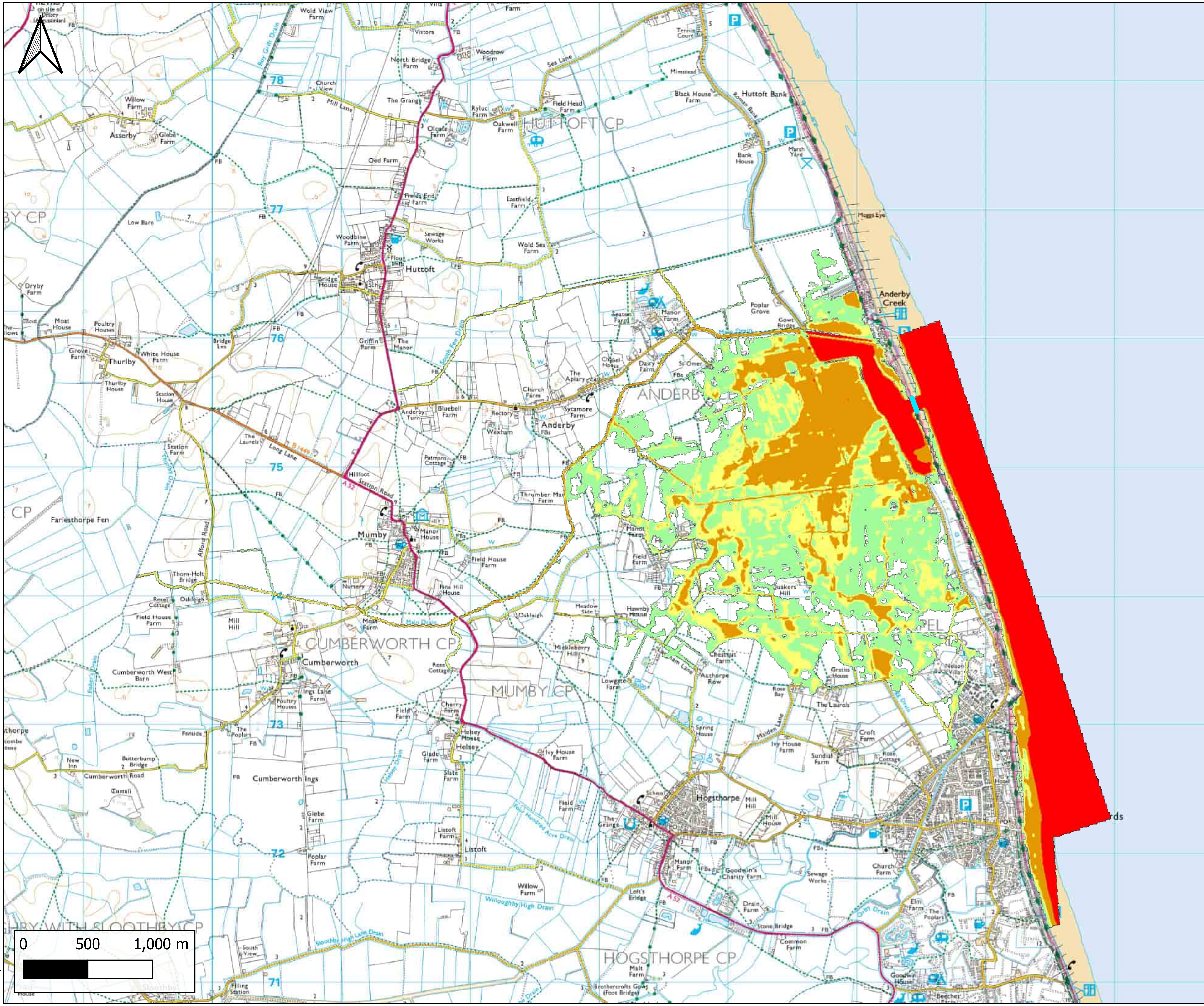
Maximum Flood Velocity
0.5% AEP + CC Breach 1
Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Breach Location

Flood Hazard Rating

- 0.00 - 0.75
- 0.75 - 1.25
- 1.25 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

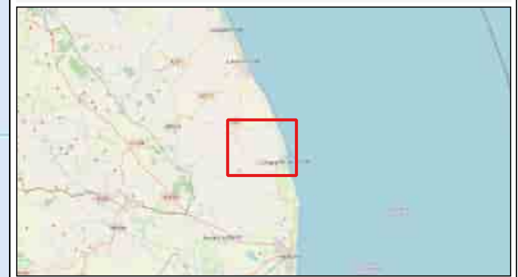


Figure No. 12

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

SLR
6 PRINCESS STREET
MANCHESTER
M1 6NG
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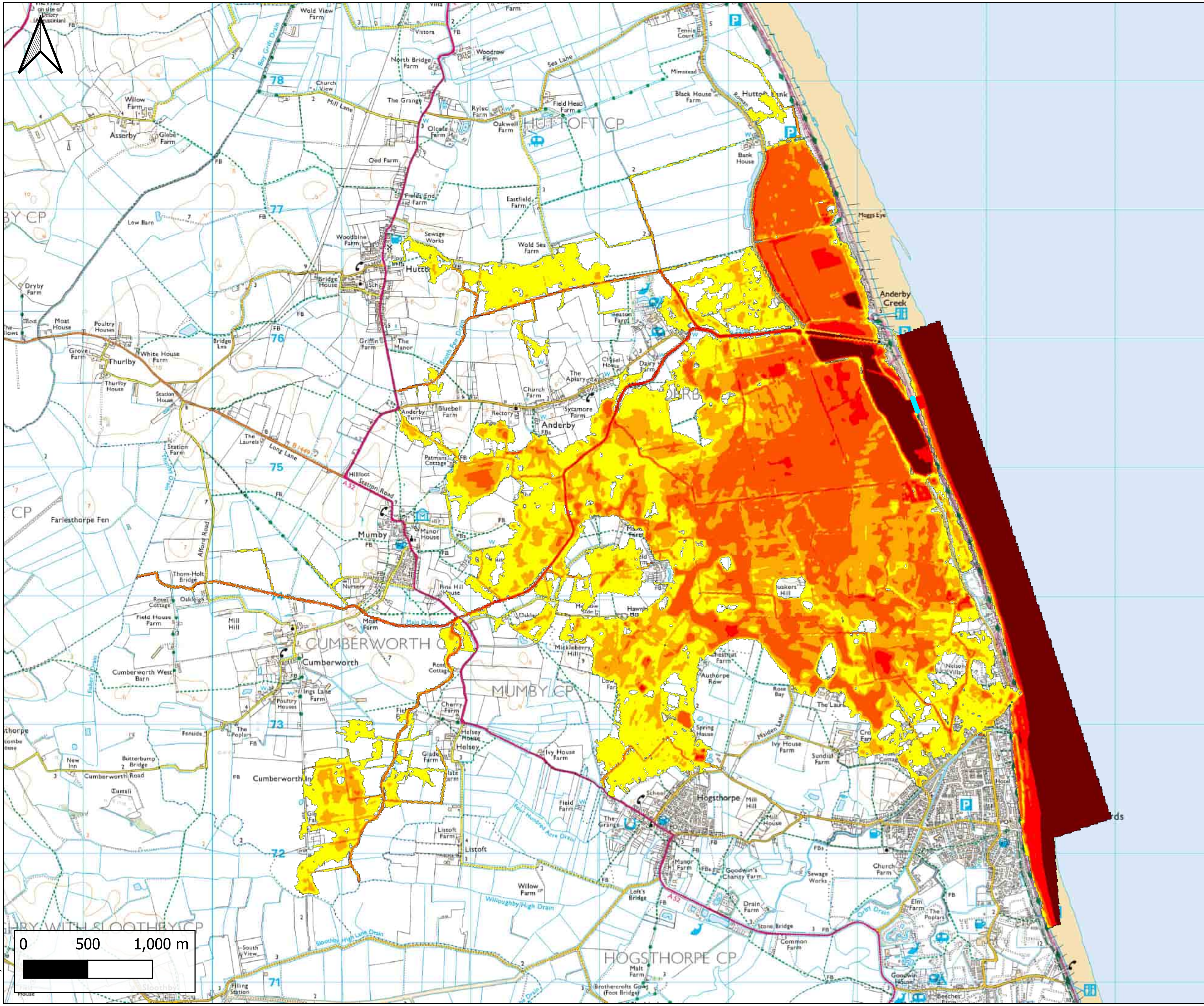
Maximum Flood Hazard
0.5% AEP + CC Breach 1
Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Breach Location

Maximum Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

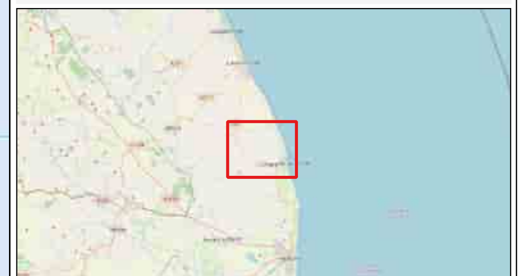


Figure No. 13

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

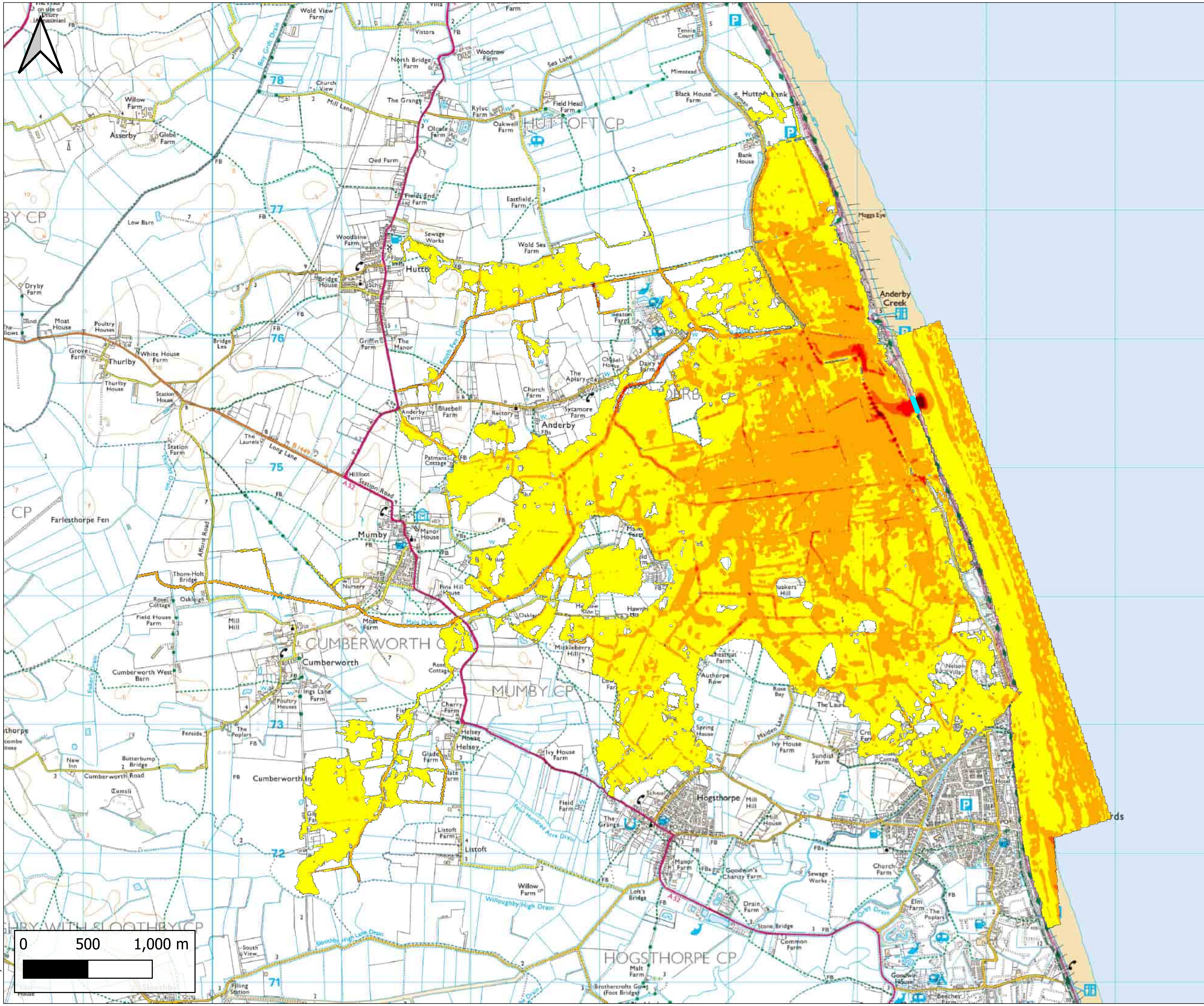
SLR

6 PRINCESS STREET
MANCHESTER
M1 6NG
www.slrconsulting.com

Maximum Flood Depths
0.1% AEP Breach 1
Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Breach Location

Maximum Flood Velocity (m/s)

- 0 - 0.3
- 0.3 - 1.0
- 1.0 - 1.5
- 1.5 - 2.5
- Above 2.50

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

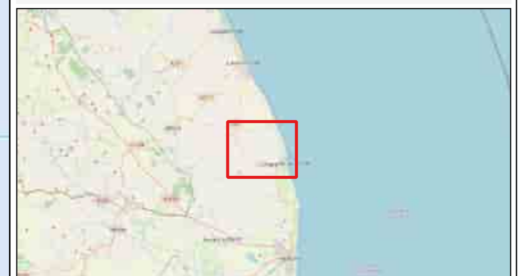


Figure No. 14

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

SLR

6 PRINCESS STREET
MANCHESTER
M1 6NG

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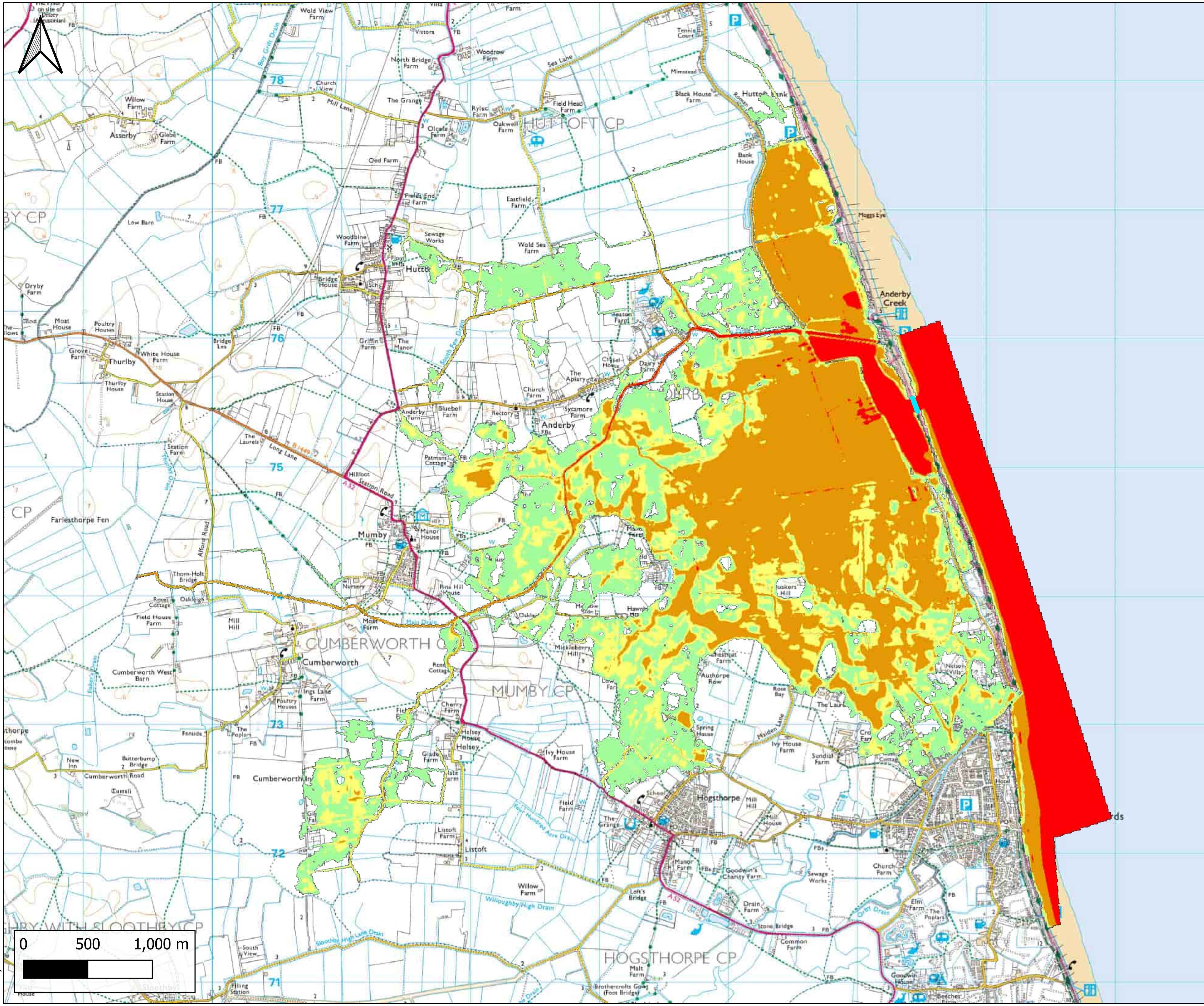
Maximum Flood Velocity
0.1% AEP Breach 1
Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013



Legend

Breach Location

Flood Hazard Rating

- 0.00 - 0.75
- 0.75 - 1.25
- 1.25 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

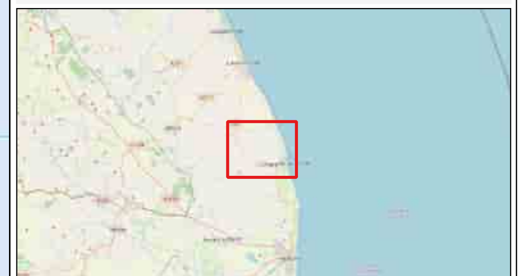


Figure No. 15

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

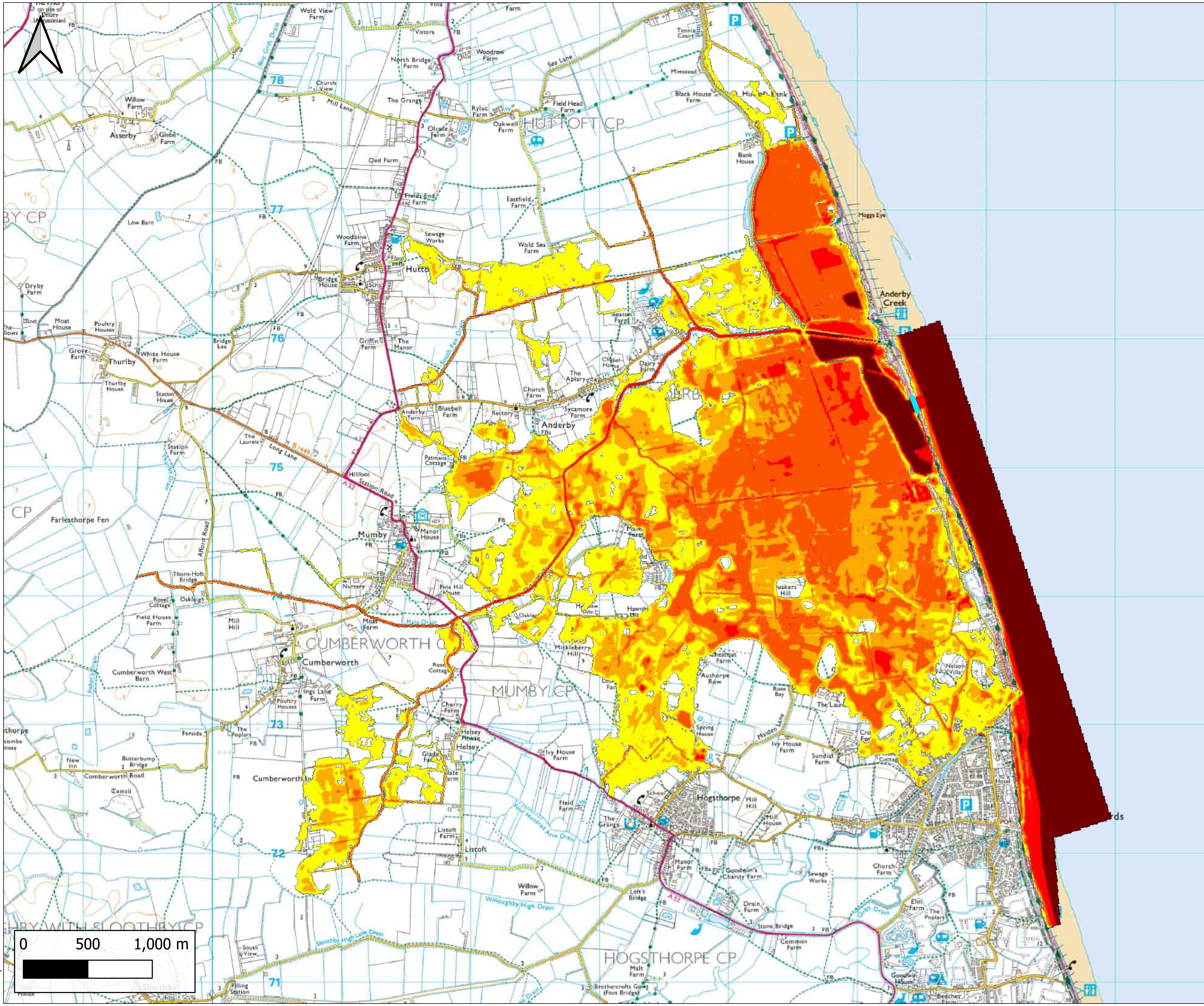
Client

Outer Dowsing Offshore Wind

6 PRINCESS STREET
MANCHESTER
M1 6NG
www.slrconsulting.com

Maximum Flood Hazard
0.1% AEP Breach 1
Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025



Legend

Breach Location

Maximum Flood Depth (m)

- 0.00 - 0.25
- 0.25 - 0.50
- 0.50 - 1.00
- 1.00 - 2.00
- Above 2.00

*Note: Due to the model cell resolution, the modelled extent of the noise bund is shown to be greater than in reality. This is a modelling assumption and is required to ensure that the flooding mechanisms are accurately represented within the hydraulic model.

Figure No. 16

Project

Outer Dowsing Offshore Wind - Noise Bund Breach Modelling

Client

Outer Dowsing Offshore Wind

SLR

6 PRINCESS STREET
MANCHESTER
M1 6NG

www.slrconsulting.com

Maximum Flood Depths 0.1% AEP + CC Breach 1 Baseline Scenario

Scale	Version	Date
A3	1.0	January 2025

SLR Project Number: 410.V05356.00013

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