REPORT

Southwold Harbour Study

Tidal Modelling Report

Client: East Suffolk Council

Reference: PC1683-RHD-ZZ-XX-RP-Z-0004

Status: Final/001

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Enhancing Society Together

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1 Introduction

1.1 Background

The many studies undertaken for Southwold Harbour and the Blyth Estuary demonstrate the complex issues surrounding planning for the future management of the area. These complexities are compounded by uncertainties about the future behaviour of the estuary under different management and climate change scenarios, which could affect the use of the harbour and the aspirations of harbour users and other local stakeholders. These issues have become increasingly critical as decisions are needed on the continued operational use of the harbour and management of the South Pier, which is in poor condition in places[1].

This project will develop an Investment Plan for the continued use of Southwold Harbour. The planned programme of investment needs to be driven by the important aspirations for use and management of the harbour of a wide range of stakeholders. Understanding these aspirations under different scenarios is a key aspect of the study. Different scenarios will be tested based on an improved understanding of the physical behaviour of the harbour and estuary.

The scope of the Southwold Harbour Investment Plan project includes the development of hydrodynamic models to assess the present-day hydraulic regime for waves and currents in the entrance to Southwold Harbour. This includes calculation of water depths, wave heights and current speeds at various stages of the tide, to determine whether the present day and potential future conditions meet the operational requirements of the harbour users.

The wave and tidal flow modelling needs to assess the expected impact of the future management cases for the harbour and estuary on the harbour regime. This includes considering the influence that the South Pier has on wave activity within the Harbour Entrance and at the North Wall, as well as potential future changes to the river regime, e.g. increased tidal volume, on flow speed and depth through the harbour and the Blackshore area. The sedimentation behaviour of the harbour and its expected response to the present day and future wave and tidal climate and storm events is also to be assessed.

The results of the modelling for the future management scenarios will inform the assessment of the residual functional life of the harbour entrance structures and identification of possible structural improvements to the harbour that would enhance present and future conditions for navigation and moorings. The wave and tidal models will be used to assess the expected performance of the potential structural improvements, and to identify future monitoring requirements to support the future management of the harbour and estuary.

1.2 General approach to wave and tidal modelling

The proposed approach to the wave and tidal modelling to be undertaken for this project aims to achieve a true representation of the hydrodynamic behaviour within the harbour area. Key considerations include:

- Diffraction around the North and South Piers;
- Wave reflections through the harbour entrance, including sensitivity to wave angle;
- Wave transmission through the gaps in the South Pier; and
- Wave reflection from the various structures in the outer harbour, including the North Wall and the various structures around the Dunwich Creek entrance.
- Influence of flows from the Dunwich Creek on tidal flows
- Influence of the Dunwich Creek on sedimentation opposite the North Wall (shoal bank)

[1] *Refer to Condition Inspection Report, Appendix A*

Figure 1-1 – Satellite image showing wave diffraction around the piers, and wave disturbance in the harbour entrance channel (Google Earth, 2020)

Particular issues that will be considered in the assessment of the modelling results include:

- Wave and current behaviour in the harbour entrance, considered against operational requirements for vessels;
- Wave behaviour at the North Wall and other vessel moorings, considered against requirements for safe mooring;
- Wave and current behaviour over and around the shoal bank at the landward end of the South Pier; and
- Wave and current interactions around the Dunwich Creek entrance, including
    - Wave reflection from the timber piles
    - Influence of the spending beaches on wave dynamics.

The results from the wave and tidal flow modelling will be used in combination to assess the potential for sedimentation and/or scour throughout the estuary, for the agreed scenarios. This analysis will focus on those scenarios and options which make changes to the harbour entrance structures. The assessment will be informed by the agreed baseline, including information from stakeholders.

1.3 Key issues and approach to tidal modelling

The aim of the tidal modelling is to derive present-day tidal conditions (water levels, current speeds and directions) in the navigable parts of the Harbour and upstream waterway, and to assess the impacts of potential changes to the harbour structures and the future management of the estuary.

Baseline tidal modelling was completed for the present day and for the Do Nothing scenario, to derive current speeds at various stages of the tide. The modelling was informed by data and previous modelling for the estuary, and our understanding of the behaviour of the estuary based on this information.

Following the baseline modelling, scenario modelling was undertaken to assess the performance of the various estuary management scenarios, and the impacts of these on the estuary regime. In cases involving

a change to the river regime, i.e. increasing tidal volume, the impacts on flow speed and depth through the harbour were evaluated. Future management options were also considered, which might include changes to the estuary defences, or changes to the harbour structures.

1.4 This Report

This report sets out the approach taken to the tidal modelling completed for the Southwold Harbour Study. **Section 2** includes the site conditions used as input data for the models and **Section 3** describes the modelling methodology and introduces the model results, which are provided as appendices. Discussion of the model results is included in the main project report.

2 Site Conditions

2.1 General

Data was collected from East Suffolk Council, the Environment Agency and the UK Met Office, as well as various open-source datasets. All available information has been reviewed to identify relevant data for the model build and subsequent calibration. This has included consideration of the feedback provided by stakeholders during the workshop held in December 2019, such as comments on wave interactions in the harbour entrance and around the mouth of the Dunwich Creek. This information has contributed to developing our baseline understanding of the estuary's hydro-geomorphological behaviour. The sections which follow summarise the information that was been used to provide input data for the tidal model.

2.2 Water levels

Two types of water level data have been used for the modelling:

- Measured data recorded by Shore between 18th and 25th February 2020 (see **Appendix A**). The measured data was used for local model calibration.
- International Hydrographic Organisation (IHO) predicted data. The IHO data are used for regional model calibration given the extent of the domain.

2.2.1 Measured water level data

Water level measurements were recorded by Shore at three locations along the River Blyth, the Harbour Pier (SW1), the Bailey Bridge (SW2) and the A12 at Blythborough (SW3), as shown in **Figure 2-1** and **Table 2-1**. Measured water levels are shown in **Figure 2-2**, relative to Ordnance Datum Newlyn (ODN), which is approximately mean sea level. Water levels on the neap tide (19th February 2020) and spring tide (24th February 2020) are shown in **Figure 2-3**.

Figure 2-1 – Water level measurement locations

Table 2-1: Co-ordinates of measured water level stations (in OSGB36-BNG)

ID	Location	Easting (m)	Northing(m)
SW1	Harbour pier	650452.08	274841.58
SW2	Bailey Bridge area	649441.82	275800.90
SW3	Blythburgh	645210.90	275576.56

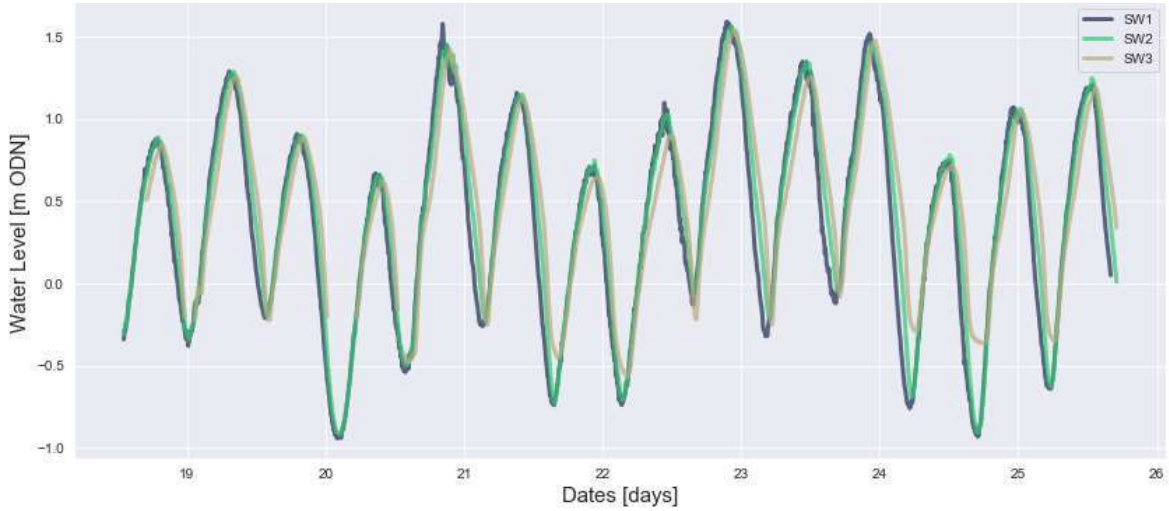


Figure 2-2 – Recorded water level timeseries at three locations

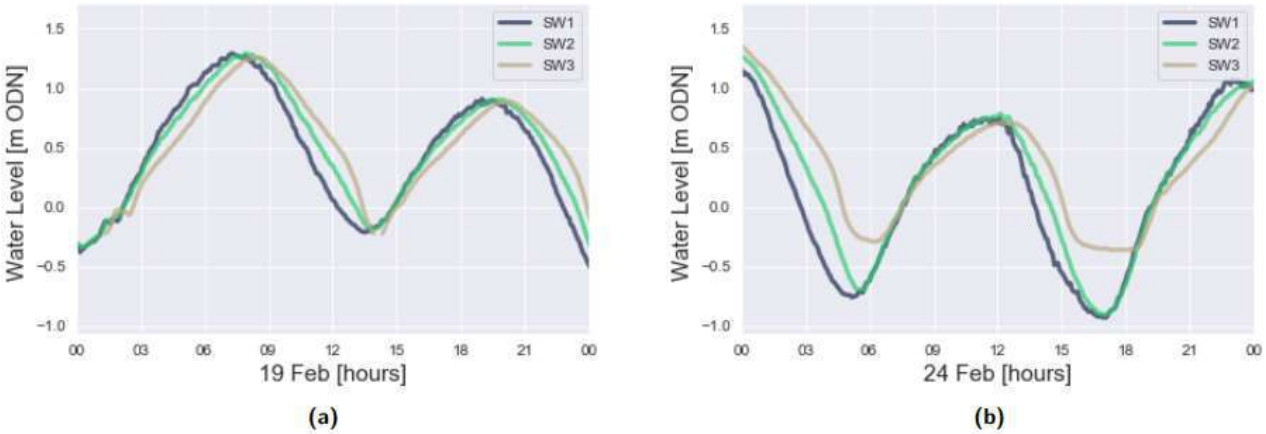
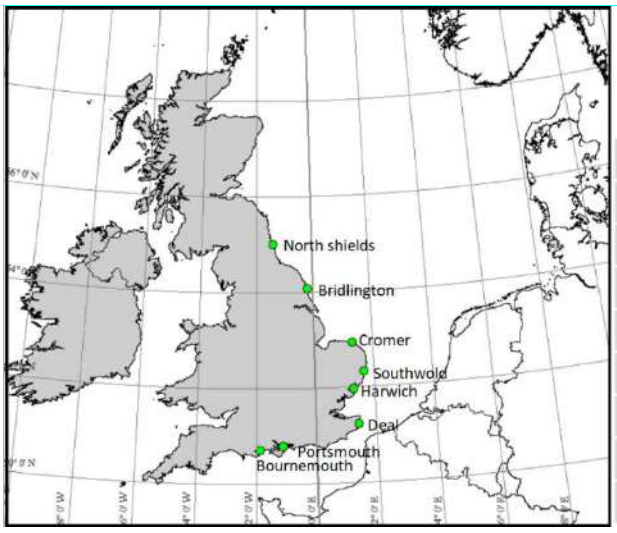


Figure 2-3 – Single day time series of water level elevation (a – Neap tide; b-Spring tide)

2.2.2 IHO predicted water level data

The predicted water levels at 8 locations (**Figure 2-4**) have been taken from the IHO database. The predicted data were extracted every 10 minutes from January 2019 to December 2019.



ID	Station	Lat	Long
1	North Shields	55.01	-1.41
2	Bridlington	54.08	-0.19
3	Cromer	52.93	1.30
4	Southwold	52.31	1.67
5	Harwich	51.95	1.29
6	Deal	51.22	1.41
7	Portsmouth	50.78	-1.11
8	Bournemouth	50.71	-1.88

Figure 2-4 – Location of IHO tide gauges

2.3 Tidal discharge and currents

Six profiles of discharge measurements were surveyed within each cycle of 1.5 hours for the neap tide (19th February 2020) and spring tide (24th February 2020). Measurements started at the most seaward profile (Transect 1) and ended at the most inland profile (Transect 6), as shown in **Figure 2-5**. The neap tide and spring tide discharge measurements are shown in **Figure 2-7** and **Figure 2-8** respectively. Further details of the tidal flow measurements are provided in **Section 3.5** of the main project report, and in **Appendix A**.

Figure 2-5 – Transect locations for flow velocity and discharge measurement

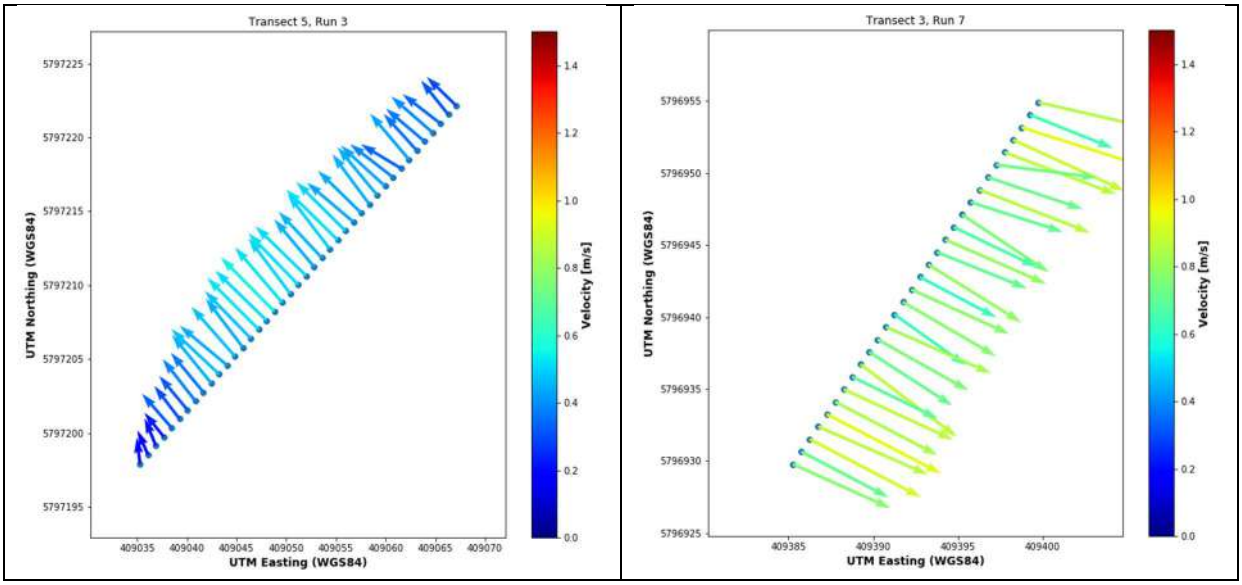


Figure 2-6 – Example of direction and magnitude of depth averaged velocity at Transect 5

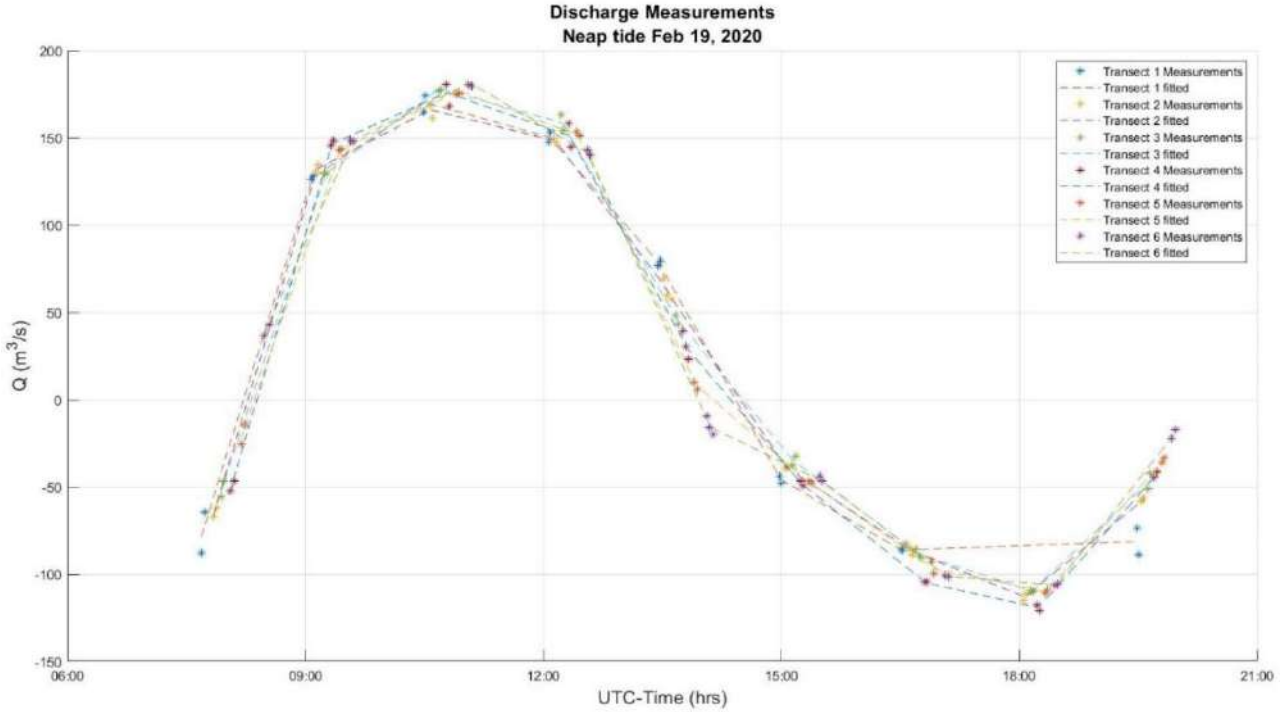


Figure 2-7 – Neap tide discharge measurements

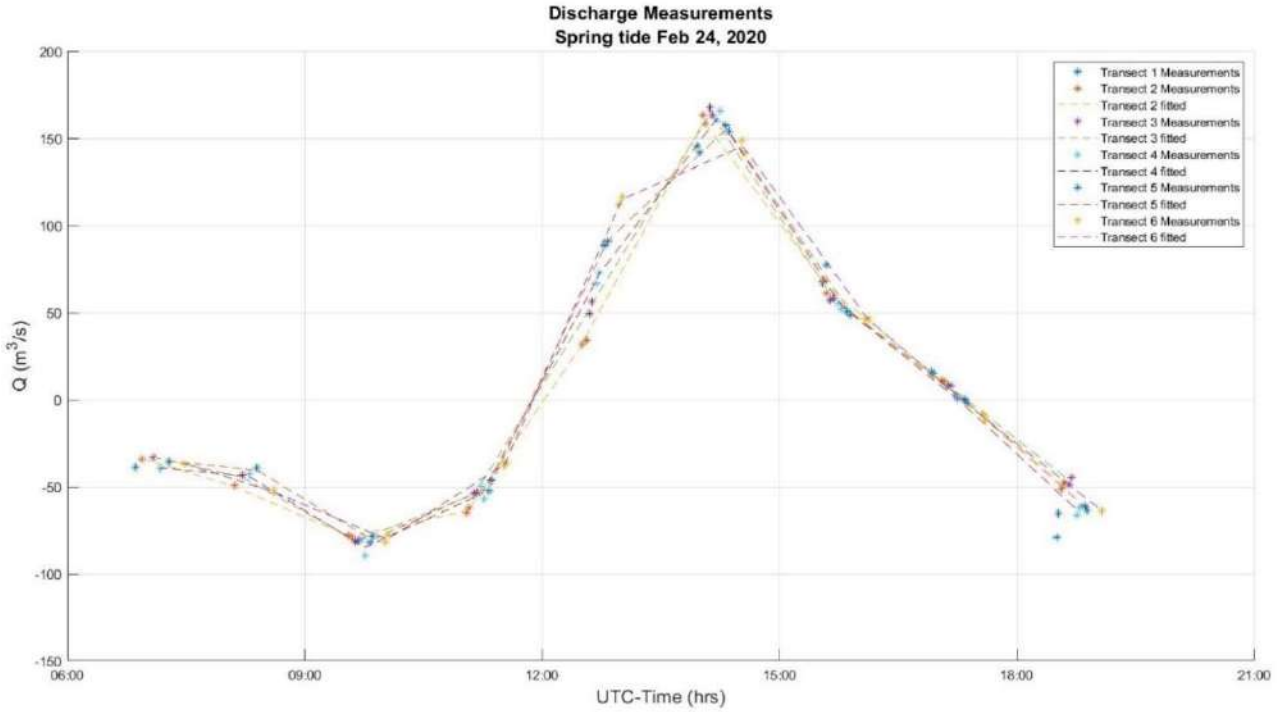


Figure 2-8 – Spring tide discharge measurements

2.4 Bathymetry

The bathymetric data for the model domains has been obtained from four sources:

- Detailed bathymetric survey with 0.5 x 0.5m resolution, undertaken by Shore in February 2020, as shown in **Figure 2-9**. This survey extends from approximately 100m offshore of the seaward end of the harbour piers up to the Bailey bridge. These data are referenced to OSGB36-BNG (X,Y) and ODN elevation (Z). Further details provided in **Section 3.2** of the main project report, and **Appendix A**.
- The LIDAR survey of the Suffolk Estuaries which was carried out at low tide on 14th April 2003 by the Environment Agency (EA) National Centre for Environmental Data and Surveillance (**Figure 2-10**). These data are referenced to ODN;
- Seazone data provided by HR Wallingford Ltd, collected in September 2016 and covering an extended area around the Blyth estuary (**Figure 2-11**). These data are referenced to Chart Datum;
- The C-map data covering the North Sea area, extracted from the world-wide Electronic Chart Database (C-Map database) by Jeppesen Norway (**Figure 2-12**). These data are referenced to Chart Datum.

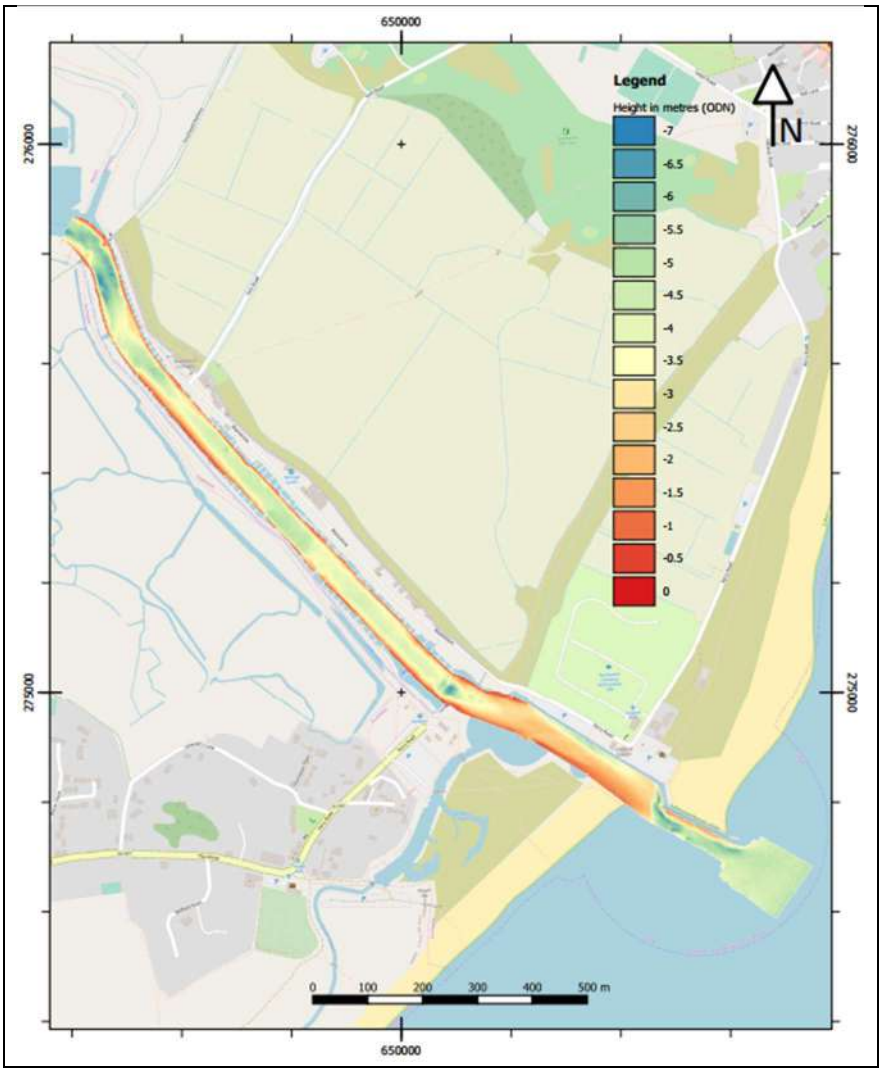


Figure 2-9 – Detailed bathymetric survey data

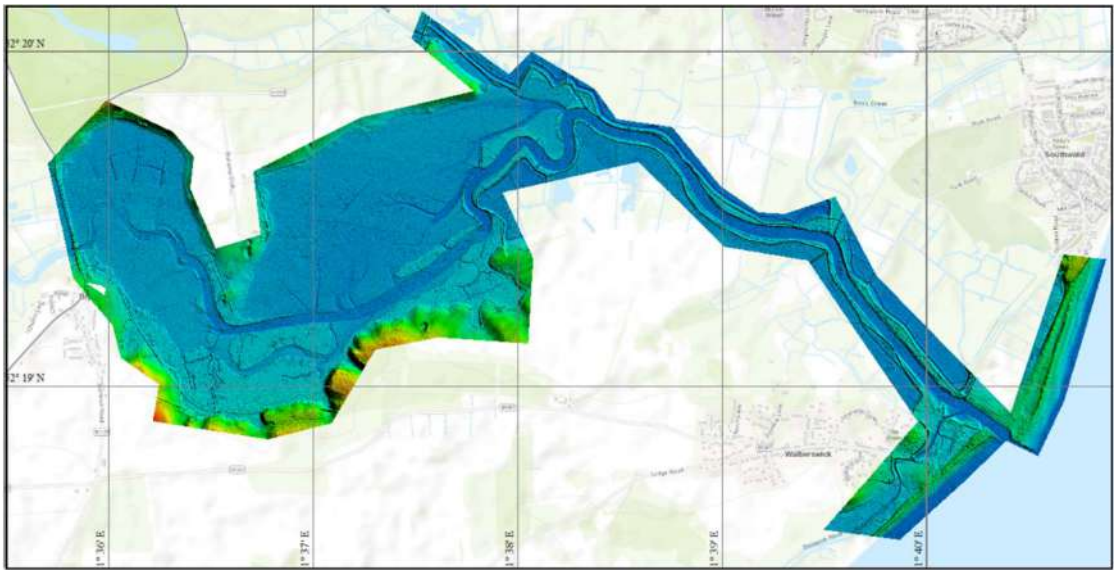


Figure 2-10 – Blyth Estuary LiDAR Survey data

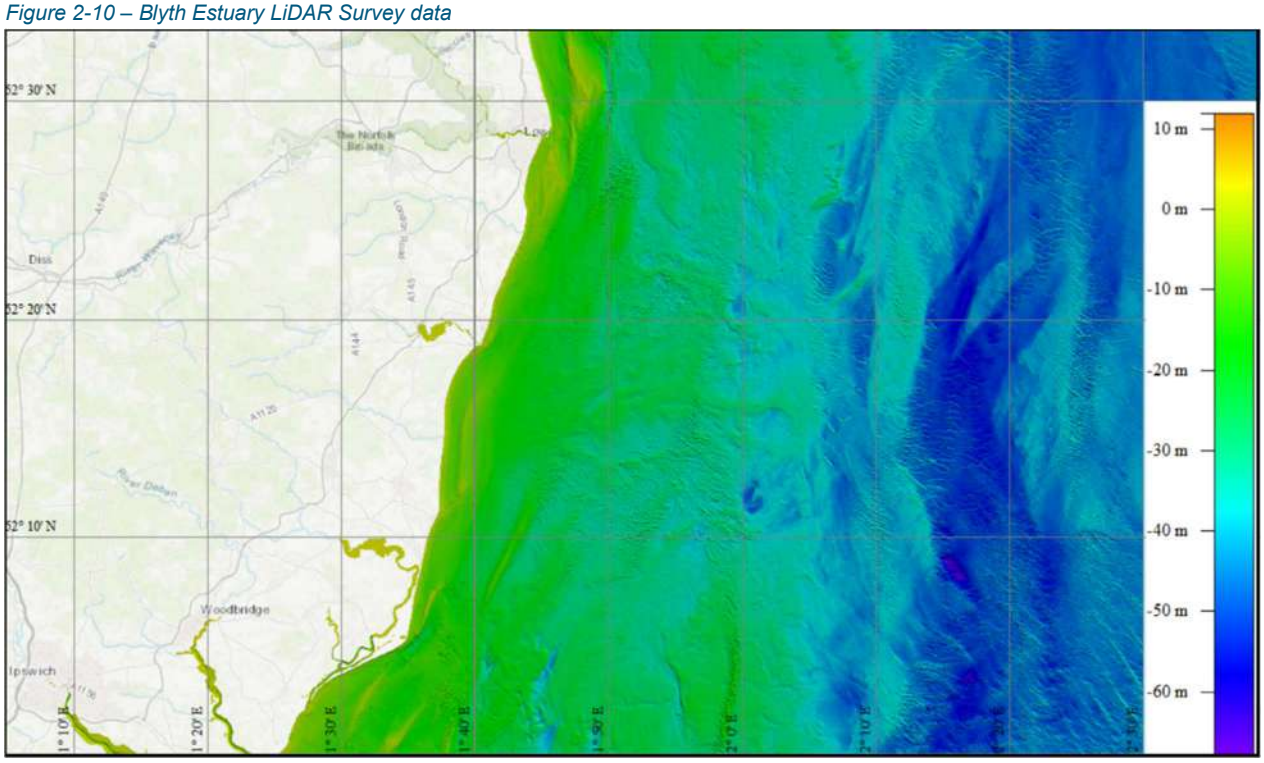


Figure 2-11 – Seazone data

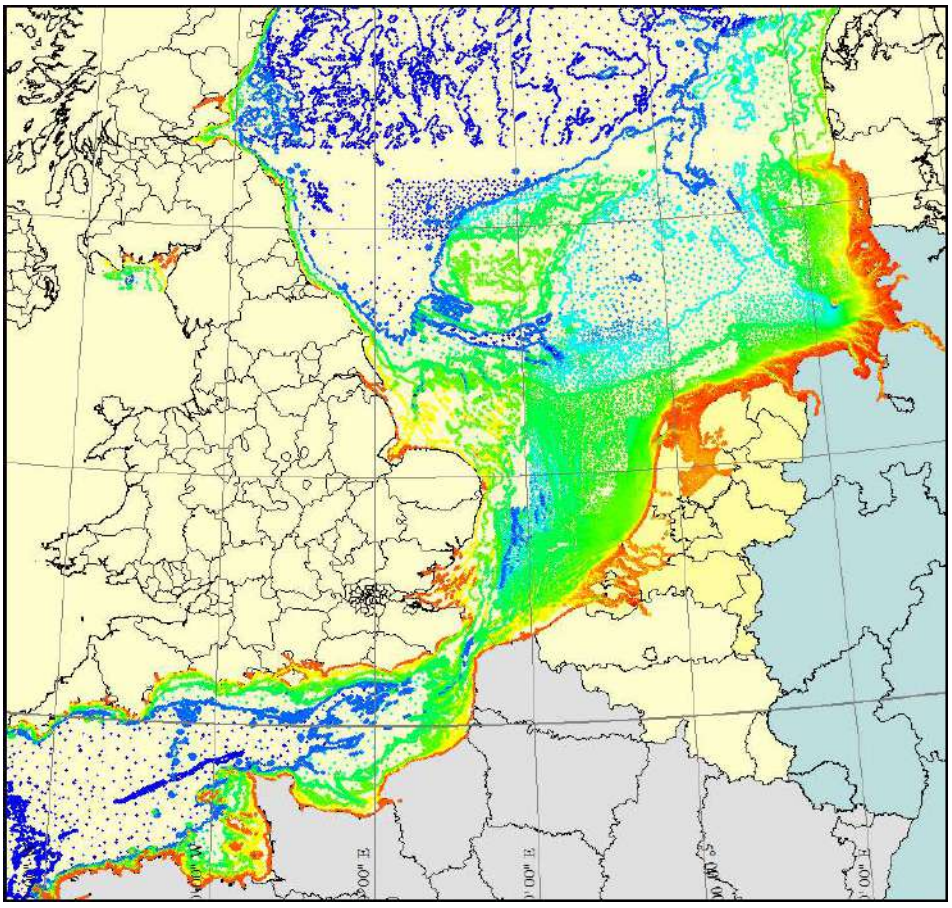


Figure 2-12 – C-map data

2.5 Climate change

The tidal modelling of the future estuary management scenarios considered the expected impact of climate change on water levels. Further details of the how sea level rise is considered in this project are provided in **Section 5.2** of the main project report. The water level conditions at the harbour mouth that were applied in the tidal model are summarised in **Table 2-1**.

Table 2-2: Modelled water level conditions

Scenario	Water level at harbour mouth (m ODN)	Approximate Return Period (AEP %)	Input data
February 2020 survey	1.49	0.5 (200%)	February 2020 survey
2070, RCP 2.6, 50%	2.04	0.5 (200%)	February 2020 input conditions +0.55m
December 2013 event -0.4m	2.7	20 (5%)	December 2013 input conditions -0.4m
December 2013 event	3.1	100 (1%)	Observed conditions at model boundaries
2070, RCP 8.5, 95%	3.57	100 (1%)	December 2013 input conditions +0.47m

3 Tidal Modelling

3.1 Model selection

To assess the flow patterns and water level variations in the project area, the hydrodynamic module of the MIKE21 Flexible Mesh Flow Model developed by DHI has been used for this study. For this project, two flow models at different scales have been developed.

The modelling was based on the integration and downscaling from a large-scale regional model of tidal currents to a small-scale local model. The 2D model MIKE21-HD was used for the regional model to simulate the large-scale circulation patterns of the coastal areas of the North Sea. This regional model provided the boundary conditions as input to the more detailed local model at and around the development area.

The large-scale regional model used within this study is based on an existing in-house model developed by Royal HaskoningDHV. The regional model covers the entire English Channel and North Sea and is calibrated against various IHO tide gauges close to the project location.

In order to determine the detailed tidal water levels and flow patterns around the project area, a local model was developed by refining the model in a relatively small area around the site. This detail model was nested within the large scale model and further calibrated based on the measurements from the project area. The boundary conditions as input to the local model are provided by the regional model.

3.2 Computational mesh and bathymetry

3.2.1 Regional model

The model bathymetry and grid were constructed based on the electronic sea maps in DHI's Mike C-map and Seazone dataset, and the coastline positions digitised based on Google Earth. The model bathymetry shown in **Figure 3-1** has then been generated by interpolation of these bathymetric data to the flexible mesh.

The computational mesh consists of 265,000 elements and 135,000 nodes. As the regional model is developed for simulation of the large scale circulation patterns, the mesh resolution is relative coarse, ranging from 1km to 7km. In general, the resolution increases towards the coastline in order to capture the nearshore bottom characteristics.

3.2.2 Local model

The model bathymetry and grid were locally updated using bathymetric survey data, LiDAR and Seazone data. This local mesh consists of 38,193 elements and 21,471 nodes and has different levels of resolution. The size of the computational cell varies over the model domain, with the highest resolution of 8m is generated around the Blyth estuary in order to give a detailed representation of the hydrodynamics and 800m at offshore area. The local model domain and the bathymetric data interpolated to the local model grid is shown in **Figure 3-3**. The detailed bathymetry and computational mesh within the Blyth estuary is shown in **Figure 3-2.**

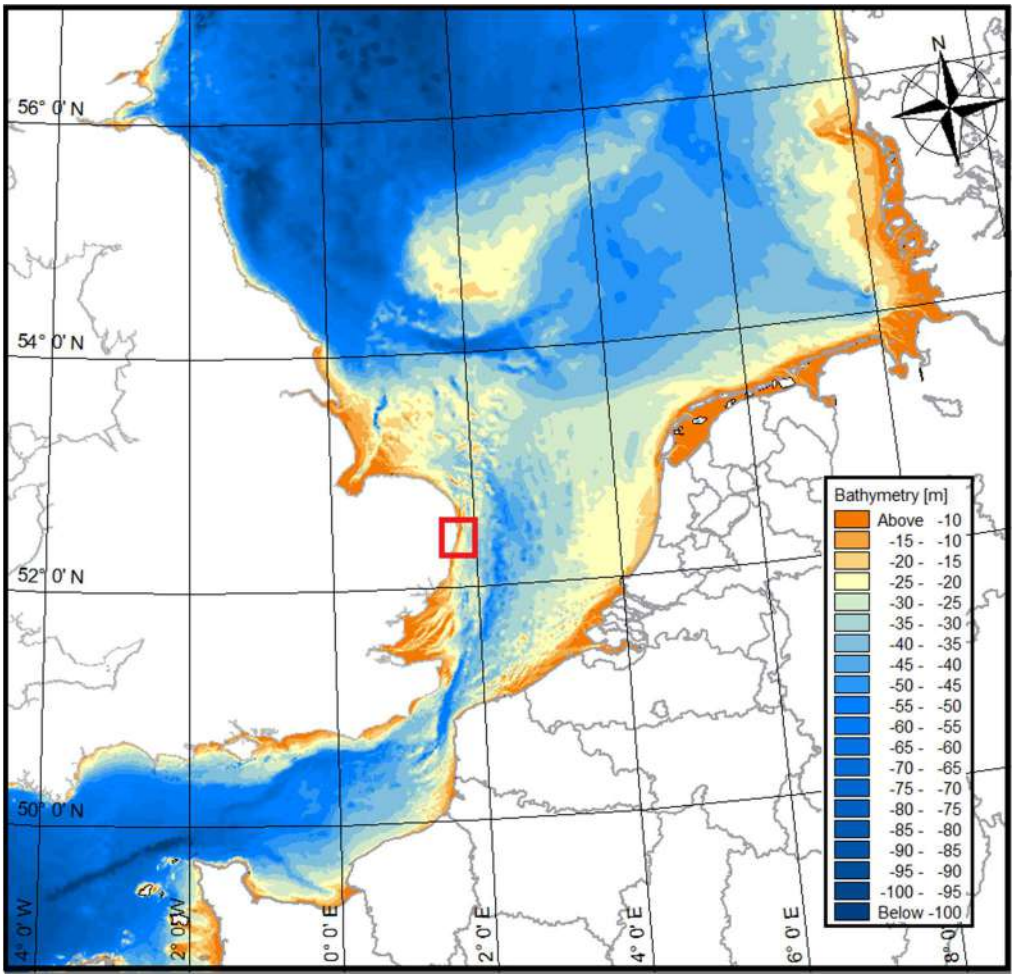


Figure 3-1 – Regional HD model domain and bathymetry (local model area is inside the red box)

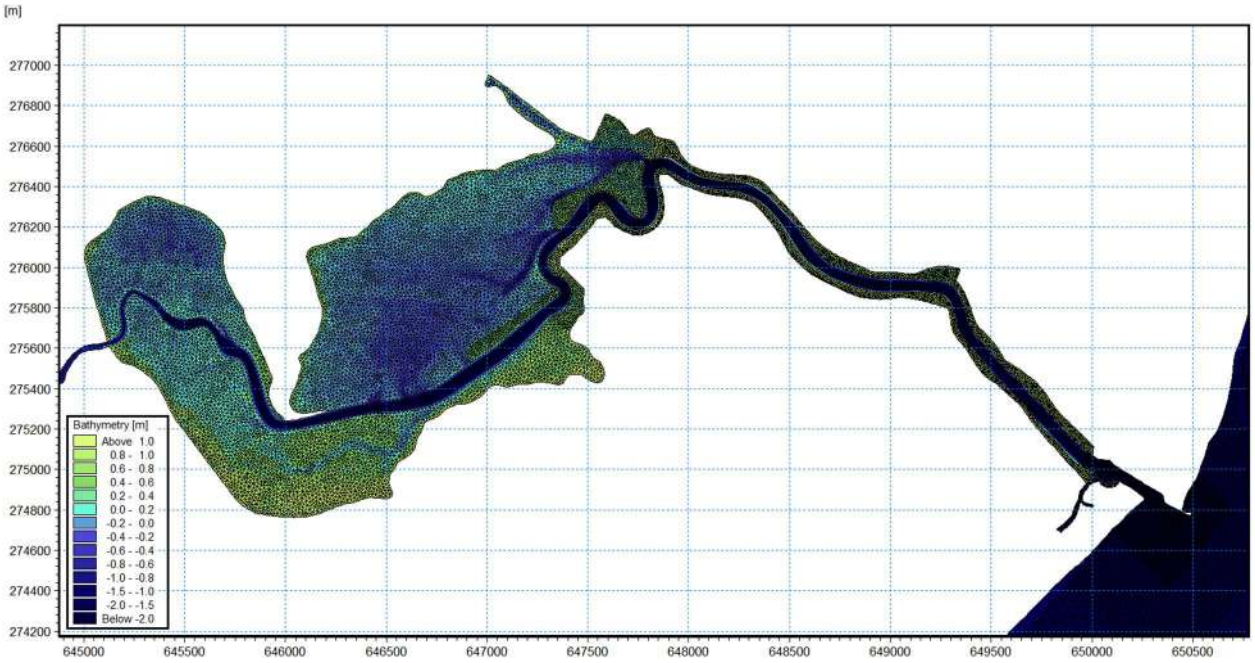


Figure 3-2 – Detail of bathymetry and computational mesh around the Blyth estuary

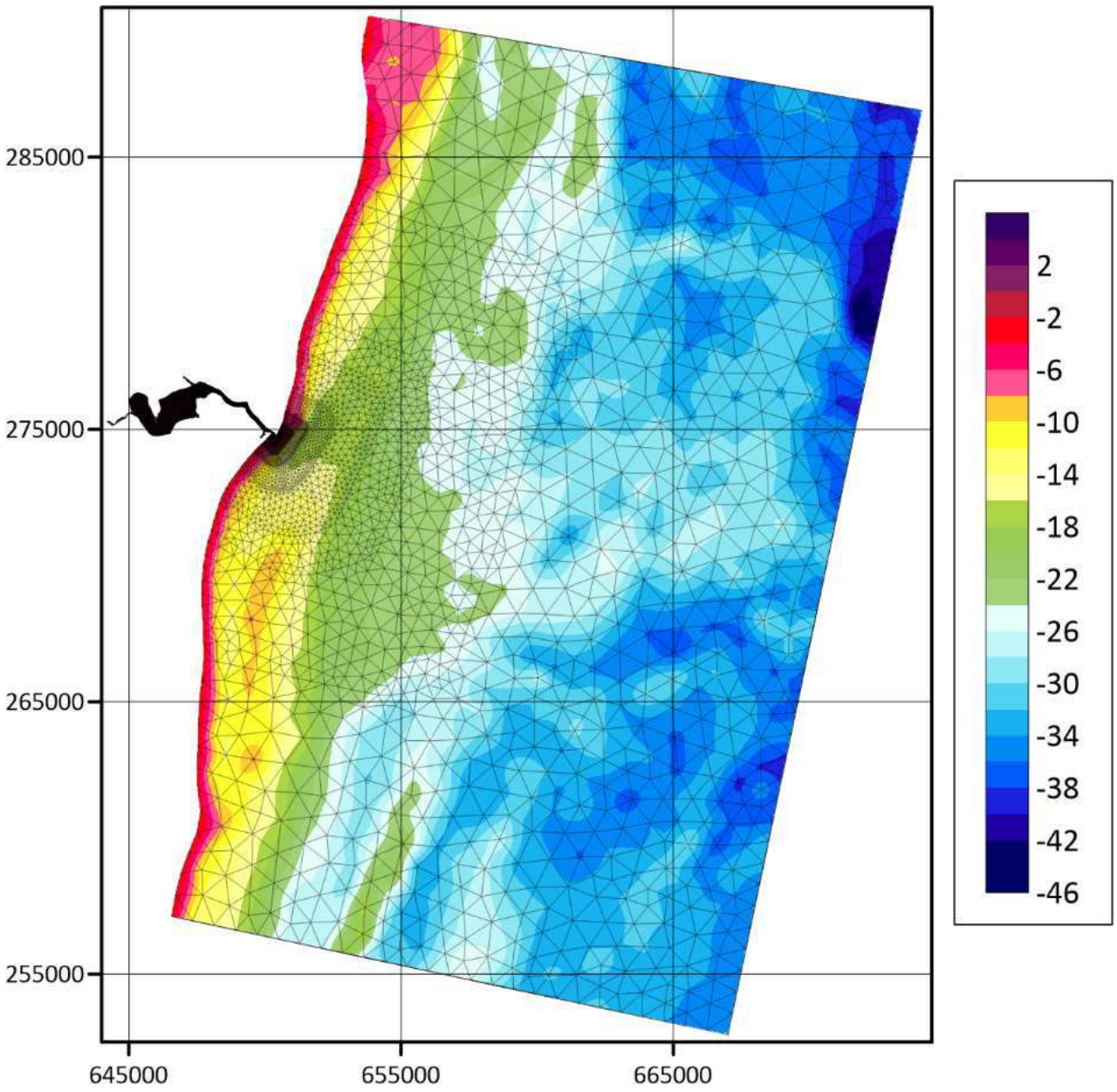


Figure 3-3 – Combined bathymetry and computational mesh of the local model domain

3.2.3 Boundary Conditions

The open boundaries of the regional model are set as water level boundaries, varying in time and with distance along the boundaries. This data was extracted from the global tide model, which represents the major diurnal (K1, O1, P1 and Q1) and semidiurnal tidal constituents (M2, S2, N2 and K2) with a spatial resolution of 0.25° × 0.25° based on OPEX/POSEIDON altimetry data.

The offshore open boundary at the sea side of the local model is set to water level boundaries which vary in time and with distance along the boundary. The water level boundaries are extracted from the regional model for a period of one month from 1st February to 1st March 2020.

3.3 Model calibration

3.3.1 General

In order to accurately simulate tidal currents, the regional and local models were calibrated. Calibration is the process of defining the optimum model parameters, so the model results are as close as possible to the measured data.

The regional model was run to simulate the water level from 17th July 2019 to 5th August 2019 in order to compare with the IHO tide gauge stations

For the local model, the calibration was based on measured water level data available from 18th February 2020 to 25th February 2020, from the three stations SW1, SW2 and SW3 shown in **Figure 2-1**. The local model was also calibrated against six profiles of discharge measurements recorded on 19th and 24th February 2020.

3.3.2 Calibration results

Regional model

The simulated water levels were plotted against eight IHO stations along the coastline of England, as shown in **Figure 3-4** to **Figure 3-11**.

In general the results from the regional model agree well with the IHO data. There are some differences at the stations located within estuaries or inlets where the model mesh is too coarse, however, at these locations tidal phasing is in good agreement.

Overall, the calibration results indicate that the water levels are well predicted for most stations. The good calibration results in terms of water levels indicate that the regional model is capable of providing reasonable water level boundary conditions for local model.

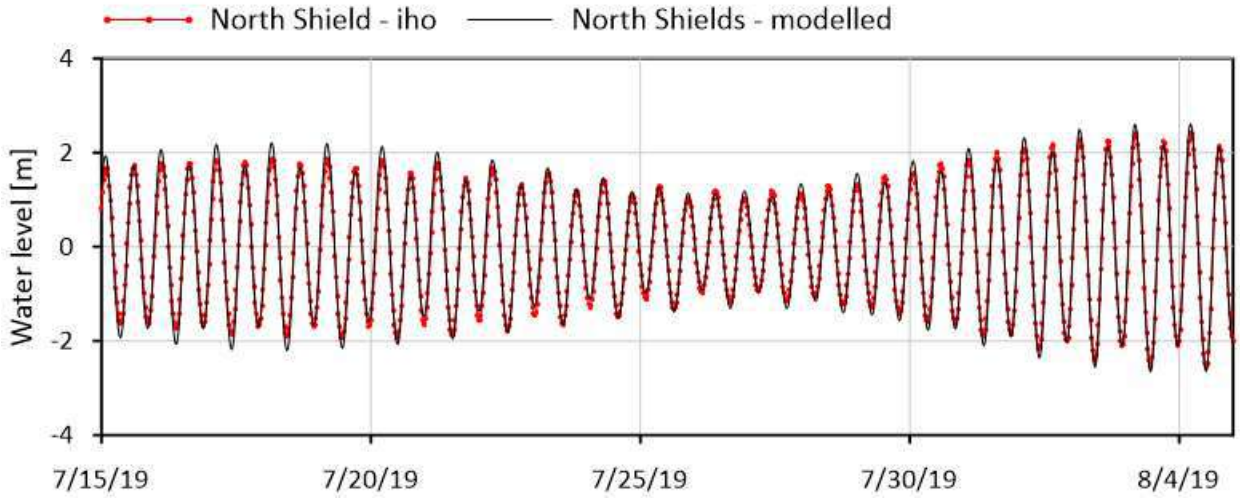


Figure 3-4 – Time series comparison, simulated vs IHO water levels at North Shields

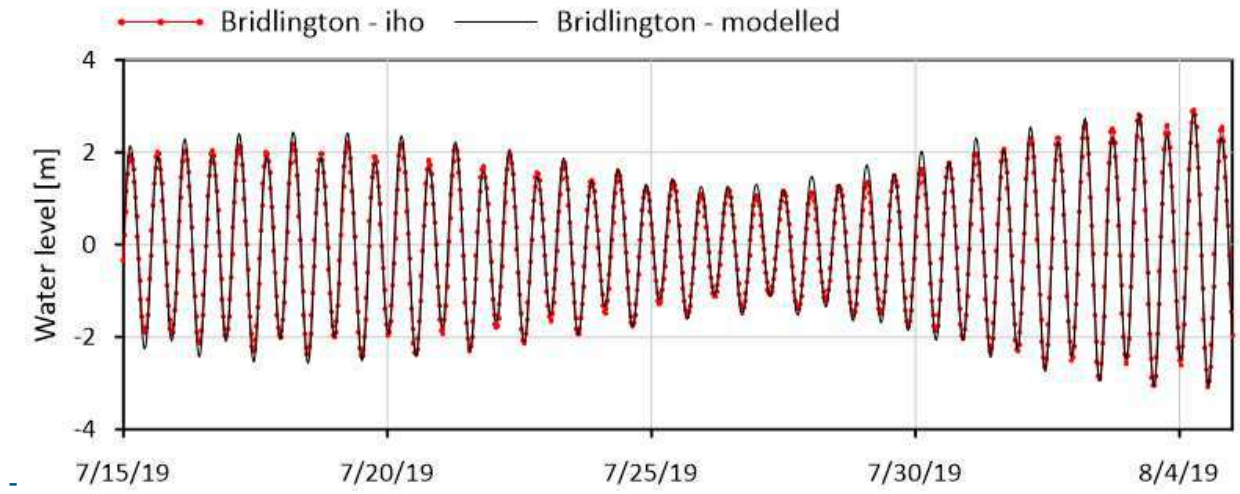


Figure 3-5 – Time series comparison, simulated vs IHO water levels at Bridlington

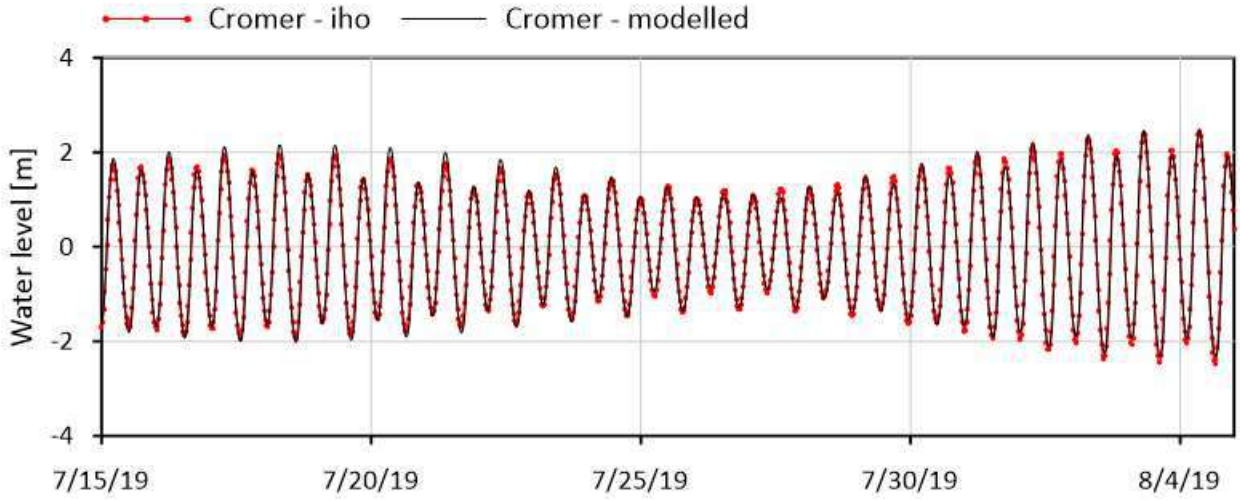


Figure 3-6 – Time series comparison, simulated vs IHO water levels at Cromer

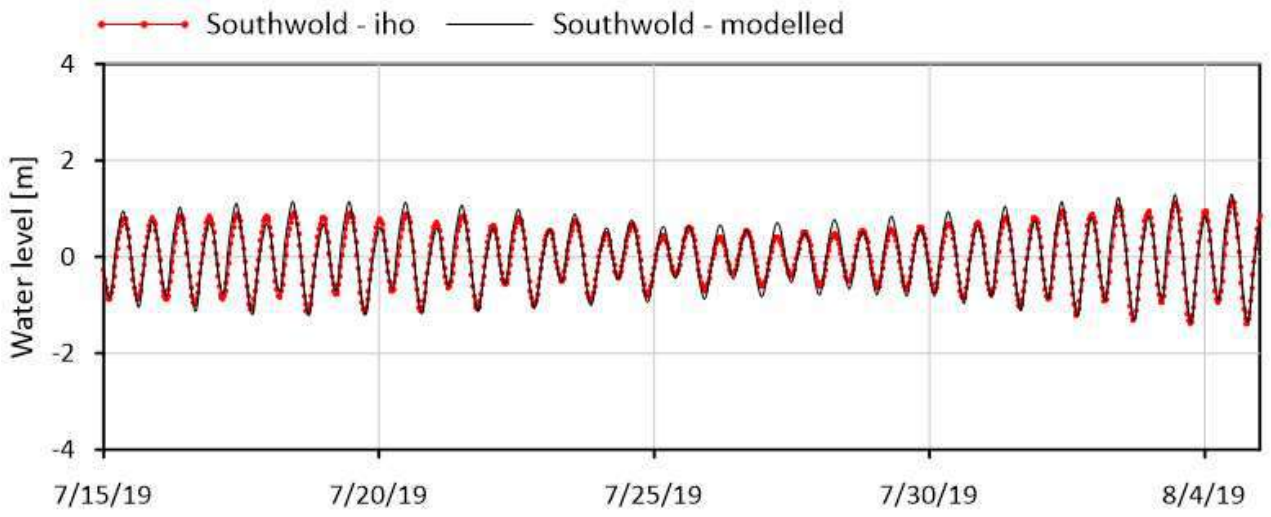


Figure 3-7 – Time series comparison, simulated vs IHO water levels at Southwold

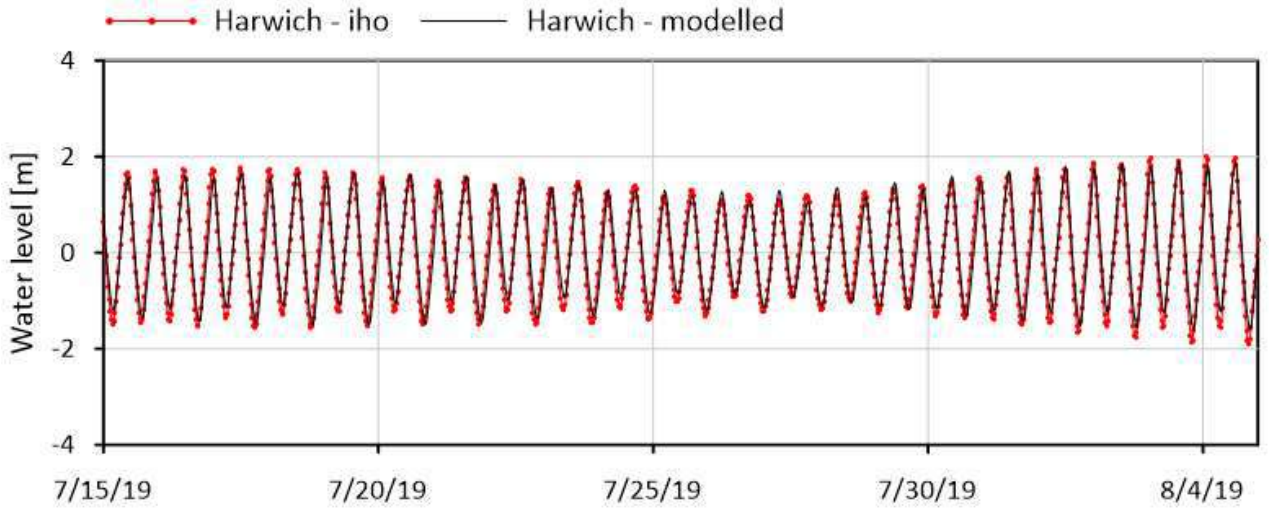


Figure 3-8 – Time series comparison, simulated vs IHO water levels at Harwich

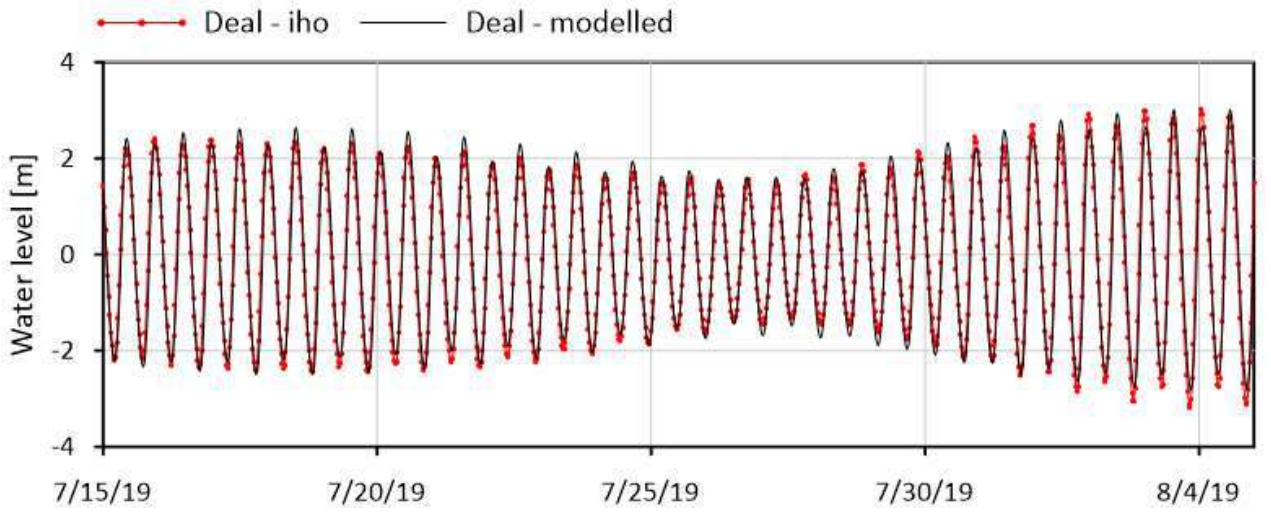


Figure 3-9 – Time series comparison, simulated vs IHO water levels at Deal

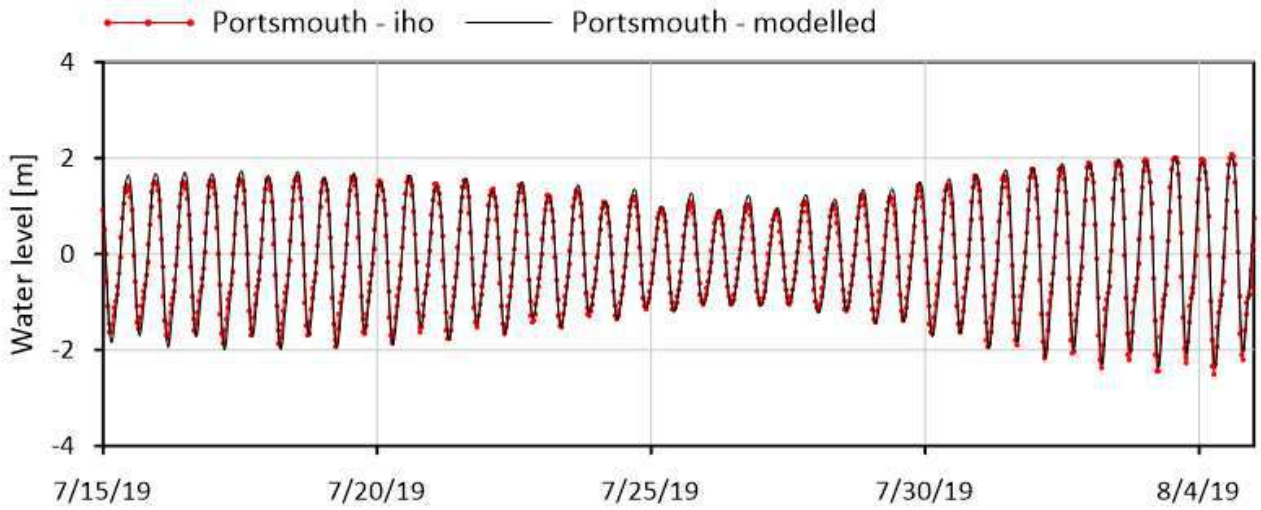


Figure 3-10 – Time series comparison, simulated vs IHO water levels at Portsmouth

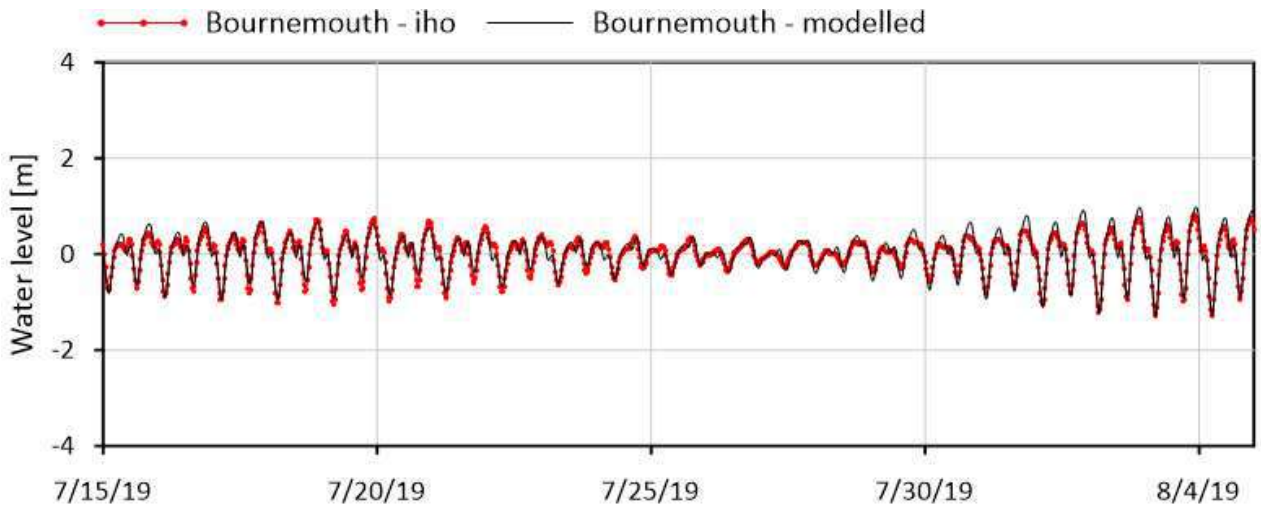


Figure 3-11 – Time series comparison, simulated vs IHO water levels at Bournemouth

Local model

The comparison of the measured and simulated water levels is shown in **Figure 3-12** to **Figure 3-14**. The comparison of the measured discharge and simulated discharge is shown in **Figure 3-15** and **Figure 3-16**.

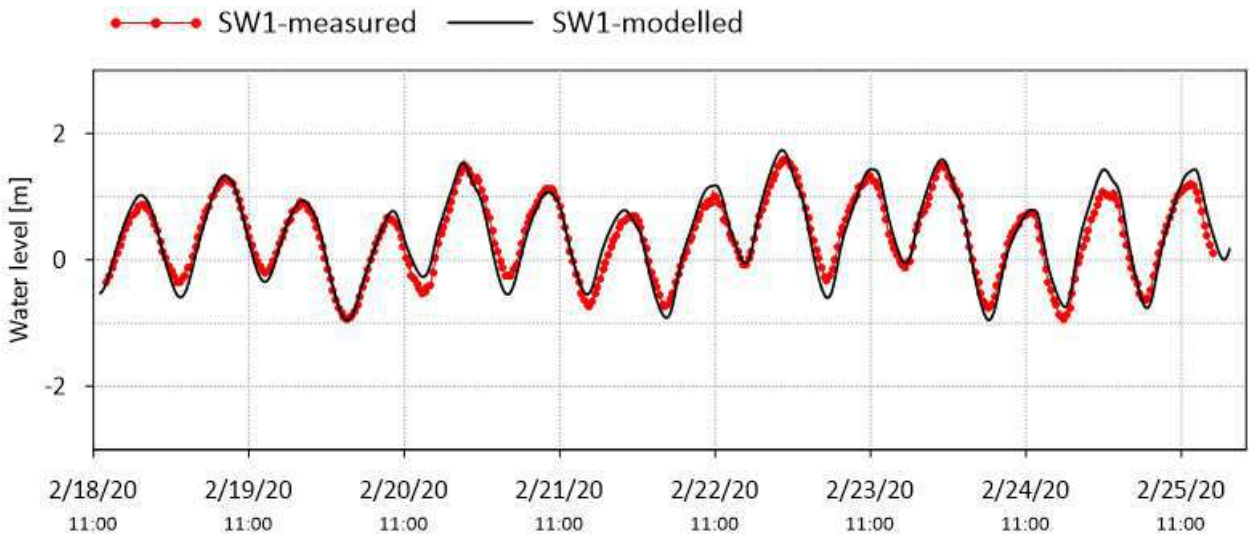


Figure 3-12 – Time series comparison, simulated vs observed water levels at the SW1 station

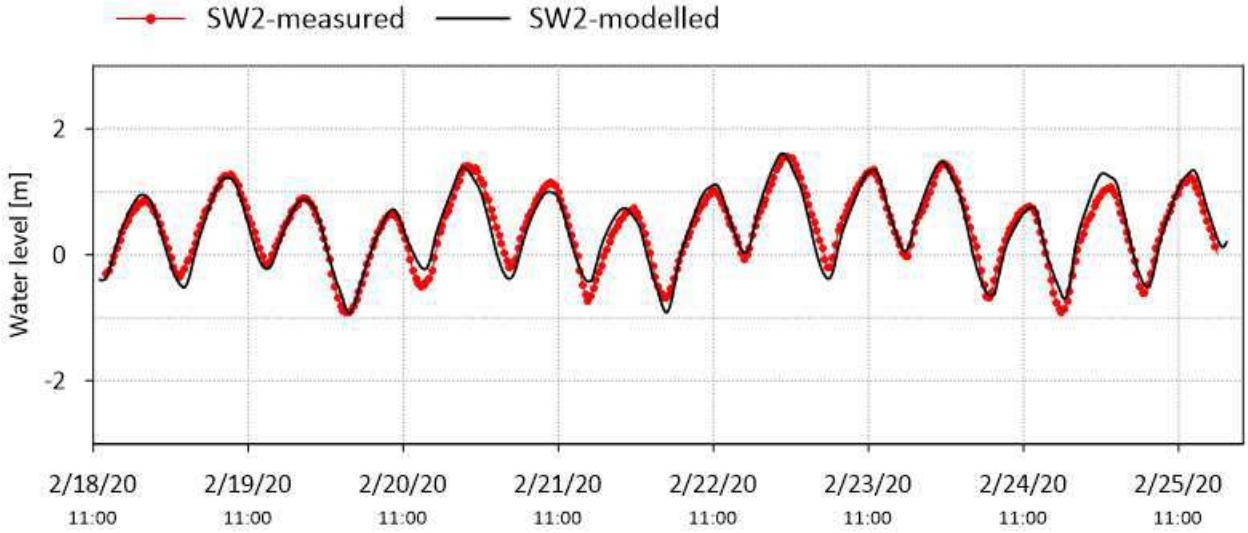


Figure 3-13 – Time series comparison, simulated vs observed water levels at the SW2 station

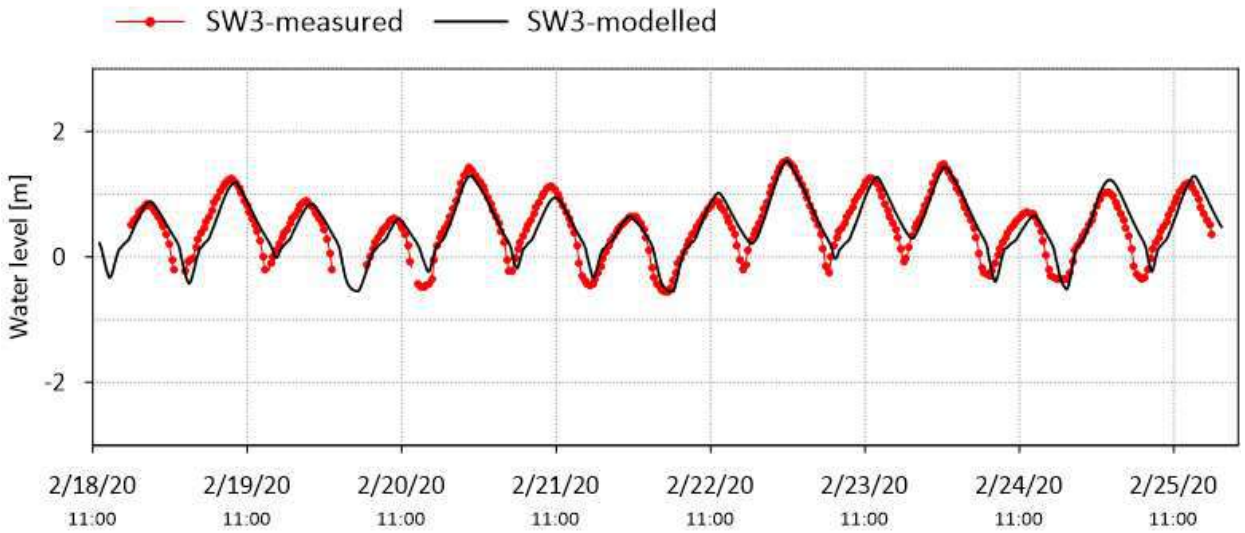


Figure 3-14 – Time series comparison, simulated vs observed water levels at the SW3 station

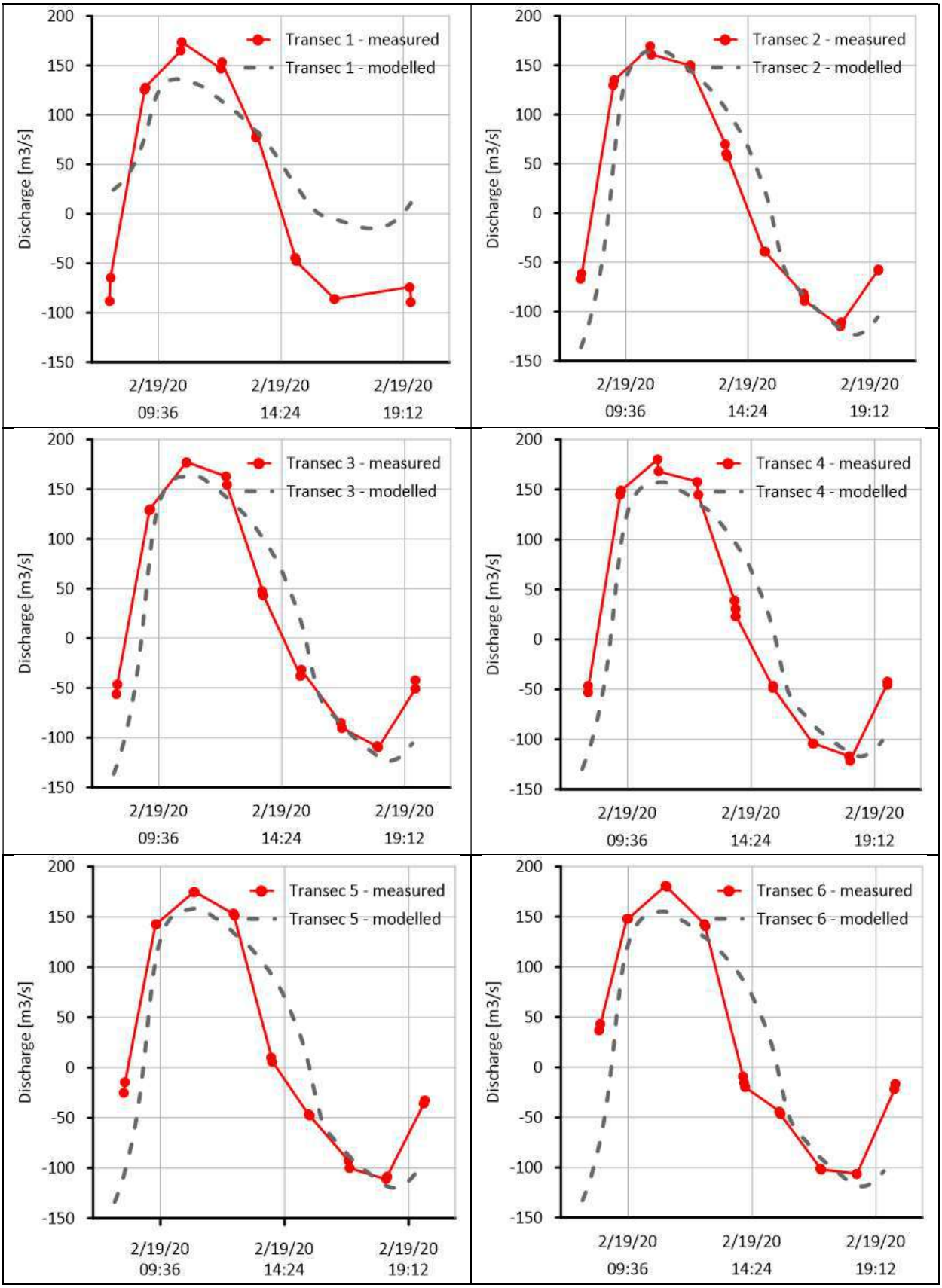


Figure 3-15 – Time series comparison, simulated vs observed discharge, neap tide

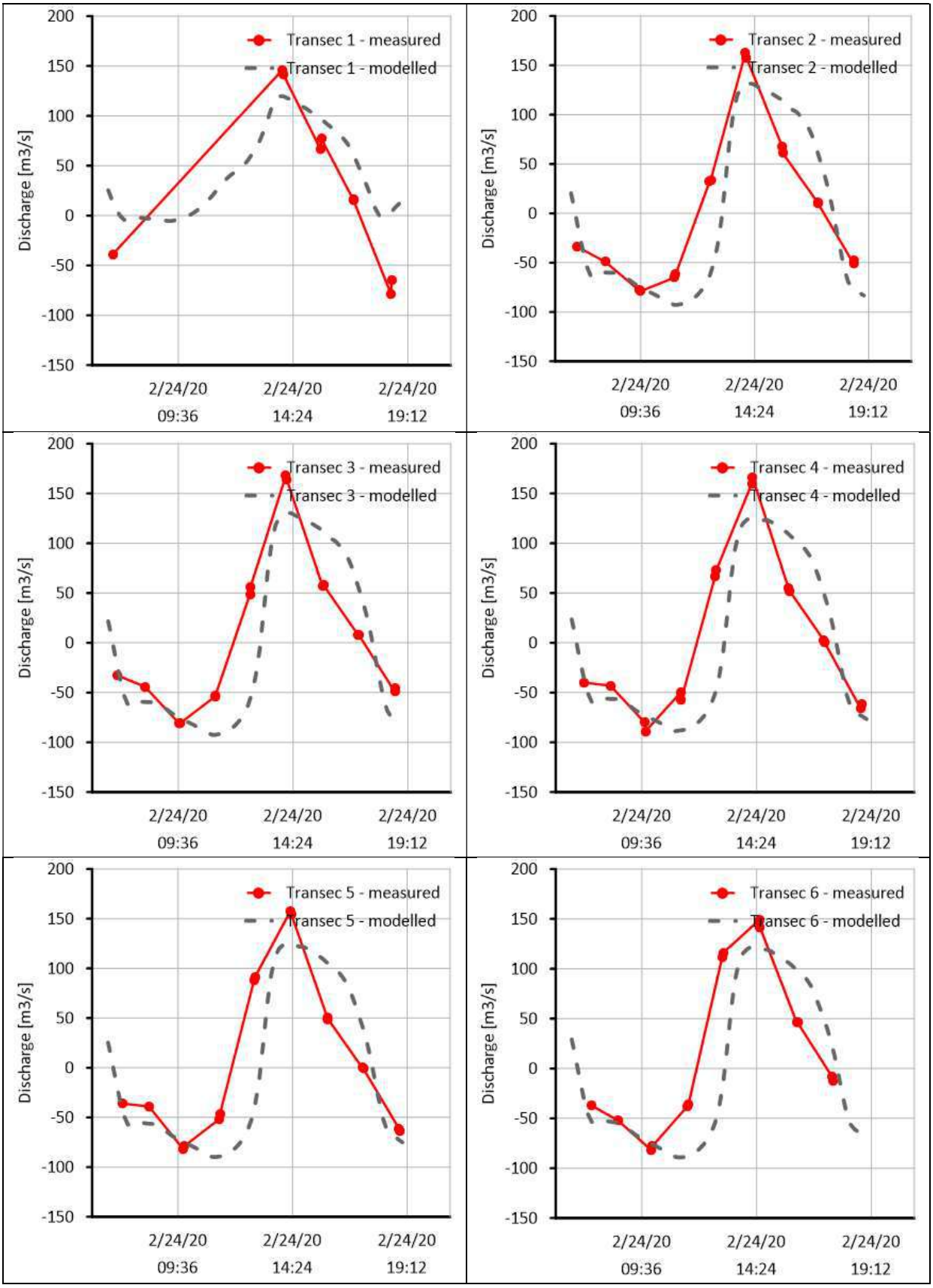


Figure 3-16 – Time series comparison, simulated vs observed discharge, spring tide

3.4 Model Run Scenarios

3.4.1 Future management scenarios

The following scenarios for management of the estuary were assessed using the wave and tidal models:

- **E0 – Maintain Integrity of Present-day Defences:** This baseline option assumed the present-day estuary defences remained in place.
- **E1 – Do Nothing:** No further works undertaken to the flood defences or harbour structures.
- **E2 – Improve Estuary Defences:** Estuary defences are maintained and improved to provide protection against a 1 in 100-year return period (1% AEP) surge event, allowing for sea level rise to 2070.
- **E3 – SMP Policy:** Harbour entrance and mid and upper estuary defences are improved to keep pace with increasing water levels and (possibly increasing) tidal flow volumes. Some banks on south side of estuary are realigned, allowing flooding.
- **E4 – EA Strategy position:** Management of mid and upper estuary defences is withdrawn by 2030. Rock terminal groyne would be built at Gun Hill to reduce the risk of beach erosion if the North Pier was to fail (the benefits of retaining the North Pier are acknowledged in the EA Strategy).

For scenarios E2 and E3, it is assumed that the harbour entrance structures are maintained or improved as necessary. The wave modelling considers various options for the improvement of the harbour entrance structures. For scenario E4, the condition of the harbour entrance structures would be allowed to deteriorate and eventually fail. For the purposes of the wave modelling, scenario E4 is the same as scenario E0, with failure of the harbour entrance structures. These management scenarios are described in more detail in **Section 7** of the main project report.

The different configurations of the estuary defences in each of these scenarios influence the tidal flow volumes and current speeds through the harbour, depending on the area/volume of the marshes that is able to flood.

In terms of the EA Strategy scenario, maintenance has been withdrawn from the flood embankments to Bulcamp House Marsh, Tinkers Marsh (excluding the sluice), Union Farm and Blyford. Maintenance has continued to the flood cells downstream of the A12, including Robinsons Marsh following the 2013 flood event. Whilst the EA Strategy preferred option included proposals for secondary defences to reduce the risk of flooding to Southwold and Walberswick, these have not yet been implemented. The secondary defences were not included in the tidal model because there proposed form of construction and location was unclear, and because they would have a very limited impact on the tidal volume within the estuary.

3.4.2 Boundary conditions

The various climate change scenarios set out in **Section 2.5** were used as the water level boundary conditions.

3.4.3 Additional options

In addition to the main estuary management scenarios described in **Section 3.4.1**, various additional options were assessed, based on feedback from stakeholder workshops and review of the initial modelling results.

No Overtopping of Walberswick Dunes

During the 2013 flood event, the sea level exceeded the crest level of the Walberswick dunes. Additional model runs were completed for all options for the 2013 event conditions, which assumed that the Walberswick dunes would not be overtopped. These additional model runs supported the comparison of

the model results with the EA Strategy modelling and demonstrated the potential benefits of maintaining a higher crest level to the dunes.

Short South Pier

An additional option was assessed by both the wave model and the tidal model, whereby the length of the South Pier was reduced by about 110m. This scenario was considered in order to assess an 'interim failure' scenario, and whether reducing the length of the South Pier might reduce tidal flow rates at the harbour entrance. This option also gave an indication of the expected impact on tidal flows of increasing the width of the harbour entrance.

Solid South Pier

The Baseline wave and tidal models represented the present form of the South Pier, including the wave energy transmission and tidal flow through the 'windows' in the structure. An additional option was assessed by both the wave model and the tidal model, whereby the South Pier was assumed to be solid. This scenario enabled the impact of transmission through the pier on the flow conditions in the entrance channel to be demonstrated, when compared to a solid structure.

Narrow channel

This option was added following discussion with the stakeholder group, and assumed that the river channel would be narrowed opposite the North Wall, to constrain the volume of water entering the estuary and reduce water levels upstream. This option could be combined with any of the other management options for the estuary defences and harbour structures.

Spillway (Sluice Gate)

Following discussion of the initial model results with the stakeholder group it was agreed that an additional option should be assessed. This option would be a 'managed alternative' to scenario E2 - SMP Policy. Instead of removing or realigning the southern estuary defences, the embankments to Robinsons' and Tinkers' marshes would be raised and a spillway constructed, in the form of an automatically controlled sluice gate, within the embankment to Robinsons' marsh, located downstream of the Blackshore properties. Development of this option is discussed further in Appendix E to the main project report.

The spillway option was assessed using the tidal model to determine peak water levels and flow rates in the Harbour, for comparison with the other estuary management options. The modelling assumed the most effective arrangement of a spillway, with a 30m wide controlled sluice gate with its sill at ground level, and with the structure located immediately downstream of the Blackshore properties. The input conditions for the model represented a scenario where the spillway was most likely to be effective, with the sluice opened ahead of the peak of a 'steep' surge tide. Various timings for opening the sluice gate were assessed to identify the timing that achieved the greatest reduction in peak flood levels. A range of water level conditions were also assessed, for comparison with the other options.

Passive Spillway

Following review of the draft project report, and meetings with the stakeholder group and Harbour Management Committee, additional modelling was requested to assess the impact of a passive spillway option on peak water levels and flow rates in the Harbour. This option assumes that a passive spillway would be constructed in the embankment to Tinkers Marsh, a short distance upstream of the Bailey Bridge. The embankments to Robinson's and Tinker's Marshes would be raised to prevent overtopping, with a lower section of embankment over the length of the proposed spillway.

The passive spillway option was assessed using the tidal model to determine peak water levels and flow rates in the Harbour, for comparison with the other estuary management options. The modelling initially assumed that a 500m long spillway would be constructed, as a long spillway is more likely to be effective.

Various spillway levels were considered in order to optimise this against the reduction in peak flood levels that would be achieved. A range of water level conditions were assessed, for comparison with the other options. Sensitivity to spillway length was reviewed, and the impact of allowing flow through the culverts between Tinker's and Robinson's Marshes was also considered.

Sensitivity to Marsh Sedimentation

As well as considering the sensitivity of the estuary hydrodynamics to the boundary water level (sea level rise), sensitivity to the level of the breached marshes was also assessed. This issue is discussed in Section 3.8 of the main project report. Marsh levels were increased by 300mm and 600mm for the conditions and scenarios set out in **Table 3-1**.

Table 3-1: Model runs to assess sensitivity to marsh level

	Feb 2020 conditions (1.49m water level)		**Dec 2013 event -0.4m** (2.7m water level)	**Dec 2013 conditions** (3.1m water level)		**Dec 2013 event in 2070 (RCP8.5, 95%)** (3.57m water level)	
	+300mm	+600mm	+300mm	+300mm	+600mm	+300mm	+600mm
Baseline	✓	✓	✓	✓	✓	✓	✓
E0 - Do Nothing	✓	-	-	✓	-	-	-
E1 - Raised defences	✓	✓	✓	✓	✓	✓	✓

3.5 Model Results

The tidal model generated flood extents, peak water levels and peak current speeds for each model run. The output locations for the peak water levels and current speeds are shown in Error! Reference source not found.. The model results are provided in Appendices to this report, as follows, as map figures and summary tables. The model results are discussed within the main project report.

- **Appendix A** – Flood Extents
- **Appendix B** – Peak Water Levels
- **Appendix C** – Current speed maps
- **Appendix D** – Peak Current Speeds

Appendix A includes relevant figures from the EA Strategy (2009) and the 2019 East Anglian Coastal Modelling (JBA, 2019) to enable comparison and validation of the modelled flood extents.

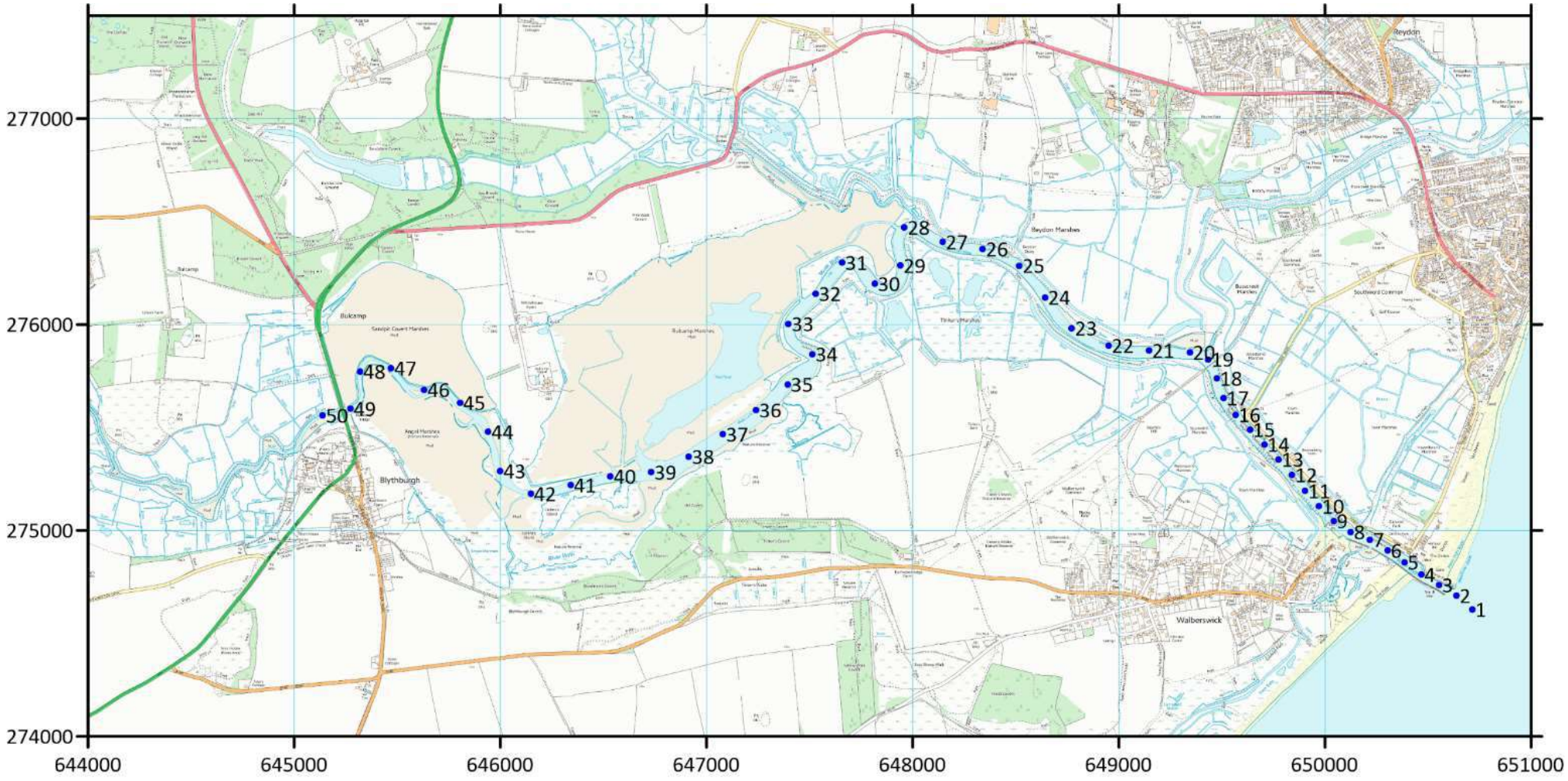


Figure 3-17 – Output locations for peak water levels and current speeds

Appendix A

Tidal Modelling Results – Flood Extents

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Appendix B

Tidal Modelling Results – Peak Water Levels

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Table B1 – Maximum water level at each cross section, mODN

Point number	Coordinates		Chainage	2020												2020 conditions in 2070, RCP2.6, 50%							2.7m Sea Level (2013 event -0.4m)								
				Baseline	Do Nothing	Raise banks	SMP - N banks only	Short S Pier	Solid S Pier	Present day + Narrow channel	Baseline	Baseline	Do Nothing	Raise banks	Raise banks	Baseline	Do Nothing	Raise banks	SMP - N banks only	Short S Pier	Solid S Pier	Present day + Narrow channel	Baseline	Raise banks	SMP - N banks only	Baseline	Raise banks	Present day + narrow channel	Raise banks + Narrow channel	Raise banks, 500m Spillway at 2.20mOD	Raise banks, 500m spillway at 2.00mOD
	x	y		E0	E1	E2	E3	H0	F0	G0	E0 Marsh +300	E0 Marsh +600	E1 Marsh +300	E2 Marsh +300	E2 Marsh +600	E0	E1	E2	E3	H0	F0	G0	E0	E2	E3	E0 Marsh +300	E2 Marsh +300	G0	G2	S6	S7
1	650589.35	274654.97	0	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	2.04	2.04	2.04	2.04	2.04	2.04	2.05	2.70	2.71	2.71	2.70	2.71	2.70	2.70	2.71	2.71
2	650514.59	274722.30	100	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	1.49	2.04	2.04	2.04	2.04	2.04	2.04	2.05	2.70	2.70	2.70	2.70	2.70	2.69	2.70	2.7	2.7
3	650429.40	274774.28	200	1.45	1.38	1.45	1.45	1.49	1.44	1.45	1.47	1.47	1.39	1.46	1.47	2.03	1.99	2.03	2.03	2.04	1.98	2.04	2.68	2.68	2.69	2.68	2.69	2.68	2.69	2.68	2.68
4	650343.21	274825.04	300	1.43	1.27	1.42	1.43	1.44	1.44	1.42	1.44	1.46	1.29	1.45	1.46	1.99	1.82	1.98	1.99	1.99	1.98	1.99	2.57	2.57	2.57	2.58	2.59	2.58	2.59	2.57	2.56
5	650262.46	274884.60	400	1.42	1.26	1.42	1.42	1.44	1.43	1.43	1.44	1.46	1.28	1.45	1.46	1.97	1.77	1.96	1.97	1.97	1.98	1.97	2.47	2.42	2.43	2.49	2.46	2.48	2.46	2.42	2.39
6	650179.89	274941.34	500	1.42	1.24	1.42	1.42	1.43	1.43	1.39	1.44	1.46	1.26	1.44	1.46	1.96	1.76	1.96	1.96	1.97	1.97	1.93	2.47	2.43	2.43	2.49	2.46	2.35	2.28	2.42	2.39
7	650094.48	274993.96	600	1.42	1.24	1.42	1.42	1.43	1.43	1.39	1.44	1.46	1.26	1.44	1.46	1.96	1.76	1.96	1.96	1.97	1.97	1.94	2.47	2.43	2.43	2.48	2.47	2.37	2.33	2.43	2.4
8	650001.26	275031.31	700	1.42	1.22	1.42	1.42	1.43	1.42	1.39	1.44	1.46	1.24	1.44	1.46	1.96	1.75	1.96	1.96	1.97	1.97	1.94	2.45	2.43	2.42	2.46	2.46	2.36	2.33	2.42	2.38
9	649918.05	275085.46	800	1.42	1.22	1.42	1.42	1.43	1.42	1.39	1.44	1.46	1.24	1.44	1.46	1.96	1.75	1.96	1.96	1.97	1.97	1.94	2.45	2.43	2.43	2.47	2.47	2.37	2.34	2.43	2.39
10	649846.47	275156.49	900	1.41	1.21	1.41	1.41	1.43	1.42	1.39	1.44	1.46	1.23	1.44	1.46	1.96	1.75	1.96	1.96	1.97	1.97	1.94	2.44	2.42	2.42	2.46	2.45	2.36	2.33	2.41	2.37
11	649779.40	275230.59	1000	1.41	1.20	1.41	1.41	1.42	1.42	1.39	1.44	1.45	1.23	1.44	1.46	1.96	1.75	1.96	1.96	1.97	1.97	1.93	2.42	2.40	2.40	2.44	2.44	2.35	2.32	2.4	2.35
12	649716.29	275308.45	1100	1.41	1.20	1.41	1.41	1.42	1.42	1.39	1.44	1.46	1.23	1.44	1.46	1.96	1.75	1.96	1.96	1.96	1.96	1.93	2.41	2.38	2.38	2.42	2.42	2.33	2.30	2.38	2.32
13	649650.36	275383.94	1200	1.40	1.19	1.40	1.40	1.42	1.41	1.38	1.43	1.45	1.22	1.43	1.45	1.95	1.75	1.95	1.95	1.96	1.96	1.92	2.38	2.36	2.36	2.41	2.41	2.31	2.28	2.36	2.3
14	649581.39	275456.68	1300	1.40	1.18	1.40	1.40	1.41	1.41	1.38	1.43	1.45	1.21	1.43	1.45	1.95	1.75	1.95	1.95	1.96	1.96	1.92	2.37	2.35	2.34	2.39	2.39	2.30	2.27	2.34	2.27
15	649511.58	275528.58	1400	1.40	1.17	1.40	1.40	1.41	1.41	1.38	1.43	1.45	1.20	1.43	1.45	1.95	1.75	1.95	1.95	1.95	1.95	1.92	2.35	2.34	2.33	2.38	2.38	2.29	2.27	2.33	2.25
16	649441.52	275600.24	1500	1.40	1.17	1.40	1.40	1.41	1.41	1.38	1.43	1.45	1.20	1.43	1.45	1.94	1.75	1.95	1.94	1.95	1.95	1.92	2.34	2.33	2.32	2.36	2.37	2.28	2.26	2.31	2.23
17	649384.13	275682.37	1600	1.40	1.16	1.40	1.40	1.41	1.41	1.38	1.43	1.45	1.19	1.43	1.45	1.94	1.74	1.95	1.94	1.95	1.95	1.92	2.33	2.32	2.31	2.36	2.37	2.27	2.25	2.31	2.23
18	649351.39	275777.07	1700	1.41	1.17	1.41	1.41	1.42	1.41	1.38	1.43	1.46	1.20	1.43	1.46	1.95	1.74	1.95	1.95	1.96	1.96	1.92	2.34	2.33	2.32	2.36	2.38	2.28	2.26	2.31	2.24
19	649310.60	275869.80	1800	1.41	1.18	1.41	1.41	1.42	1.41	1.38	1.43	1.46	1.21	1.43	1.46	1.95	1.75	1.95	1.95	1.96	1.96	1.92	2.34	2.33	2.32	2.36	2.37	2.28	2.26	2.31	2.23
20	649220.73	275904.08	1900	1.40	1.18	1.41	1.40	1.42	1.41	1.38	1.43	1.46	1.21	1.43	1.46	1.95	1.74	1.95	1.95	1.95	1.95	1.92	2.33	2.32	2.31	2.35	2.37	2.27	2.25	2.3	2.22
21	649022.63	275912.96	2100	1.40	1.18	1.41	1.41	1.42	1.41	1.38	1.43	1.45	1.21	1.43	1.46	1.94	1.75	1.95	1.94	1.95	1.95	1.92	2.30	2.31	2.29	2.33	2.35	2.26	2.24	2.29	2.2
22	648826.39	275937.35	2300	1.41	1.18	1.41	1.41	1.42	1.41	1.38	1.44	1.46	1.21	1.44	1.46	1.94	1.75	1.95	1.95	1.95	1.95	1.92	2.31	2.31	2.30	2.33	2.35	2.26	2.24	2.29	2.2
23	648647.76	276021.18	2500	1.41	1.18	1.41	1.41	1.42	1.41	1.38	1.44	1.46	1.21	1.44	1.46	1.94	1.75	1.95	1.95	1.95	1.95	1.92	2.30	2.30	2.29	2.32	2.34	2.25	2.24	2.28	2.2
24	648517.55	276170.37	2700	1.41	1.18	1.41	1.41	1.42	1.42	1.39	1.44	1.46	1.21	1.44	1.46	1.95	1.75	1.95	1.95	1.95	1.95	1.92	2.29	2.30	2.28	2.32	2.34	2.25	2.23	2.28	2.2
25	648393.18	276324.90	2900	1.41	1.18	1.41	1.41	1.42	1.42	1.39	1.44	1.46	1.21	1.44	1.46	1.94	1.75	1.94	1.94	1.95	1.95	1.91	2.26	2.28	2.26	2.29	2.32	2.23	2.22	2.26	2.19
26	648216.30	276405.44	3100	1.41	1.18	1.42	1.42	1.42	1.42	1.39	1.44	1.46	1.21	1.44	1.46	1.94	1.75	1.94	1.94	1.95	1.95	1.91	2.26	2.28	2.26	2.28	2.32	2.23	2.22	2.25	2.19
27	648020.90	276439.42	3300	1.42	1.19	1.42	1.42	1.43	1.42	1.40	1.44	1.47	1.21	1.44	1.47	1.94	1.75	1.95	1.95	1.95	1.95	1.92	2.26	2.28	2.26	2.28	2.32	2.23	2.22	2.25	2.19
28	647835.93	276509.92	3500	1.42	1.19	1.43	1.42	1.43	1.43	1.40	1.45	1.47	1.21	1.45	1.47	1.95	1.75	1.95	1.95	1.95	1.95	1.92	2.26	2.28	2.26	2.28	2.32	2.23	2.22	2.26	2.19
29	647815.75	276325.09	3700	1.42	1.18	1.43	1.43	1.43	1.43	1.40	1.45	1.47	1.21	1.45	1.47	1.95	1.75	1.95	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.28	2.32	2.23	2.22	2.26	2.19
30	647691.77	276237.23	3900	1.42	1.19	1.43	1.43	1.44	1.43	1.40	1.45	1.47	1.21	1.45	1.47	1.95	1.75	1.95	1.95	1.95	1.96	1.92	2.26	2.28	2.26	2.28	2.32	2.23	2.22	2.26	2.19
31	647533.18	276339.81	4100	1.43	1.19	1.43	1.43	1.44	1.43	1.40	1.45	1.47	1.22	1.45	1.48	1.95	1.75	1.95	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.28	2.32	2.23	2.22	2.26	2.19
32	647405.54	276188.85	4300	1.43	1.19	1.43	1.43	1.44	1.44	1.41	1.45	1.48	1.22	1.45	1.48	1.95	1.76	1.95	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.28	2.32	2.23	2.22	2.26	2.19
33	647273.25	276042.40	4500	1.43	1.19	1.44	1.43	1.44	1.44	1.41	1.45	1.48	1.22	1.46	1.48	1.95	1.76	1.95	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.28	2.32	2.23	2.22	2.26	2.19
34	647389.48	275894.80	4700	1.43	1.19	1.44	1.43	1.44	1.44	1.41	1.46	1.48	1.22	1.46	1.48	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.29	2.26	2.28	2.32	2.23	2.22	2.26	2.19
35	647269.88	275748.12	4900	1.43	1.19	1.44	1.43	1.44	1.44	1.41	1.46	1.48	1.22	1.46	1.48	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.29	2.26	2.28	2.32	2.23	2.22	2.26	2.19
36	647116.00	275622.93	5100	1.43	1.19	1.44	1.44	1.45	1.44	1.41	1.46	1.48	1.22	1.46	1.48	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.29	2.26	2.28	2.32	2.23	2.22	2.26	2.19
37	646955.90	275505.88	5300	1.43	1.19	1.44	1.44	1.45	1.44	1.41	1.46	1.48	1.22	1.46	1.48	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.29	2.26	2.28	2.32	2.23	2.22	2.26	2.19
38	646789.98	275397.29	5500	1.43	1.19	1.44	1.44	1.45	1.44	1.41	1.46	1.48	1.22	1.46	1.49	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.29	2.26	2.28	2.32	2.23	2.22	2.26	2.19
39	646607.44	275321.70	5700	1.44	1.19	1.44	1.44	1.45	1.44	1.41	1.46	1.48	1.22	1.46	1.49	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.29	2.26	2.28	2.32	2.23	2.22	2.26	2.19
40	646410.38	275301.47	5900	1.44	1.19	1.44	1.44	1.45	1.44	1.41	1.46	1.49	1.22	1.46	1.49	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.29	2.26	2.28	2.32	2.23	2.22	2.26	2.19
41	646217.14	275259.18	6100	1.44	1.19	1.44	1.44	1.45	1.44	1.41	1.46	1.49	1.22	1.46	1.49	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.29	2.26	2.28	2.32	2.23	2.22	2.26	2.19
42	646023.43	275217.29	6300	1.44	1.19	1.44	1.44	1.45	1.44	1.42	1.46	1.49	1.22	1.46	1.49	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.28	2.32	2.23	2.22	2.26	2.19
43	645875.76	275327.15	6500	1.44	1.19	1.44	1.44	1.45	1.45	1.42	1.46	1.49	1.22	1.47	1.49	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.27	2.32	2.23	2.22	2.26	2.19
44	645817.54	275517.49	6700	1.44	1.19	1.44	1.44	1.45	1.45	1.42	1.47	1.49	1.22	1.47	1.49	1.95	1.76	1.96	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.27	2.32	2.23	2.22	2.26	2.19
45	645680.50	275658.83	6900	1.44	1.19	1.44	1.44	1.45	1.45	1.42	1.47	1.49	1.22	1.47	1.49	1.95	1.76	1.95	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.27	2.31	2.23	2.22	2.26	2.19
46	645506.83	275722.56	7100	1.44	1.19	1.44	1.44	1.45	1.45	1.42	1.47	1.49	1.22	1.47	1.49	1.95	1.76	1.95	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.27	2.31	2.23	2.22	2.26	2.19
47	645346.05	275826.63	7300	1.44	1.19	1.44	1.44	1.45	1.45	1.42	1.47	1.49	1.22	1.47	1.49	1.95	1.76	1.95	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.27	2.31	2.23	2.22	2.26	2.19
48	645195.32	275811.26	7500	1.44	1.19	1.44	1.44	1.45	1.45	1.42	1.47	1.49	1.22	1.47	1.49	1.95	1.76	1.95	1.95	1.96	1.96	1.92	2.26	2.28	2.26	2.27	2.31	2.23	2.22	2.26	2.18
49	645149.01	275630.20	7700	1.44	1.19	1.44	1.44	1.45	1.45	1.42	1.47	1.49	1.22	1.47	1.49	1.92	1.75	1.93	1.93	1.93	1.93	1.90	2.19	2.21	2.19	2.19	2.23	2.16	2.16	2.19	2.12
50	645014.31	275597.45	7840	1.44	1.19	1.45	1.44	1.45	1.45	1.42	1.47	1.49	1.22	1.47	1.50	1.82	1.73	1.83	1.83	1.83	1.83	1.82	1.85	1.85	1.84	1.85	1.85	1.84	1.84	1.79	1.78

Point number	Chainage	2013 event																										2013 event in 2070, RCP8.5, 95%									
		Baseline	Baseline – dunes defended	Do Nothing	Do Nothing – dunes defended	Raise banks	Raise banks – dunes defended	SMP - N banks only	Short S Pier	Solid S Pier	Sluice gate at 2.3mOD	Sluice gate at 2.5mOD	Sluice gate at 2.7mOD	Raise all banks, 500m Spillway at 2.55mOD	Raise all banks, 500m Spillway at 2.55mOD, dunes undefended	Raise all banks, 500m Spillway at 2.35mOD	Raise all banks, 500m Spillway at 2.0mOD	Raise d/s banks, 500m Spillway at 2.0mOD	Raise d/s banks, 500m Spillway at 2.0mOD, culverts	Raise d/s banks, 250m Spillway at 2.0mOD	Raise d/s banks, 250m Spillway at 2.0mOD, dunes	Present day + narrow channel	Raise banks + Narrow channel – no culverts	Raise banks + Narrow channel – culverts	SMP – N banks only + narrow channel	Baseline	Baseline	Do Nothing	Raise banks	Raise banks	Baseline	Do Nothing	Raise banks	SMP – N banks only	Short S Pier	Raise banks + Narrow channel	Baseline	Raise banks	Passive Spillway at 2.35mOD	500m Passive Spillway at 2.00mOD, dunes undefended
		E0U	E0	E1U	E1	E2U	E2	E3	H0	F0	S1a	S1b	S1c	S2	S3U	S4	S8	S9	S11	S10	S13U	G0	G2a	G2b	G3	E0 Marsh +300	E0 Marsh +600	E1 Marsh +300	E2 Marsh +300	E2 Marsh +600	E0	E1	E2	E3	H0	G2	E0 Marsh +300	E2 Marsh +300	S5	S12U
1	0	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.11	3.10	3.10	3.10	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57	3.57
2	100	3.10	3.10	3.09	3.09	3.10	3.10	3.10	3.10	3.09	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.09	3.10	3.10	3.09	3.10	3.10	3.56	3.56	3.57	3.56	3.57	3.57	3.56	3.57	3.57	3.56
3	200	3.08	3.07	3.04	3.04	3.09	3.08	3.07	3.08	2.68	3.07	3.07	3.08	3.08	3.09	3.08	3.07	3.07	3.07	3.07	3.08	3.09	3.09	3.09	3.08	3.08	3.08	3.04	3.08	3.08	3.53	3.52	3.54	3.52	3.54	3.55	3.53	3.54	3.54	3.53
4	300	2.98	2.91	2.78	2.68	3.03	2.96	2.91	2.92	2.61	2.93	2.93	2.97	2.96	3.03	2.95	2.92	2.91	2.91	2.92	3.00	3.02	3.00	3.00	2.98	2.98	2.98	2.69	2.97	2.99	3.40	3.20	3.43	3.31	3.33	3.48	3.40	3.43	3.38	3.39
5	400	2.77	2.60	2.35	2.14	2.92	2.74	2.61	2.61	2.62	2.66	2.67	2.75	2.74	2.92	2.71	2.61	2.61	2.61	2.62	2.81	2.86	2.83	2.83	2.79	2.77	2.77	2.19	2.77	2.80	3.02	2.59	3.13	2.86	2.76	3.26	3.03	3.15	2.95	3.02
6	500	2.78	2.63	2.36	2.15	2.92	2.76	2.63	2.64	2.60	2.68	2.69	2.76	2.76	2.92	2.72	2.63	2.64	2.64	2.65	2.82	2.64	2.55	2.56	2.43	2.78	2.79	2.19	2.79	2.82	3.05	2.60	3.15	2.88	2.80	2.91	3.06	3.17	3.00	3.05
7	600	2.78	2.65	2.35	2.16	2.92	2.78	2.65	2.66	2.62	2.70	2.70	2.78	2.77	2.92	2.74	2.65	2.65	2.65	2.66	2.82	2.66	2.58	2.60	2.50	2.78	2.79	2.20	2.80	2.83	3.06	2.61	3.17	2.89	2.83	2.93	3.07	3.20	3.02	3.05
8	700	2.73	2.63	2.25	2.14	2.89	2.77	2.63	2.64	2.60	2.69	2.69	2.78	2.77	2.90	2.73	2.63	2.63	2.63	2.64	2.78	2.63	2.62	2.63	2.53	2.73	2.74	2.20	2.80	2.83	2.97	2.62	3.19	2.91	2.82	2.99	2.98	3.21	3.02	2.97
9	800	2.71	2.66	2.25	2.15	2.87	2.79	2.65	2.66	2.61	2.71	2.71	2.79	2.78	2.88	2.75	2.64	2.65	2.65	2.66	2.75	2.64	2.65	2.66	2.57	2.72	2.72	2.20	2.82	2.84	2.95	2.62	3.22	2.93	2.86	3.04	2.95	3.24	3.05	2.94
10	900	2.68	2.63	2.25	2.15	2.86	2.78	2.63	2.64	2.59	2.68	2.69	2.78	2.77	2.86	2.73	2.62	2.62	2.62	2.64	2.72	2.61	2.64	2.65	2.55	2.69	2.69	2.20	2.80	2.83	2.93	2.62	3.20	2.93	2.84	3.03	2.93	3.23	3.03	2.92
11	1000	2.65	2.60	2.25	2.15	2.84	2.76	2.60	2.61	2.57	2.66	2.67	2.76	2.75	2.85	2.71	2.59	2.59	2.59	2.61	2.69	2.59	2.63	2.64	2.53	2.65	2.66	2.20	2.79	2.82	2.91	2.62	3.19	2.93	2.83	3.02	2.92	3.22	2.99	2.91
12	1100	2.60	2.56	2.25	2.15	2.81	2.74	2.56	2.57	2.53	2.63	2.64	2.74	2.73	2.82	2.68	2.55	2.55	2.55	2.57	2.65	2.55	2.61	2.62	2.50	2.61	2.61	2.20	2.77	2.80	2.89	2.62	3.17	2.92	2.81	3.00	2.89	3.19	2.95	2.89
13	1200	2.56	2.53	2.25	2.15	2.79	2.72	2.53	2.54	2.51	2.61	2.61	2.72	2.71	2.80	2.65	2.54	2.51	2.51	2.54	2.61	2.52	2.59	2.60	2.48	2.57	2.57	2.20	2.75	2.78	2.87	2.62	3.15	2.92	2.80	2.99	2.88	3.17	2.91	2.87
14	1300	2.53	2.50	2.25	2.15	2.77	2.71	2.50	2.51	2.48	2.59	2.59	2.70	2.69	2.78	2.63	2.53	2.49	2.49	2.50	2.57	2.49	2.58	2.59	2.46	2.53	2.55	2.20	2.74	2.77	2.85	2.62	3.14	2.92	2.78	2.98	2.86	3.16	2.86	2.84
15	1400	2.51	2.48	2.25	2.15	2.76	2.69	2.48	2.49	2.46	2.60	2.60	2.69	2.68	2.76	2.61	2.52	2.47	2.47	2.47	2.53	2.47	2.58	2.58	2.44	2.52	2.54	2.20	2.73	2.76	2.84	2.62	3.12	2.92	2.78	2.97	2.85	3.15	2.83	2.83
16	1500	2.49	2.47	2.25	2.15	2.74	2.68	2.47	2.47	2.45	2.60	2.60	2.67	2.67	2.75	2.59	2.51	2.46	2.45	2.46	2.52	2.46	2.57	2.58	2.43	2.50	2.52	2.20	2.72	2.75	2.82	2.62	3.11	2.92	2.77	2.96	2.83	3.14	2.81	2.82
17	1600	2.49	2.47	2.25	2.14	2.73	2.68	2.47	2.47	2.45	2.59	2.60	2.66	2.66	2.73	2.58	2.50	2.45	2.45	2.45	2.52	2.46	2.56	2.57	2.42	2.50	2.51	2.20	2.71	2.74	2.80	2.62	3.10	2.92	2.75	2.96	2.80	3.13	2.80	2.79
18	1700	2.50	2.48	2.25	2.14	2.74	2.68	2.47	2.48	2.46	2.60	2.60	2.67	2.67	2.74	2.59	2.51	2.46	2.46	2.46	2.52	2.47	2.57	2.58	2.43	2.50	2.52	2.20	2.72	2.75	2.81	2.62	3.11	2.92	2.76	2.96	2.82	3.13	2.81	2.79
19	1800	2.49	2.47	2.25	2.14	2.74	2.68	2.47	2.47	2.46	2.60	2.60	2.66	2.66	2.74	2.58	2.51	2.46	2.45	2.46	2.52	2.46	2.57	2.58	2.43	2.50	2.52	2.19	2.72	2.75	2.81	2.62	3.11	2.92	2.76	2.96	2.82	3.13	2.80	2.80
20	1900	2.47	2.46	2.25	2.14	2.73	2.68	2.45	2.46	2.44	2.59	2.59	2.65	2.66	2.73	2.57	2.50	2.45	2.45	2.45	2.52	2.45	2.56	2.57	2.42	2.48	2.51	2.19	2.71	2.74	2.78	2.62	3.10	2.92	2.74	2.96	2.79	3.13	2.79	2.77
21	2100	2.43	2.42	2.25	2.14	2.70	2.66	2.42	2.42	2.41	2.58	2.58	2.62	2.64	2.70	2.54	2.48	2.44	2.44	2.43	2.51	2.41	2.55	2.56	2.39	2.47	2.51	2.19	2.69	2.72	2.75	2.62	3.07	2.91	2.72	2.94	2.76	3.10	2.78	2.75
22	2300	2.44	2.43	2.25	2.14	2.71	2.66	2.43	2.43	2.42	2.58	2.58	2.62	2.64	2.71	2.55	2.49	2.45	2.44	2.44	2.51	2.42	2.55	2.56	2.40	2.47	2.51	2.19	2.69	2.73	2.74	2.62	3.08	2.91	2.71	2.94	2.75	3.10	2.78	2.74
23	2500	2.43	2.42	2.25	2.14	2.70	2.65	2.42	2.42	2.41	2.58	2.58	2.60	2.63	2.70	2.55	2.48	2.45	2.45	2.44	2.51	2.42	2.55	2.55	2.39	2.47	2.51	2.19	2.69	2.72	2.73	2.62	3.06	2.92	2.71	2.93	2.74	3.09	2.78	2.71
24	2700	2.43	2.42	2.25	2.14	2.69	2.65	2.42	2.42	2.41	2.57	2.57	2.60	2.63	2.70	2.55	2.46	2.45	2.45	2.44	2.50	2.41	2.54	2.55	2.39	2.48	2.52	2.19	2.68	2.71	2.74	2.62	3.05	2.92	2.71	2.93	2.75	3.08	2.78	2.68
25	2900	2.43	2.37	2.25	2.14	2.66	2.63	2.37	2.38	2.37	2.55	2.55	2.58	2.61	2.67	2.53	2.43	2.44	2.44	2.43	2.48	2.37	2.52	2.53	2.35	2.47	2.51	2.19	2.65	2.68	2.73	2.62	2.99	2.92	2.70	2.90	2.73	3.02	2.76	2.62
26	3100	2.43	2.36	2.25	2.14	2.66	2.62	2.36	2.36	2.36	2.55	2.55	2.57	2.60	2.67	2.53	2.43	2.44	2.44	2.43	2.47	2.36	2.52	2.53	2.34	2.47	2.51	2.19	2.65	2.68	2.72	2.62	2.98	2.92	2.70	2.90	2.73	3.01	2.75	2.60
27	3300	2.43	2.35	2.25	2.14	2.66	2.63	2.36	2.36	2.35	2.55	2.55	2.57	2.60	2.67	2.53	2.43	2.44	2.44	2.42	2.46	2.35	2.52	2.53	2.33	2.47	2.51	2.19	2.65	2.68	2.72	2.62	2.97	2.92	2.69	2.89	2.72	3.00	2.74	2.59
28	3500	2.43	2.35	2.25	2.14	2.67	2.63	2.36	2.36	2.35	2.55	2.55	2.57	2.61	2.67	2.53	2.43	2.45	2.44	2.43	2.46	2.35	2.52	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.72	2.62	2.98	2.92	2.69	2.90	2.72	3.00	2.73	2.59
29	3700	2.43	2.35	2.25	2.14	2.67	2.63	2.36	2.37	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.45	2.43	2.47	2.35	2.53	2.53	2.34	2.47	2.51	2.19	2.66	2.69	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.01	2.74	2.60
30	3900	2.42	2.35	2.25	2.14	2.67	2.63	2.36	2.37	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.44	2.43	2.47	2.35	2.53	2.53	2.34	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.01	2.74	2.60
31	4100	2.42	2.35	2.25	2.14	2.67	2.63	2.36	2.37	2.35	2.56	2.55	2.58	2.61	2.68	2.53	2.43	2.45	2.44	2.43	2.46	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.01	2.74	2.60
32	4300	2.43	2.35	2.25	2.14	2.67	2.63	2.36	2.37	2.35	2.56	2.55	2.58	2.61	2.68	2.53	2.43	2.45	2.44	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.00	2.74	2.60
33	4500	2.43	2.35	2.25	2.14	2.67	2.63	2.36	2.36	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.45	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.00	2.74	2.60
34	4700	2.43	2.35	2.25	2.14	2.67	2.64	2.36	2.36	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.44	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.01	2.74	2.60
35	4900	2.43	2.35	2.25	2.14	2.67	2.64	2.36	2.36	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.45	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.00	2.74	2.60
36	5100	2.43	2.35	2.25	2.14	2.67	2.64	2.36	2.36	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.45	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.00	2.74	2.60
37	5300	2.43	2.35	2.25	2.14	2.67	2.64	2.36	2.36	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.45	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.00	2.74	2.60
38	5500	2.42	2.35	2.25	2.14	2.67	2.64	2.36	2.36	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.45	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.99	2.92	2.69	2.90	2.72	3.00	2.74	2.60
39	5700	2.42	2.35	2.26	2.14	2.67	2.64	2.36	2.36	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.45	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.98	2.92	2.69	2.90	2.72	3.00	2.74	2.60
40	5900	2.42	2.35	2.26	2.14	2.67	2.64	2.36	2.36	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.45	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.98	2.92	2.69	2.90	2.72	3.00	2.74	2.60
41	6100	2.42	2.35	2.25	2.14	2.67	2.64	2.36	2.36	2.35	2.56	2.56	2.58	2.61	2.68	2.53	2.43	2.45	2.45	2.43	2.47	2.35	2.53	2.53	2.33	2.47	2.51	2.19	2.66	2.68	2.71	2.62	2.98	2.92	2.69	2.90	2.71	3.00	2.74	2.59
42	6300	2.42	2.35	2.25	2.14	2.67	2.63	2.36	2.36	2.34	2.55	2.55	2.58	2.61	2.68	2.53	2.43	2.45	2.44	2.43	2.47	2.35	2.53	2.53	2.33	2.46	2.50	2.18	2.66	2.68	2.71	2.62	2.98	2.92	2.69	2.90	2.71	2.99	2.74	2.59
43	6500	2.42	2.35	2.25	2.14	2.67	2.63	2.36	2.36	2.34	2.55	2.55	2.58	2.61	2.68	2.53	2.43	2.45	2.44	2.43	2.47	2.35	2.52	2.53	2.33	2.46	2.50	2.18	2.66	2.67	2.71	2.62	2.98	2.91	2.69	2.90	2.71	2.99	2.74	2.59
44	6700	2.42	2.36	2.25	2.14	2.67	2.63	2.36	2.37	2.34	2.55	2.55	2.58	2.61	2.68	2.53	2.43	2.45	2.44	2.43	2.47	2.34	2.52	2.53	2.33	2.46	2.50	2.18	2.65	2.67	2.71	2.62	2.98	2.91	2.69	2.90	2.71	2.99	2.73	2.59
45	6900	2.42	2.36	2.25	2.14	2.67	2.63	2.36	2.37	2.34	2.55	2.55	2.57	2.61	2.68	2.53	2.43	2.44	2.44	2.43	2.47	2.34	2.52	2.53	2.33	2.46	2.50	2.18	2.65	2.67	2.71	2.61	2.97	2.91	2.68	2.89	2.71	2.98	2.73	2.59
46	7100	2.42	2.36	2.25	2.14	2.67	2.63	2.37	2.37	2.34	2.55	2.55	2.57	2.61	2.68	2.53	2.43	2.44	2.44	2.43	2.47	2.34	2.52	2.53	2.33	2.46	2.50	2.18	2.65	2.67	2.71	2.61	2.97	2.91	2.68	2.89	2.71	2.98	2.73	2.59
47	7300	2.42	2.36	2.25	2.14	2.67	2.63	2.37	2.37	2.34	2.55	2.55	2.57	2.61	2.68	2.53	2.43	2.44	2.44	2.43	2.46	2.34	2.52	2.53	2.33	2.46	2.50	2.18	2.65	2.67	2.71	2.61	2.97	2.91	2.68	2.89	2.71	2.98	2.73	2.59
48	7500	2.42	2.36	2.25	2.13	2.67	2.63	2.37	2.37	2.34	2.55	2.55	2.57	2.60	2.67	2.53	2.43	2.44	2.44	2.43	2.46	2.34	2.52	2.53	2.32	2.46	2.49	2.18	2.65	2.66	2.70	2.61	2.97	2.91	2.68	2.89	2.71	2.98	2.73	2.59
49	7700	2.34	2.28	2.18	2.08	2.58	2.55	2.29	2.29	2.27	2.47	2.47	2.49	2.52	2.59	2.44	2.35	2.37	2.37	2.35	2.39	2.27	2.44	2.45	2.25	2.37	2.39	2.11	2.55	2.54	2.62	2.53	2.88	2.82	2.60	2.80	2.61	2.87	2.64	2.51
50	7840	2.02	2.00	1.84	1.83	2.05	2.04	1.99	2.01	1.94	2.03	2.03	2.03	2.04	2.05	2.02	2.00	2.01	2.00	2.01	2.02	1.99	2.00	2.00	1.96	2.05	2.07	1.83	2.07	2.10	2.42	2.24	2.59	2.48	2.42	2.47	2.46	2.62	2.47	2.40

Appendix C

Tidal Modelling Results – Tidal Flows

Royal HaskoningDHV

- BLANK PAGE -

Table C1 – Maximum tidal flow rate at each cross section, m/s

Point number	Coordinates		Chainage	2020												2020 conditions in 2070, RCP2.6, 50%							2.7m Sea Level (2013 event -0.4m)								
				Baseline	Do Nothing	Raise banks	SMP - N banks only	Short S Pier	Solid S Pier	Present day + narrow channel	Baseline	Baseline	Do Nothing	Raise banks	Raise banks	Baseline	Do Nothing	Raise banks	SMP - N banks only	Short S Pier	Solid S Pier	Present day + narrow channel	Baseline	Raise banks	SMP - N banks only	Baseline	Raise banks	Raise banks, 500m spillway at 2.20m	Raise banks, 500m spillway at 2.00m	Present day + narrow channel	Raise banks + Narrow channe
	x	y		E0	E1	E2	E3	H0	F0	G0	E0 Marsh +300	E0 Marsh +600	E1 Marsh +300	E2 Marsh +300	E2 Marsh +600	E0	E1	E2	E3	H0	F0	G0	E0	E2	E3	E0 Marsh +300	E2 Marsh +300	S6	S7	G0	G2
1	650589.35	274654.97	0	1.37	1.38	1.38	1.38	1.39	1.38	1.38	1.38	1.38	1.38	1.38	1.39	1.41	1.40	1.42	1.42	1.42	1.40	1.27	1.27	1.27	1.27	1.27	1.27	1.27	1.39	1.27
2	650514.59	274722.30	100	1.43	1.50	1.44	1.46	1.51	1.46	1.45	1.42	1.42	1.50	1.43	1.44	1.45	1.53	1.47	1.49	1.54	1.51	1.33	1.33	1.33	1.36	1.33	1.33	1.36	1.36	1.44	1.34
3	650429.40	274774.28	200	1.39	1.80	1.40	1.40	1.32	1.33	1.38	1.19	0.95	1.76	1.21	0.97	1.51	2.47	1.53	1.50	1.35	1.45	1.43	1.95	1.85	1.81	1.88	1.78	1.84	1.82	1.93	1.81
4	650343.21	274825.04	300	1.42	1.72	1.43	1.34	1.41	1.41	1.42	1.23	0.94	1.70	1.24	0.95	1.53	2.30	1.54	1.45	1.53	1.49	1.48	1.93	1.84	1.70	1.87	1.77	1.70	1.69	1.96	1.83
5	650262.46	274884.60	400	1.39	1.90	1.41	1.39	1.50	1.47	1.07	1.18	0.92	1.79	1.20	0.94	1.46	2.31	1.49	1.47	1.58	1.47	1.05	1.79	1.76	1.72	1.74	1.69	1.74	1.74	1.54	1.47
6	650179.89	274941.34	500	1.42	1.85	1.41	1.45	1.46	1.45	1.39	1.20	0.92	1.74	1.18	0.91	1.49	2.25	1.48	1.51	1.54	1.47	1.36	1.81	1.75	1.75	1.76	1.68	1.77	1.76	1.78	1.73
7	650094.48	274993.96	600	1.38	1.72	1.36	1.38	1.39	1.39	1.32	1.13	0.80	1.62	1.10	0.77	1.40	1.91	1.36	1.38	1.42	1.33	1.26	1.60	1.58	1.59	1.56	1.51	1.60	1.60	1.76	1.59
8	650001.26	275031.31	700	1.23	1.52	1.16	1.21	1.26	1.23	1.19	1.06	0.79	1.49	1.00	0.77	1.30	1.82	1.23	1.28	1.34	1.26	1.20	1.44	1.43	1.46	1.39	1.37	1.47	1.46	1.47	1.44
9	649918.05	275085.46	800	1.07	1.32	1.07	1.07	1.09	1.08	1.05	0.95	0.78	1.30	0.95	0.79	1.21	1.74	1.20	1.20	1.22	1.17	1.12	1.34	1.37	1.36	1.31	1.33	1.39	1.38	1.30	1.29
10	649846.47	275156.49	900	1.03	1.27	1.02	1.02	1.04	1.01	1.01	0.91	0.74	1.24	0.90	0.74	1.14	1.63	1.14	1.13	1.15	1.12	1.05	1.28	1.30	1.29	1.24	1.25	1.31	1.30	1.24	1.24
11	649779.40	275230.59	1000	1.00	1.31	0.99	1.00	1.02	1.00	0.98	0.91	0.74	1.26	0.88	0.74	1.15	1.66	1.14	1.14	1.16	1.11	1.06	1.31	1.32	1.32	1.24	1.25	1.34	1.34	1.28	1.28
12	649716.29	275308.45	1100	1.03	1.30	1.01	1.02	1.04	1.05	1.00	0.90	0.74	1.25	0.87	0.72	1.13	1.57	1.09	1.14	1.15	1.11	1.04	1.39	1.43	1.41	1.29	1.32	1.42	1.42	1.36	1.38
13	649650.36	275383.94	1200	0.96	1.28	0.96	0.96	0.98	0.98	0.94	0.83	0.71	1.22	0.83	0.71	1.05	1.51	1.05	1.05	1.07	1.04	0.99	1.39	1.41	1.40	1.28	1.30	1.42	1.42	1.36	1.37
14	649581.39	275456.68	1300	1.09	1.35	1.09	1.09	1.11	1.11	1.06	0.93	0.75	1.30	0.93	0.76	1.15	1.66	1.16	1.15	1.18	1.13	1.07	1.43	1.44	1.45	1.32	1.33	1.47	1.47	1.40	1.39
15	649511.58	275528.58	1400	1.18	1.44	1.19	1.18	1.21	1.20	1.15	1.05	0.86	1.42	1.03	0.87	1.31	1.82	1.32	1.31	1.33	1.28	1.20	1.51	1.53	1.53	1.40	1.44	1.55	1.56	1.48	1.48
16	649441.52	275600.24	1500	1.14	1.44	1.14	1.14	1.16	1.15	1.12	0.99	0.80	1.37	0.98	0.80	1.22	1.75	1.22	1.21	1.24	1.19	1.13	1.55	1.58	1.58	1.42	1.44	1.60	1.61	1.52	1.52
17	649384.13	275682.37	1600	1.05	1.28	1.06	1.06	1.06	1.06	1.03	0.91	0.74	1.24	0.91	0.75	1.10	1.76	1.11	1.11	1.12	1.08	1.02	1.39	1.41	1.41	1.28	1.30	1.43	1.44	1.35	1.36
18	649351.39	275777.07	1700	0.77	1.03	0.78	0.78	0.79	0.78	0.75	0.67	0.56	0.99	0.68	0.57	0.85	1.50	0.86	0.85	0.86	0.85	0.80	1.23	1.25	1.25	1.14	1.15	1.27	1.29	1.19	1.20
19	649310.60	275869.80	1800	0.75	0.92	0.76	0.75	0.76	0.76	0.72	0.65	0.53	0.88	0.65	0.53	0.80	1.17	0.80	0.80	0.81	0.78	0.73	1.13	1.15	1.12	1.04	1.06	1.14	1.16	1.06	1.04
20	649220.73	275904.08	1900	0.86	1.07	0.86	0.87	0.88	0.87	0.84	0.75	0.61	1.03	0.75	0.61	0.93	1.28	0.93	0.93	0.95	0.91	0.86	1.14	1.14	1.15	1.05	1.07	1.16	1.19	1.10	1.09
21	649022.63	275912.96	2100	0.80	1.05	0.80	0.80	0.82	0.81	0.78	0.70	0.58	1.00	0.70	0.58	0.87	1.18	0.87	0.87	0.89	0.85	0.81	1.19	1.20	1.21	1.10	1.10	1.23	1.25	1.15	1.14
22	648826.39	275937.35	2300	0.82	1.06	0.82	0.82	0.84	0.84	0.80	0.71	0.59	1.00	0.71	0.60	0.89	1.21	0.89	0.89	0.90	0.87	0.83	1.13	1.14	1.14	1.04	1.05	1.16	1.16	1.10	1.10
23	648647.76	276021.18	2500	0.90	1.20	0.90	0.90	0.92	0.91	0.88	0.78	0.64	1.13	0.77	0.64	0.97	1.22	0.97	0.96	0.98	0.95	0.90	1.23	1.25	1.25	1.12	1.13	1.26	1.26	1.20	1.20
24	648517.55	276170.37	2700	0.83	1.13	0.84	0.83	0.85	0.84	0.81	0.70	0.57	1.08	0.71	0.57	0.87	1.15	0.88	0.87	0.89	0.87	0.82	1.25	1.27	1.27	1.15	1.17	1.28	1.28	1.21	1.22
25	648393.18	276324.90	2900	0.95	1.05	0.95	0.95	0.97	0.96	0.93	0.82	0.70	0.94	0.82	0.70	1.05	0.97	1.05	1.04	1.07	1.03	0.97	1.48	1.51	1.50	1.34	1.38	1.52	1.52	1.42	1.43

Point number	Chainage	2013 event																										2013 event in 2070, RCP8.5, 95%									
		Baseline	Baseline – dunes defended	Do Nothing	Do Nothing – dunes defended	Raise banks	Raise banks – dunes defended	SMP - N banks only	Short S Pier	Solid S Pier	Sluice gate at 2.3mOD	Sluice gate at 2.5mOD	Sluice gate at 2.7mOD	Raise all banks, 500m Spillway at 2.55mOD	Raise all banks, 500m Spillway at 2.55mOD, dunes undefended	Raise all banks, 500m Spillway at 2.35mOD	Raise all banks, 500m Spillway at 2.0mOD	Raise d/s banks, 500m Spillway at 2.0mOD	Raise d/s banks, 500m Spillway at 2.0mOD, culverts open	Raise d/s banks, 250m Spillway at 2.0mOD	Raise d/s banks, 250m Spillway at 2.0mOD, dunes undefended	Present day + narrow channel	Raise banks + Narrow channel – no culverts	Raise banks + Narrow channel – culverts	SMP – N banks only + narrow channel	Baseline	Baseline	Do Nothing	Raise banks	Raise banks	Baseline	Do Nothing	Raise banks	SMP – N banks only	Short S Pier	Raise banks + Narrow channel	Baseline	Raise banks	Passive Spillway at 2.35mOD	500m Passive Spillway at 2.00mOD, dunes undefended
		E0U	E0	E1U	E1	E2U	E2	E3	H0	F0	S1a	S1b	S1c	S2	S3U	S4	S8	S9	S11	S10	S13U	G0	G2a	G2b	G3	E0 Marsh +300	E0 Marsh +600	E1 Marsh +300	E2 Marsh +300	E2 Marsh +600	E0	E1	E2	E3	H0	G2	E0 Marsh +300	E2 Marsh +300	S5	S12U
1	0	1.29	1.29	1.41	1.30	1.28	1.28	1.29	1.29	1.41	1.30	1.30	1.30	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.29	1.41	1.29	1.29	1.29	1.29	1.28	1.30	1.29	1.29	1.32	1.33	1.31	1.31	1.33	1.31	1.32	1.31	1.33	1.32
2	100	1.36	1.40	1.68	1.52	1.35	1.35	1.38	1.40	1.48	1.38	1.39	1.39	1.38	1.38	1.38	1.38	1.39	1.39	1.39	1.36	1.45	1.35	1.35	1.39	1.35	1.34	1.52	1.35	1.35	1.43	1.68	1.41	1.40	1.44	1.37	1.43	1.40	1.41	1.43
3	200	2.10	2.03	3.12	2.86	2.02	2.02	1.97	1.65	2.47	2.11	2.11	2.11	1.99	2.08	1.98	1.98	2.04	2.04	2.04	2.10	2.05	1.93	1.94	1.88	2.05	1.98	2.88	1.96	1.89	2.29	3.15	2.24	2.21	1.81	2.07	2.27	2.21	2.16	2.27
4	300	2.00	1.90	2.74	2.48	1.95	1.95	1.82	1.87	2.25	1.93	1.94	1.94	1.84	1.94	1.83	1.83	1.90	1.90	1.90	2.01	2.01	1.92	1.91	1.82	1.97	1.91	2.49	1.90	1.83	2.13	2.66	2.09	1.99	1.96	2.02	2.11	2.06	1.94	2.11
5	400	1.99	2.31	2.93	3.23	2.08	2.08	2.24	2.32	2.09	2.20	2.20	2.05	2.06	1.91	2.06	2.24	2.32	2.32	2.30	1.98	1.66	1.62	1.64	1.69	1.96	1.92	3.18	2.00	1.92	2.62	3.89	2.47	3.12	3.26	1.89	2.62	2.41	2.66	2.70
6	500	1.94	2.14	2.88	3.13	1.96	1.96	2.18	2.16	2.01	2.12	2.13	1.98	2.00	1.95	2.00	2.18	2.15	2.15	2.13	1.95	1.90	1.99	1.97	2.01	1.90	1.85	3.08	1.88	1.81	2.41	3.66	2.30	3.04	3.04	2.29	2.41	2.24	2.54	2.50
7	600	1.74	1.94	2.83	2.97	1.77	1.77	1.97	1.96	1.68	1.92	1.92	1.76	1.79	1.65	1.79	1.97	1.95	1.95	1.92	1.71	1.95	1.98	1.90	2.10	1.70	1.67	2.90	1.69	1.61	2.23	3.34	2.06	2.73	2.72	2.33	2.23	1.99	2.28	2.32
8	700	1.68	1.75	2.97	2.89	1.56	1.56	1.76	1.76	1.54	1.75	1.73	1.57	1.58	1.58	1.58	1.80	1.79	1.79	1.75	1.67	1.68	1.61	1.59	1.70	1.67	1.67	2.80	1.47	1.39	2.28	3.21	1.73	2.44	2.43	1.82	2.28	1.66	2.01	2.38
9	800	1.56	1.48	2.60	2.48	1.49	1.49	1.47	1.48	1.47	1.53	1.53	1.53	1.48	1.45	1.47	1.48	1.50	1.50	1.48	1.55	1.42	1.35	1.37	1.36	1.55	1.55	2.39	1.46	1.42	2.10	2.70	1.53	1.86	1.89	1.37	2.09	1.52	1.54	2.20
10	900	1.59	1.44	2.41	2.38	1.38	1.38	1.42	1.45	1.40	1.46	1.47	1.43	1.39	1.37	1.38	1.49	1.52	1.51	1.47	1.59	1.43	1.27	1.27	1.26	1.58	1.58	2.28	1.35	1.31	2.07	2.43	1.45	1.86	1.89	1.30	2.07	1.43	1.58	2.19
11	1000	1.71	1.54	2.43	2.38	1.39	1.39	1.53	1.55	1.45	1.55	1.56	1.45	1.40	1.45	1.40	1.61	1.62	1.62	1.57	1.71	1.56	1.31	1.30	1.33	1.70	1.69	2.28	1.35	1.31	2.20	2.34	1.45	1.96	2.00	1.37	2.19	1.43	1.7	2.28
12	1100	1.84	1.66	2.19	2.14	1.51	1.51	1.65	1.67	1.56	1.67	1.69	1.49	1.49	1.56	1.49	1.73	1.75	1.75	1.69	1.84	1.69	1.42	1.42	1.44	1.83	1.82	2.05	1.41	1.32	2.35	2.12	1.59	2.10	2.14	1.49	2.32	1.52	1.85	2.43
13	1200	1.81	1.63	1.98	1.92	1.48	1.48	1.63	1.65	1.54	1.66	1.68	1.48	1.48	1.55	1.48	1.74	1.75	1.75	1.69	1.84	1.67	1.40	1.41	1.43	1.79	1.78	1.83	1.39	1.31	2.31	1.87	1.57	2.07	2.11	1.47	2.28	1.50	1.85	2.41
14	1300	1.82	1.65	1.96	1.92	1.52	1.52	1.66	1.66	1.57	1.71	1.73	1.58	1.54	1.60	1.53	1.81	1.82	1.82	1.74	1.90	1.71	1.43	1.43	1.47	1.80	1.79	1.82	1.44	1.38	2.28	1.84	1.59	2.03	2.07	1.49	2.22	1.54	1.91	2.39
15	1400	1.86	1.71	2.06	1.88	1.60	1.60	1.71	1.71	1.63	1.57	1.59	1.59	1.62	1.69	1.62	1.93	1.94	1.94	1.85	2.02	1.76	1.51	1.52	1.54	1.84	1.82	1.78	1.57	1.52	2.29	1.97	1.68	2.06	2.09	1.59	2.21	1.66	2.03	2.44
16	1500	1.87	1.72	2.12	1.97	1.65	1.65	1.72	1.73	1.66	1.62	1.65	1.65	1.66	1.73	1.66	2.01	2.02	2.01	1.92	2.10	1.78	1.56	1.56	1.57	1.84	1.81	1.86	1.54	1.43	2.25	2.09	1.73	2.06	2.08	1.64	2.22	1.65	2.11	2.46
17	1600	1.57	1.47	2.07	2.10	1.51	1.51	1.49	1.48	1.43	1.46	1.50	1.50	1.52	1.60	1.53	1.82	1.81	1.81	1.73	1.89	1.53	1.41	1.41	1.41	1.53	1.51	1.97	1.41	1.33	2.07	2.14	1.61	1.90	1.88	1.50	2.03	1.54	1.95	2.18
18	1700	1.40	1.32	2.03	1.97	1.34	1.34	1.33	1.32	1.28	1.29	1.35	1.35	1.36	1.43	1.37	1.63	1.63	1.63	1.56	1.71	1.37	1.25	1.26	1.26	1.35	1.35	1.85	1.26	1.17	1.98	2.04	1.45	1.88	1.87	1.34	2.00	1.38	1.77	1.89
19	1800	1.30	1.19	1.99	1.79	1.25	1.25	1.21	1.19	1.18	1.18	1.24	1.24	1.24	1.33	1.25	1.48	1.47	1.47	1.41	1.58	1.23	1.16	1.10	1.13	1.26	1.25	1.73	1.17	1.10	1.88	1.75	1.36	1.75	1.72	1.19	1.89	1.30	1.64	1.77
20	1900	1.30	1.20	2.05	1.85	1.21	1.21	1.22	1.21	1.19	1.17	1.21	1.21	1.23	1.27	1.23	1.50	1.48	1.48	1.41	1.56	1.26	1.14	1.13	1.15	1.25	1.23	1.78	1.15	1.08	1.76	1.84	1.26	1.65	1.65	1.17	1.79	1.22	1.57	1.74
21	2100	1.37	1.28	1.69	1.51	1.29	1.29	1.29	1.28	1.25	1.23	1.29	1.29	1.31	1.37	1.32	1.59	1.59	1.59	1.52	1.68	1.33	1.20	1.20	1.21	1.32	1.30	1.45	1.20	1.12	1.84	1.52	1.39	1.75	1.74	1.27	1.88	1.32	1.71	1.82
22	2300	1.21	1.18	1.39	1.32	1.21	1.21	1.19	1.17	1.16	1.17	1.21	1.21	1.22	1.28	1.22	1.24	1.23	1.23	1.24	1.33	1.20	1.14	1.14	1.14	1.13	1.06	1.22	1.13	1.05	1.53	1.43	1.29	1.37	1.38	1.19	1.56	1.22	1.33	1.49
23	2500	1.27	1.27	1.36	1.43	1.32	1.32	1.29	1.27	1.25	1.27	1.31	1.31	1.33	1.39	1.32	1.26	1.25	1.25	1.26	1.25	1.28	1.24	1.24	1.24	1.15	1.08	1.29	1.22	1.13	1.37	1.49	1.39	1.37	1.36	1.31	1.43	1.31	1.39	1.36
24	2700	1.31	1.31	1.24	1.29	1.37	1.37	1.33	1.31	1.28	1.30	1.36	1.36	1.38	1.45	1.38	1.29	1.27	1.27	1.28	1.28	1.32	1.28	1.28	1.27	1.19	1.06	1.15	1.28	1.19	1.33	1.33	1.48	1.35	1.34	1.36	1.24	1.41	1.39	1.38
25	2900	1.54	1.55	1.09	1.15	1.64	1.64	1.58	1.55	1.51	1.54	1.63	1.63	1.65	1.75	1.65	1.53	1.50	1.50	1.52	1.51	1.56	1.51	1.52	1.51	1.39	1.22	0.99	1.53	1.42	1.60	1.18	1.80	1.60	1.62	1.64	1.43	1.71	1.67	1.63

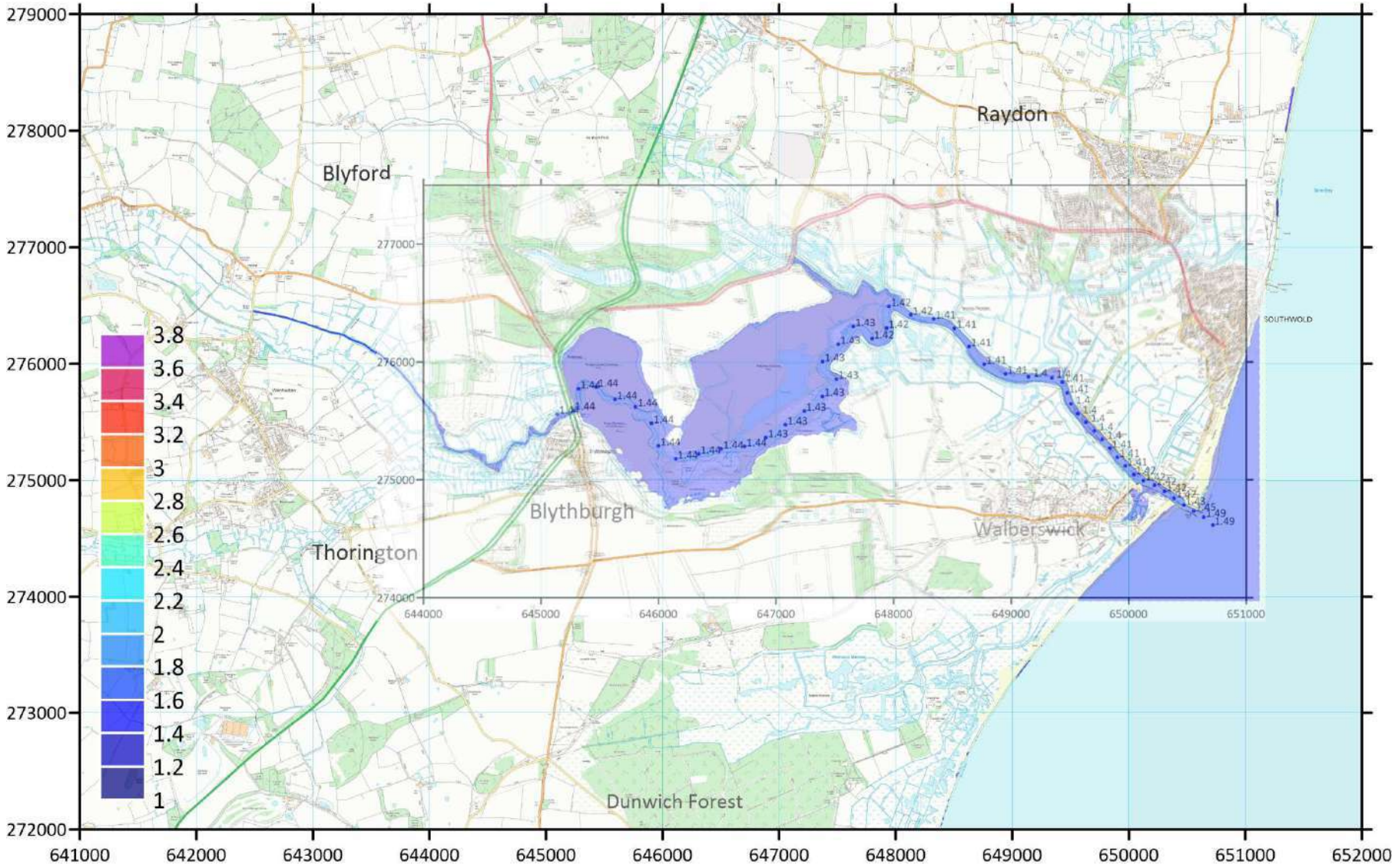
Table C2 – Maximum tidal flow rate at each cross section, knots

Point number	Coordinates		Chainage	2020												2020 conditions in 2070, RCP2.6, 50%							2.7m Sea Level (2013 event -0.4m)									
				Baseline	Do Nothing	Raise banks	SMP - N banks only	Short S Pier	Solid S Pier	Present day + narrow channel	Baseline	Baseline	Do Nothing	Raise banks	Raise banks	Baseline	Do Nothing	Raise banks	SMP - N banks only	Short S Pier	Solid S Pier	Present day + narrow channel	Baseline	Raise banks	SMP - N banks only	Baseline	Raise banks	Raise banks, 500m spillway at 2.20m	Raise banks, 500m spillway at 2.00m	Present day + narrow channel	Raise banks + Narrow channe	Baseline	Raise banks
	x	y		E0	E1	E2	E3	H0	F0	G0	E0 Marsh +300	E0 Marsh +600	E1 Marsh +300	E2 Marsh +300	E2 Marsh +600	E0	E1	E2	E3	H0	F0	G0	E0	E2	E3	E0 Marsh +300	E2 Marsh +300	S6	S7	G0	G2	E0	E2
1	650589.35	274654.97	0	2.67	2.69	2.69	2.68	2.71	2.68	2.68	2.68	2.68	2.68	2.68	2.70	2.74	2.72	2.76	2.76	2.77	2.72	2.47	2.47	2.47	2.47	2.47	2.47	2.47	2.70	2.47	2.70	2.47
2	650514.59	274722.30	100	2.78	2.92	2.80	2.83	2.93	2.84	2.82	2.76	2.76	2.92	2.78	2.80	2.83	2.98	2.86	2.90	3.00	2.94	2.59	2.59	2.59	2.64	2.59	2.59	2.64	2.64	2.80	2.60	2.80	2.60
3	650429.40	274774.28	200	2.70	3.51	2.72	2.71	2.57	2.59	2.68	2.31	1.85	3.42	2.35	1.89	2.94	4.81	2.98	2.92	2.62	2.82	2.78	3.79	3.60	3.52	3.65	3.46	3.58	3.54	3.75	3.52	3.75	3.52
4	650343.21	274825.04	300	2.76	3.34	2.77	2.61	2.75	2.74	2.76	2.39	1.83	3.30	2.41	1.85	2.97	4.48	2.99	2.81	2.96	2.90	2.88	3.75	3.58	3.30	3.64	3.44	3.30	3.29	3.81	3.56	3.81	3.56
5	650262.46	274884.60	400	2.71	3.69	2.75	2.71	2.91	2.86	2.08	2.29	1.79	3.48	2.33	1.83	2.84	4.49	2.90	2.85	3.08	2.86	2.04	3.48	3.42	3.34	3.38	3.29	3.38	3.38	2.99	2.86	2.99	2.86
6	650179.89	274941.34	500	2.76	3.59	2.73	2.81	2.84	2.82	2.70	2.33	1.79	3.38	2.29	1.77	2.89	4.37	2.87	2.93	2.99	2.86	2.64	3.52	3.40	3.40	3.42	3.27	3.44	3.42	3.46	3.36	3.46	3.36
7	650094.48	274993.96	600	2.68	3.35	2.63	2.68	2.71	2.70	2.57	2.20	1.56	3.15	2.14	1.50	2.73	3.72	2.64	2.68	2.76	2.59	2.45	3.11	3.07	3.09	3.03	2.94	3.11	3.11	3.42	3.09	3.42	3.09
8	650001.26	275031.31	700	2.39	2.96	2.25	2.36	2.45	2.39	2.31	2.06	1.54	2.90	1.94	1.50	2.53	3.54	2.40	2.48	2.61	2.45	2.33	2.80	2.78	2.84	2.70	2.66	2.86	2.84	2.86	2.80	2.86	2.80
9	649918.05	275085.46	800	2.08	2.58	2.09	2.07	2.12	2.10	2.04	1.85	1.52	2.53	1.85	1.54	2.35	3.39	2.33	2.33	2.38	2.27	2.18	2.60	2.66	2.64	2.55	2.59	2.70	2.68	2.53	2.51	2.53	2.51
10	649846.47	275156.49	900	2.00	2.47	1.99	1.99	2.02	1.96	1.96	1.77	1.44	2.41	1.75	1.44	2.21	3.17	2.21	2.20	2.24	2.18	2.04	2.49	2.53	2.51	2.41	2.43	2.55	2.53	2.41	2.41	2.41	2.41
11	649779.40	275230.59	1000	1.95	2.55	1.93	1.94	1.98	1.94	1.91	1.77	1.44	2.45	1.71	1.44	2.23	3.22	2.21	2.21	2.25	2.16	2.06	2.55	2.57	2.57	2.41	2.43	2.60	2.60	2.49	2.49	2.49	2.49
12	649716.29	275308.45	1100	2.00	2.53	1.96	1.99	2.02	2.04	1.94	1.75	1.44	2.43	1.69	1.40	2.21	3.05	2.13	2.21	2.24	2.16	2.02	2.70	2.78	2.74	2.51	2.57	2.76	2.76	2.64	2.68	2.64	2.68
13	649650.36	275383.94	1200	1.87	2.49	1.87	1.87	1.90	1.91	1.83	1.61	1.38	2.37	1.61	1.38	2.04	2.93	2.04	2.04	2.08	2.02	1.92	2.70	2.74	2.72	2.49	2.53	2.76	2.76	2.64	2.66	2.64	2.66
14	649581.39	275456.68	1300	2.12	2.62	2.13	2.12	2.15	2.16	2.06	1.81	1.46	2.53	1.81	1.48	2.24	3.23	2.26	2.24	2.29	2.20	2.08	2.78	2.80	2.82	2.57	2.59	2.86	2.86	2.72	2.70	2.72	2.70
15	649511.58	275528.58	1400	2.29	2.80	2.31	2.30	2.34	2.33	2.24	2.04	1.67	2.76	2.00	1.69	2.54	3.53	2.56	2.54	2.58	2.49	2.33	2.94	2.97	2.97	2.72	2.80	3.01	3.03	2.88	2.88	2.88	2.88
16	649441.52	275600.24	1500	2.22	2.80	2.22	2.22	2.25	2.24	2.18	1.92	1.56	2.66	1.91	1.56	2.36	3.40	2.38	2.35	2.41	2.31	2.20	3.01	3.07	3.07	2.76	2.80	3.11	3.13	2.95	2.95	2.95	2.95
17	649384.13	275682.37	1600	2.04	2.49	2.05	2.05	2.07	2.06	2.00	1.77	1.44	2.41	1.77	1.46	2.14	3.41	2.15	2.15	2.17	2.10	1.98	2.70	2.74	2.74	2.49	2.53	2.78	2.80	2.62	2.64	2.62	2.64
18	649351.39	275777.07	1700	1.50	2.01	1.53	1.51	1.53	1.52	1.46	1.30	1.09	1.92	1.32	1.11	1.65	2.91	1.68	1.66	1.68	1.65	1.56	2.39	2.43	2.43	2.22	2.24	2.47	2.51	2.31	2.33	2.31	2.33
19	649310.60	275869.80	1800	1.45	1.78	1.47	1.46	1.48	1.48	1.40	1.26	1.03	1.71	1.26	1.03	1.55	2.28	1.56	1.55	1.57	1.52	1.42	2.20	2.24	2.18	2.02	2.06	2.22	2.26	2.06	2.02	2.06	2.02
20	649220.73	275904.08	1900	1.67	2.07	1.68	1.68	1.71	1.69	1.63	1.46	1.19	2.00	1.46	1.19	1.80	2.50	1.81	1.81	1.84	1.77	1.67	2.22	2.22	2.24	2.04	2.08	2.26	2.31	2.14	2.12	2.14	2.12
21	649022.63	275912.96	2100	1.56	2.03	1.55	1.56	1.59	1.57	1.52	1.36	1.13	1.94	1.36	1.13	1.70	2.30	1.70	1.69	1.73	1.65	1.57	2.31	2.33	2.35	2.14	2.14	2.39	2.43	2.24	2.22	2.24	2.22
22	648826.39	275937.35	2300	1.60	2.05	1.59	1.59	1.62	1.63	1.56	1.38	1.15	1.94	1.38	1.17	1.73	2.35	1.73	1.73	1.76	1.69	1.61	2.20	2.22	2.22	2.02	2.04	2.26	2.26	2.14	2.14	2.14	2.14
23	648647.76	276021.18	2500	1.75	2.33	1.76	1.75	1.79	1.77	1.71	1.52	1.24	2.20	1.50	1.24	1.88	2.37	1.88	1.87	1.91	1.85	1.75	2.39	2.43	2.43	2.18	2.20	2.45	2.45	2.33	2.33	2.33	2.33
24	648517.55	276170.37	2700	1.62	2.19	1.63	1.61	1.65	1.63	1.57	1.36	1.11	2.10	1.38	1.11	1.70	2.24	1.71	1.70	1.73	1.69	1.59	2.43	2.47	2.47	2.24	2.27	2.49	2.49	2.35	2.37	2.35	2.37
25	648393.18	276324.90	2900	1.85	2.04	1.85	1.85	1.89	1.87	1.81	1.59	1.36	1.83	1.59	1.36	2.04	1.89	2.04	2.03	2.07	2.00	1.89	2.88	2.94	2.92	2.60	2.68	2.95	2.95	2.76	2.78	2.76	2.78

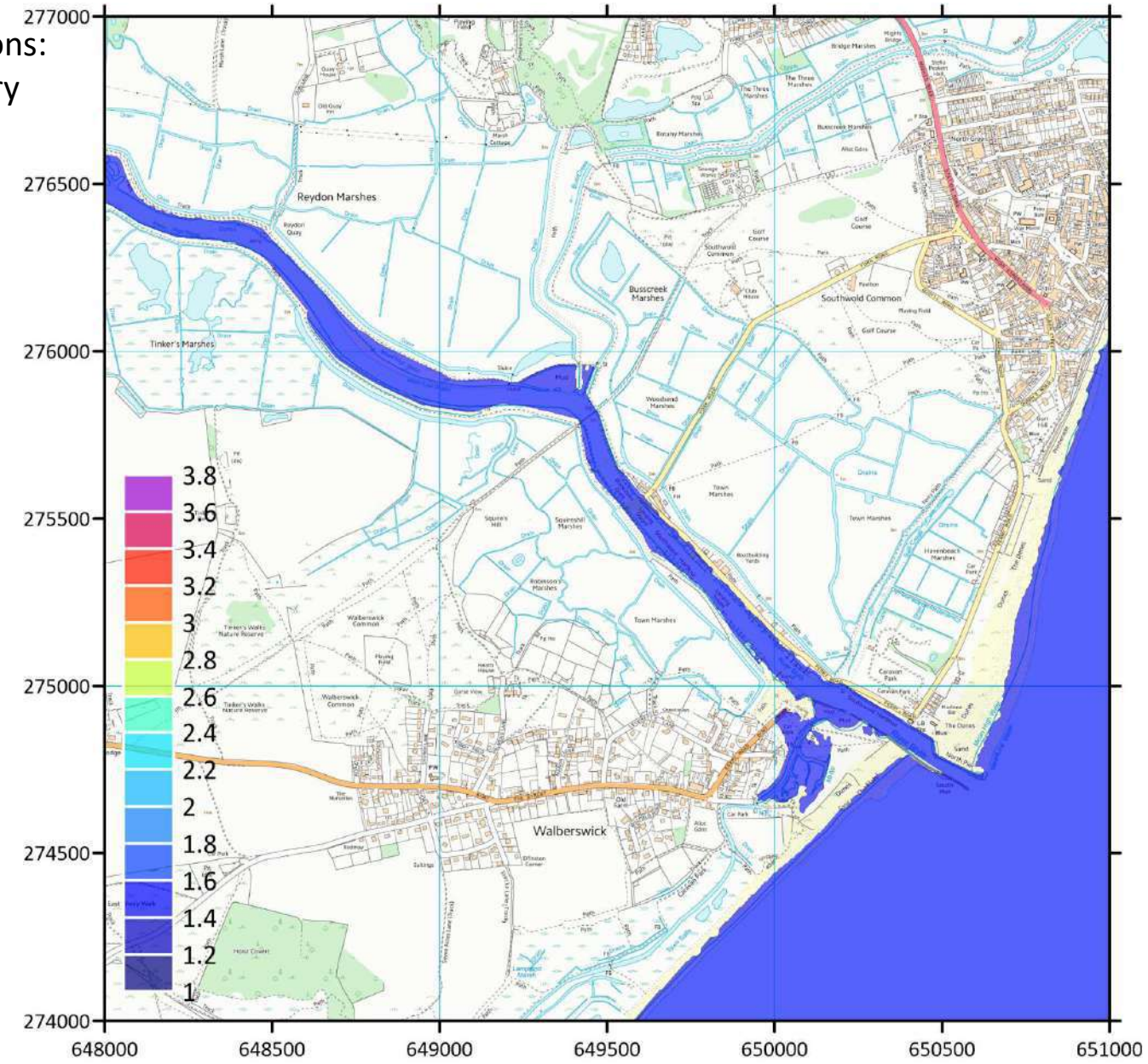
Point number	Chainage	2013 event																										2013 event in 2070, RCP8.5, 95%									
		Baseline	Baseline – dunes defended	Do Nothing	Do Nothing – dunes defended	Raise banks	Raise banks – dunes defended	SMP - N banks only	Short S Pier	Solid S Pier	Sluice gate at 2.3mOD	Sluice gate at 2.5mOD	Sluice gate at 2.7mOD	Raise all banks, 500m Spillway at 2.55mOD	Raise all banks, 500m Spillway at 2.55mOD, dunes undefended	Raise all banks, 500m Spillway at 2.35mOD	Raise all banks, 500m Spillway at 2.0mOD	Raise d/s banks, 500m Spillway at 2.0mOD	Raise d/s banks, 500m Spillway at 2.0mOD, culverts open	Raise d/s banks, 250m Spillway at 2.0mOD	Raise d/s banks, 250m Spillway at 2.0mOD, dunes undefended	Present day + narrow channel	Raise banks + Narrow channel – no culverts	Raise banks + Narrow channel – culverts	SMP – N banks only + narrow channel	Baseline	Baseline	Do Nothing	Raise banks	Raise banks	Baseline	Do Nothing	Raise banks	SMP – N banks only	Short S Pier	Raise banks + Narrow channel	Baseline	Raise banks	Passive Spillway at 2.35mOD	500m Passive Spillway at 2.00mOD, dunes undefended
		E0U	E0	E1U	E1	E2U	E2	E3	H0	F0	S1a	S1b	S1c	S2	S3U	S4	S8	S9	S11	S10	S13U	G0	G2a	G2b	G3	E0 Marsh +300	E0 Marsh +600	E1 Marsh +300	E2 Marsh +300	E2 Marsh +600	E0	E1	E2	E3	H1	G2	E0 Marsh +300	E2 Marsh +300	S5	S12U
1	0	2.50	2.51	2.74	2.53	2.51	2.50	2.51	2.51	2.74	2.53	2.53	2.53	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.51	2.74	2.51	2.51	2.51	2.51	2.49	2.53	2.51	2.51	2.57	2.59	2.55	2.56	2.58	2.55	2.57	2.55	2.59	2.57
2	100	2.64	2.72	3.27	2.95	2.68	2.62	2.68	2.72	2.88	2.68	2.70	2.70	2.68	2.68	2.68	2.68	2.70	2.70	2.70	2.64	2.82	2.62	2.62	2.70	2.62	2.60	2.95	2.62	2.62	2.78	3.27	2.73	2.72	2.79	2.66	2.78	2.72	2.74	2.78
3	200	4.07	3.95	6.07	5.56	4.04	3.93	3.82	3.21	4.80	4.10	4.10	4.10	3.87	4.04	3.85	3.85	3.97	3.97	3.97	4.08	3.99	3.75	3.77	3.65	3.99	3.85	5.60	3.81	3.67	4.46	6.12	4.36	4.29	3.52	4.02	4.41	4.30	4.20	4.41
4	300	3.90	3.69	5.33	4.83	3.77	3.79	3.54	3.63	4.37	3.75	3.77	3.77	3.58	3.77	3.56	3.56	3.69	3.69	3.69	3.91	3.91	3.73	3.71	3.54	3.83	3.71	4.84	3.69	3.56	4.15	5.17	4.06	3.86	3.82	3.93	4.10	4.00	3.77	4.10
5	400	3.87	4.49	5.70	6.28	3.79	4.04	4.35	4.52	4.06	4.28	4.28	3.99	4.00	3.71	4.00	4.35	4.51	4.51	4.47	3.85	3.23	3.15	3.19	3.29	3.81	3.73	6.18	3.89	3.73	5.09	7.56	4.81	6.07	6.34	3.67	5.09	4.69	5.17	5.25
6	500	3.78	4.16	5.60	6.08	3.81	3.81	4.23	4.19	3.91	4.12	4.14	3.85	3.89	3.79	3.89	4.24	4.18	4.18	4.14	3.79	3.69	3.87	3.83	3.91	3.69	3.60	5.99	3.65	3.52	4.68	7.12	4.48	5.91	5.90	4.45	4.69	4.35	4.94	4.86
7	600	3.38	3.77	5.50	5.77	3.23	3.43	3.83	3.82	3.27	3.73	3.73	3.42	3.48	3.21	3.48	3.83	3.79	3.79	3.73	3.32	3.79	3.85	3.69	4.08	3.30	3.25	5.64	3.29	3.13	4.33	6.50	4.00	5.30	5.29	4.53	4.34	3.87	4.43	4.51
8	700	3.27	3.40	5.77	5.61	2.97	3.03	3.43	3.43	2.99	3.40	3.36	3.05	3.07	3.07	3.07	3.50	3.48	3.48	3.40	3.25	3.27	3.13	3.09	3.30	3.25	3.25	5.44	2.86	2.70	4.43	6.24	3.37	4.75	4.71	3.54	4.43	3.23	3.91	4.63
9	800	3.03	2.88	5.05	4.83	2.84	2.90	2.86	2.87	2.86	2.97	2.97	2.97	2.88	2.82	2.86	2.88	2.92	2.92	2.88	3.01	2.76	2.62	2.66	2.64	3.01	3.01	4.65	2.84	2.76	4.08	5.24	2.98	3.61	3.67	2.66	4.06	2.95	2.99	4.28
10	900	3.09	2.80	4.69	4.63	2.68	2.69	2.77	2.82	2.72	2.84	2.86	2.78	2.70	2.66	2.68	2.90	2.95	2.94	2.86	3.09	2.78	2.47	2.47	2.45	3.07	3.07	4.43	2.62	2.55	4.02	4.73	2.82	3.62	3.68	2.53	4.02	2.78	3.07	4.26
11	1000	3.32	2.99	4.72	4.64	2.86	2.70	2.97	3.01	2.82	3.01	3.03	2.82	2.72	2.82	2.72	3.13	3.15	3.15	3.05	3.32	3.03	2.55	2.53	2.59	3.30	3.29	4.43	2.62	2.55	4.28	4.54	2.82	3.81	3.89	2.66	4.26	2.78	3.30	4.43
12	1100	3.57	3.23	4.26	4.16	3.07	2.93	3.21	3.25	3.03	3.25	3.29	2.90	2.90	3.03	2.90	3.36	3.40	3.40	3.29	3.58	3.29	2.76	2.76	2.80	3.56	3.54	3.99	2.74	2.57	4.57	4.12	3.09	4.08	4.16	2.90	4.51	2.95	3.60	4.72
13	1200	3.52	3.17	3.85	3.72	3.05	2.89	3.17	3.20	2.99	3.23	3.27	2.88	2.88	3.01	2.88	3.38	3.40	3.40	3.29	3.58	3.25	2.72	2.74	2.78	3.48	3.46	3.56	2.70	2.55	4.50	3.63	3.04	4.02	4.10	2.86	4.43	2.92	3.60	4.69
14	1300	3.54	3.21	3.81	3.73	3.15	2.95	3.23	3.24	3.05	3.32	3.36	3.07	2.99	3.11	2.97	3.52	3.54	3.54	3.38	3.69	3.32	2.78	2.78	2.86	3.50	3.48	3.54	2.80	2.68	4.42	3.58	3.10	3.94	4.02	2.90	4.32	2.99	3.71	4.65
15	1400	3.62	3.32	4.00	3.65	3.32	3.12	3.33	3.33	3.17	3.05	3.09	3.09	3.15	3.29	3.15	3.75	3.77	3.77	3.60	3.93	3.42	2.94	2.95	2.99	3.58	3.54	3.46	3.05	2.95	4.45	3.82	3.27	4.00	4.06	3.09	4.30	3.23	3.95	4.74
16	1500	3.63	3.34	4.12	3.83	3.42	3.21	3.35	3.37	3.23	3.15	3.21	3.21	3.23	3.36	3.23	3.91	3.93	3.91	3.73	4.08	3.46	3.03	3.03	3.05	3.58	3.52	3.62	2.99	2.78	4.37	4.07	3.37	4.00	4.04	3.19	4.32	3.21	4.10	4.78
17	1600	3.06	2.86	4.02	4.09	3.13	2.93	2.90	2.87	2.78	2.84	2.92	2.92	2.95	3.11	2.97	3.54	3.52	3.52	3.36	3.67	2.97	2.74	2.74	2.74	2.97	2.94	3.83	2.74	2.59	4.03	4.16	3.13	3.68	3.65	2.92	3.95	2.99	3.79	4.24
18	1700	2.73	2.57	3.95	3.84	2.80	2.61	2.59	2.56	2.49	2.51	2.62	2.62	2.64	2.78	2.66	3.17	3.17	3.17	3.03	3.32	2.66	2.43	2.45	2.45	2.62	2.62	3.60	2.45	2.27	3.84	3.97	2.82	3.65	3.64	2.60	3.89	2.68	3.44	3.67
19	1800	2.53	2.31	3.87	3.49	2.60	2.42	2.35	2.31	2.29	2.29	2.41	2.41	2.41	2.59	2.43	2.88	2.86	2.86	2.74	3.07	2.39	2.26	2.14	2.20	2.45	2.43	3.36	2.27	2.14	3.66	3.40	2.65	3.41	3.35	2.31	3.67	2.53	3.19	3.44
20	1900	2.52	2.33	3.99	3.59	2.49	2.34	2.37	2.34	2.31	2.27	2.35	2.35	2.39	2.47	2.39	2.92	2.88	2.88	2.74	3.03	2.45	2.22	2.20	2.24	2.43	2.39	3.46	2.24	2.10	3.43	3.58	2.44	3.20	3.20	2.27	3.48	2.37	3.05	3.38
21	2100	2.67	2.49	3.29	2.94	2.68	2.50	2.51	2.49	2.43	2.39	2.51	2.51	2.55	2.66	2.57	3.09	3.09	3.09	2.95	3.27	2.59	2.33	2.33	2.35	2.57	2.53	2.82	2.33	2.18	3.57	2.96	2.69	3.40	3.39	2.47	3.65	2.57	3.32	3.54
22	2300	2.35	2.29	2.70	2.58	2.53	2.36	2.31	2.28	2.26	2.27	2.35	2.35	2.37	2.49	2.37	2.41	2.39	2.39	2.41	2.59	2.33	2.22	2.22	2.22	2.20	2.06	2.37	2.20	2.04	2.97	2.77	2.50	2.66	2.68	2.31	3.03	2.37	2.59	2.90
23	2500	2.47	2.47	2.64	2.77	2.74	2.56	2.50	2.47	2.43	2.47	2.55	2.55	2.59	2.70	2.57	2.45	2.43	2.43	2.45	2.43	2.49	2.41	2.41	2.41	2.24	2.10	2.51	2.37	2.20	2.67	2.90	2.69	2.66	2.64	2.55	2.78	2.55	2.70	2.64
24	2700	2.54	2.55	2.41	2.51	2.88	2.67	2.58	2.54	2.49	2.53	2.64	2.64	2.68	2.82	2.68	2.51	2.47	2.47	2.49	2.49	2.57	2.49	2.49	2.47	2.31	2.06	2.24	2.49	2.31	2.59	2.58	2.89	2.63	2.61	2.64	2.41	2.74	2.70	2.68
25	2900	3.00	3.01	2.12	2.24	3.46	3.20	3.07	3.01	2.94	2.99	3.17	3.17	3.21	3.40	3.21	2.97	2.92	2.92	2.95	2.94	3.03	2.94	2.95	2.94	2.70	2.37	1.92	2.97	2.76	3.11	2.29	3.50	3.11	3.14	3.19	2.78	3.32	3.25	3.17

2020

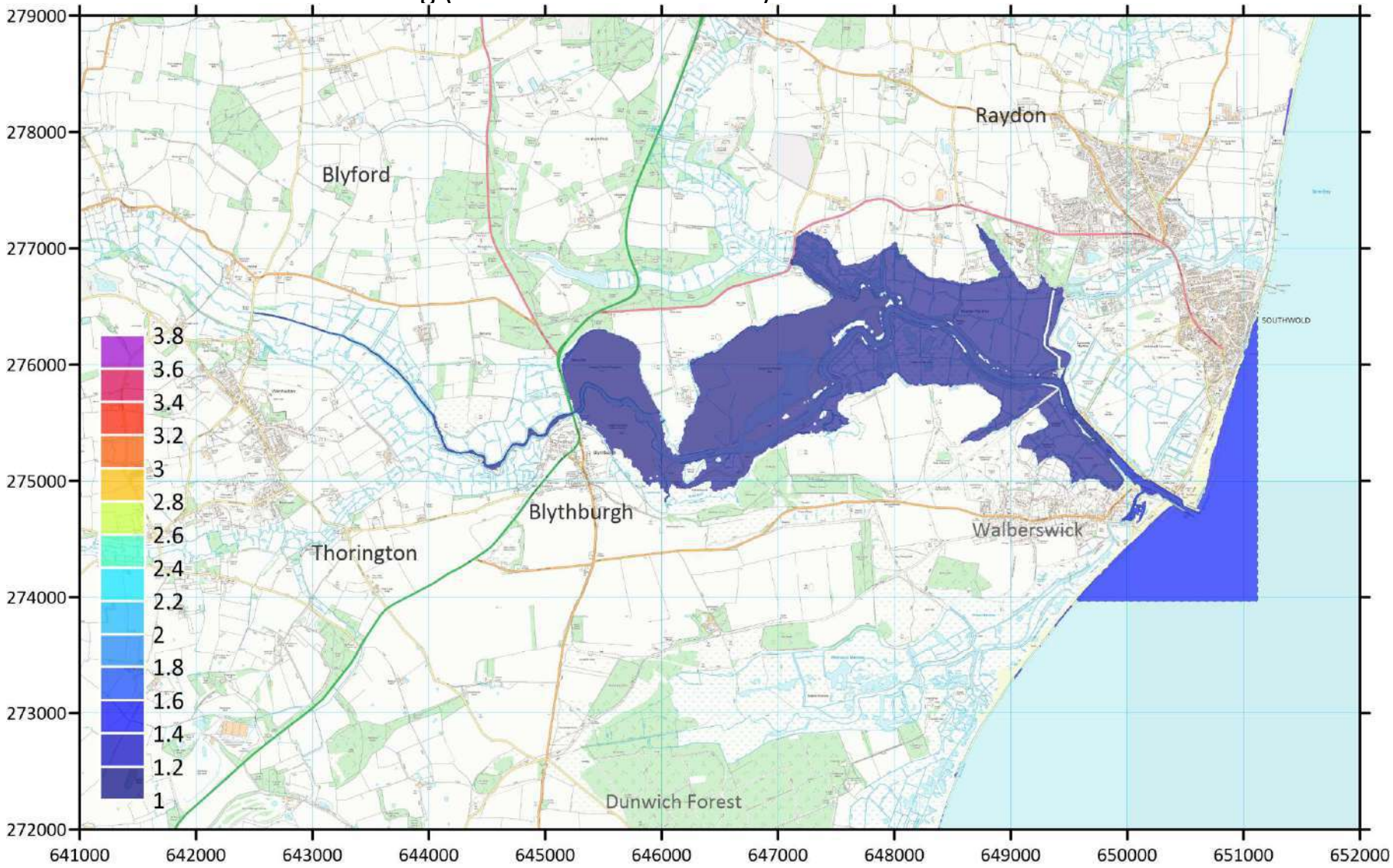
February 2020 conditions: E0 - Present-day estuary defences (Baseline)



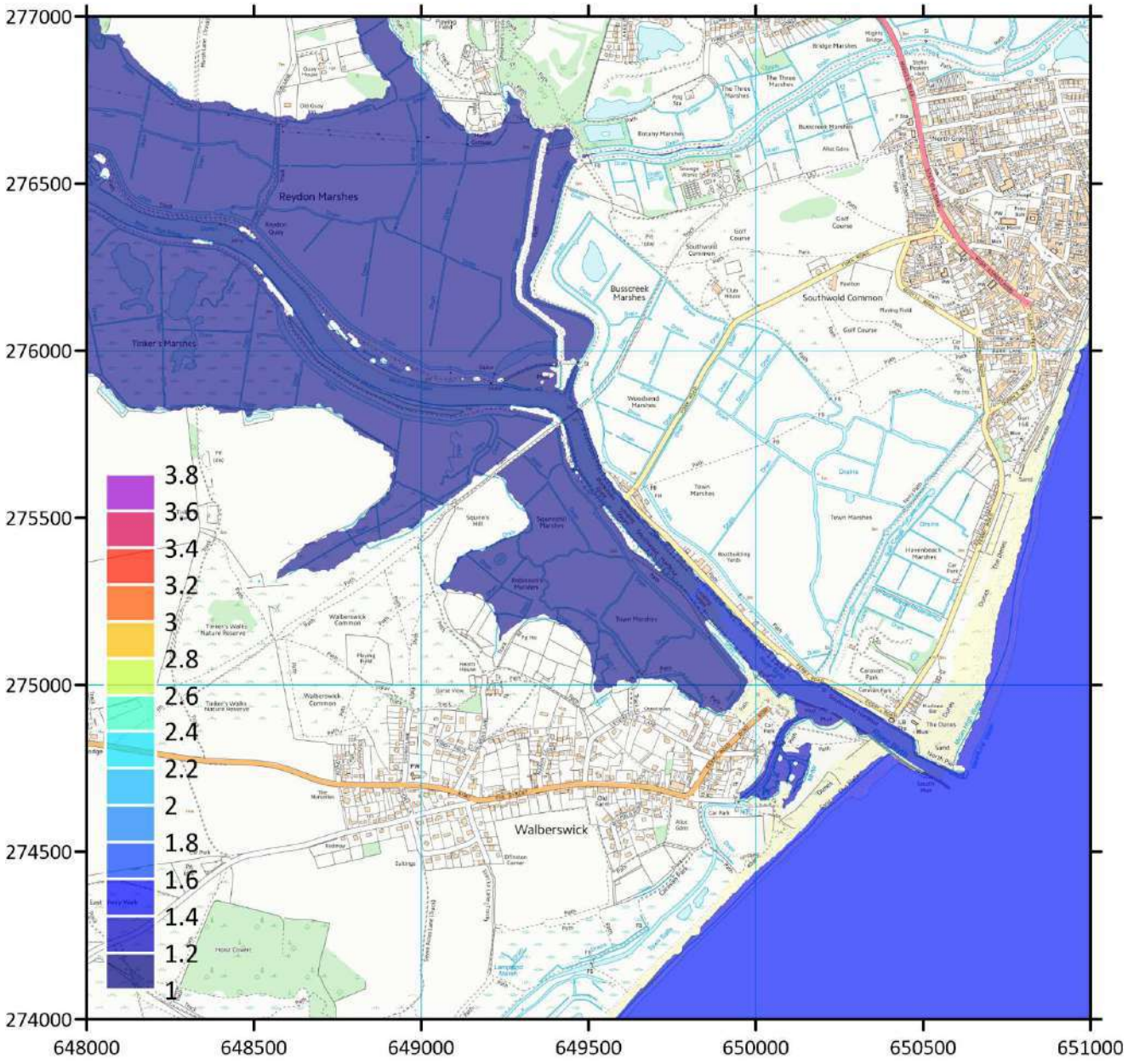
February 2020 conditions:
E0 - Present-day estuary defences (Baseline),
Zoom-in (downstream)



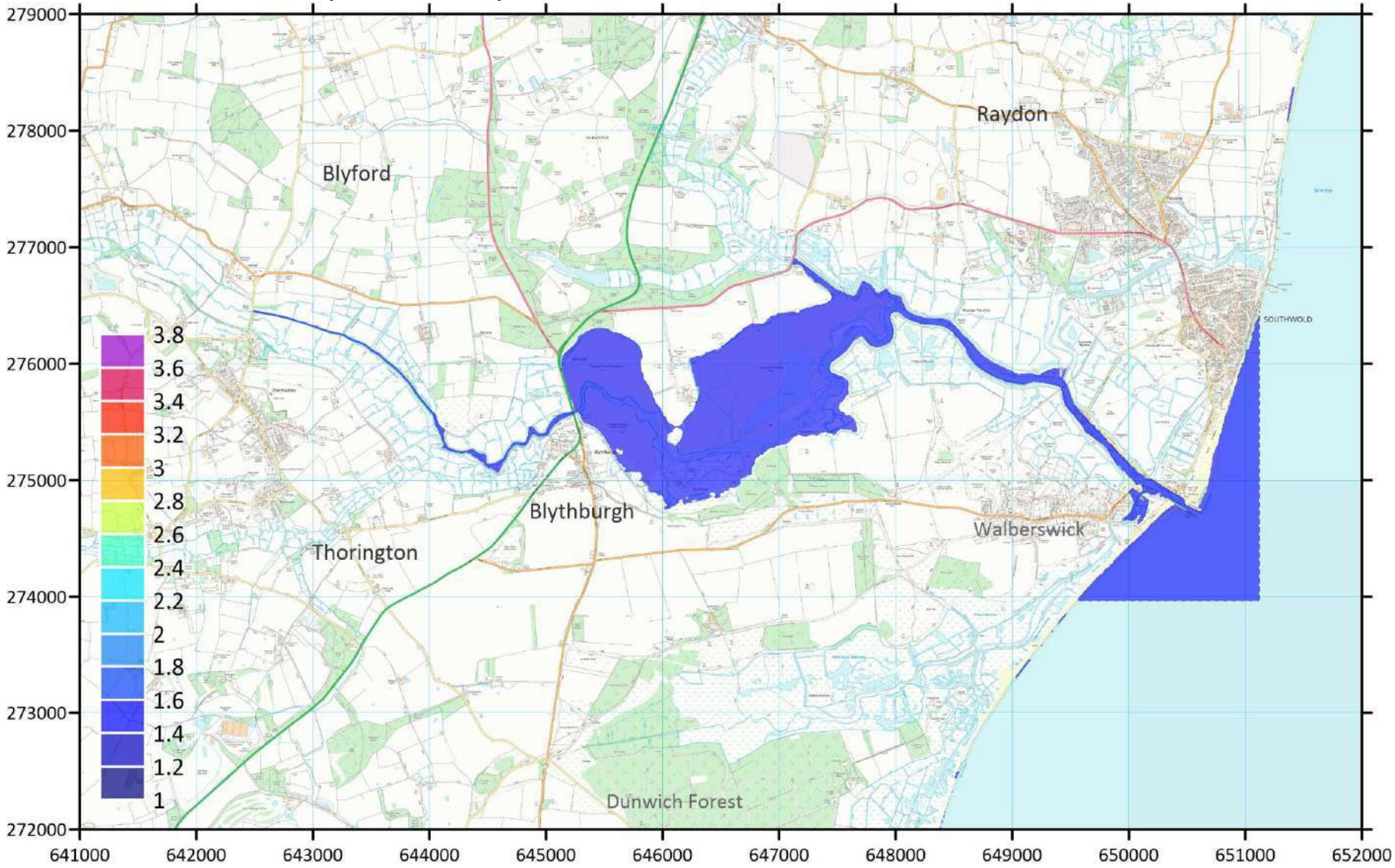
February 2020 conditions: E1 – Do Nothing (All embankments failed)



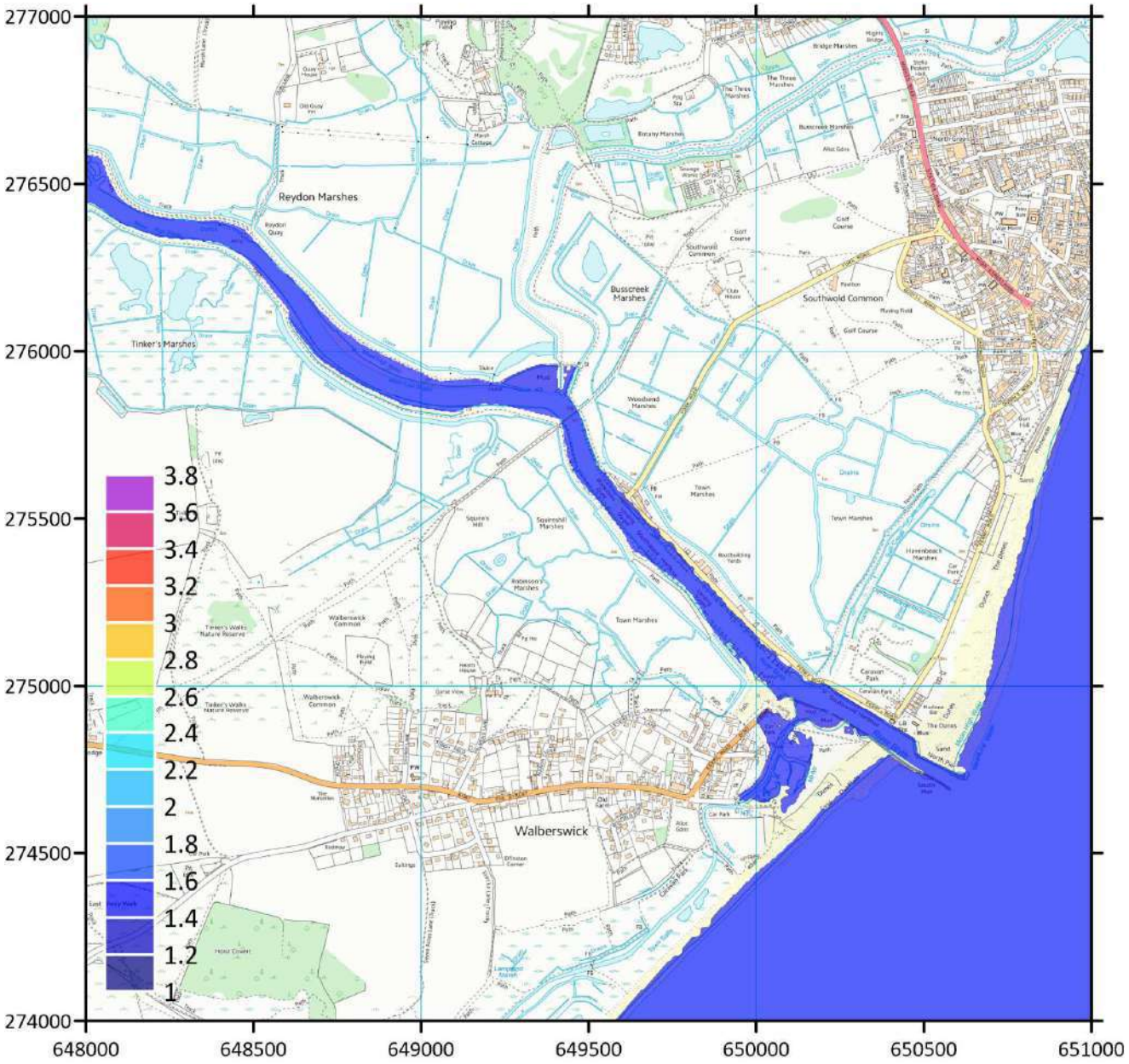
February 2020 conditions:
E1 – Do Nothing (All embankments failed),
Zoom-in (downstream)



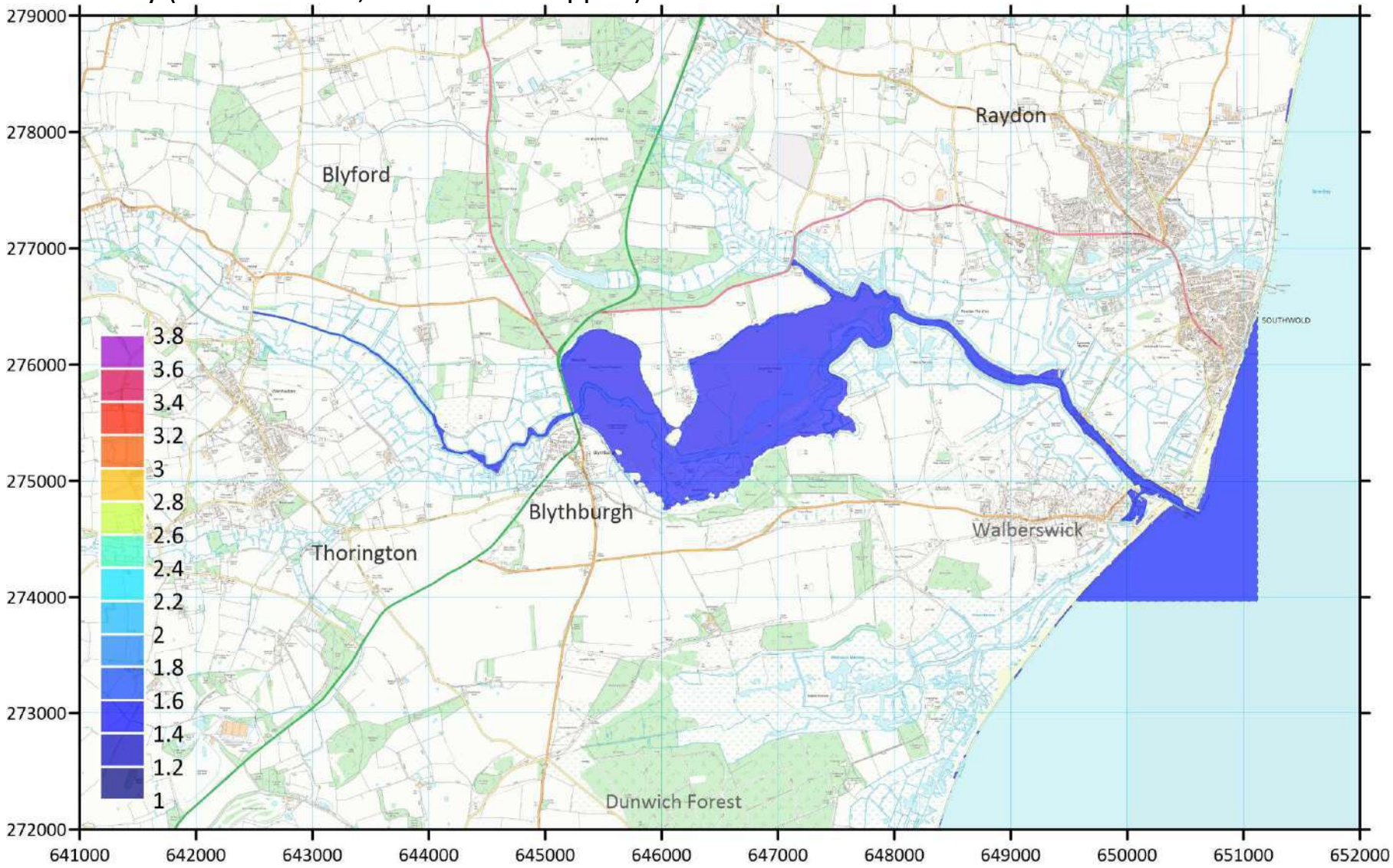
February 2020 conditions: E2 – Improve estuary defences



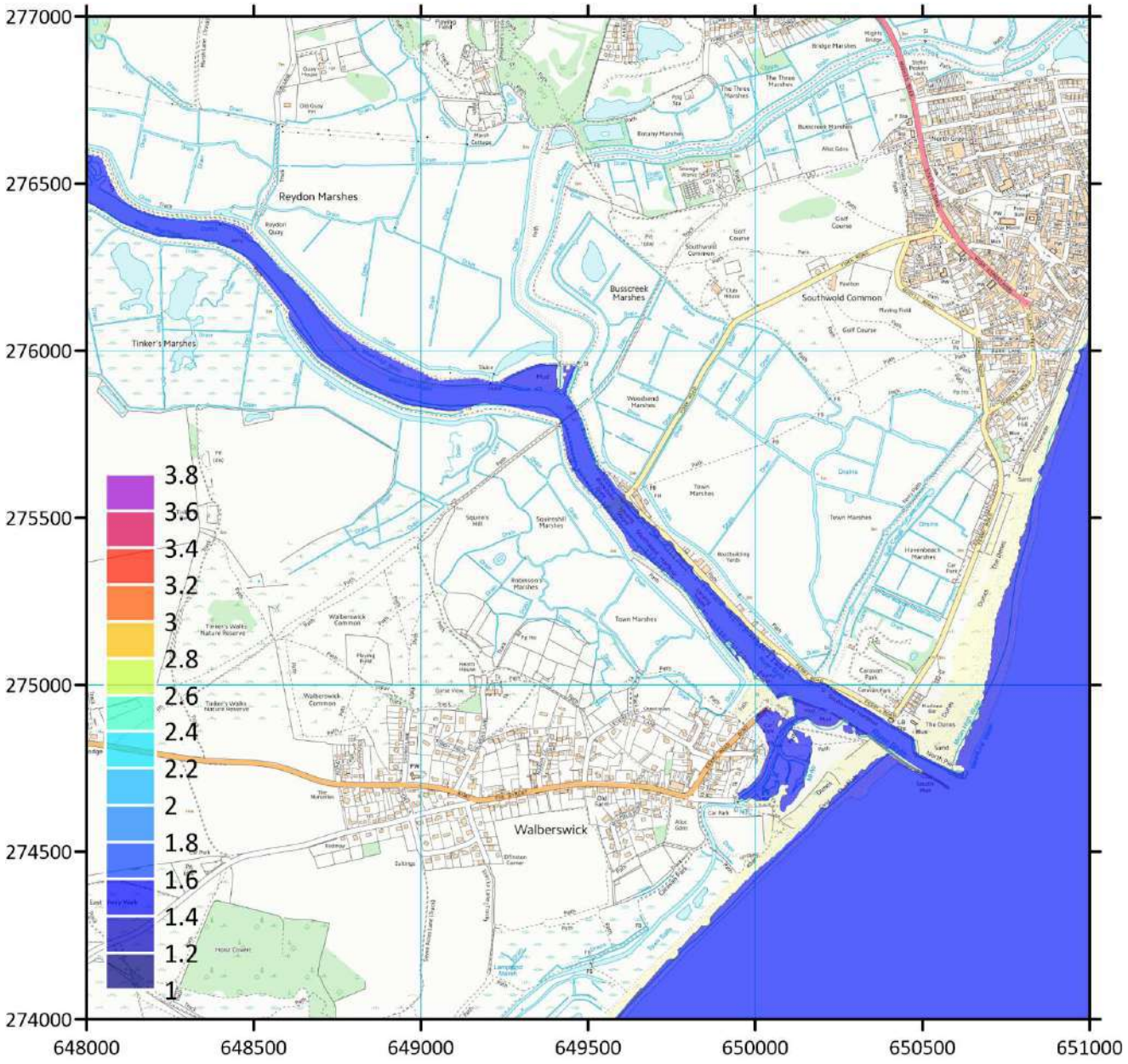
February 2020 conditions:
E2 – Improve estuary defences,
Zoom-in (downstream)



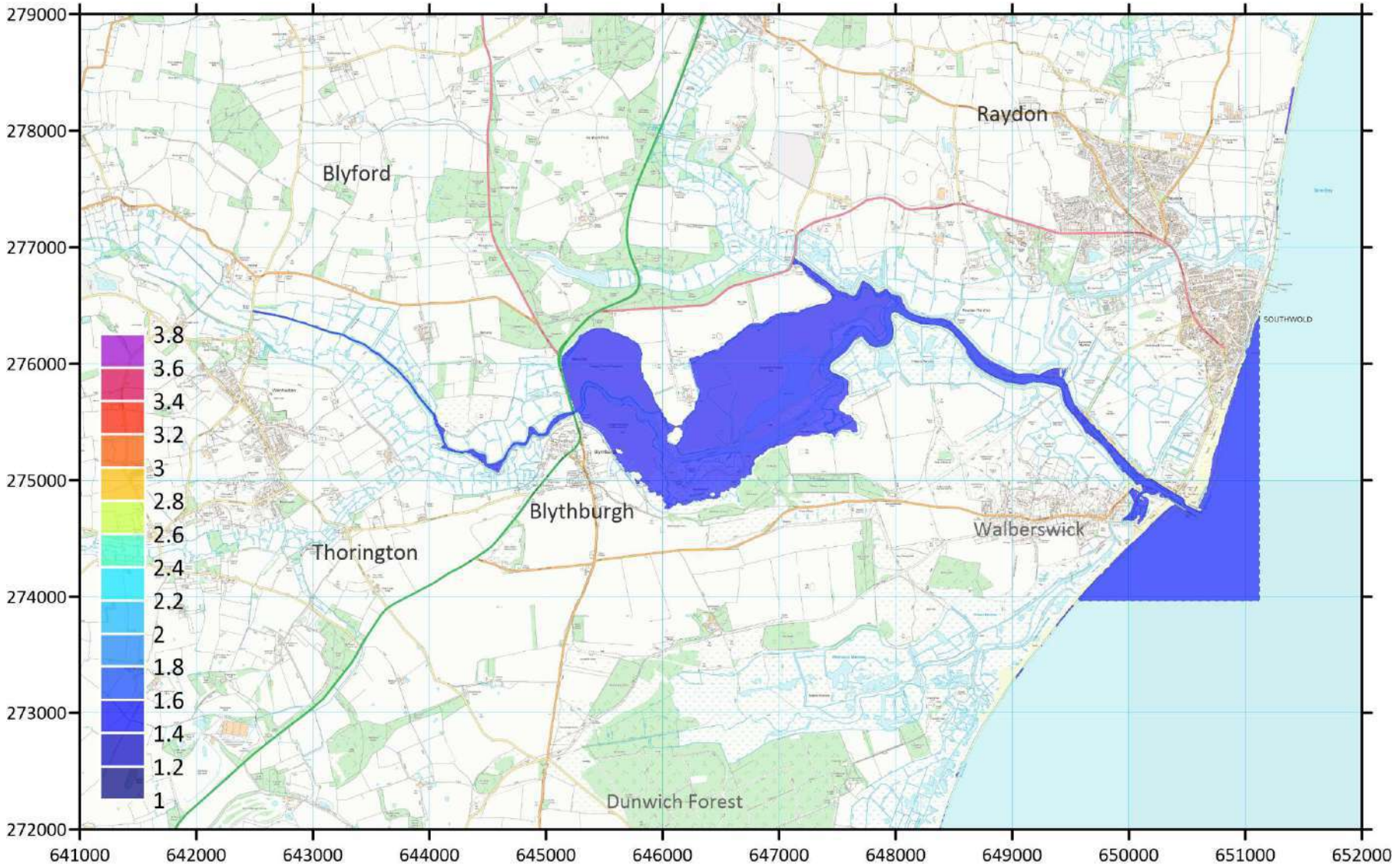
2020: E3 – SMP Policy (Raise N banks, S banks overtopped)



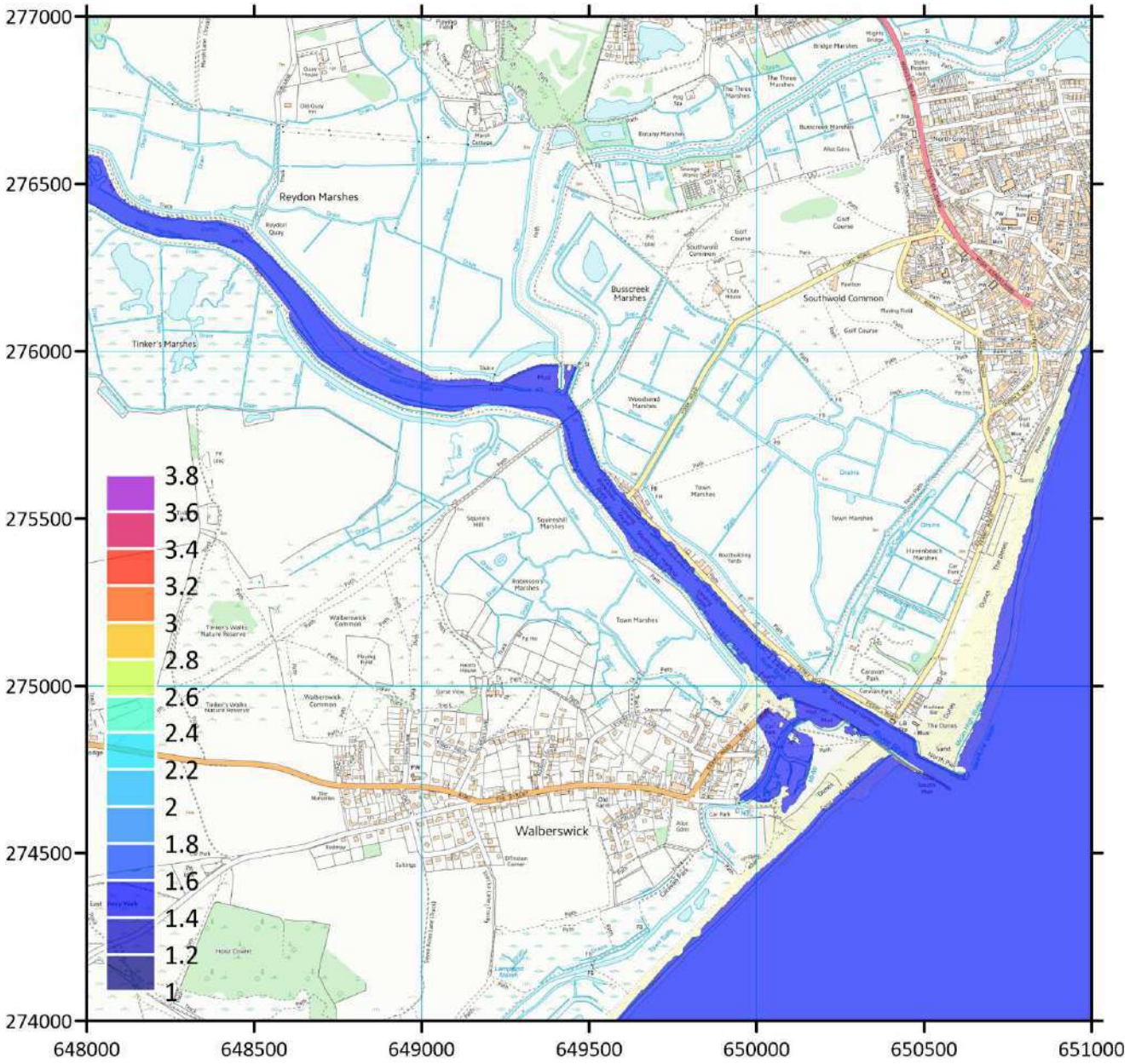
2020: E3 – SMP Policy
(Raise N banks,
S banks overtopped),
Zoom-in (downstream)



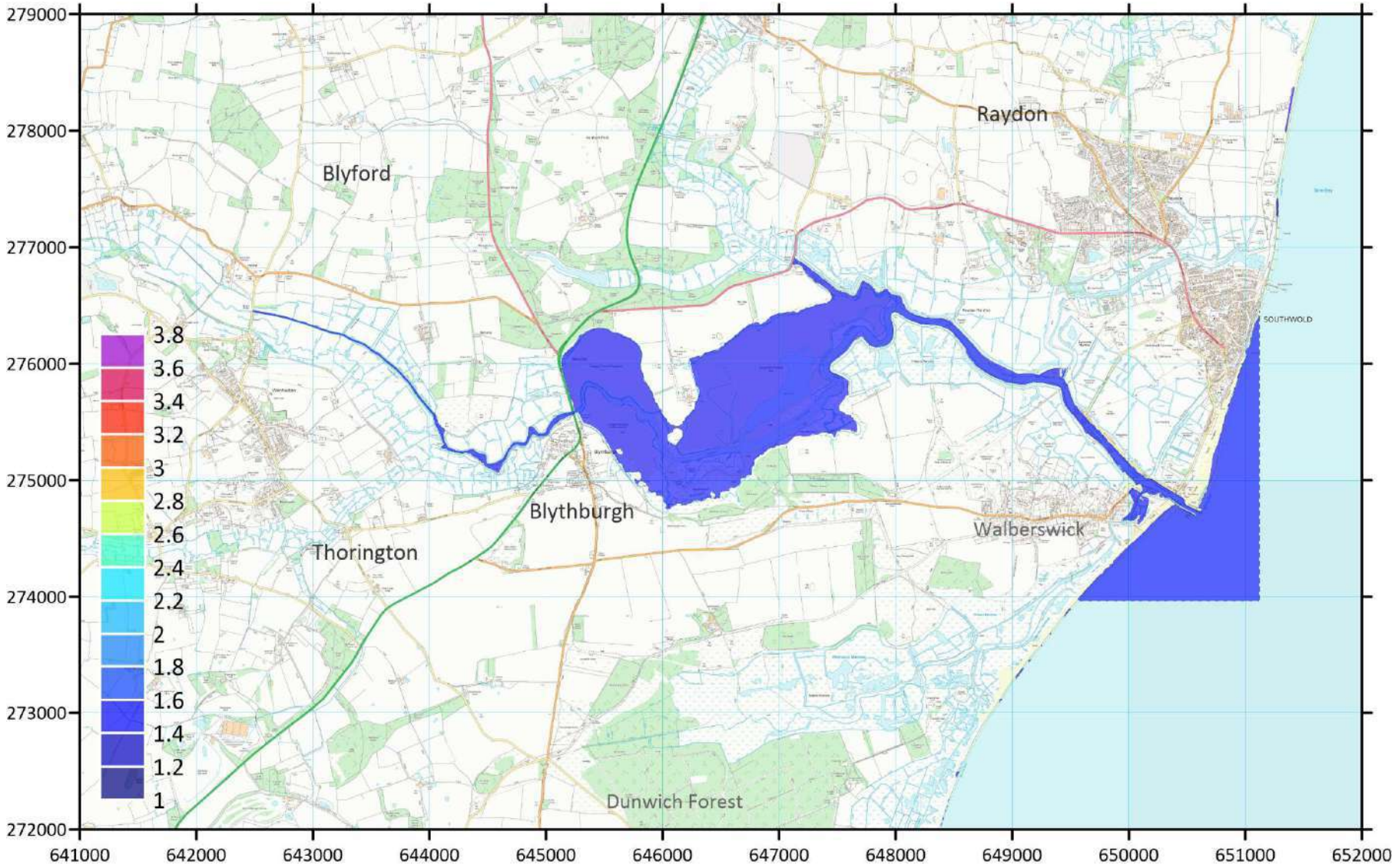
2020: H0 - Present day estuary defences, reduced S Pier



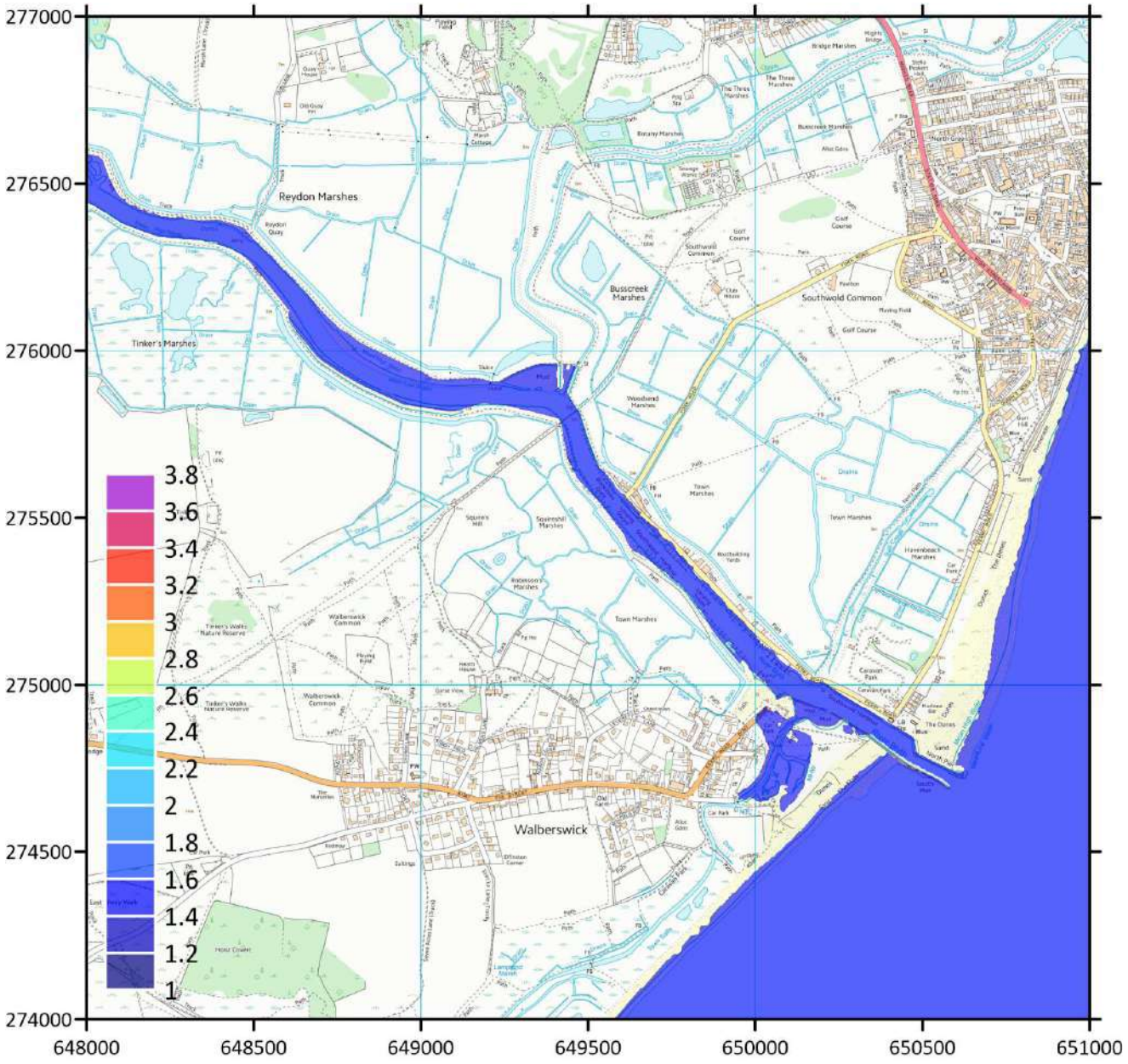
2020: H0 - Present day estuary defences, reduced S Pier: Zoom-in (downstream)



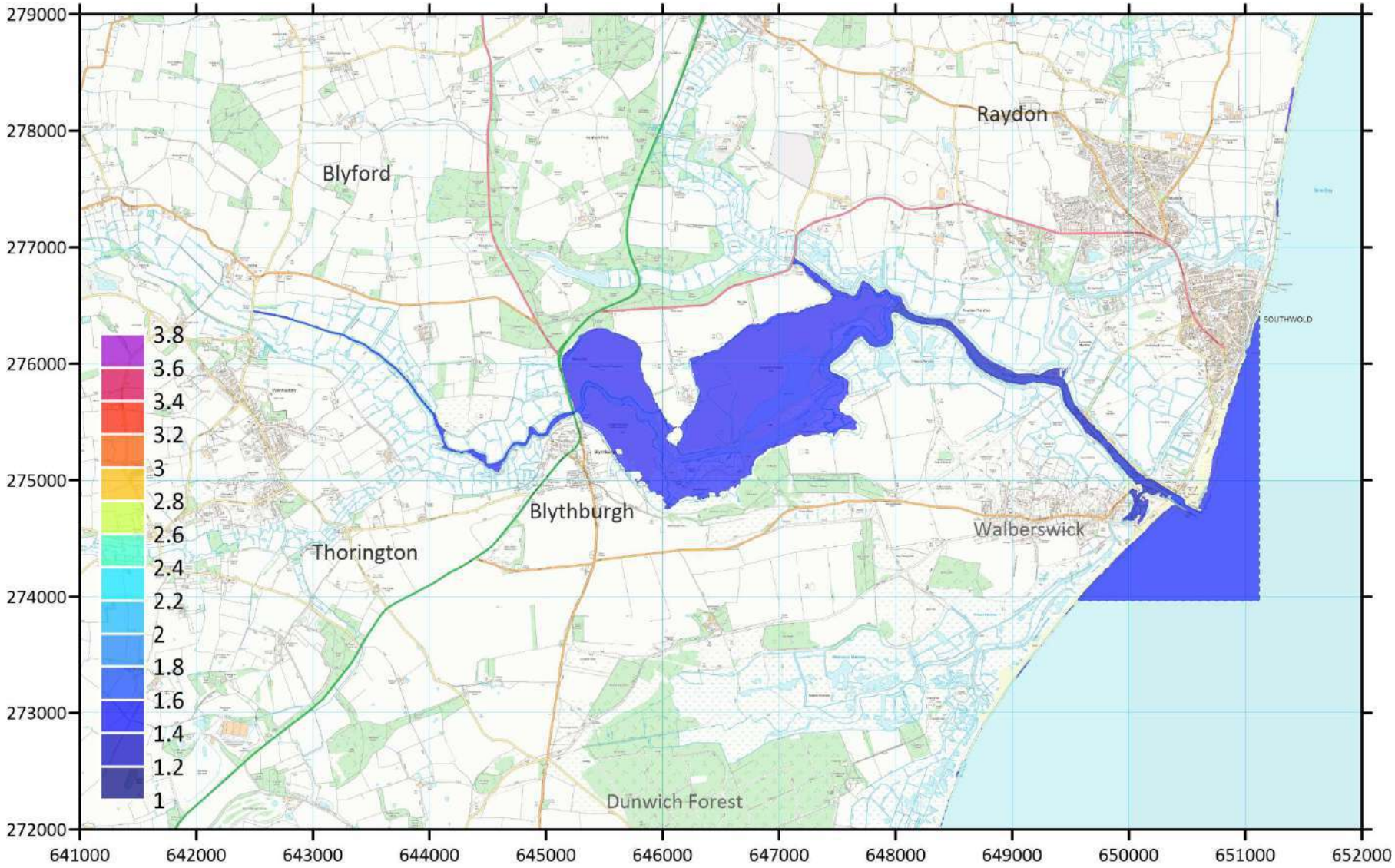
2020: F0 - Present day estuary defences, solid S Pier



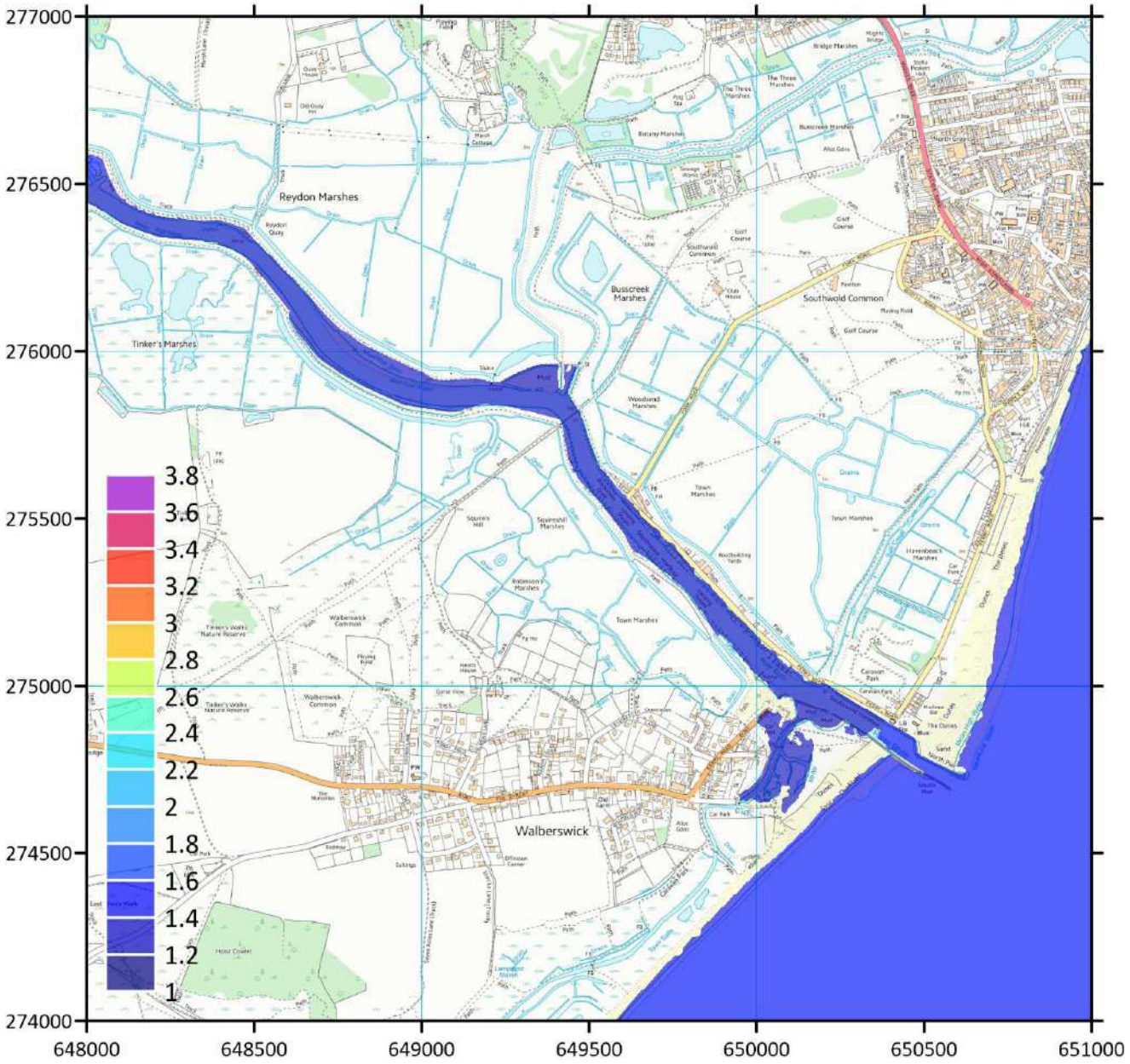
2020: F0 - Present day estuary defences, solid S Pier: Zoom-in (downstream)



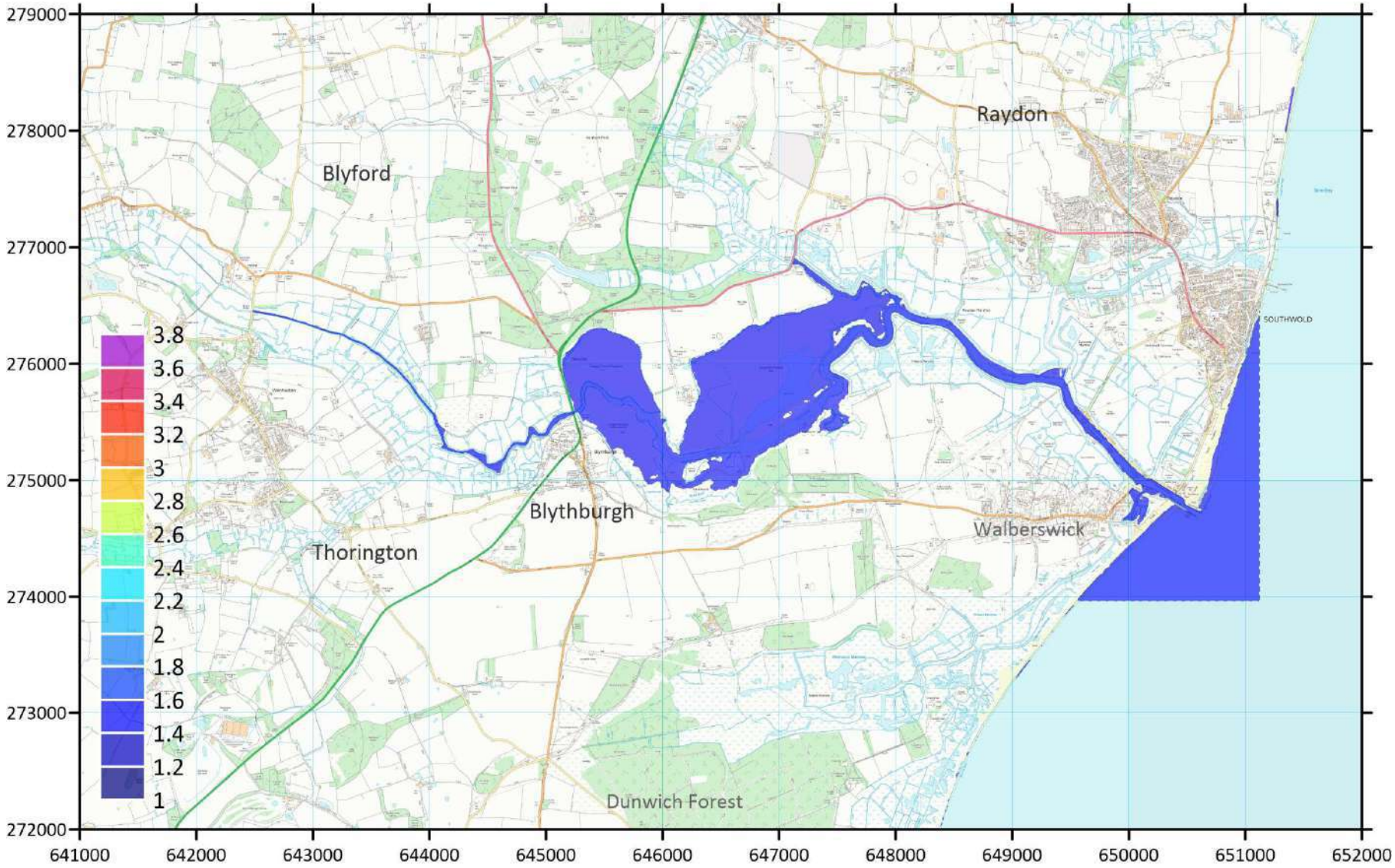
2020: G0 - Present day estuary defences, narrow channel



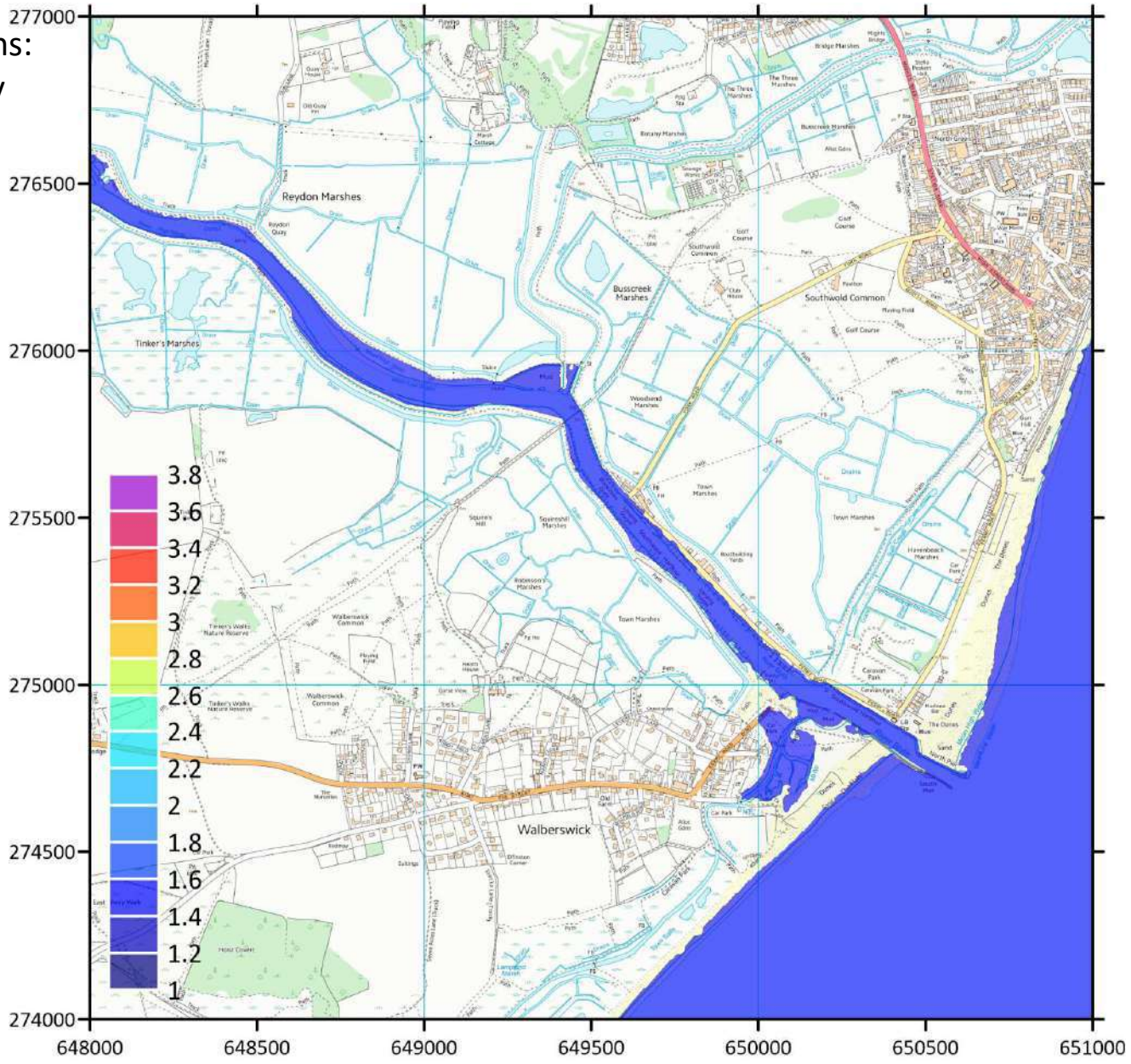
2020: G0 - Present day estuary defences, narrow channel Zoom-in (downstream)



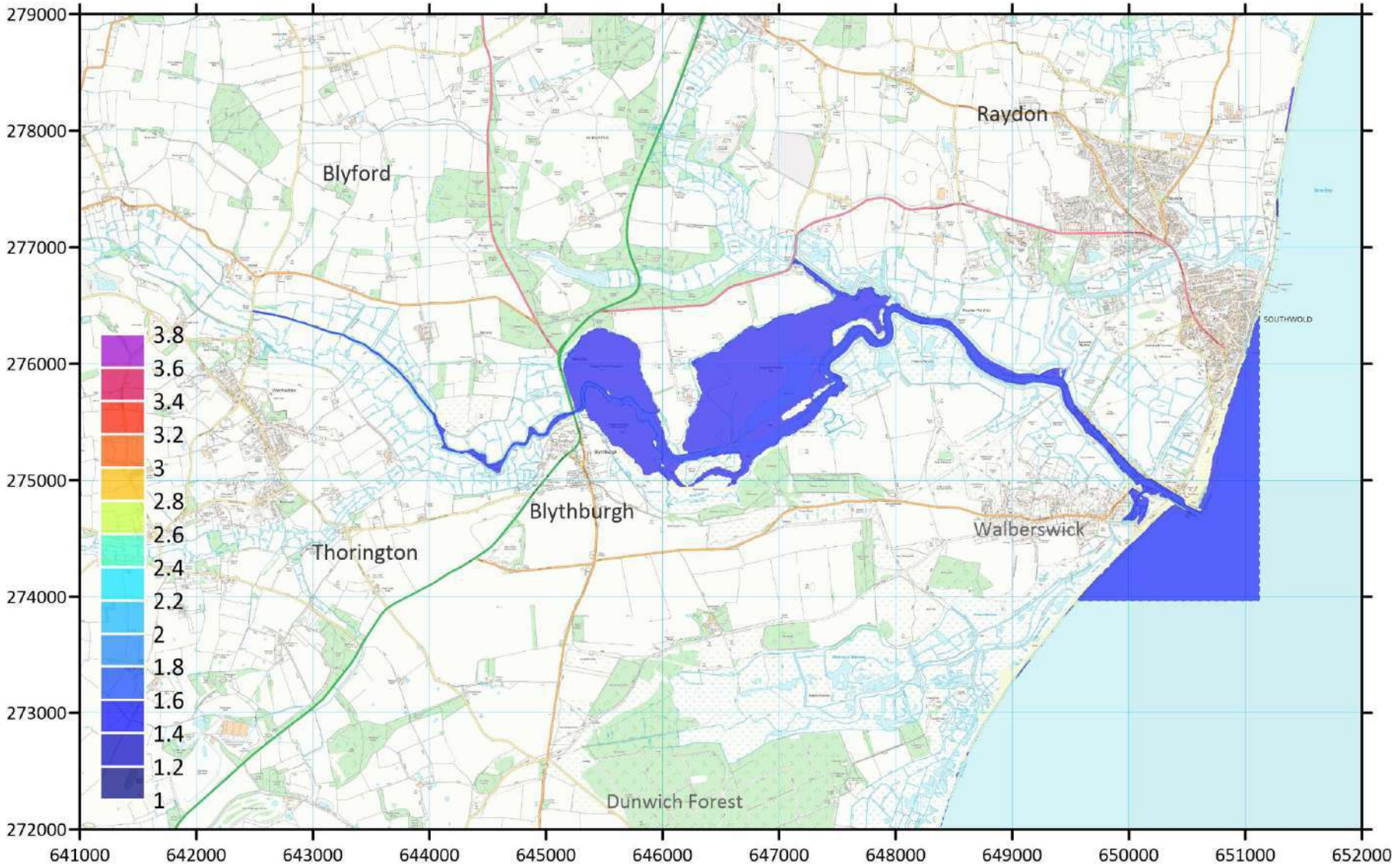
February 2020 conditions: E0 - Present-day estuary defences (Baseline), Marshes raised 300mm



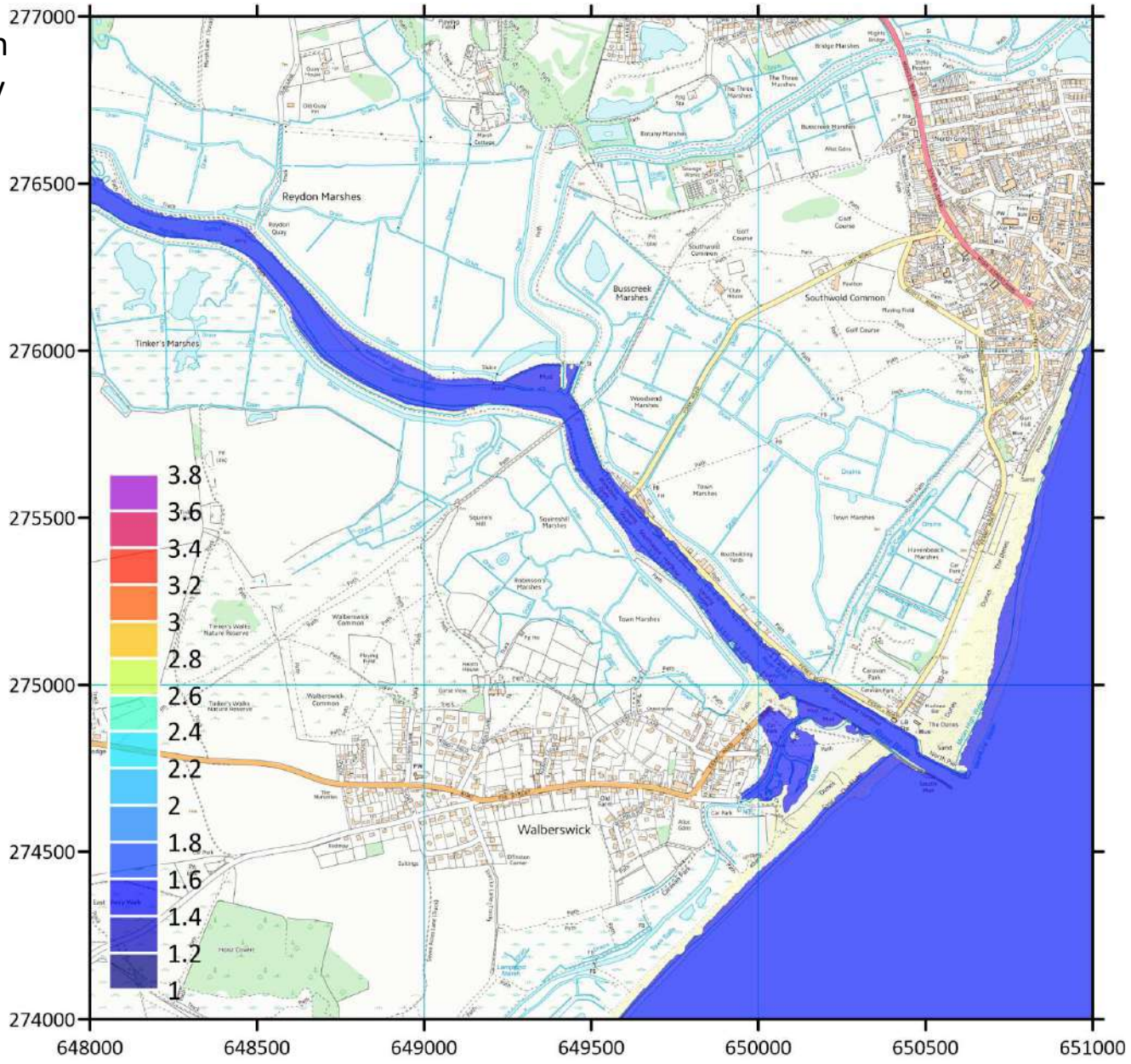
February 2020 conditions:
E0 - Present-day estuary defences (Baseline),
Marshes raised 300mm
Zoom-in (downstream)



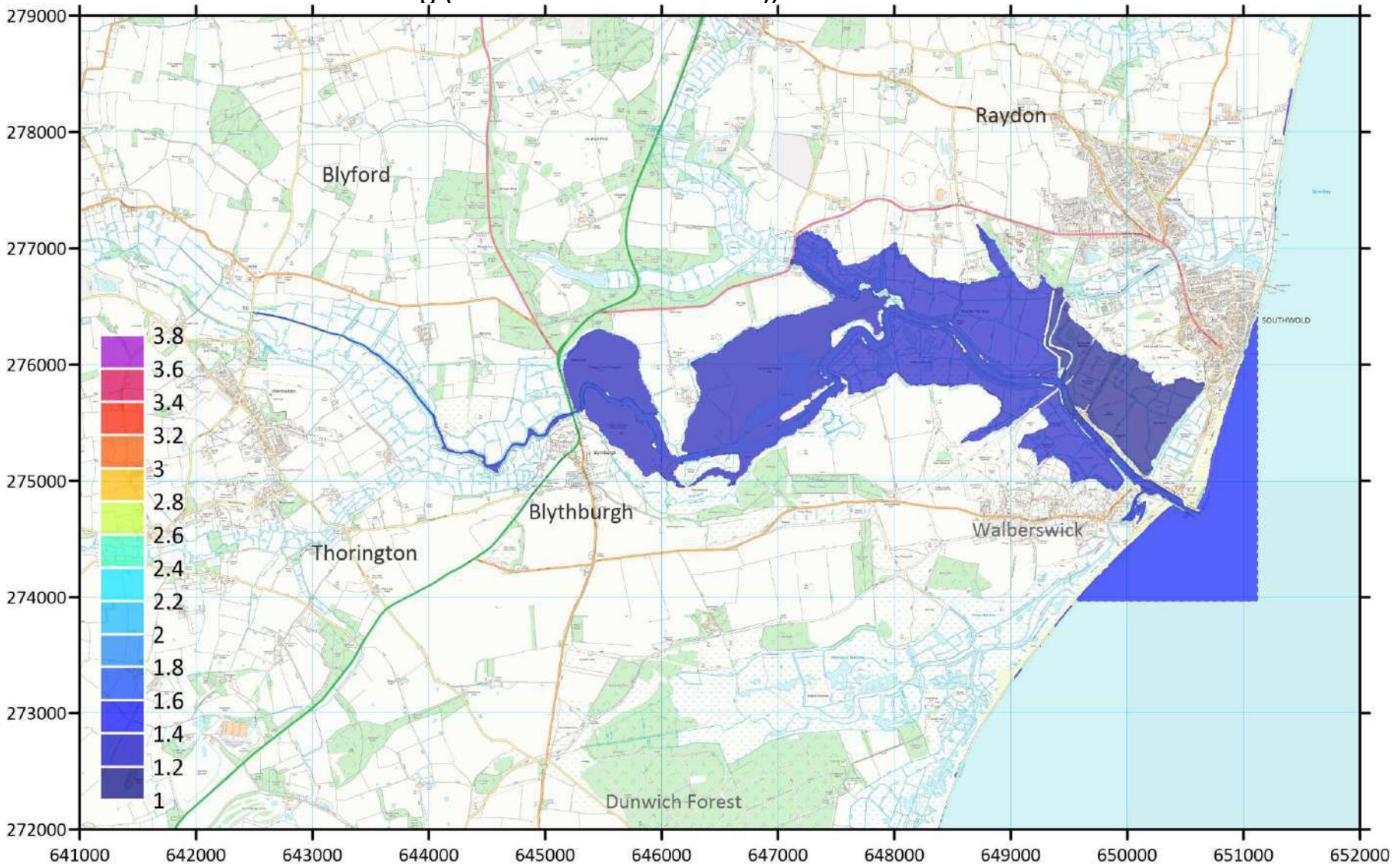
February 2020 conditions: E0 - Present-day estuary defences (Baseline), Marshes raised 600mm



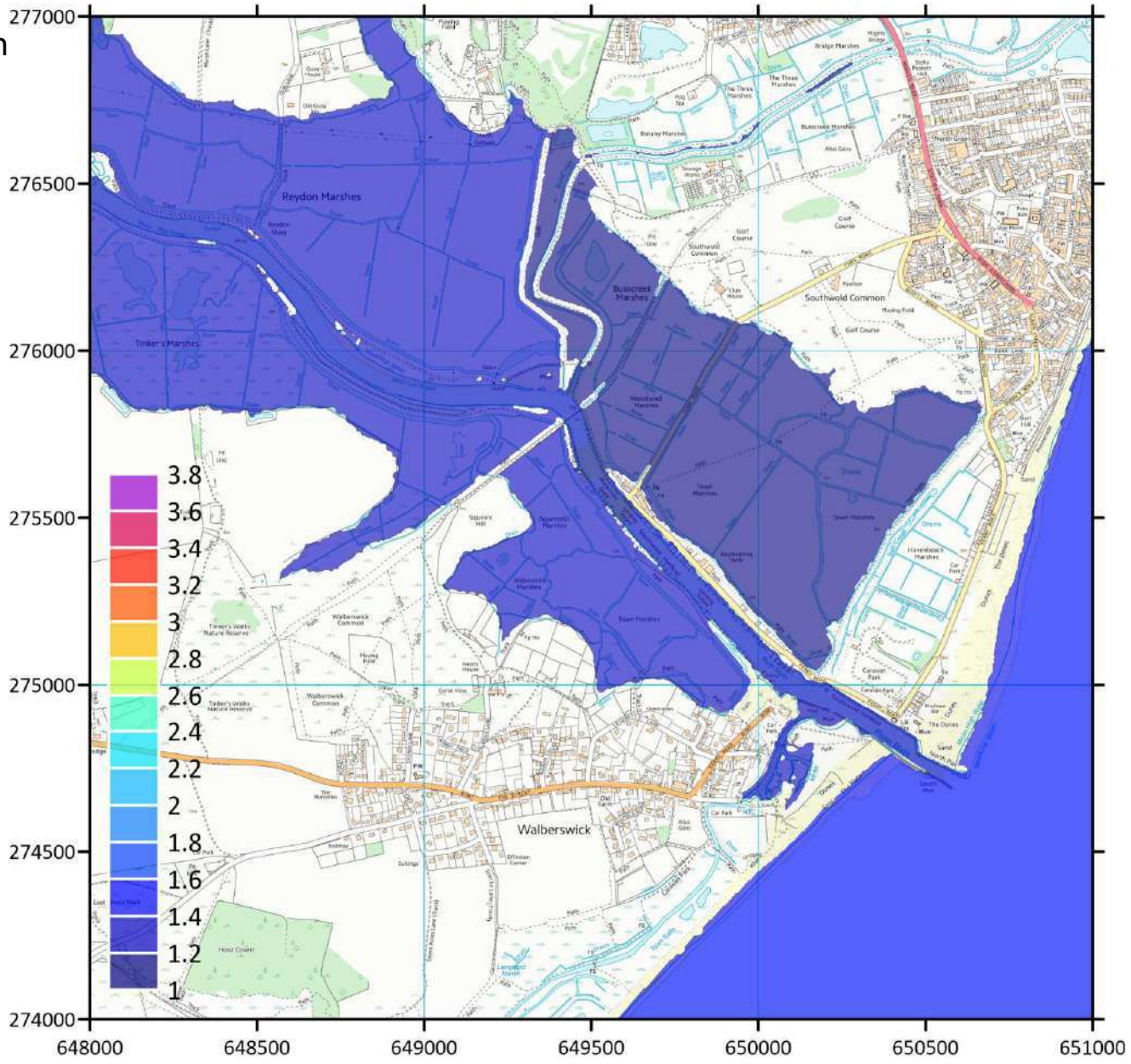
February 2020 condition
E0 - Present-day estuary defences (Baseline), Marshes raised 600mm
Zoom-in (downstream)



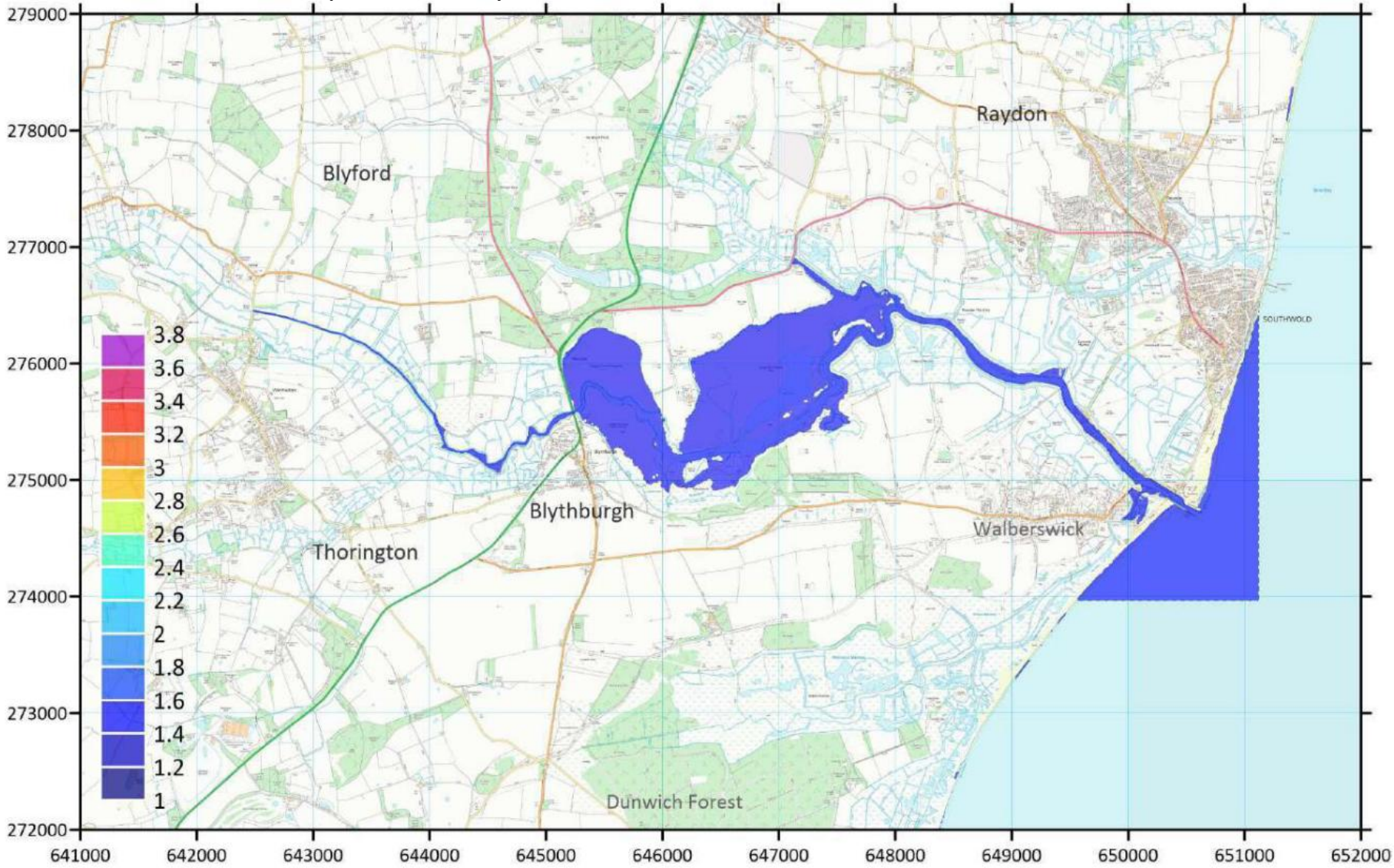
February 2020 conditions: E1 – Do Nothing (All embankments failed), Marshes raised 300mm



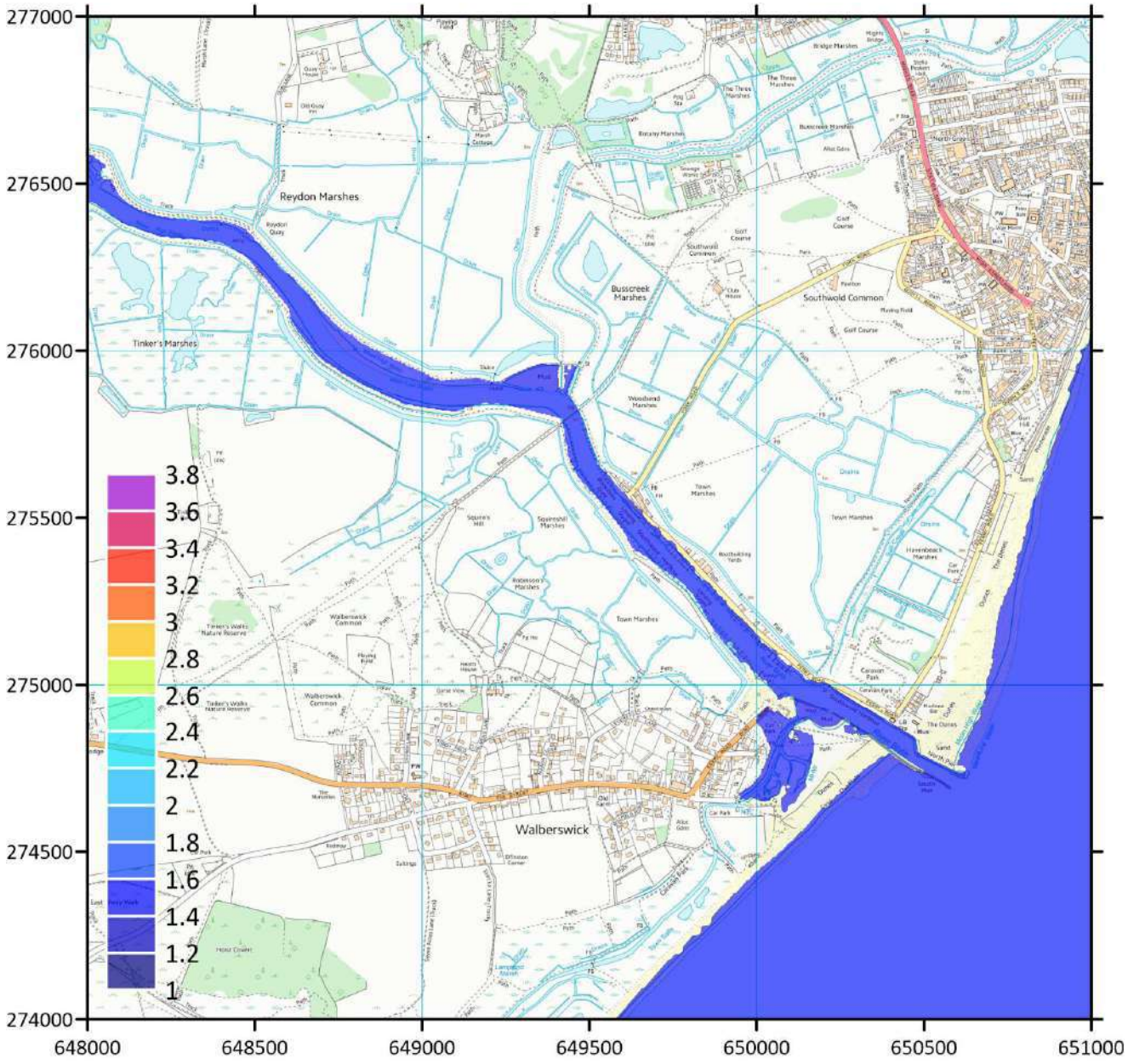
February 2020 condition
E1 – Do Nothing (All embankments failed), Marshes raised 300mm,
Zoom-in (downstream)



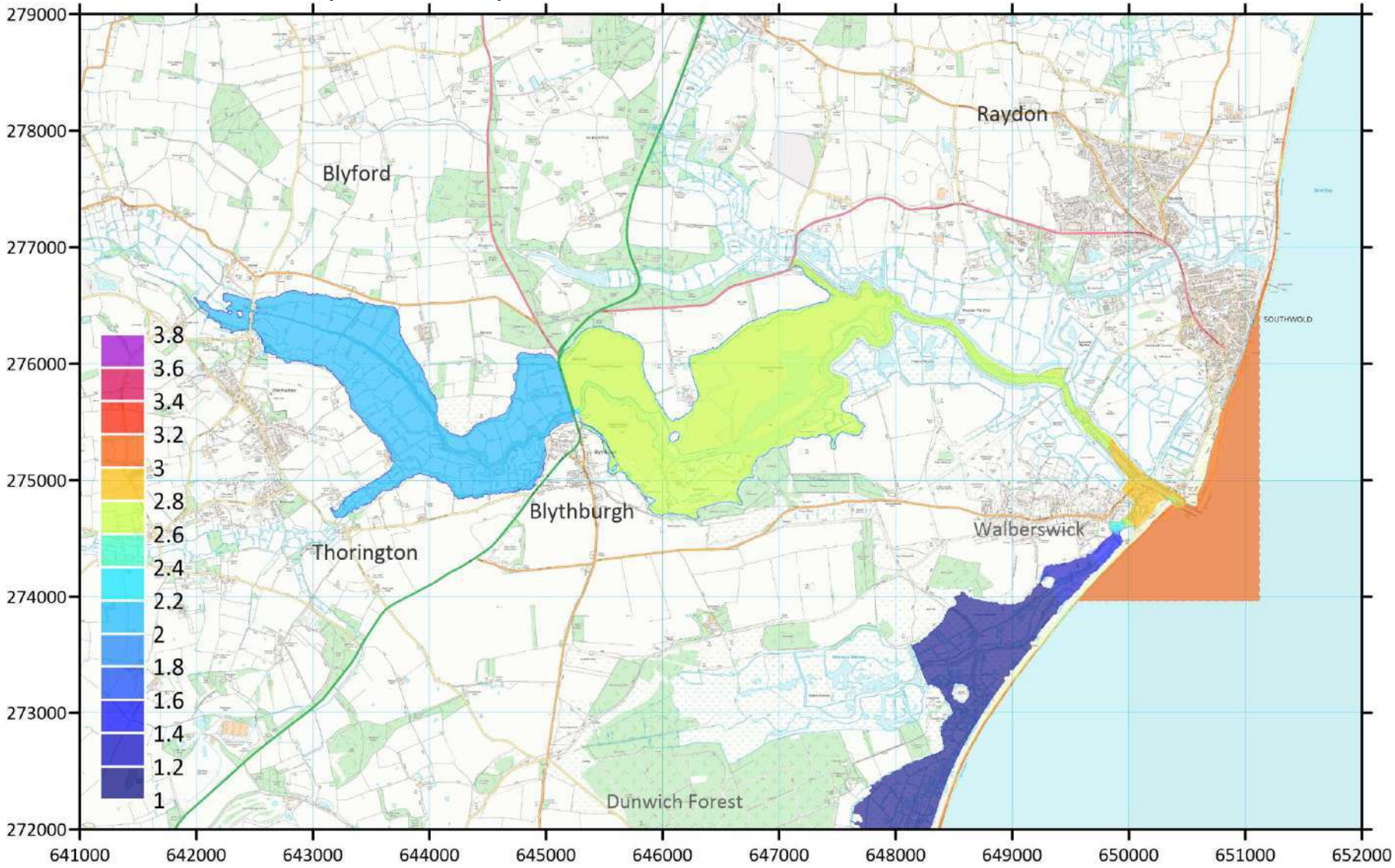
February 2020 conditions: E2 – Improve estuary defences, Marshes raised 300mm



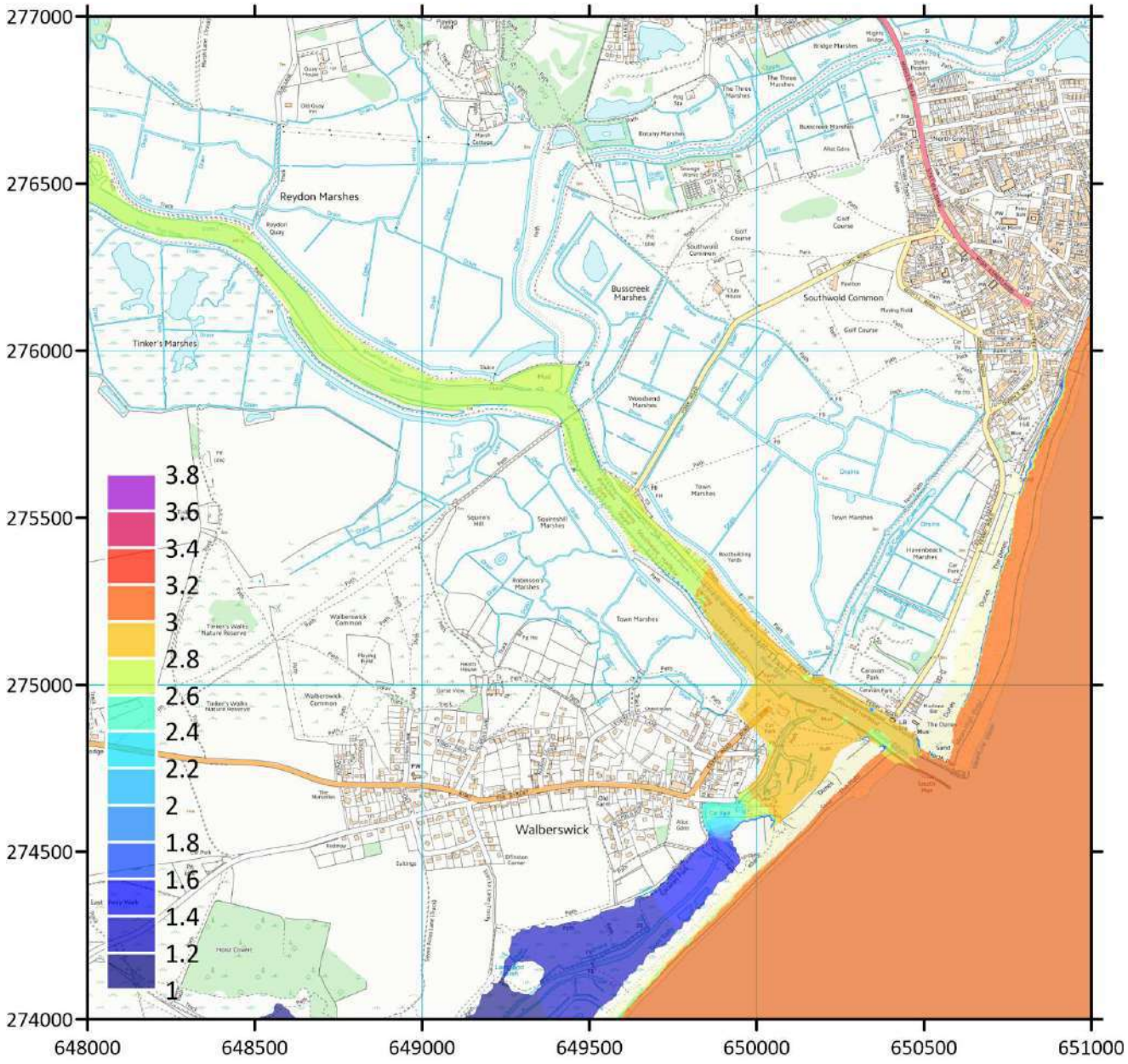
February 2020 conditions:
E2 – Improve estuary defences,
Marshes raised 300mm
Zoom-in (downstream)



February 2020 conditions: E2 – Improve estuary defences, Marshes raised 600mm



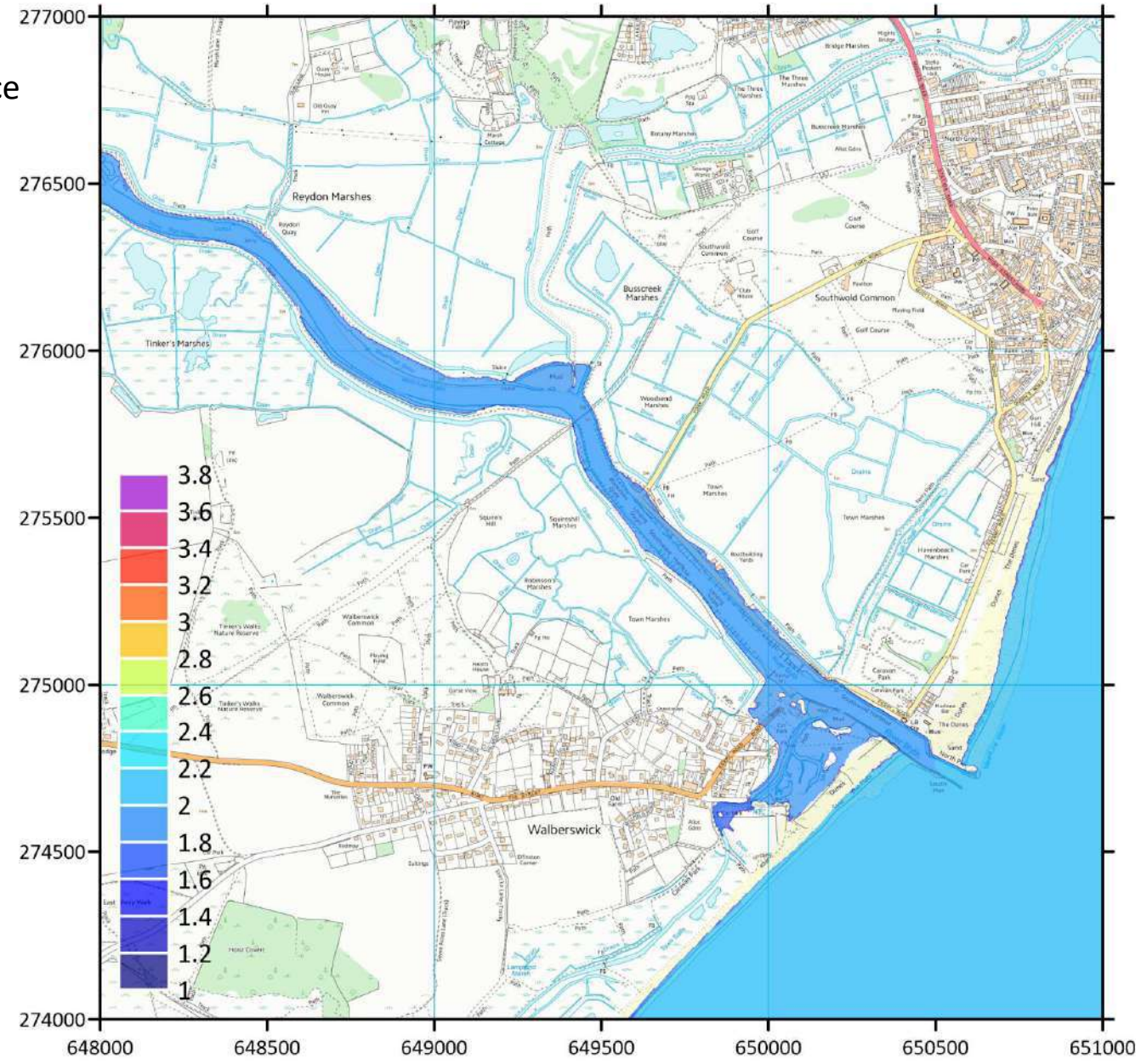
February 2020 conditions:
E2 – Improve estuary defences,
Marshes raised 600mm
Zoom-in (downstream)



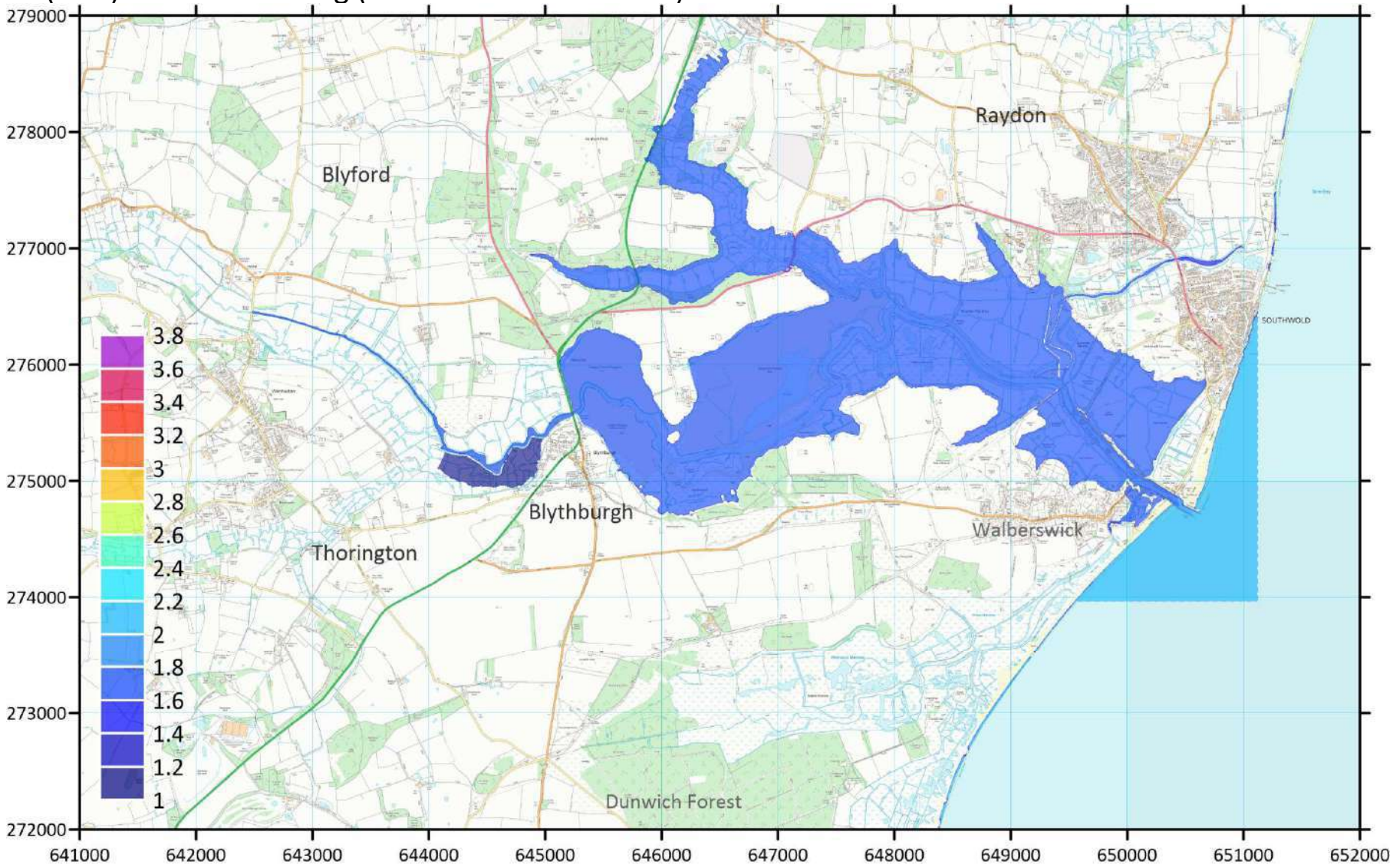
2020 conditions in 2070 – RCP2.6, 50%

2070 RCP2.6 (50%): E0 - Present day defences

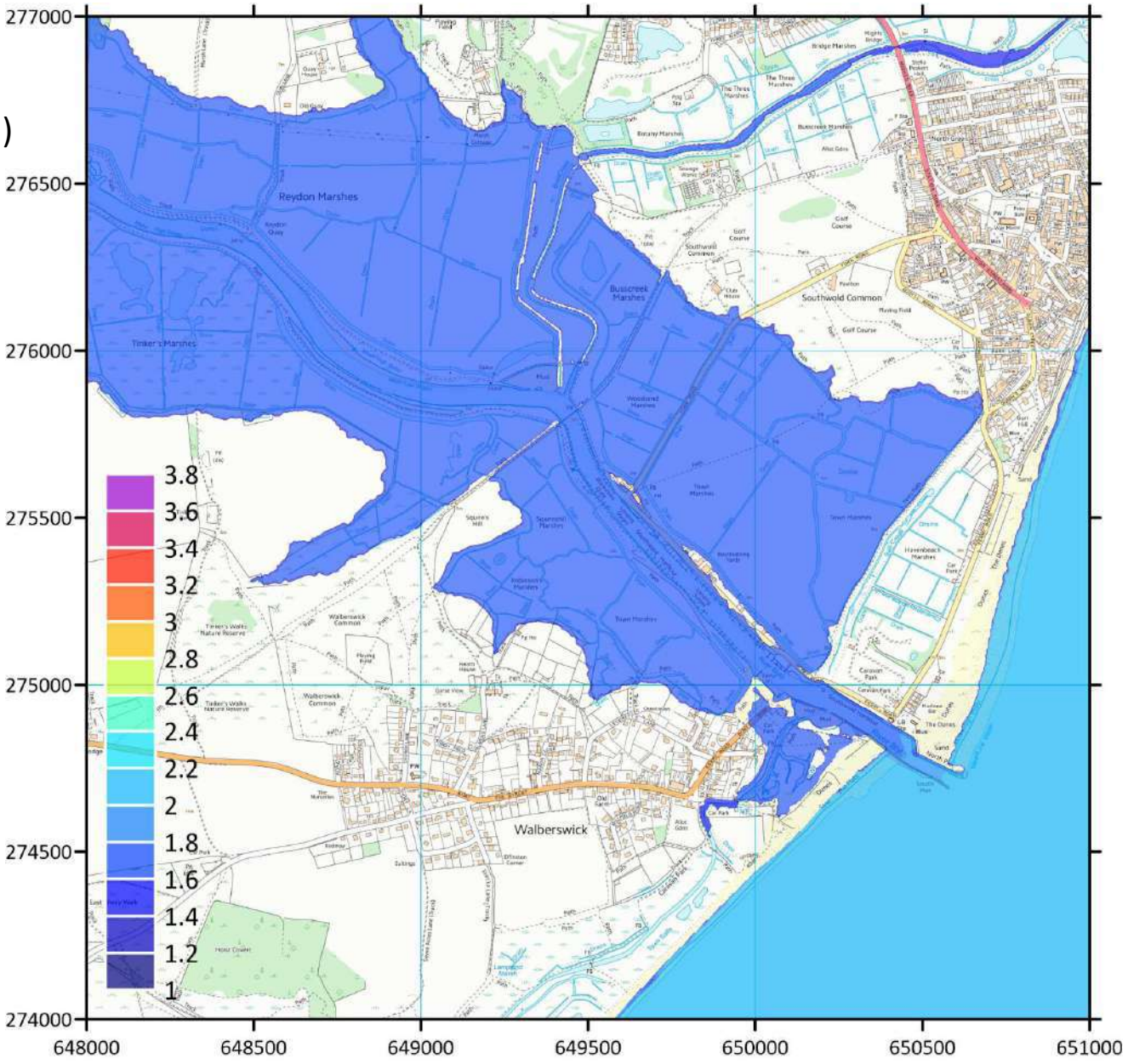
2070 RCP2.6 (50%):
E0 - Present day defence
Zoom in (downstream)



2070 RCP2.6 (50%): E1 – Do Nothing (All embankments failed)

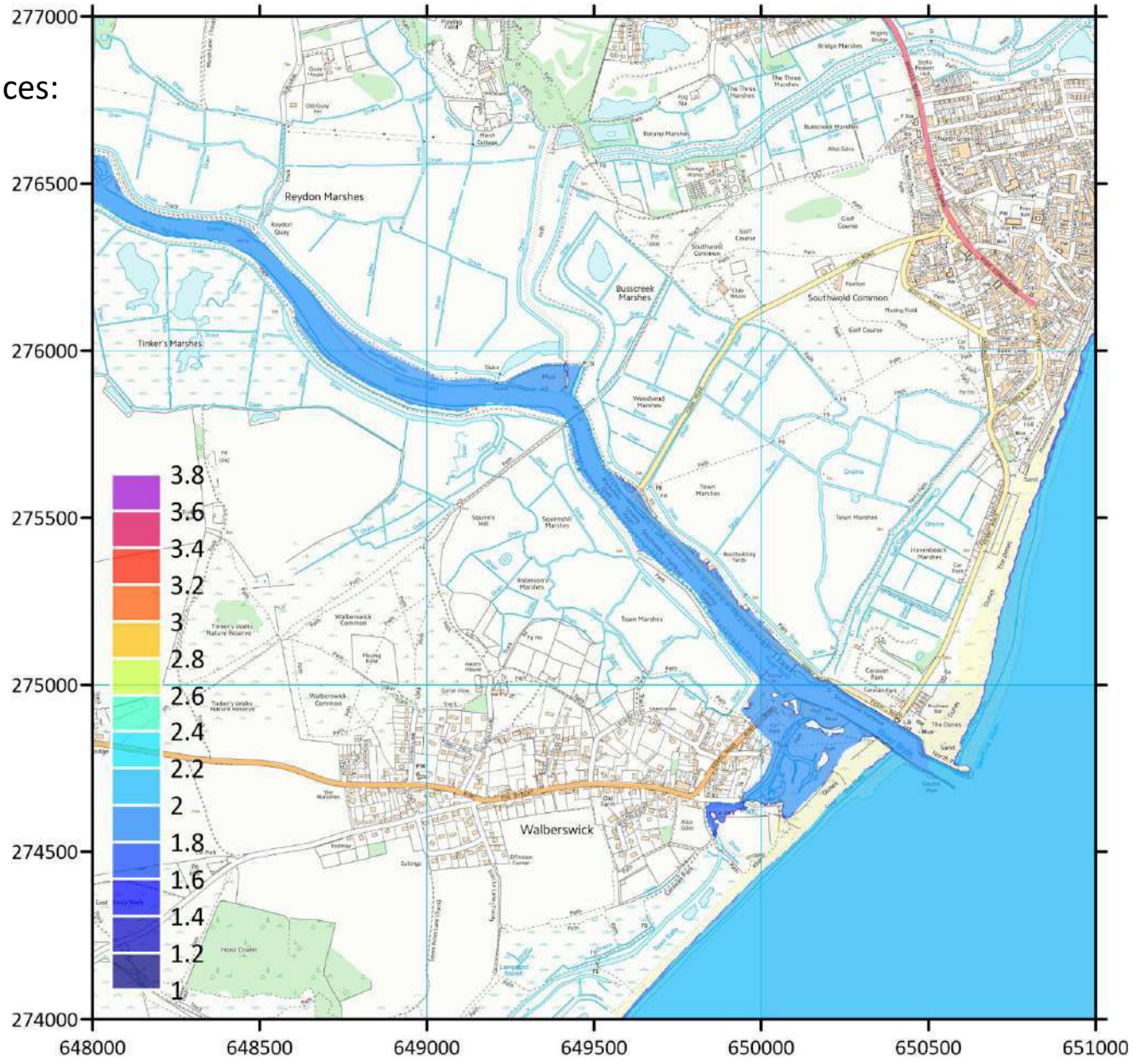


2070 RCP2.6 (50%):
E1 – Do Nothing
(All embankments failed)
Zoom in (downstream)



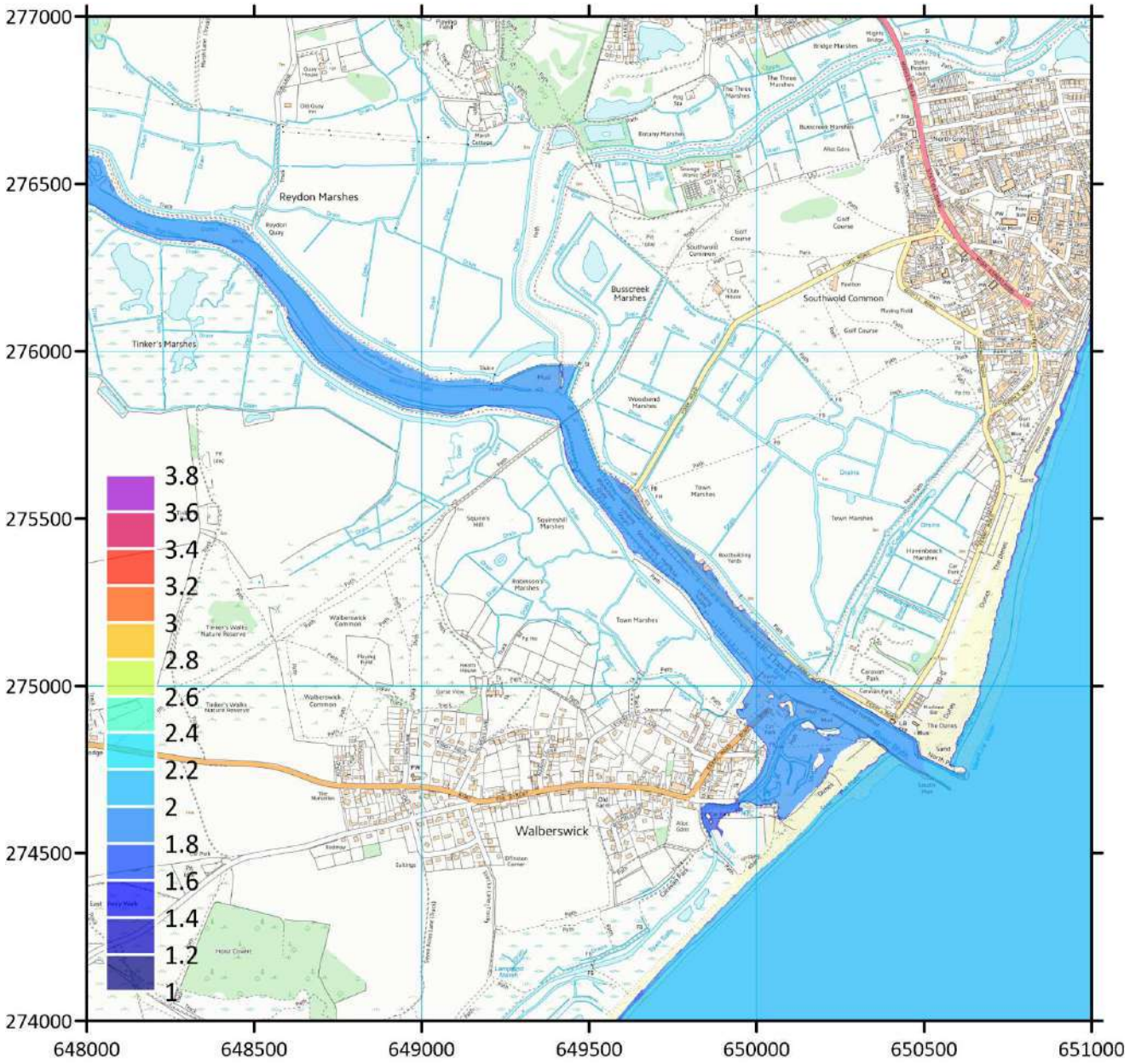
2070 RCP2.6 (50%): E2 – Raise estuary defences

2070 RCP2.6 (50%):
E2 - Raise estuary defences:
Zoom in (downstream)



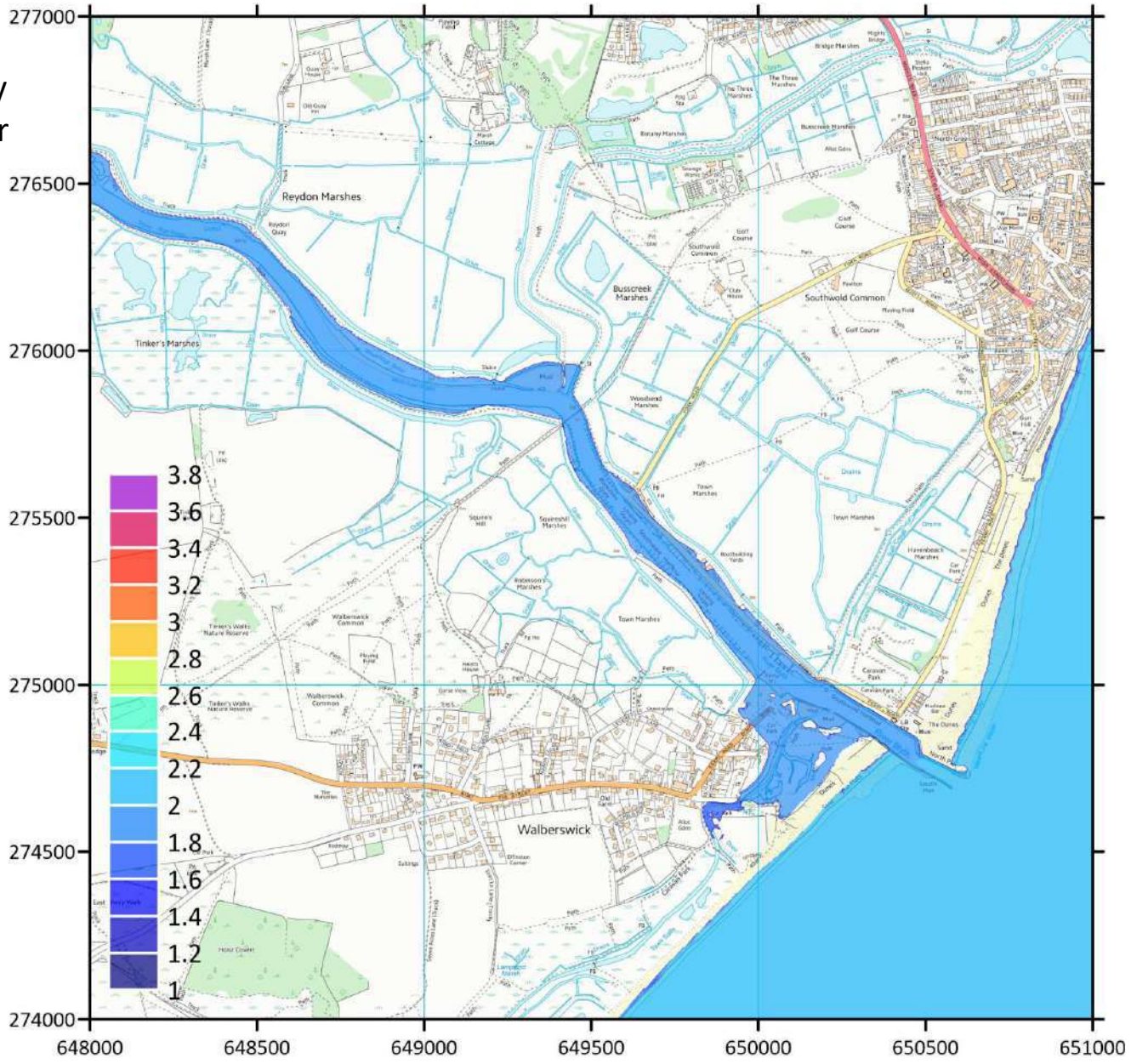
2070 RCP2.6 (50%): E3 – SMP Policy (Raise N banks, S banks overtopped)

2070 RCP2.6 (50%):
E3 – SMP Policy
(Raise N banks,
S banks overtopped)
Zoom in (downstream)



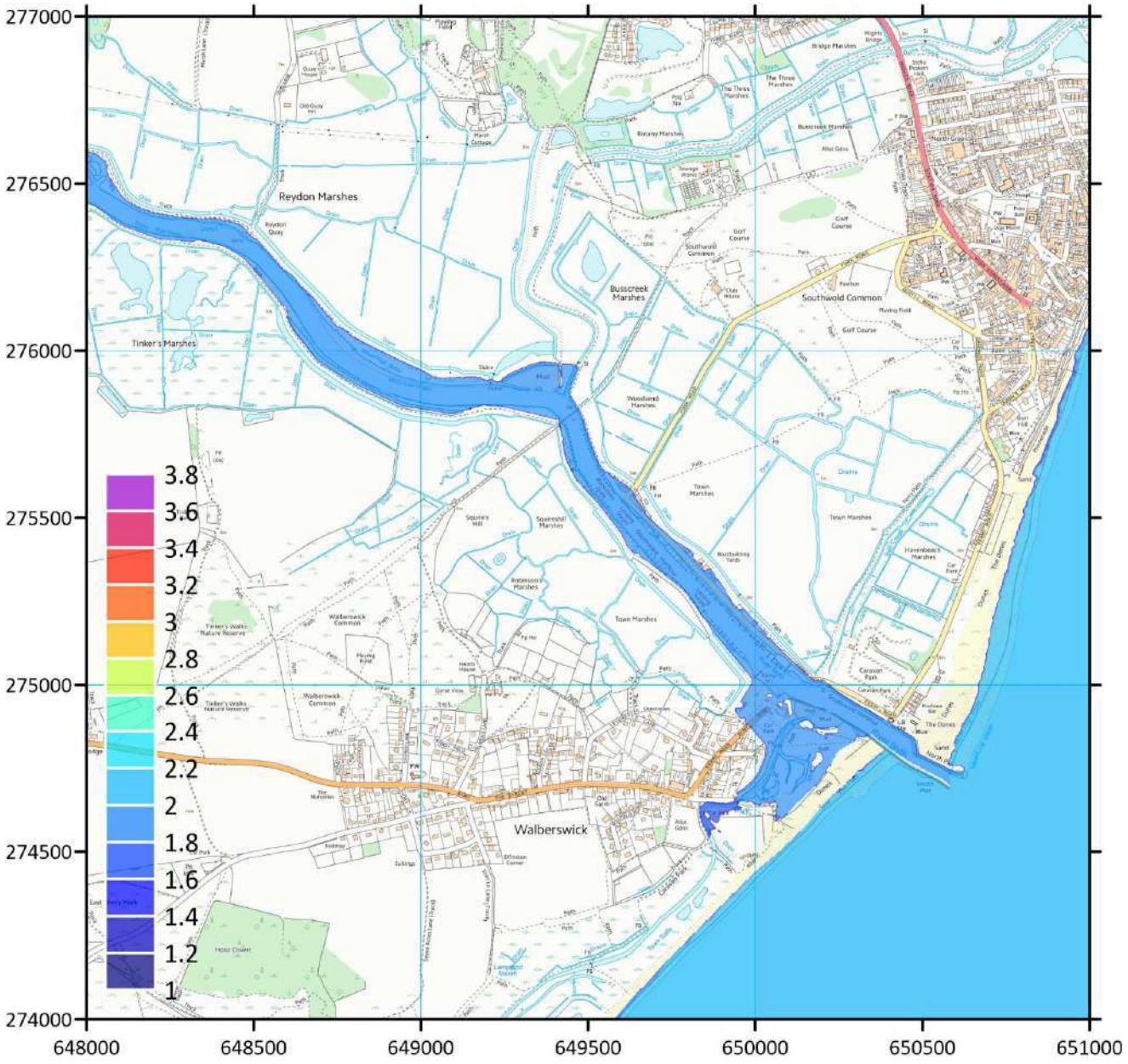
2070 RCP2.6 (50%): H0 - Present day estuary defences, reduced S Pier

2070 RCP2.6 (50%):
H0 - Present day estuary defences, reduced S Pier
Zoom in (downstream)

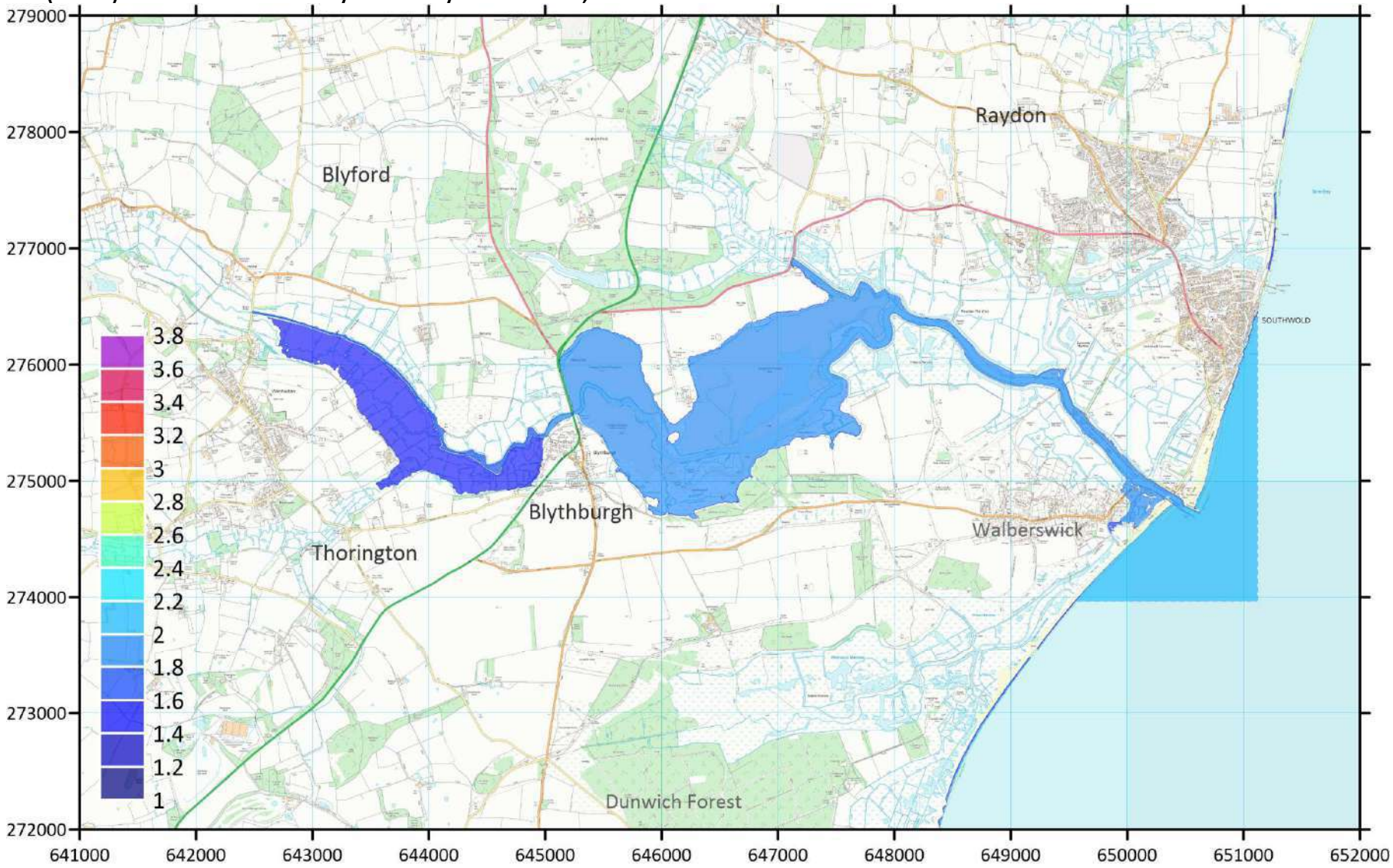


2070 RCP2.6 (50%): F0 - Present day estuary defences, solid S Pier

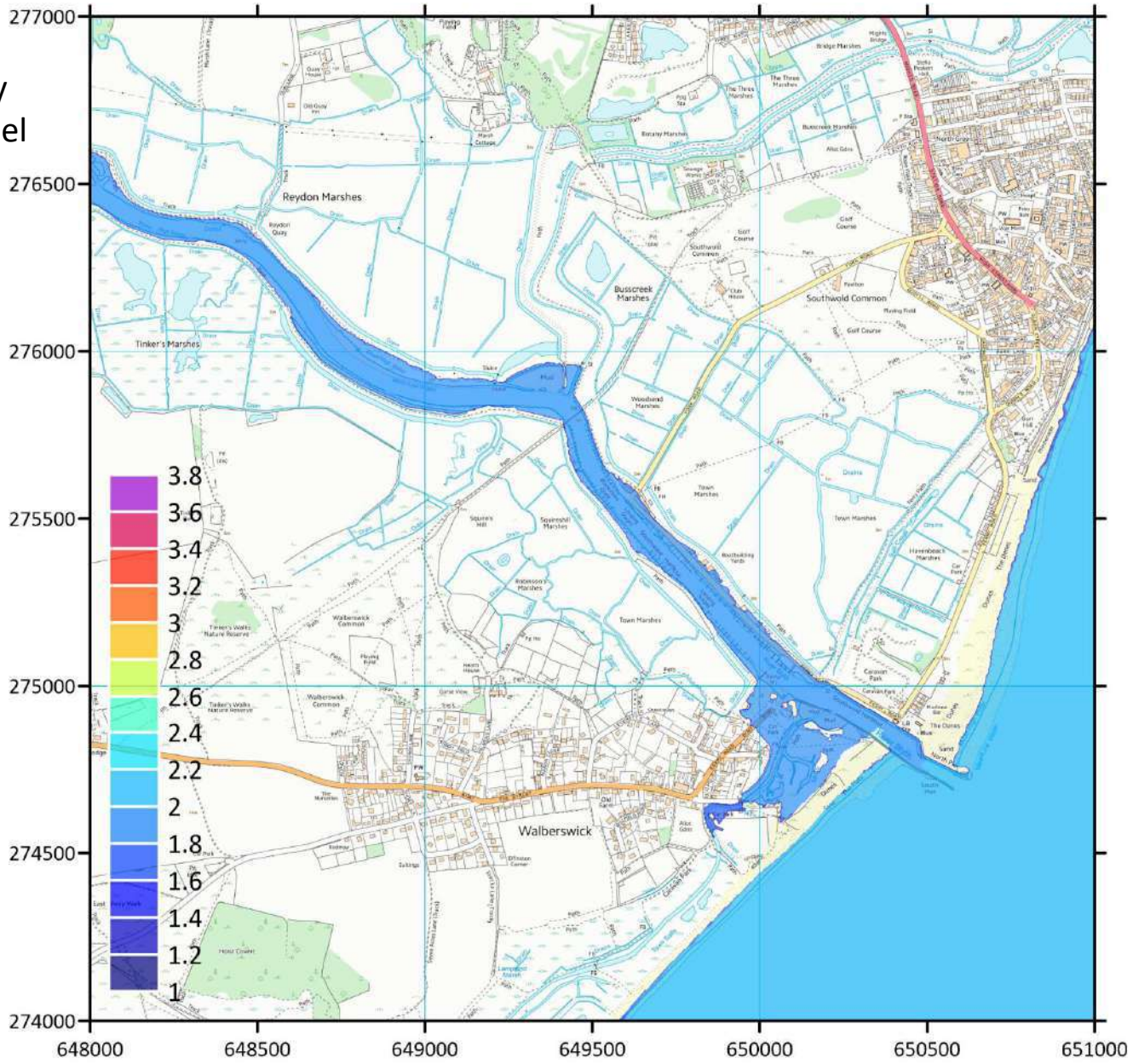
2070 RCP2.6 (50%):
F0 - Present day estuary defences, solid S Pier
Zoom in (downstream)



2070 RCP2.6 (50%): G0 - Present day estuary defences, narrow channel

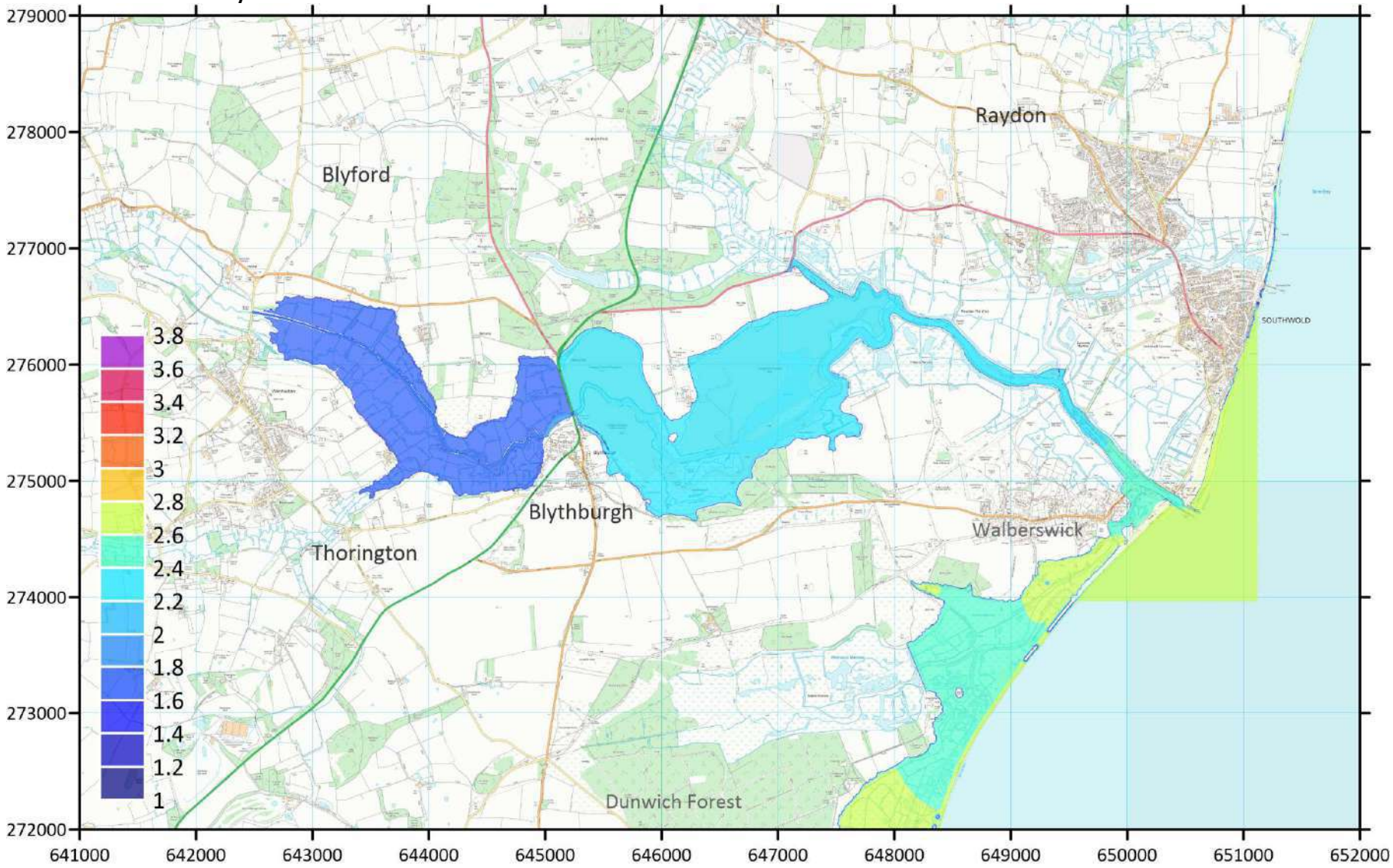


2070 RCP2.6 (50%):
G0 - Present day estuary defences, narrow channel
Zoom in (downstream)

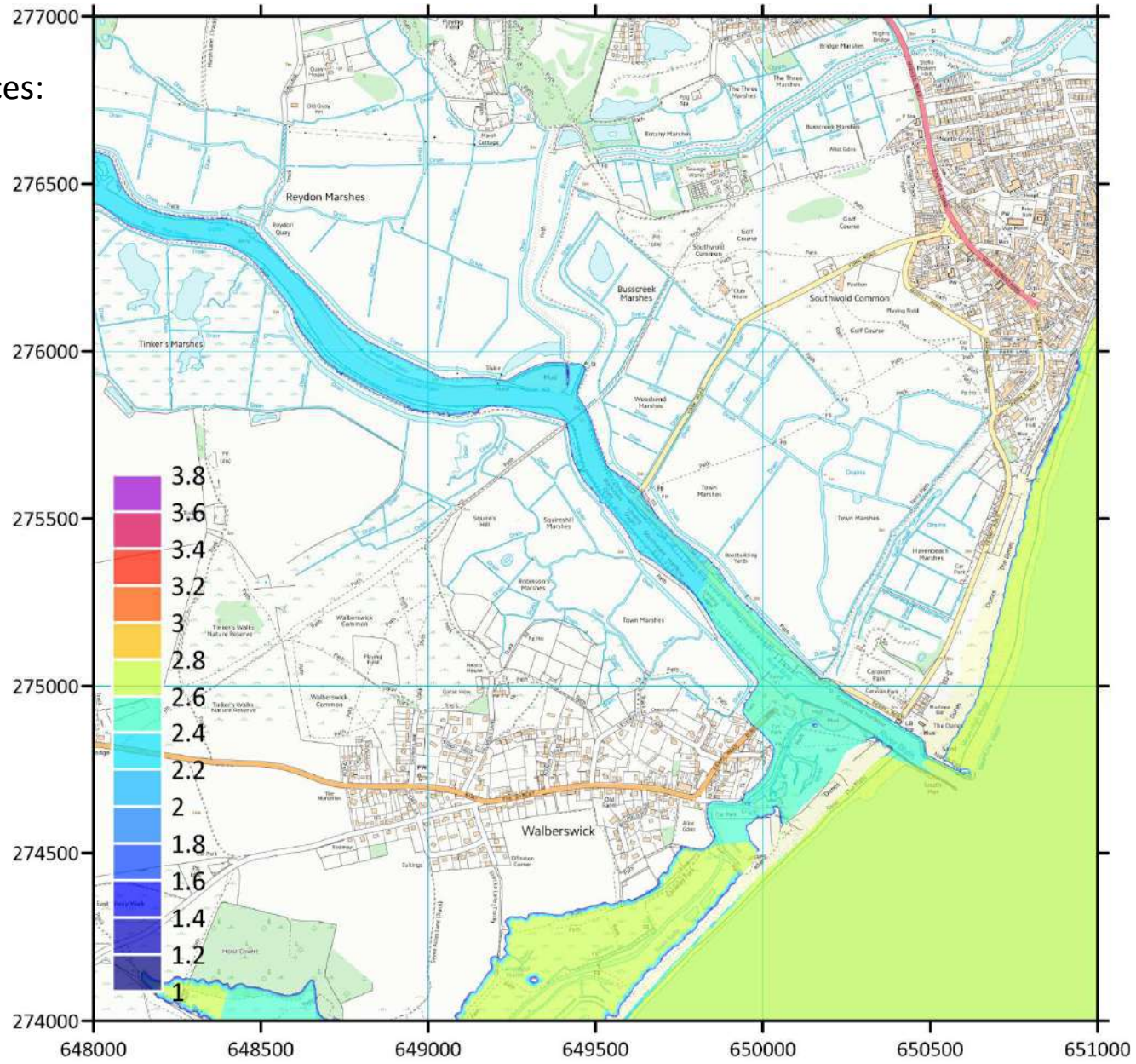


2.7m Sea Level
(2013 event conditions -0.4m)

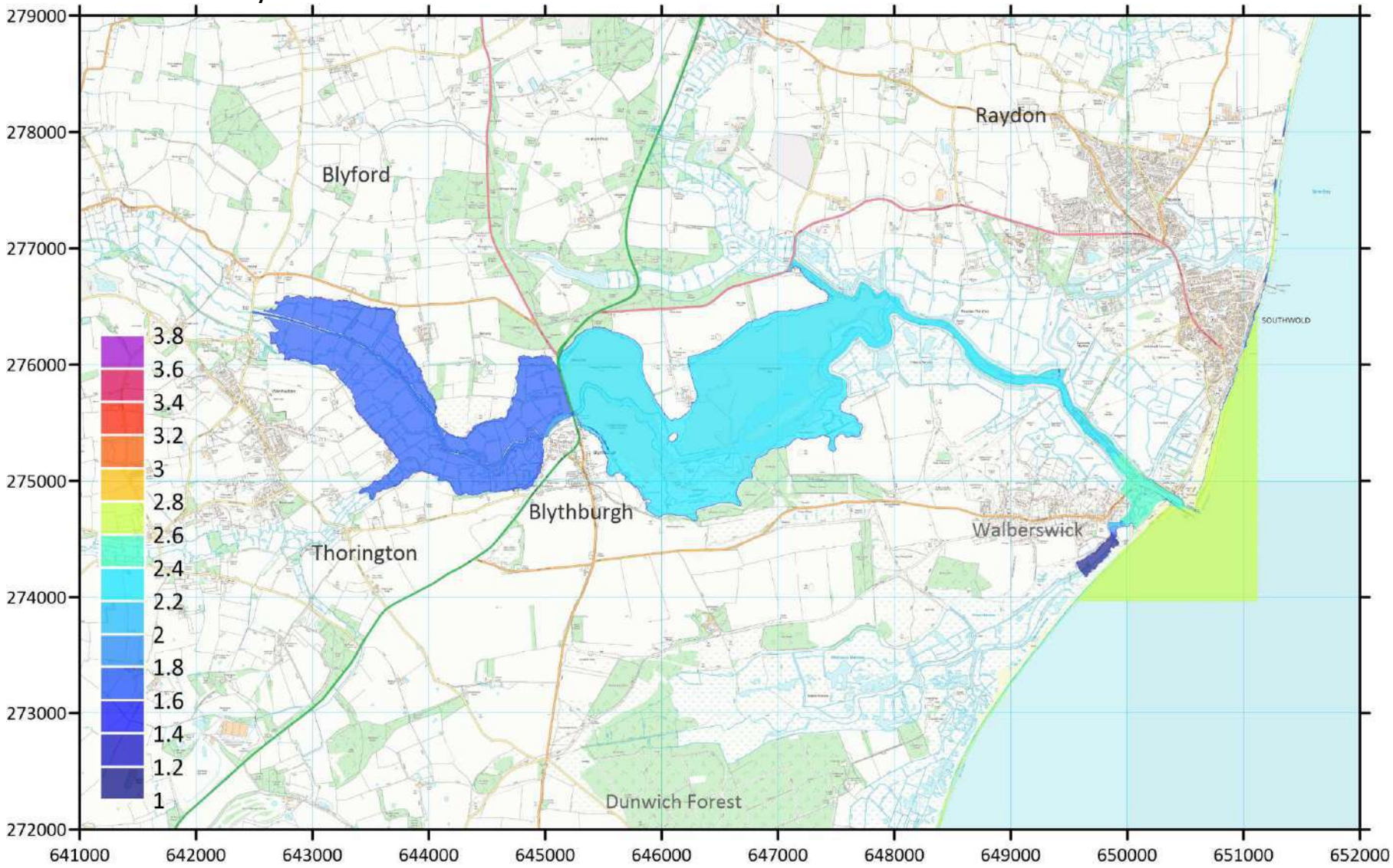
2013 -0.4m: E0 - Present day defences



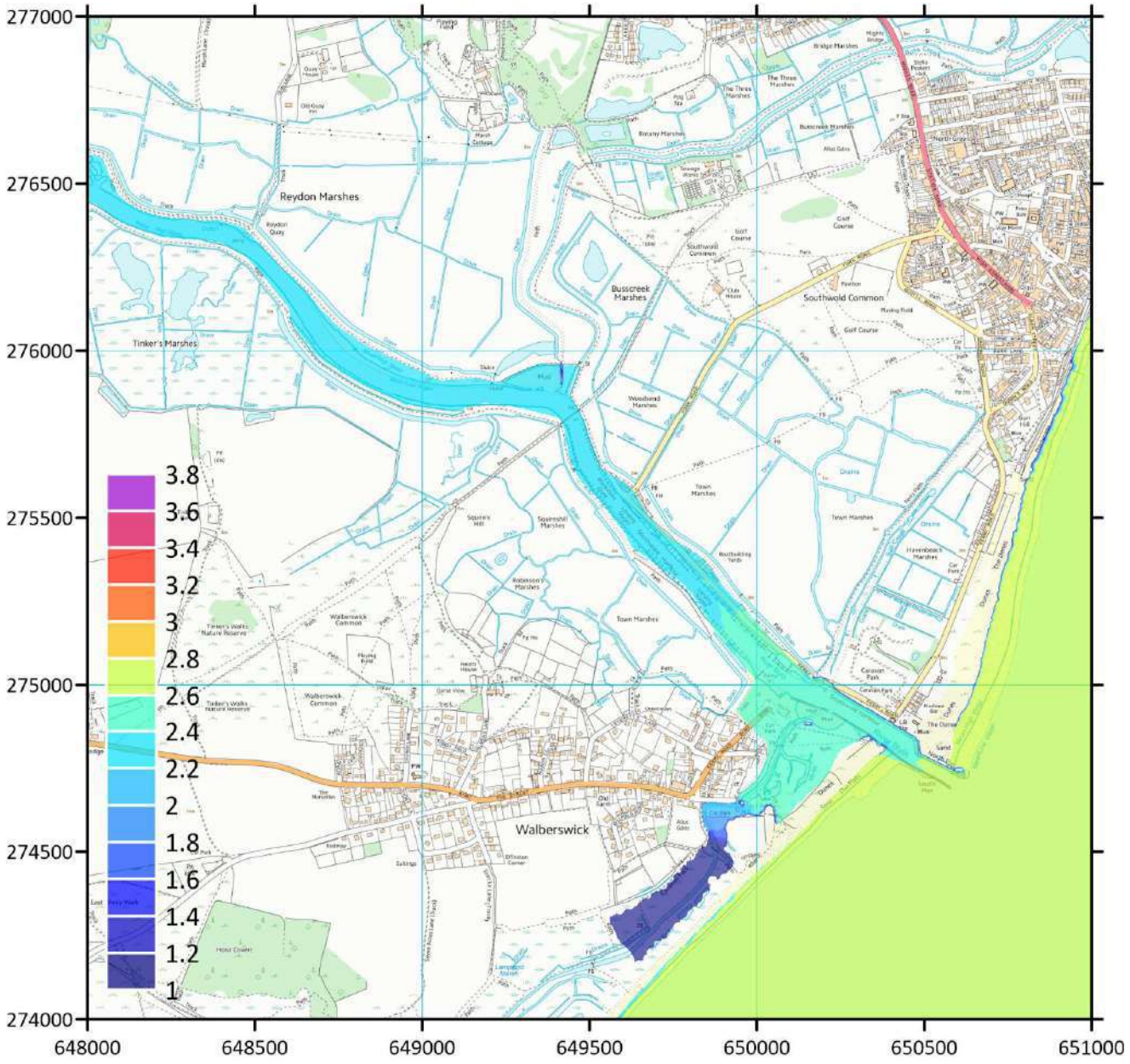
2013 -0.4m:
E0 – Present day defences:
Zoom in (downstream)



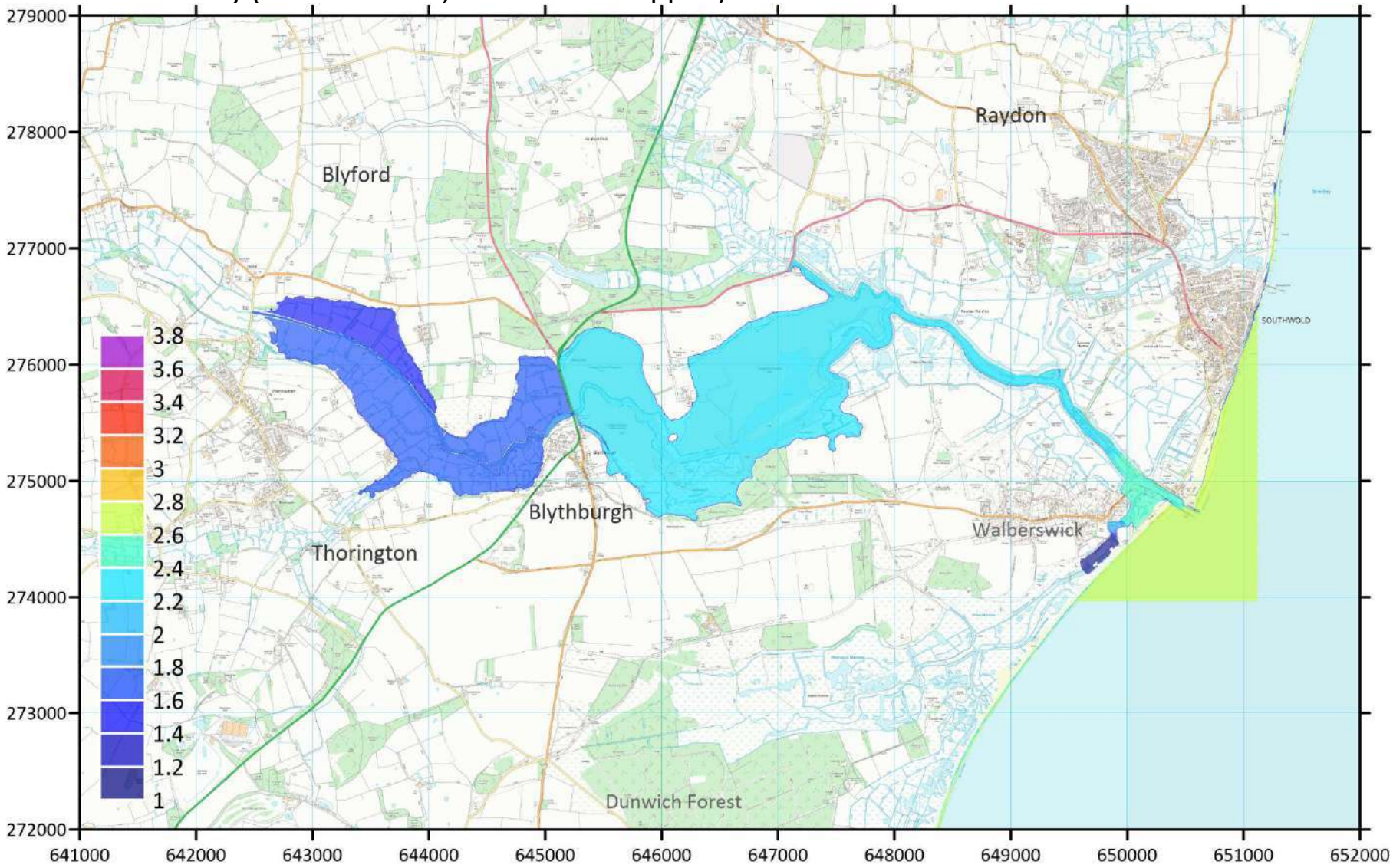
2013 -0.4m: E2 - Raise estuary defences



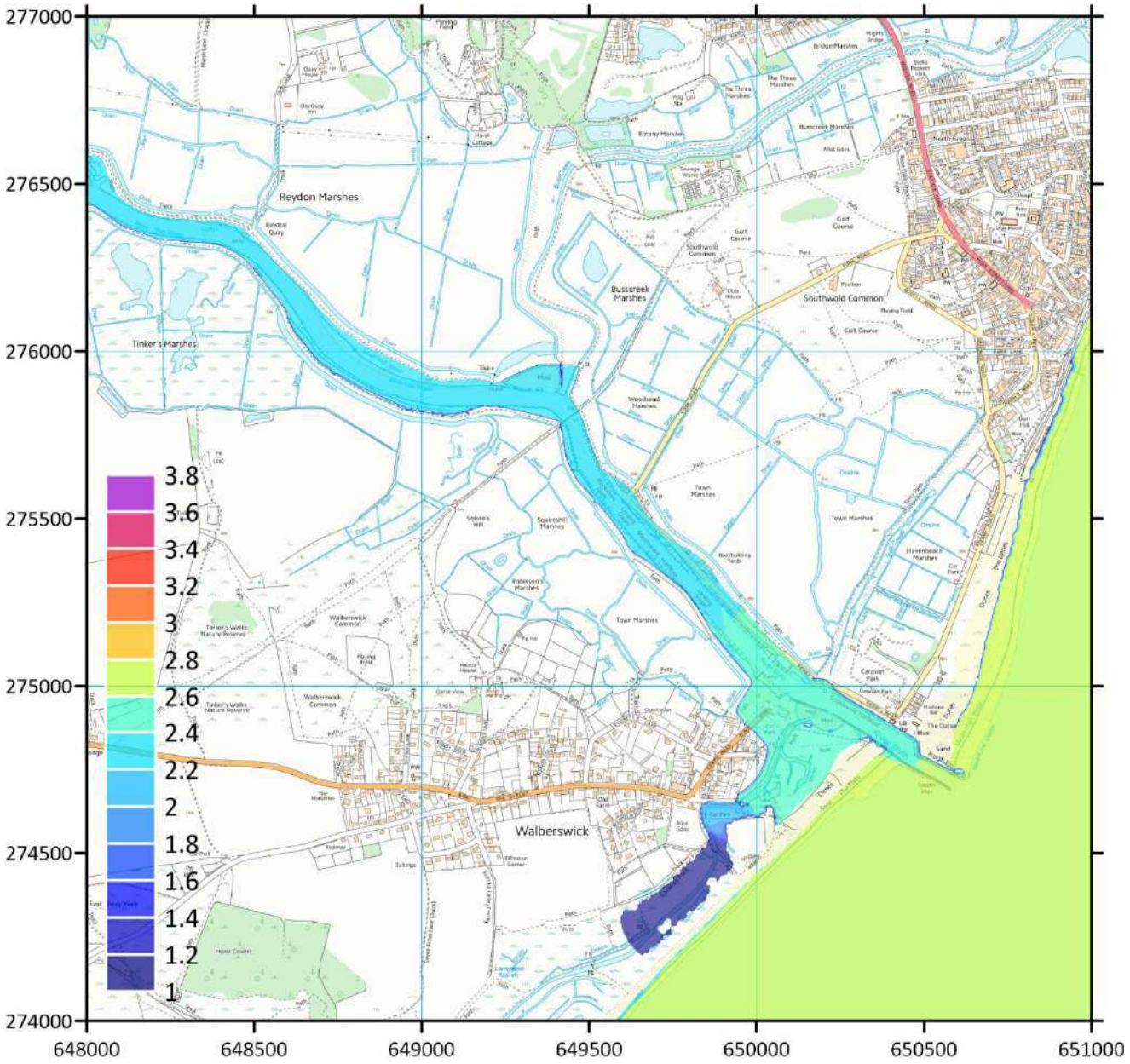
2013 -0.4m:
E2 – Raise estuary defences:
Zoom in (downstream)



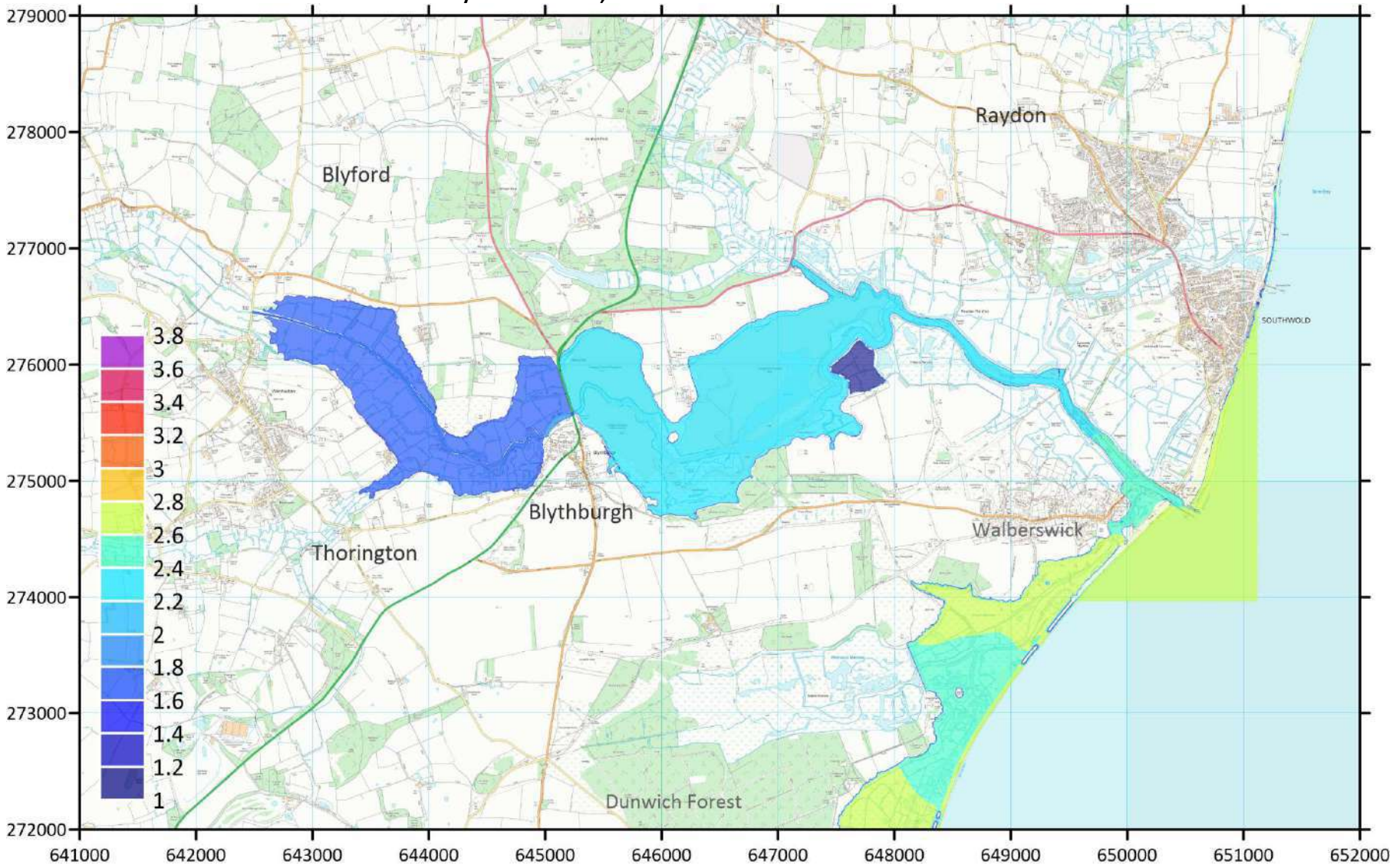
2013 -0.4m: E3 – SMP Policy (Raise N banks, S banks overtopped)



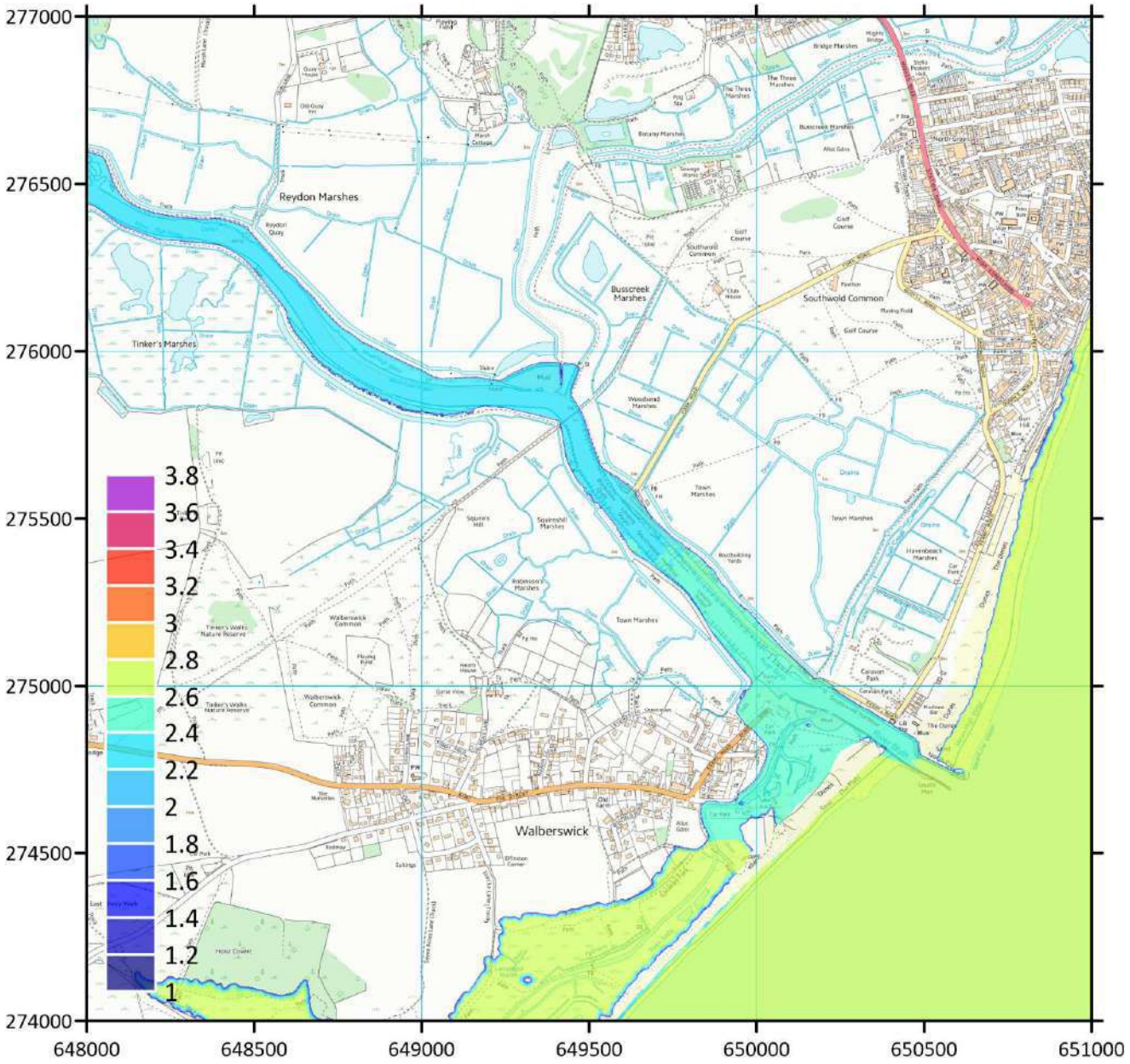
2013 -0.4m:
E3 – SMP Policy
(Raise N banks,
S banks overtopped)
Zoom in (downstream)



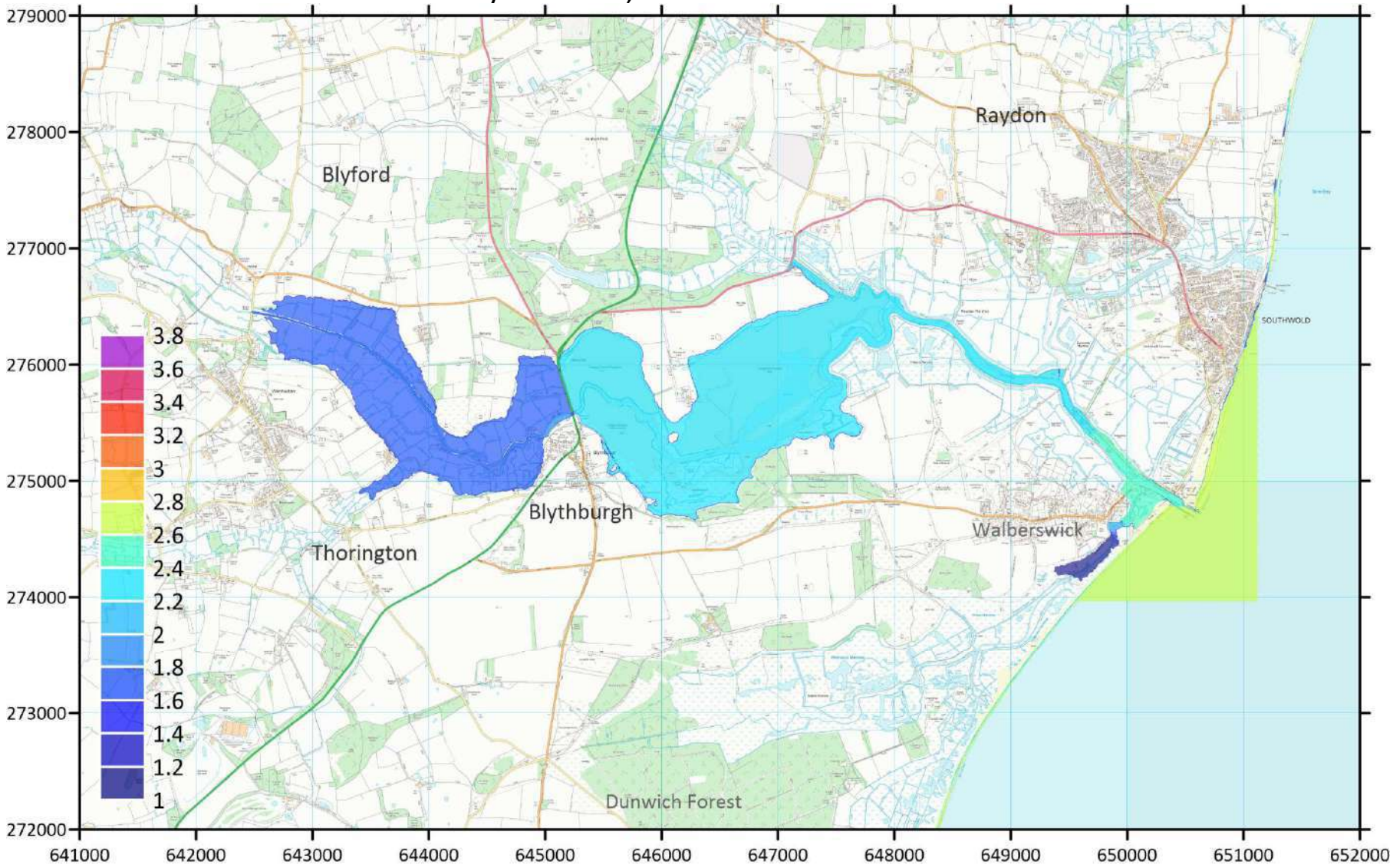
2013 event conditions -0.4m: E0 - Present day defences, Marshes raised 300mm



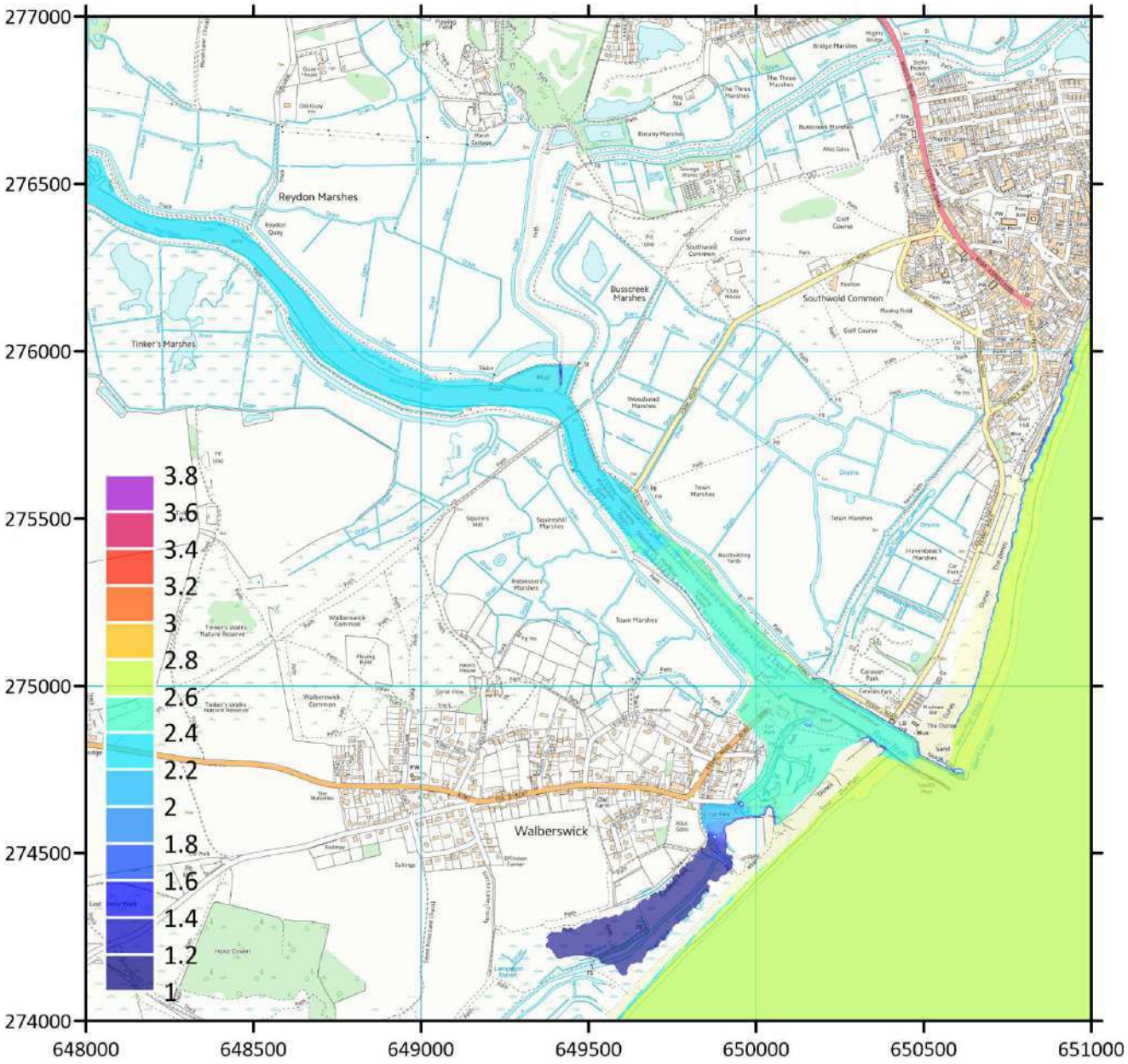
2013 event -0.4m:
E0 - Present day
Defences
Marshes raised 300mm
Zoom in (upstream)



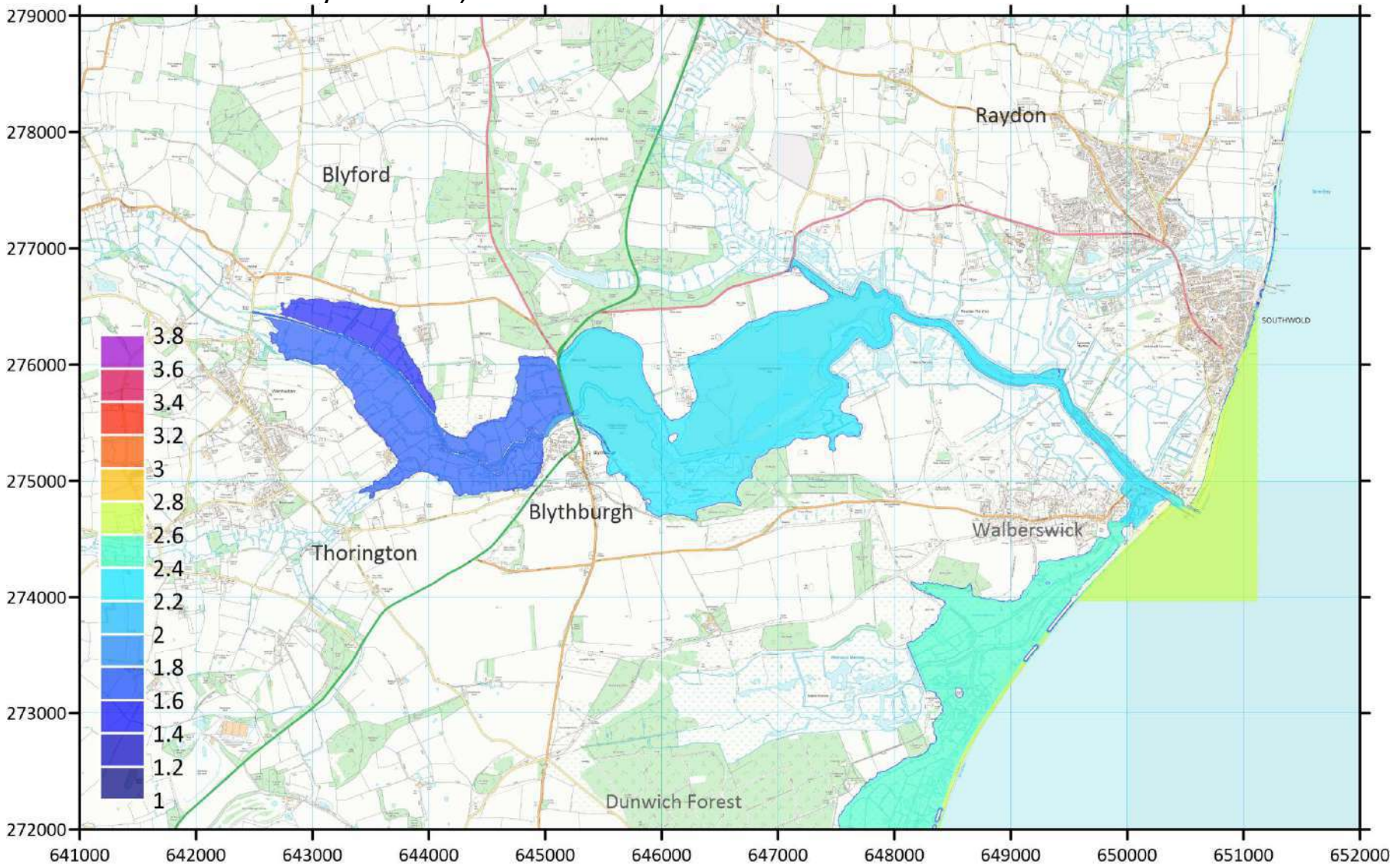
2013 event conditions -0.4m: E2 – Raise estuary defences, Marshes raised 300mm



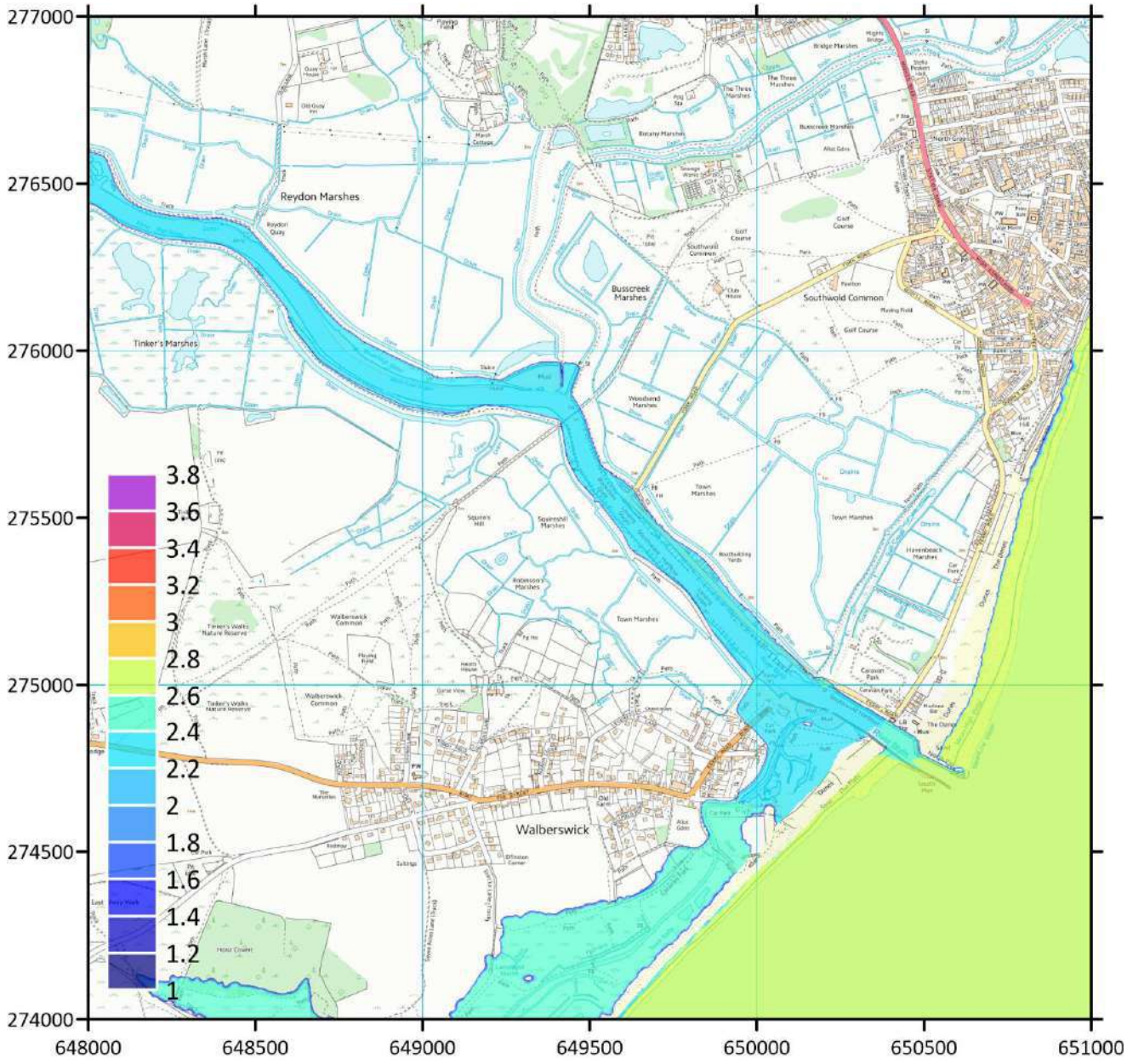
2013 event -0.4m:
E2 – Raise estuary defences
Marshes raised 300mm
Zoom in (upstream)



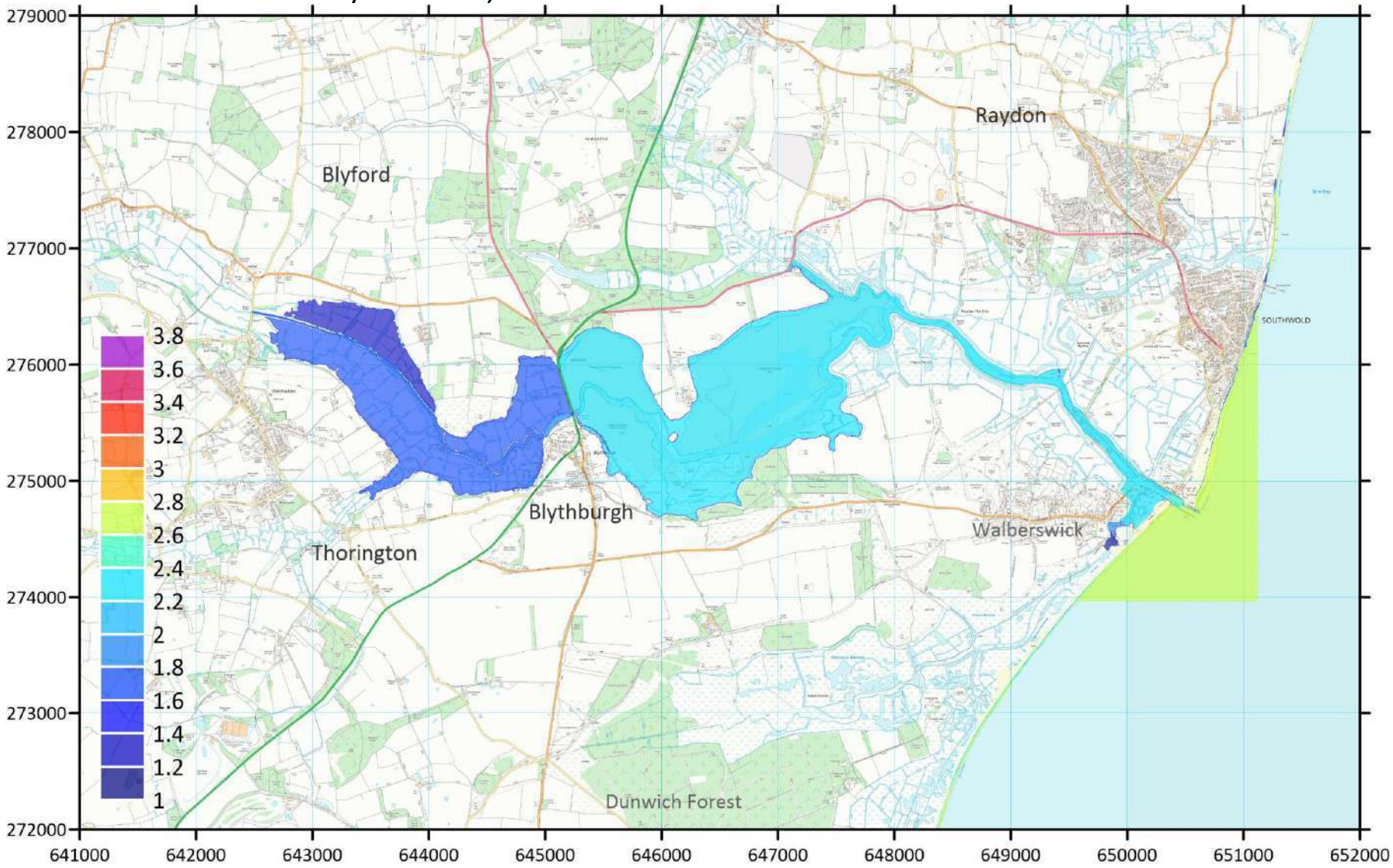
2013 event -0.4m: G0 - Present day defences, narrow channel



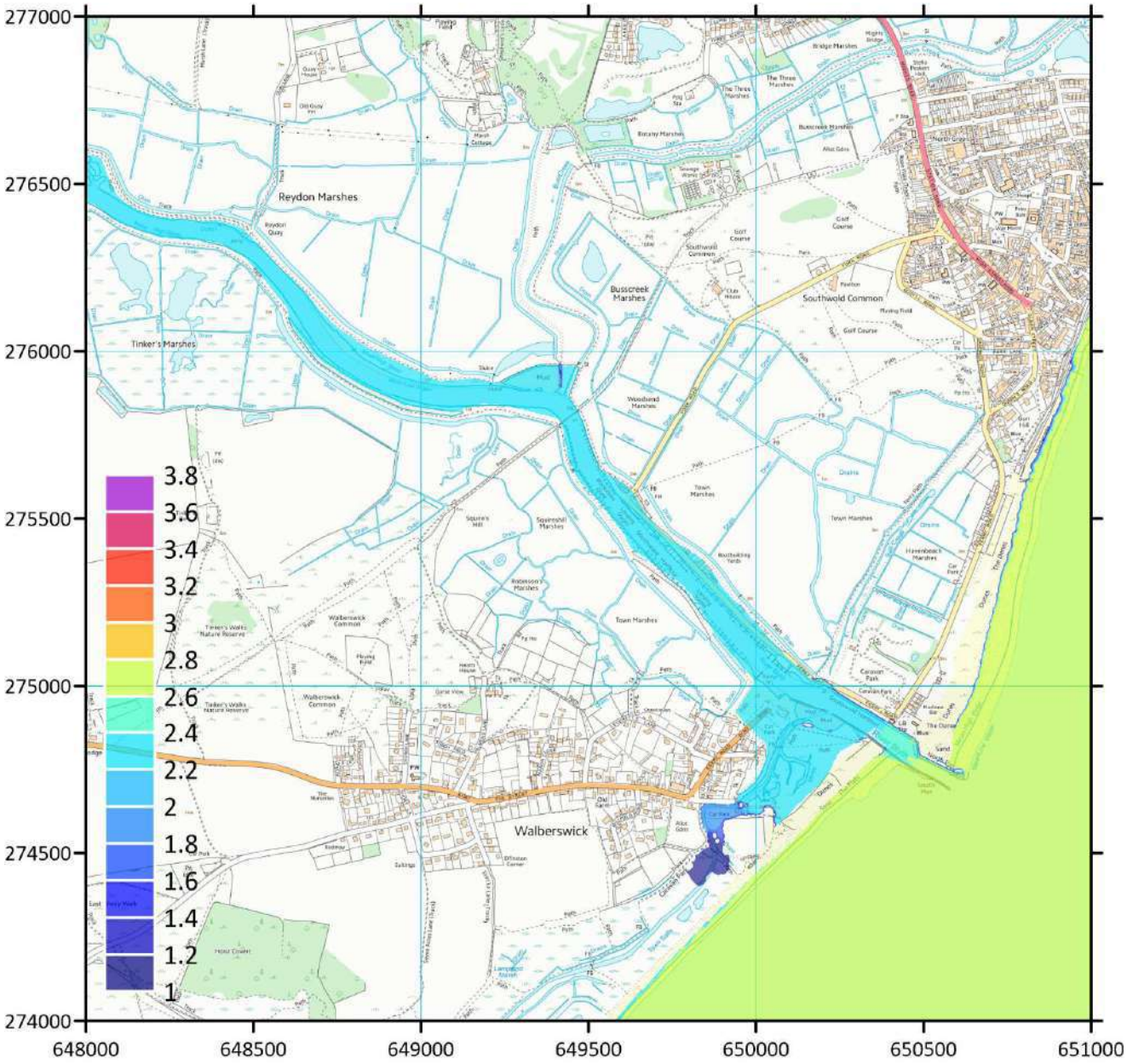
2013 event -0.4m:
G0 – Present day defences, narrow channel
Zoom in (downstream)



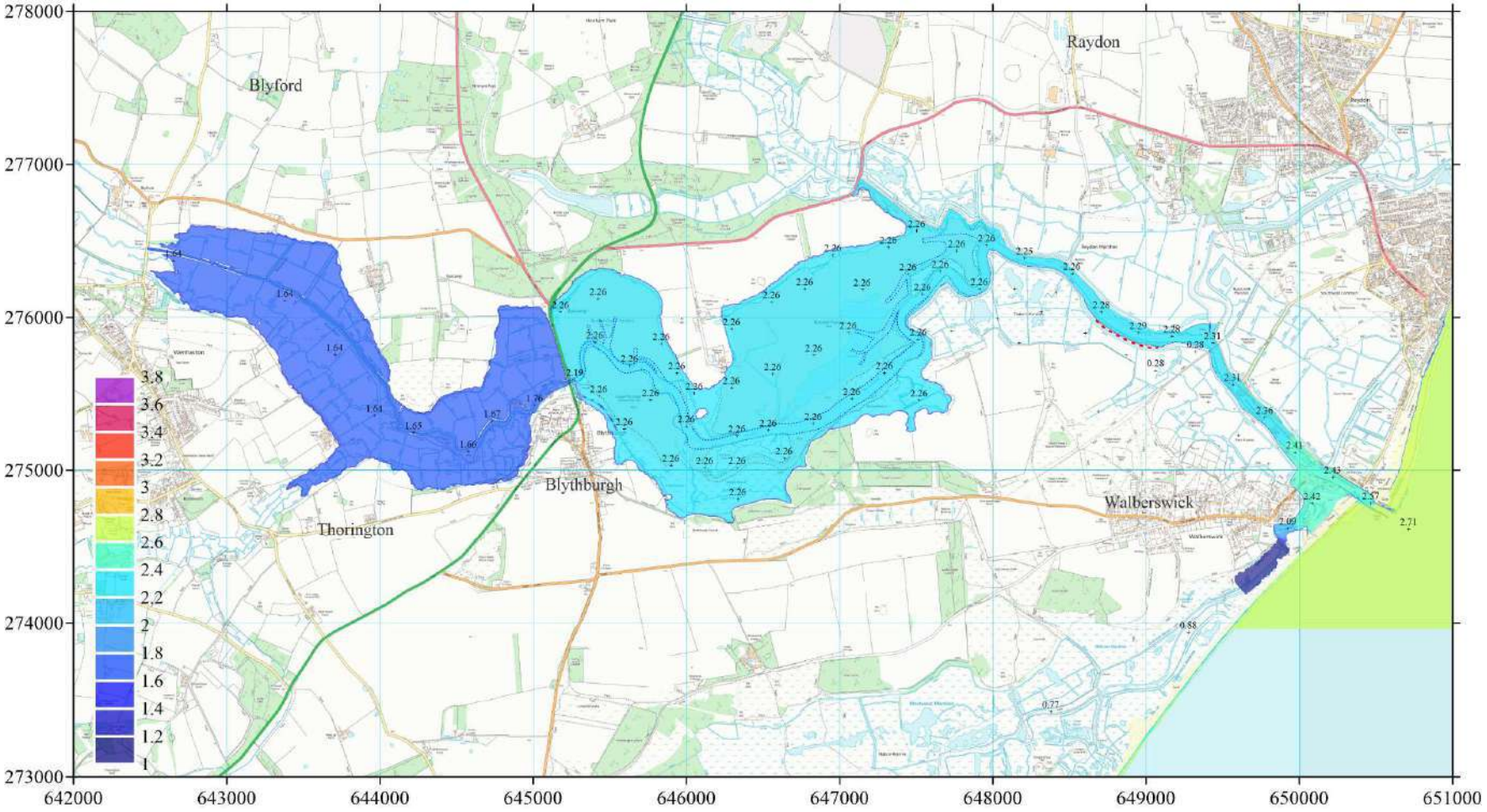
2013 event -0.4m: G2 – Raise estuary defences, narrow channel



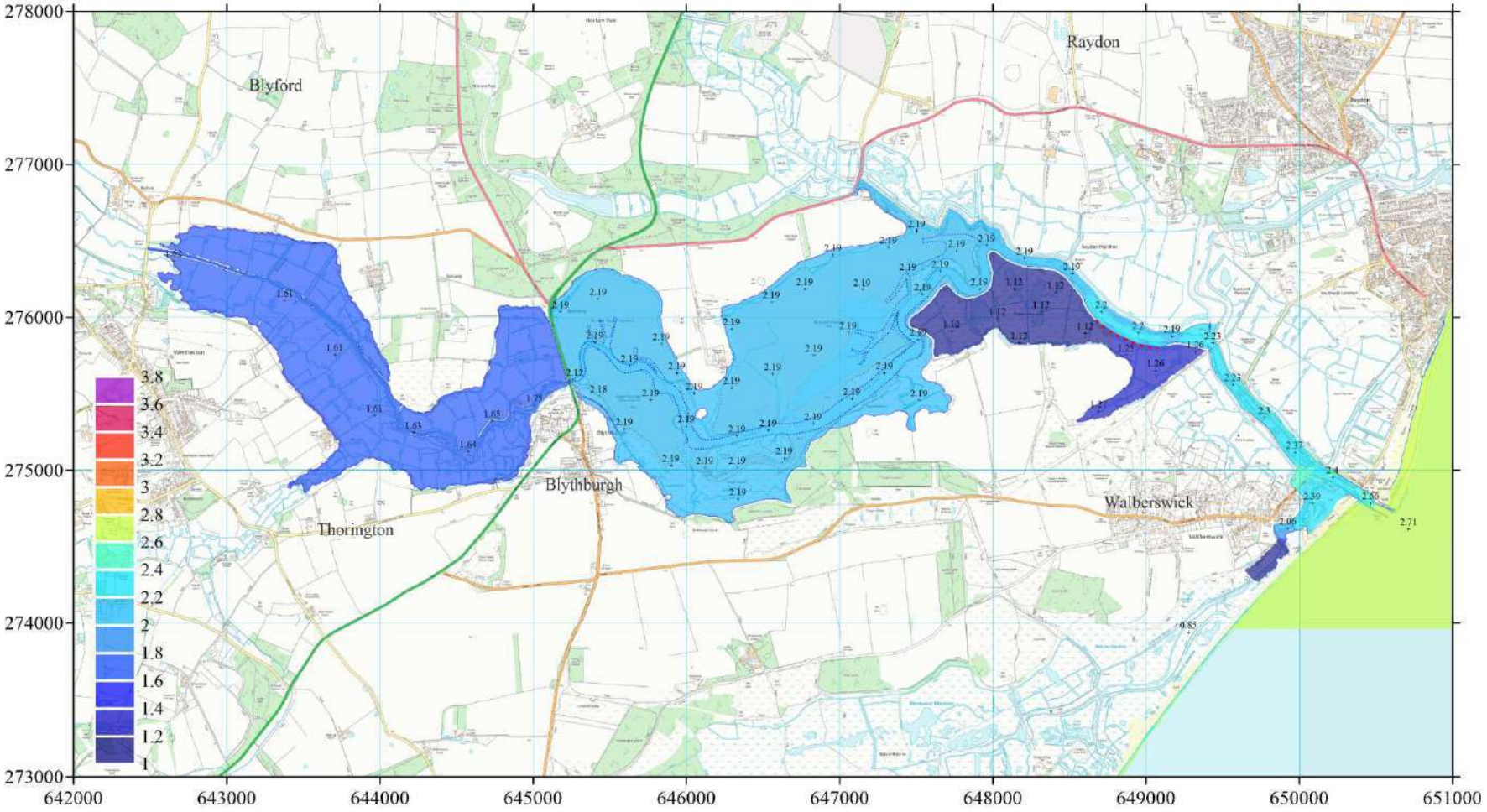
2013 event -0.4m:
G2 – Raise estuary defences, narrow channel
Zoom in (downstream)



2013 event -0.4m: S6 – Passive Spillway at 2.20m

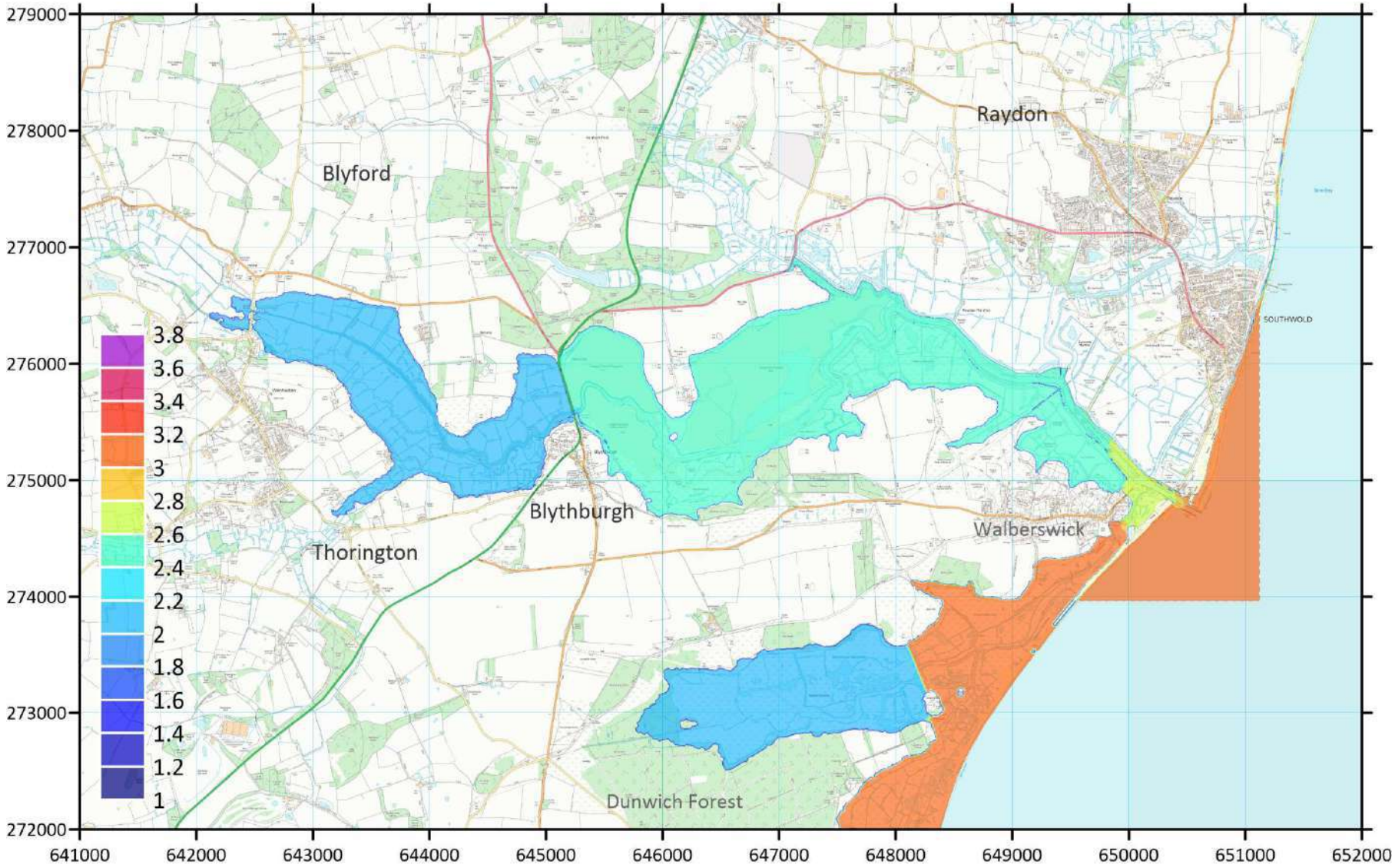


2013 event -0.4m: S7 – Passive Spillway at 2.00m

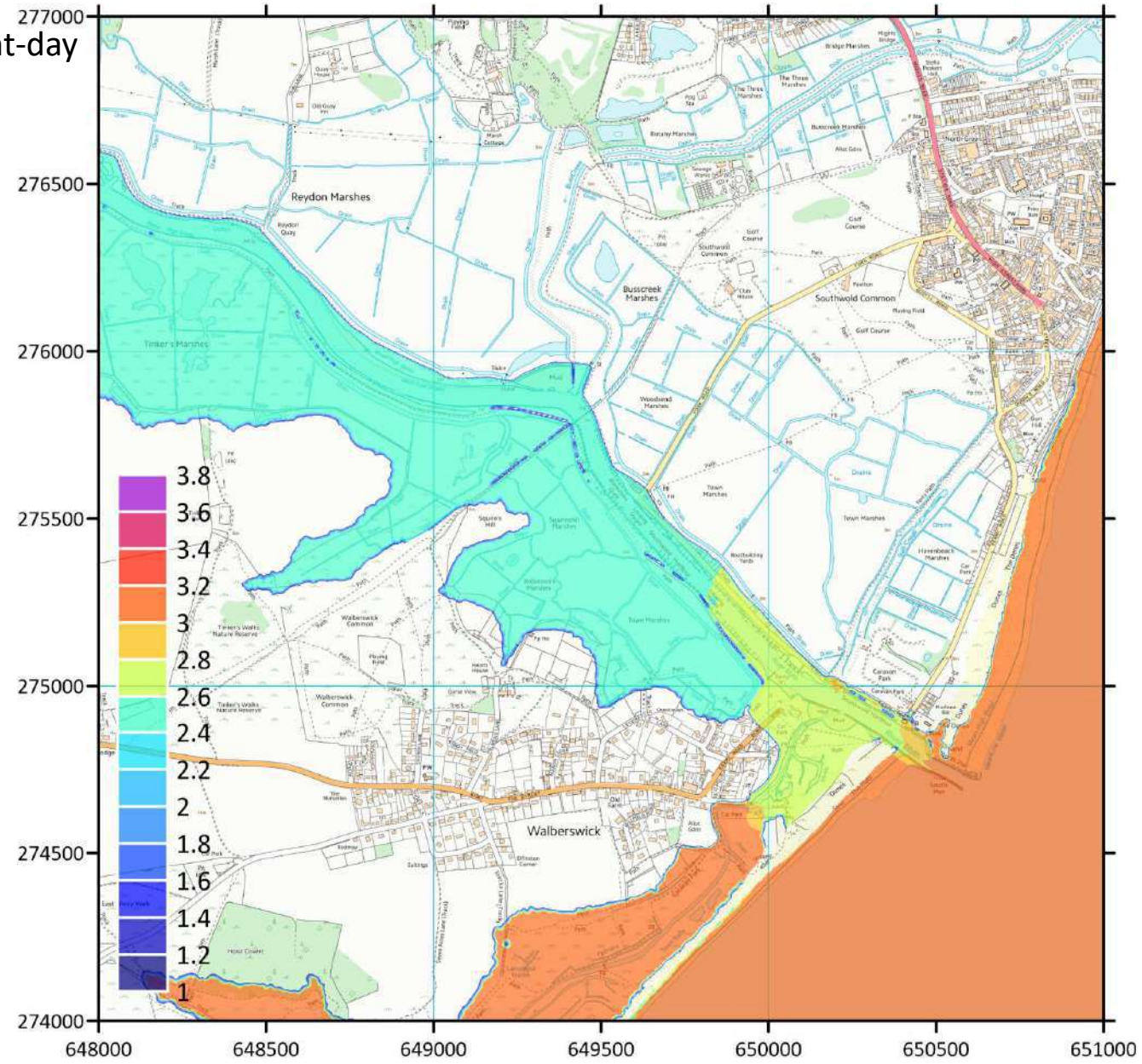


2013

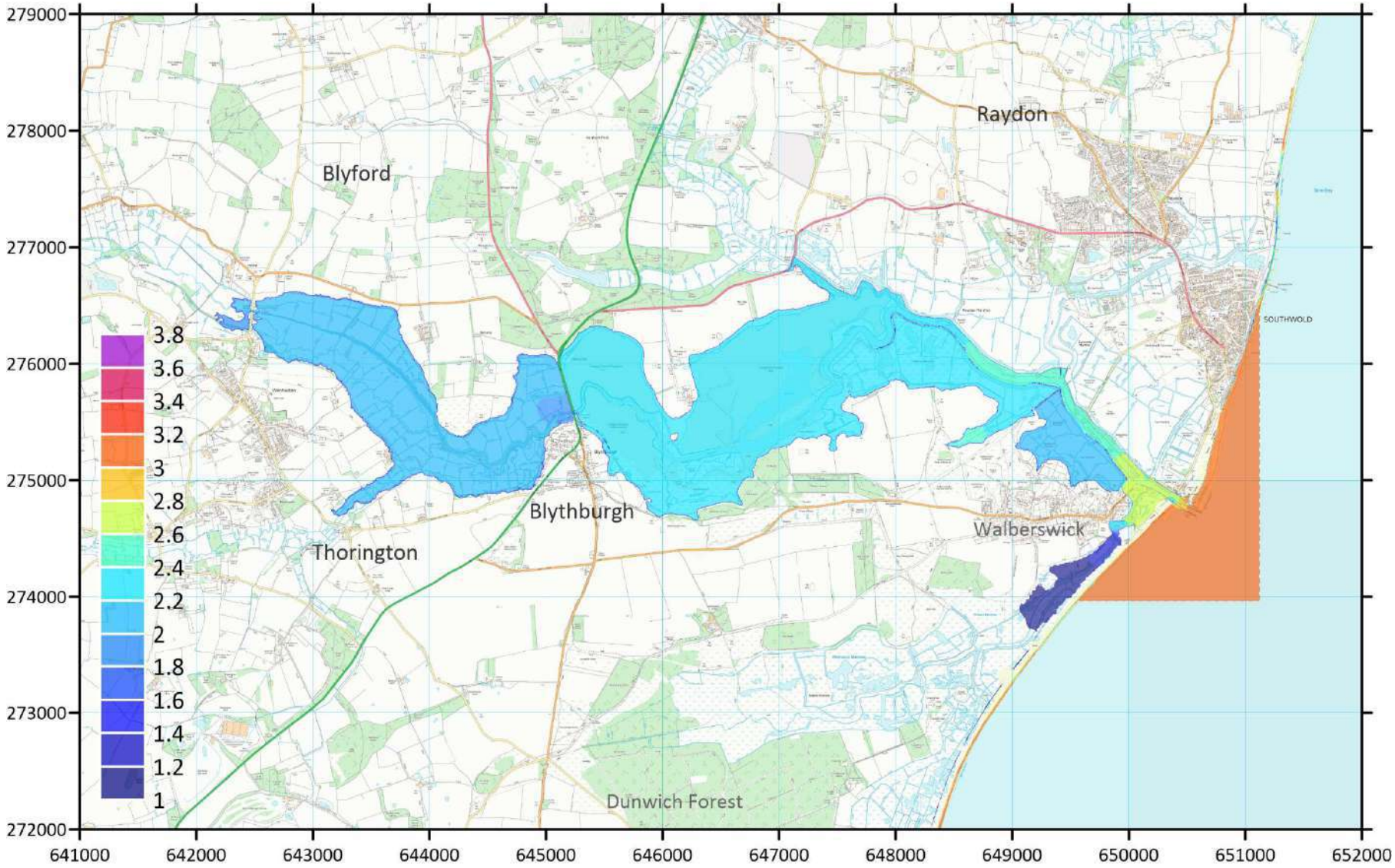
2013 event: E0 - Present-day estuary defences



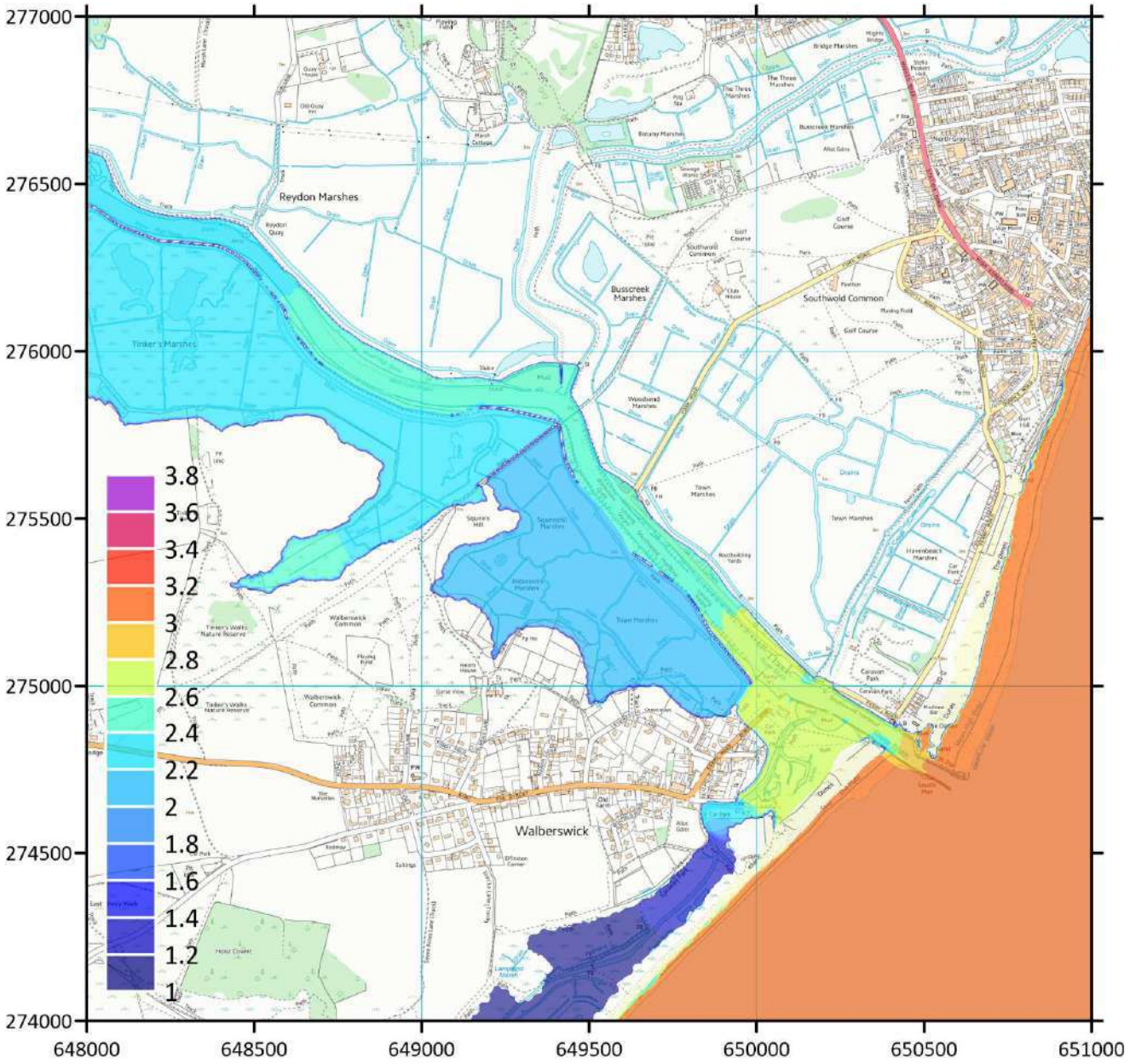
2013 event: E0 - Present-day estuary defences: Zoom-in (downstream)



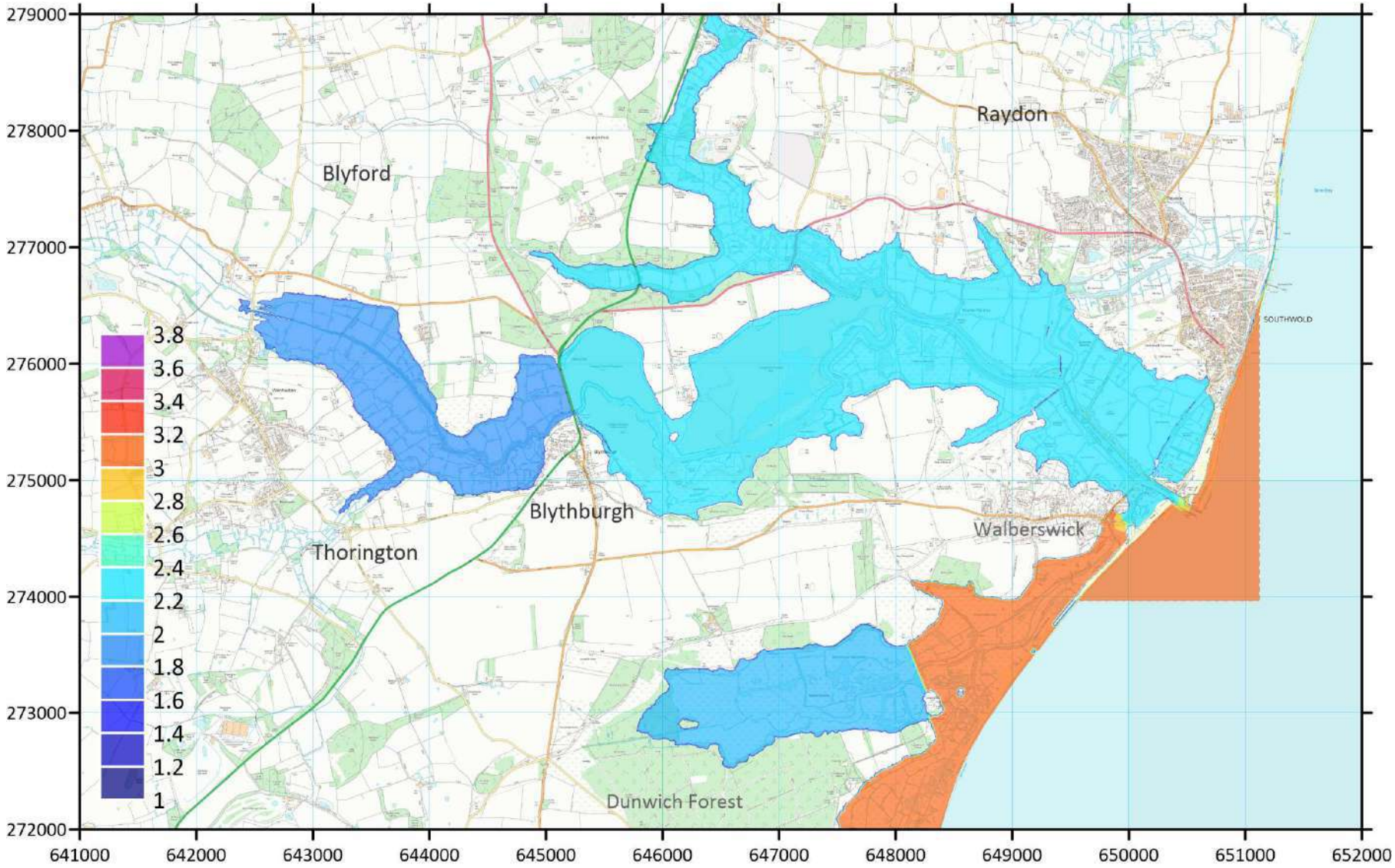
2013 event: E0 - Present-day estuary defences, Walberswick dunes defended



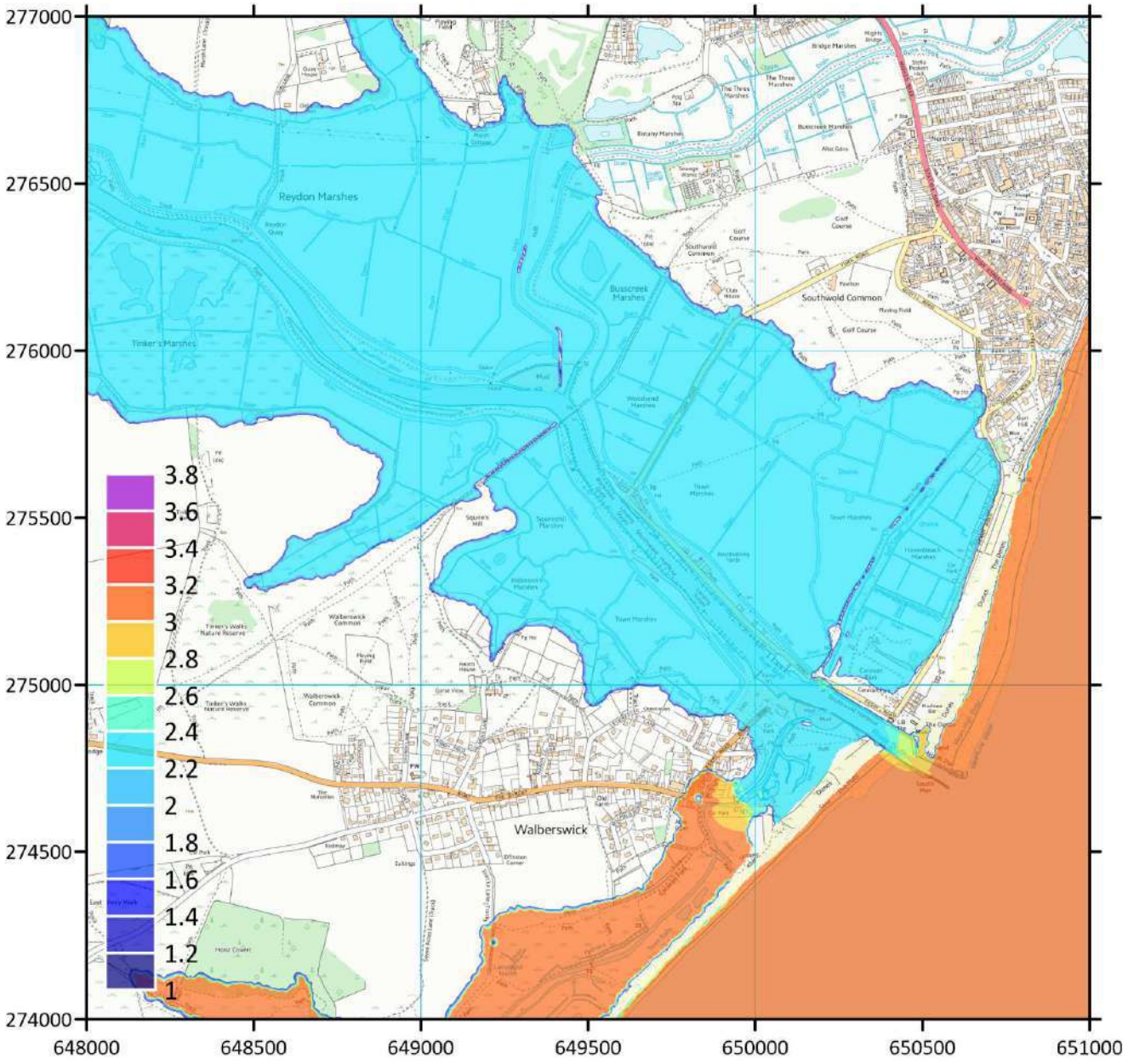
2013 event: E0 - Present-day estuary Defences, Walberswick dunes defended Zoom-in (downstream)



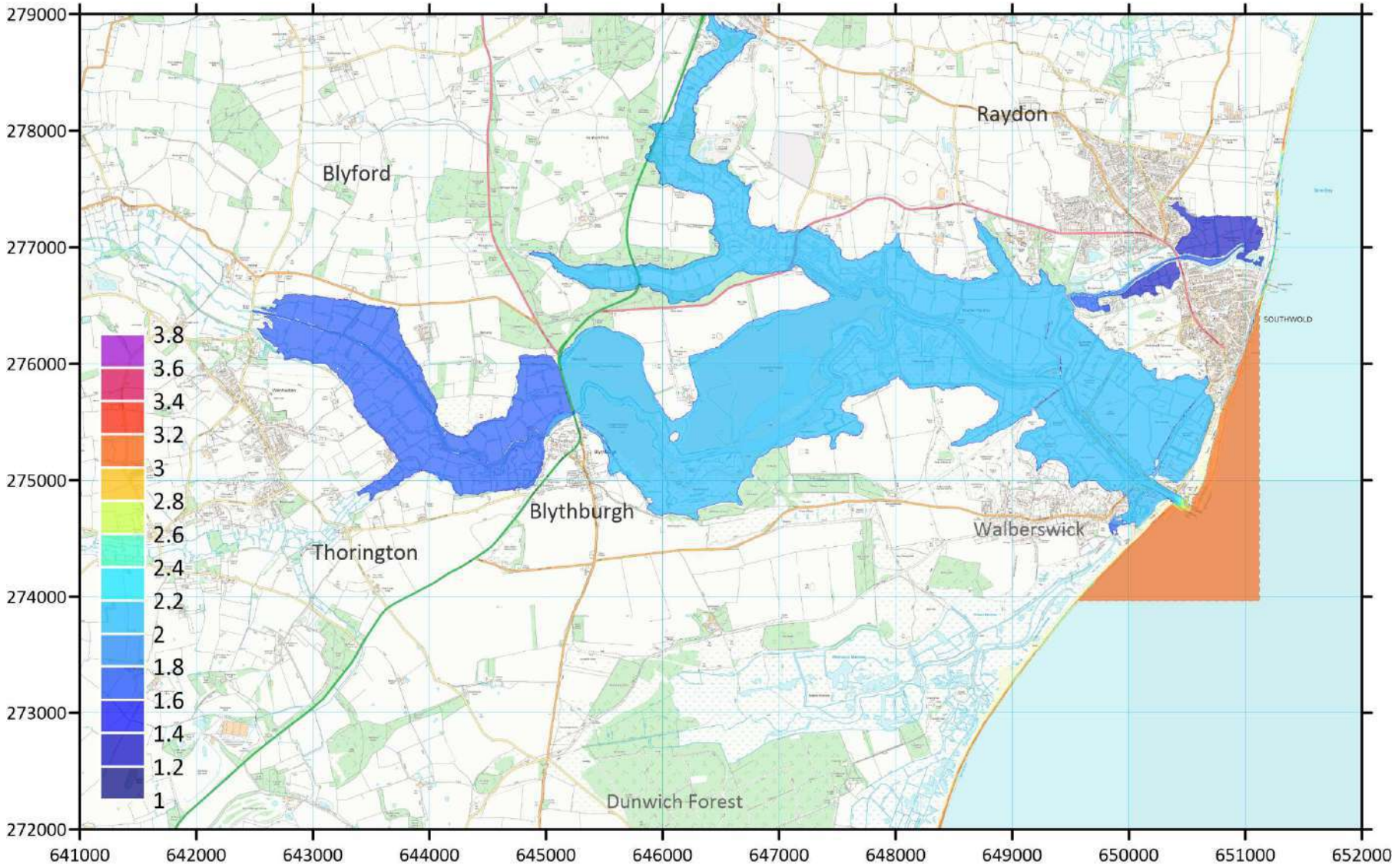
2013 event: E1 – Do Nothing (All embankments failed)



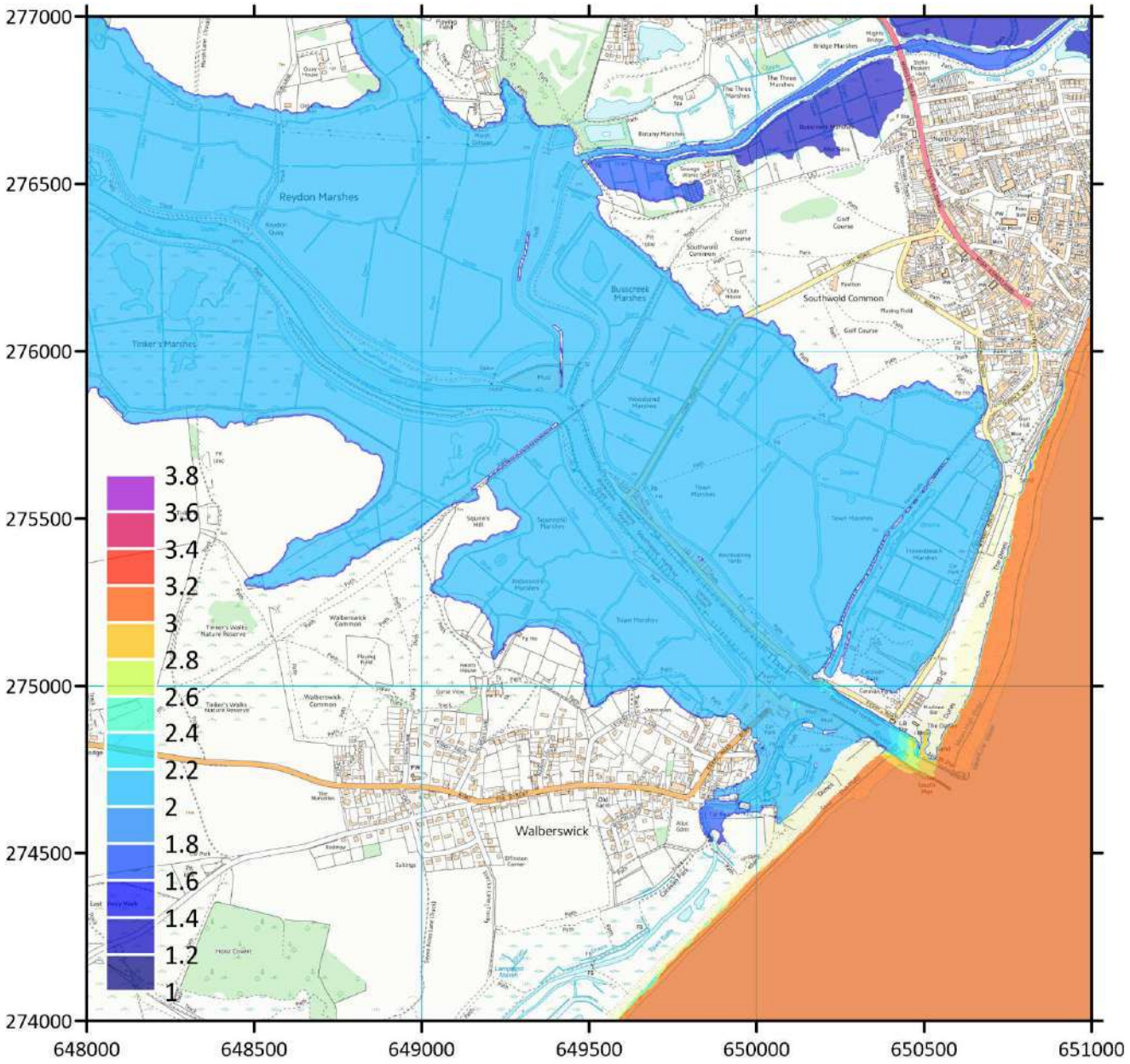
2013 event:
E1 – Do Nothing
(All embankments failed)
Zoom-in (downstream)



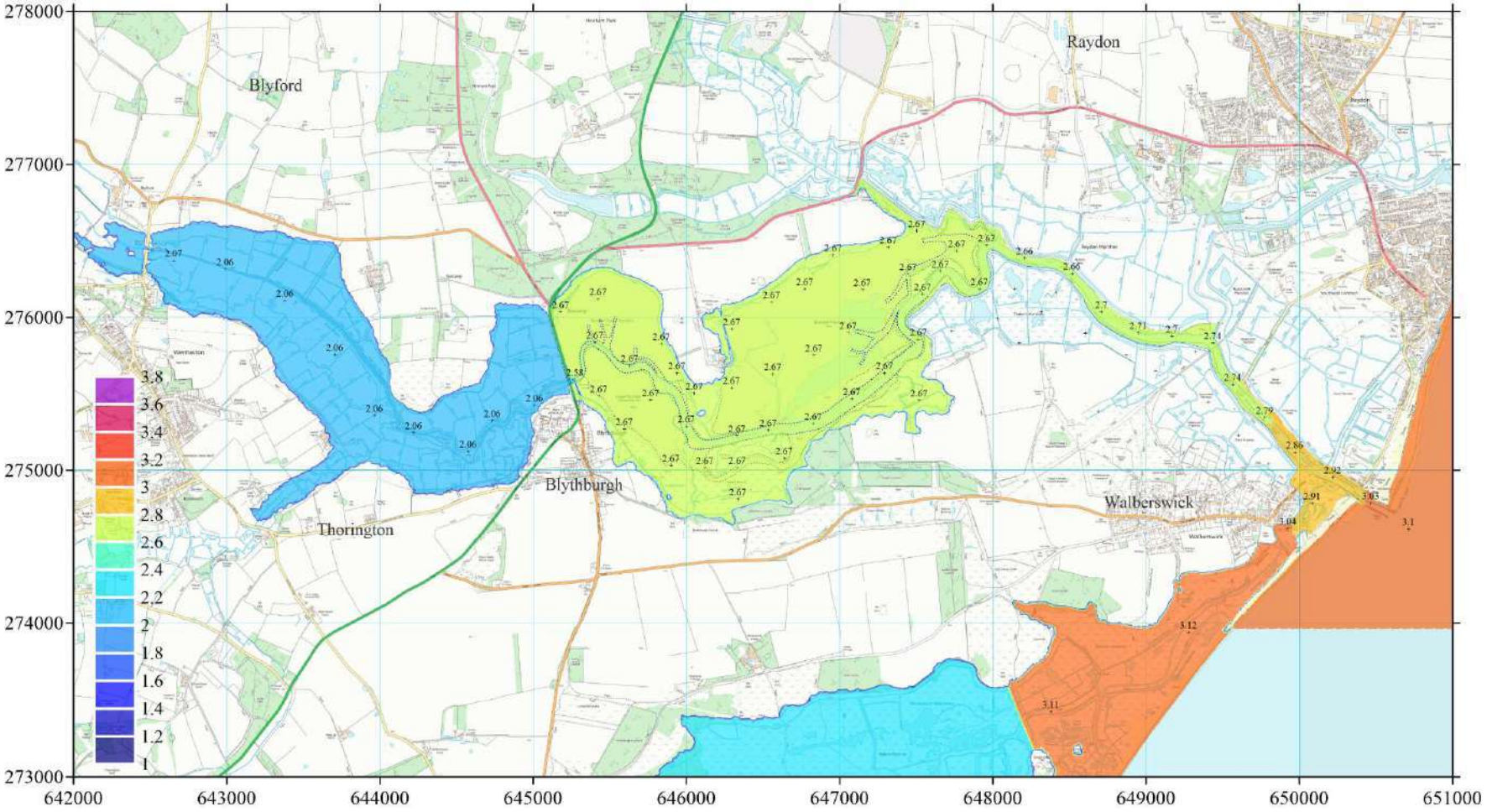
2013 event: E1 – Do Nothing (All embankments failed), Walberswick dunes defended



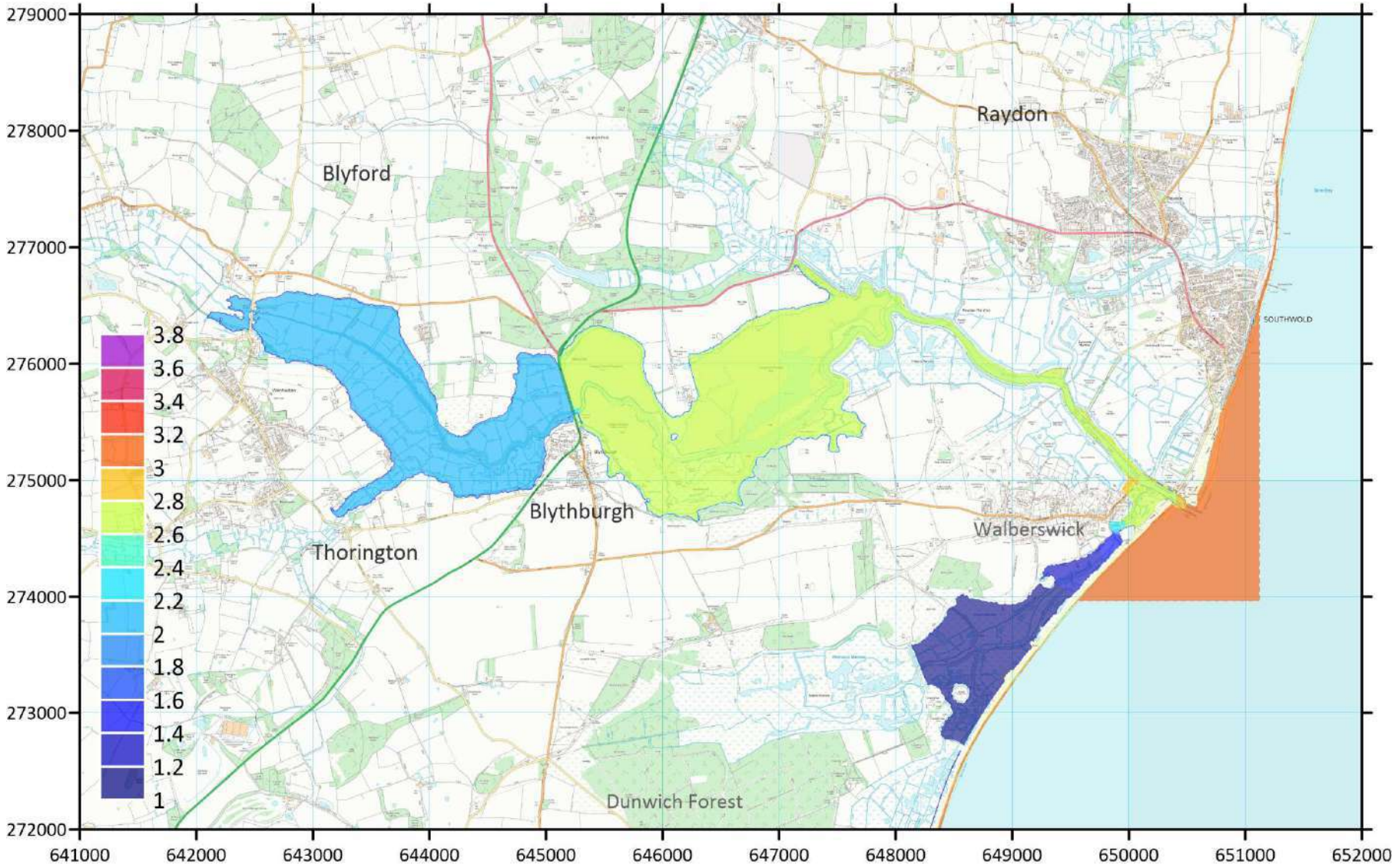
2013 event:
E1 – Do Nothing
(All embankments failed), Walberswick dunes defended
Zoom-in (downstream)



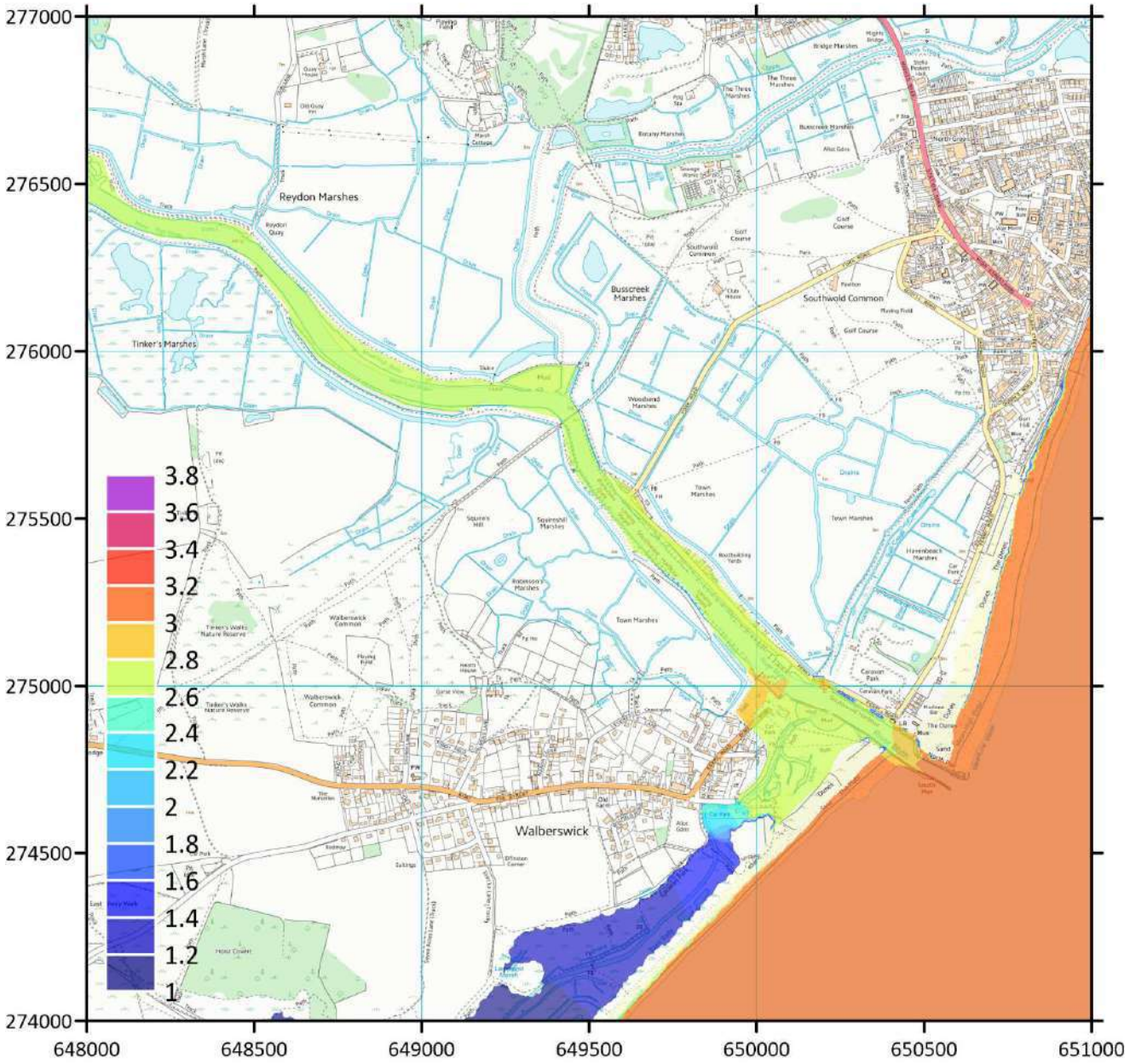
2013 event: E2 - Raise estuary defences



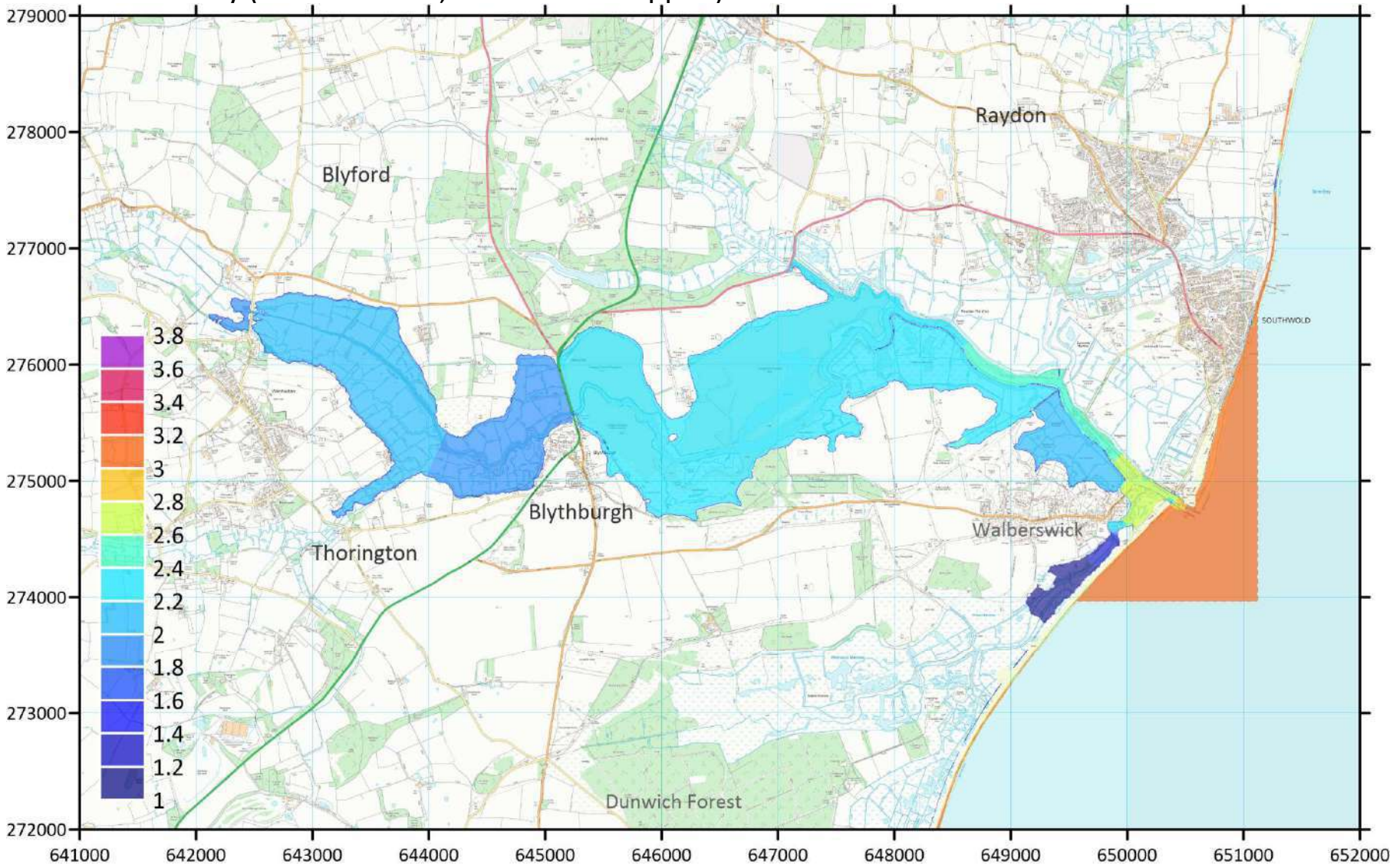
2013 event: E2 - Raise estuary defences, Walberswick dunes defended



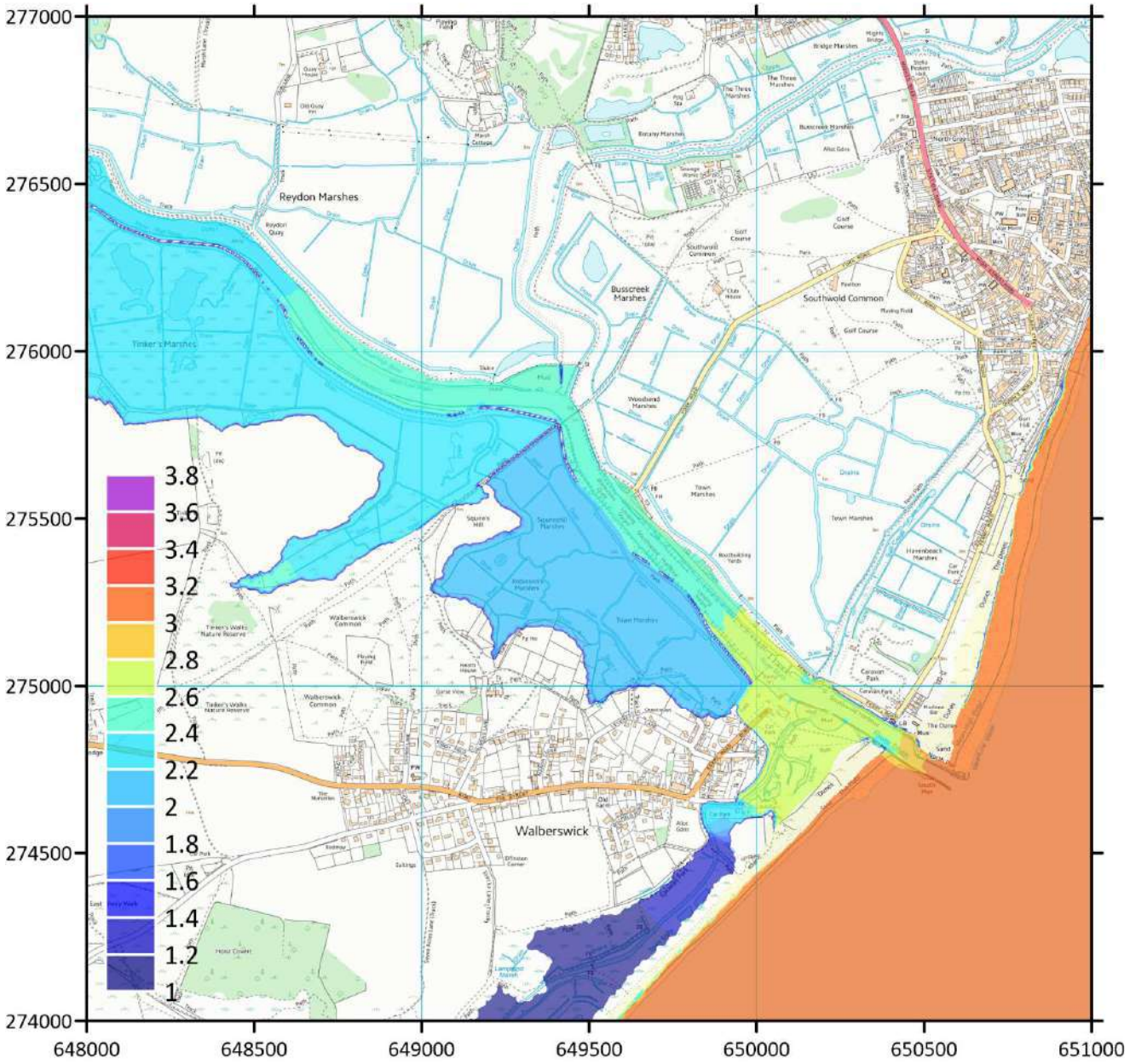
2013 event:
E2 - Raise estuary defences, Walberswick dunes defended
Zoom-in (downstream)



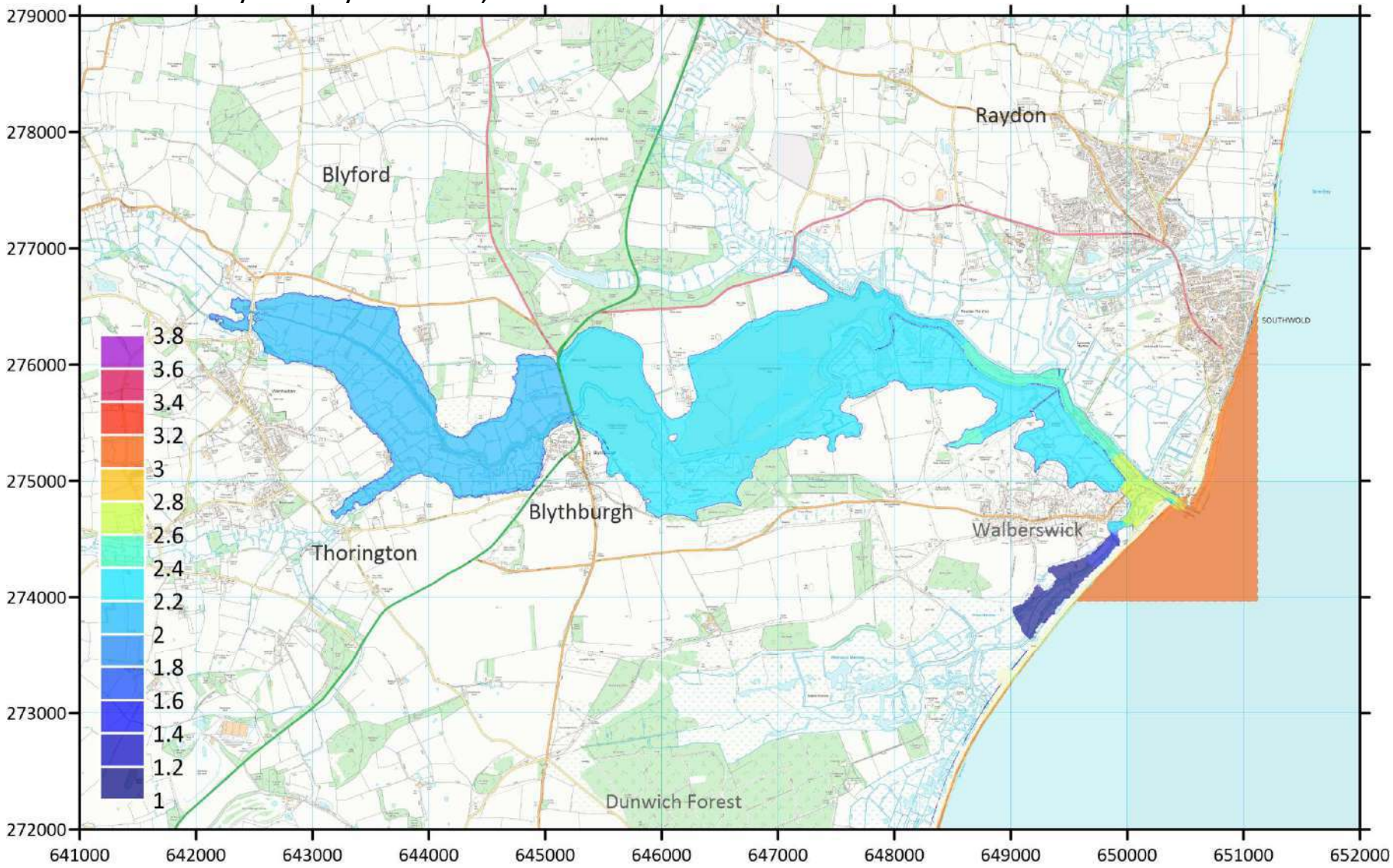
2013 event: E3 – SMP Policy (Raise N banks, S banks overtopped)



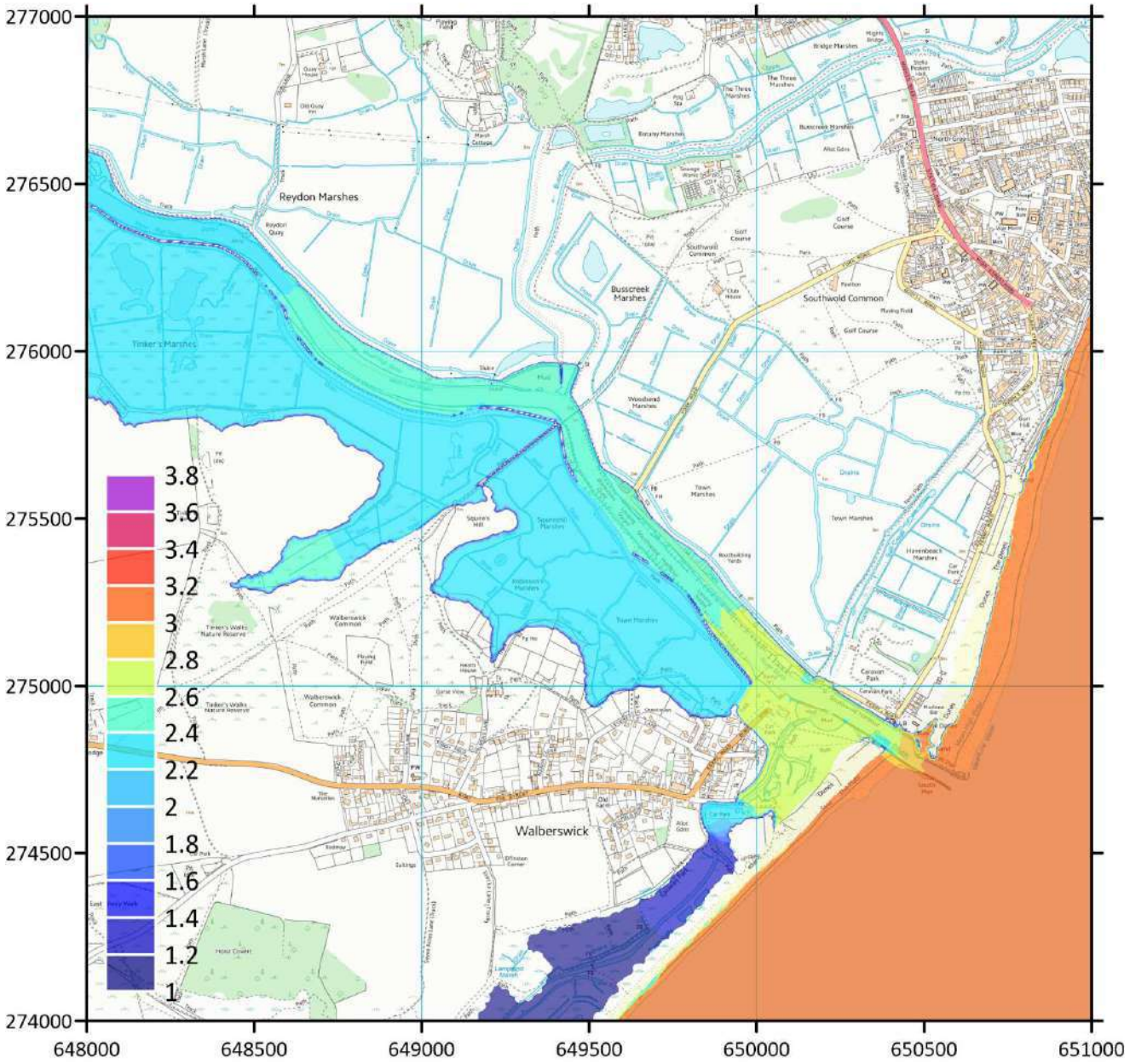
2013 event:
E3 – SMP Policy
(Raise N banks,
S banks overtopped)
Zoom in (downstream)



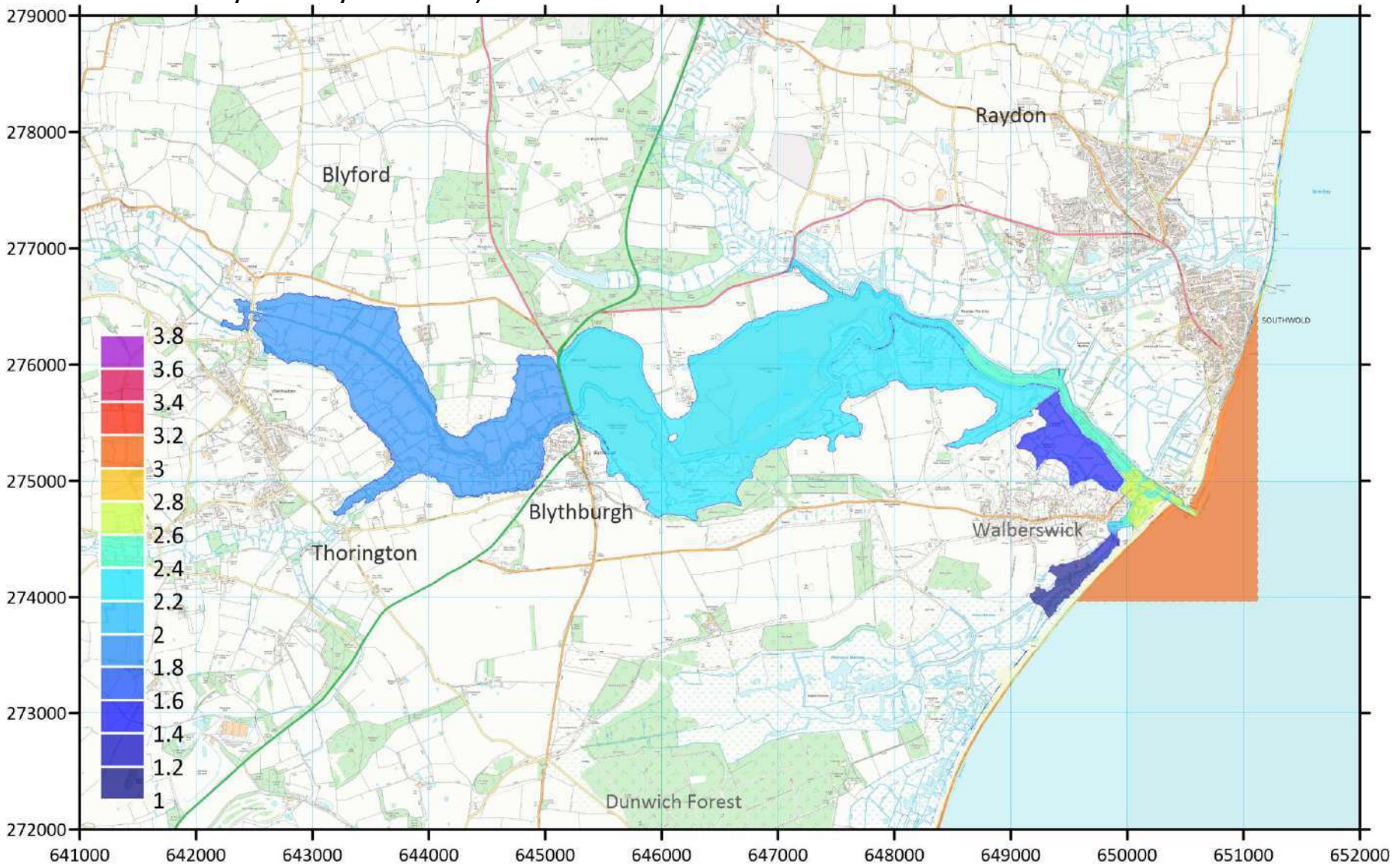
2013 event: H0 - Present day estuary defences, reduced S Pier



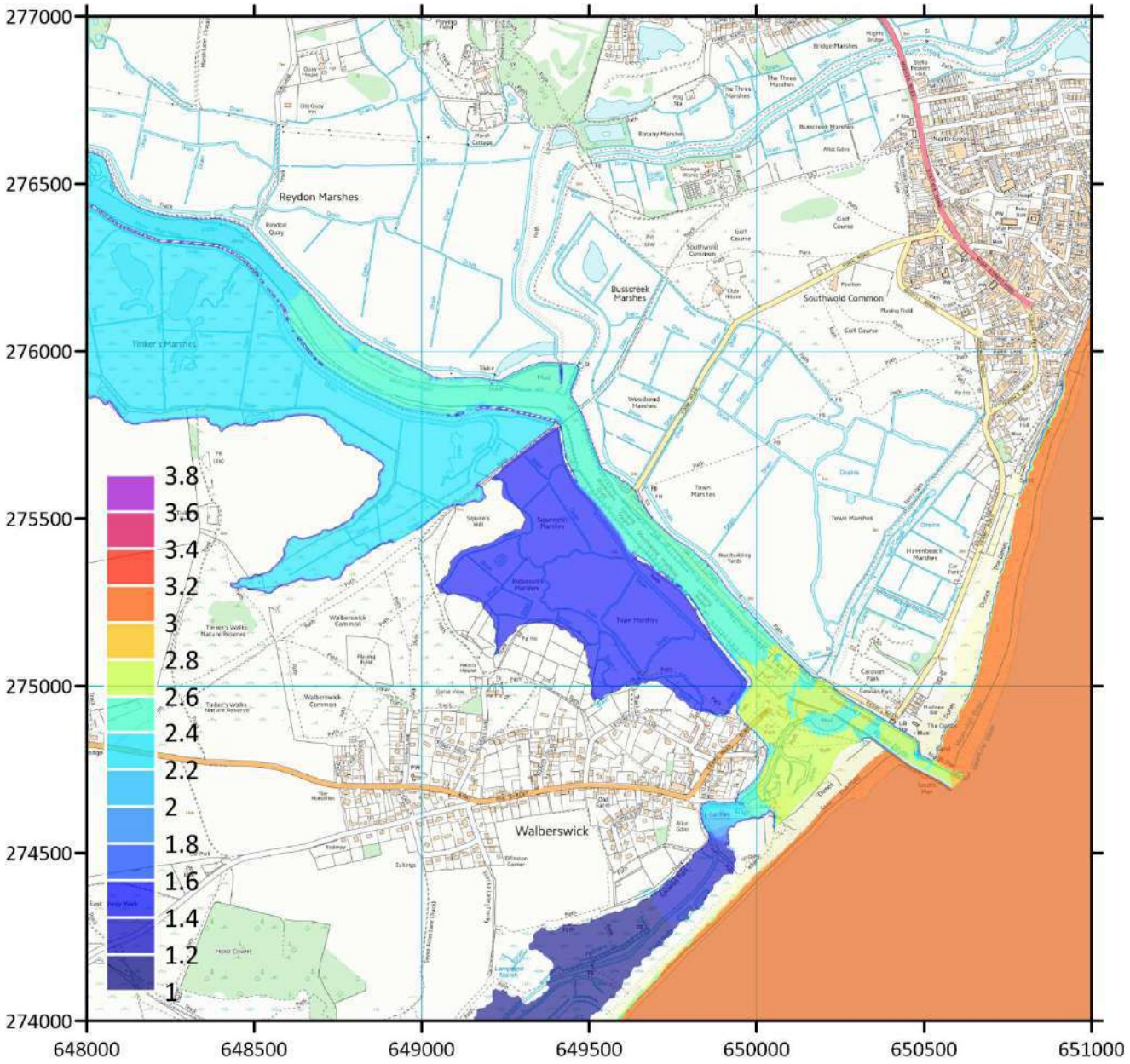
2013 event –
H0 - Present day estuary defences, reduced S Pier
Zoom in (downstream)



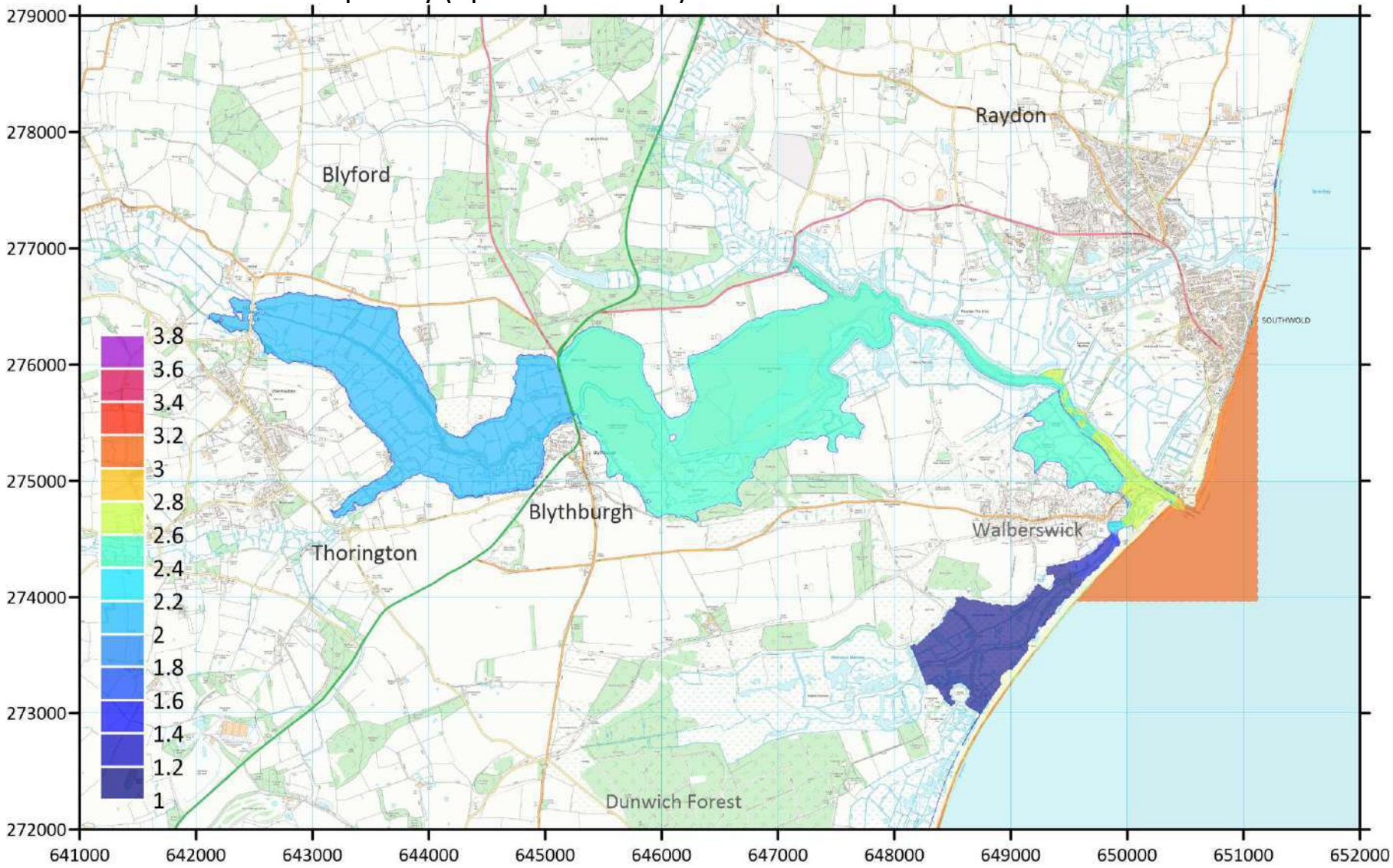
2013 event: F0 - Present day estuary defences, solid S Pier



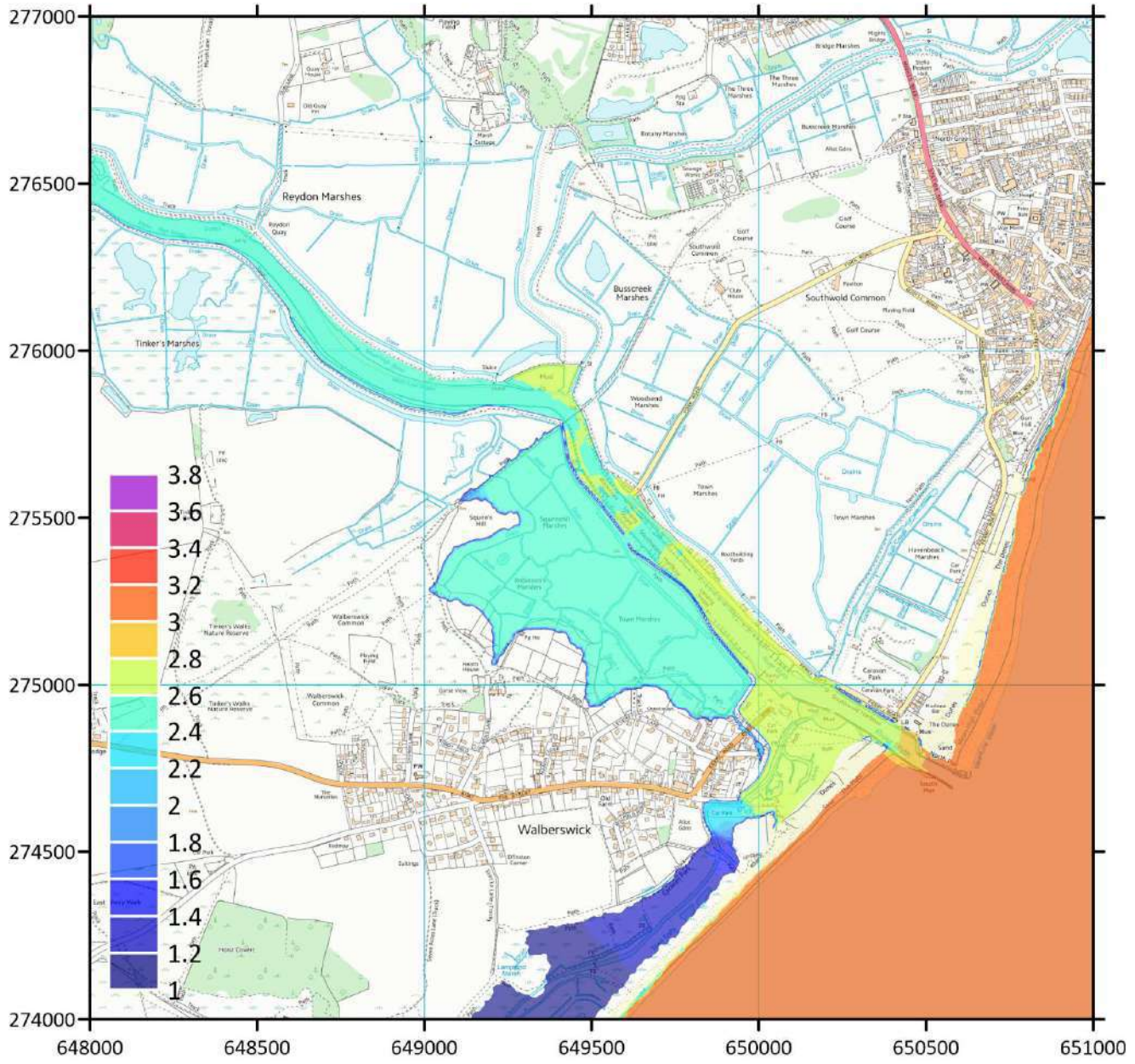
2013 event –
F0 - Present day estuary defences, solid S Pier
Zoom in (downstream)



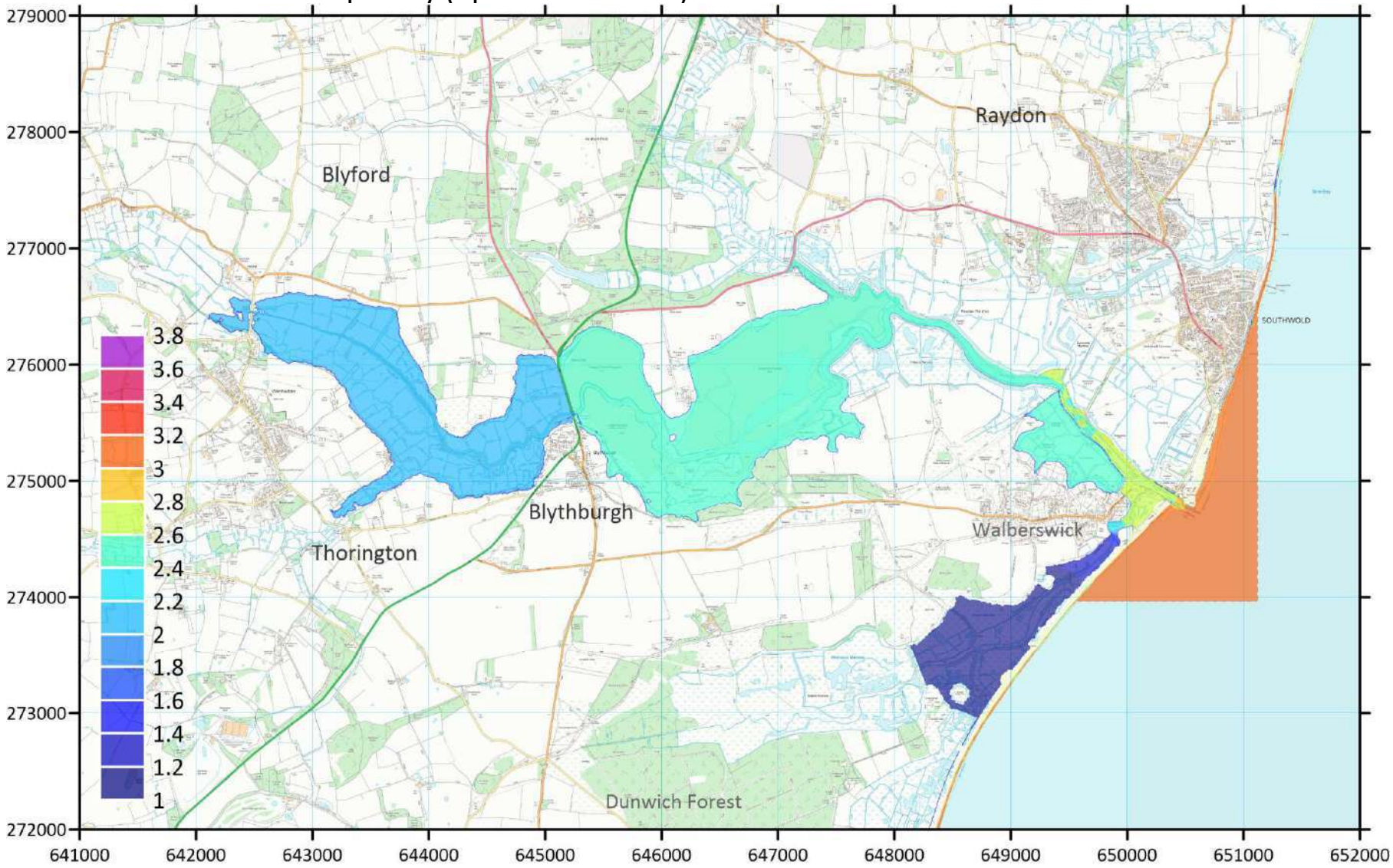
2013 event: S1a - Raise defences + spillway (open at 2.3m WL)



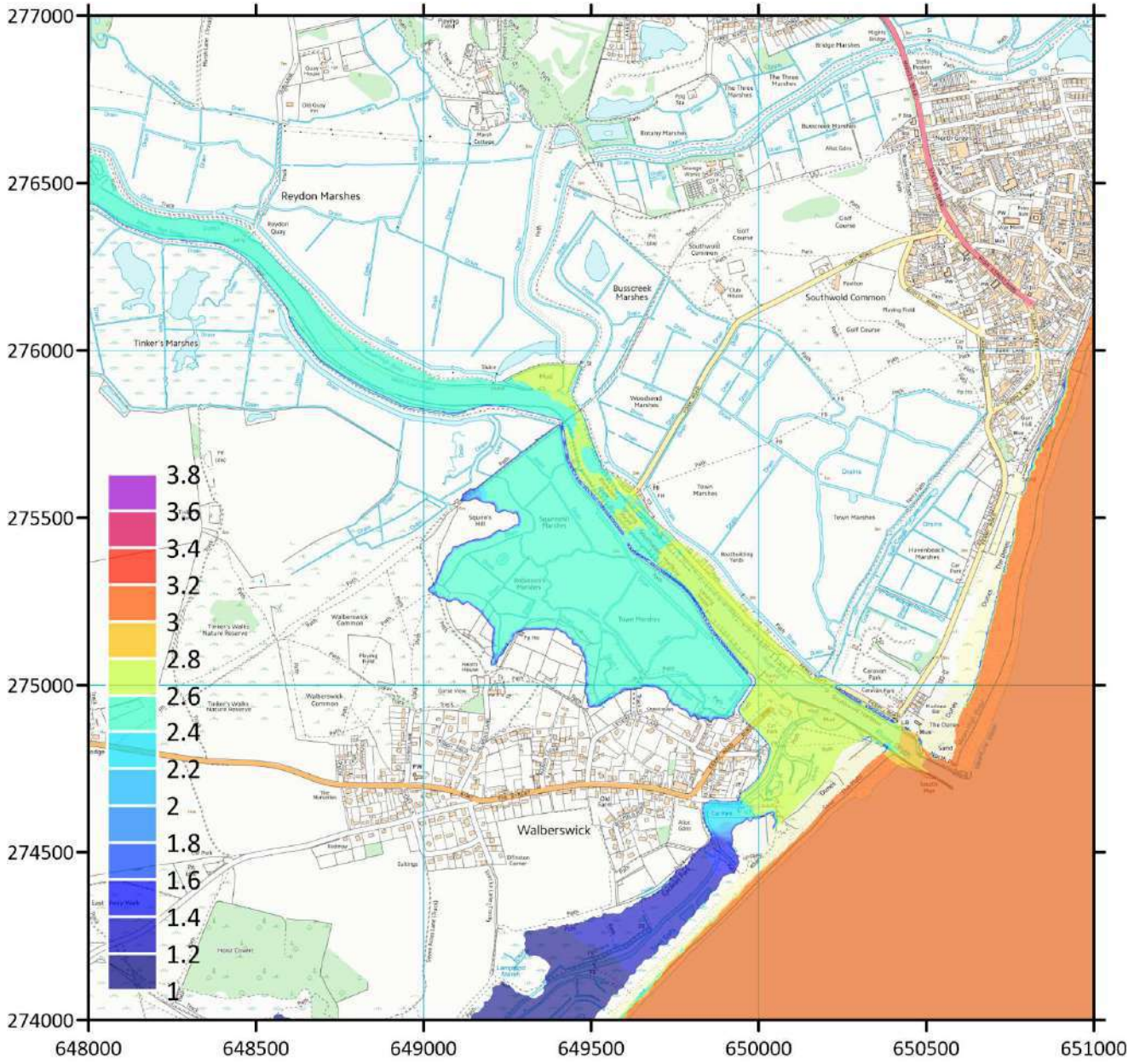
2013 event:
S1a - Raise defences
+ spillway (open at 2.3m WL)
Zoom in (downstream)



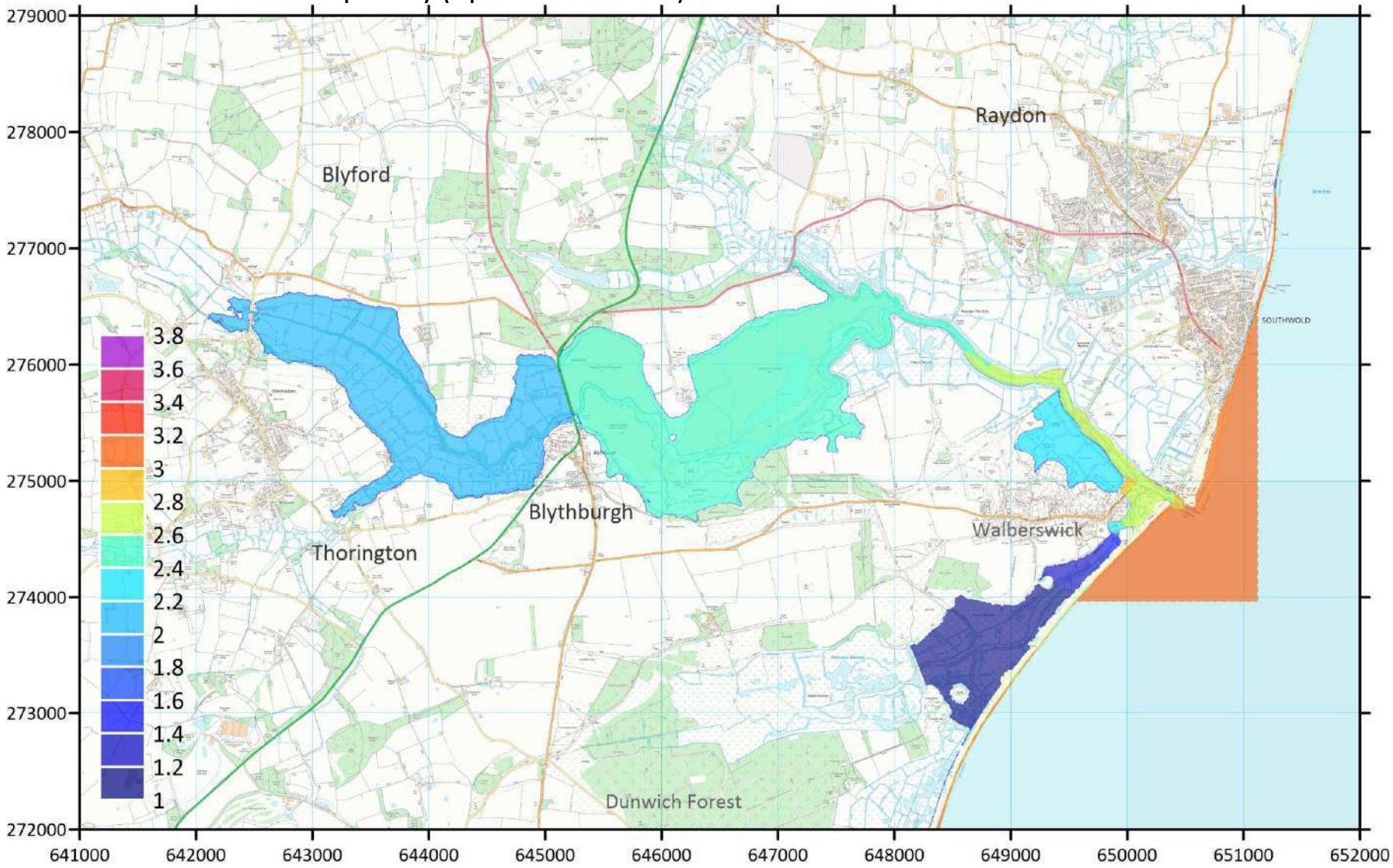
2013 event: S1b - Raise defences + spillway (open at 2.5m WL)



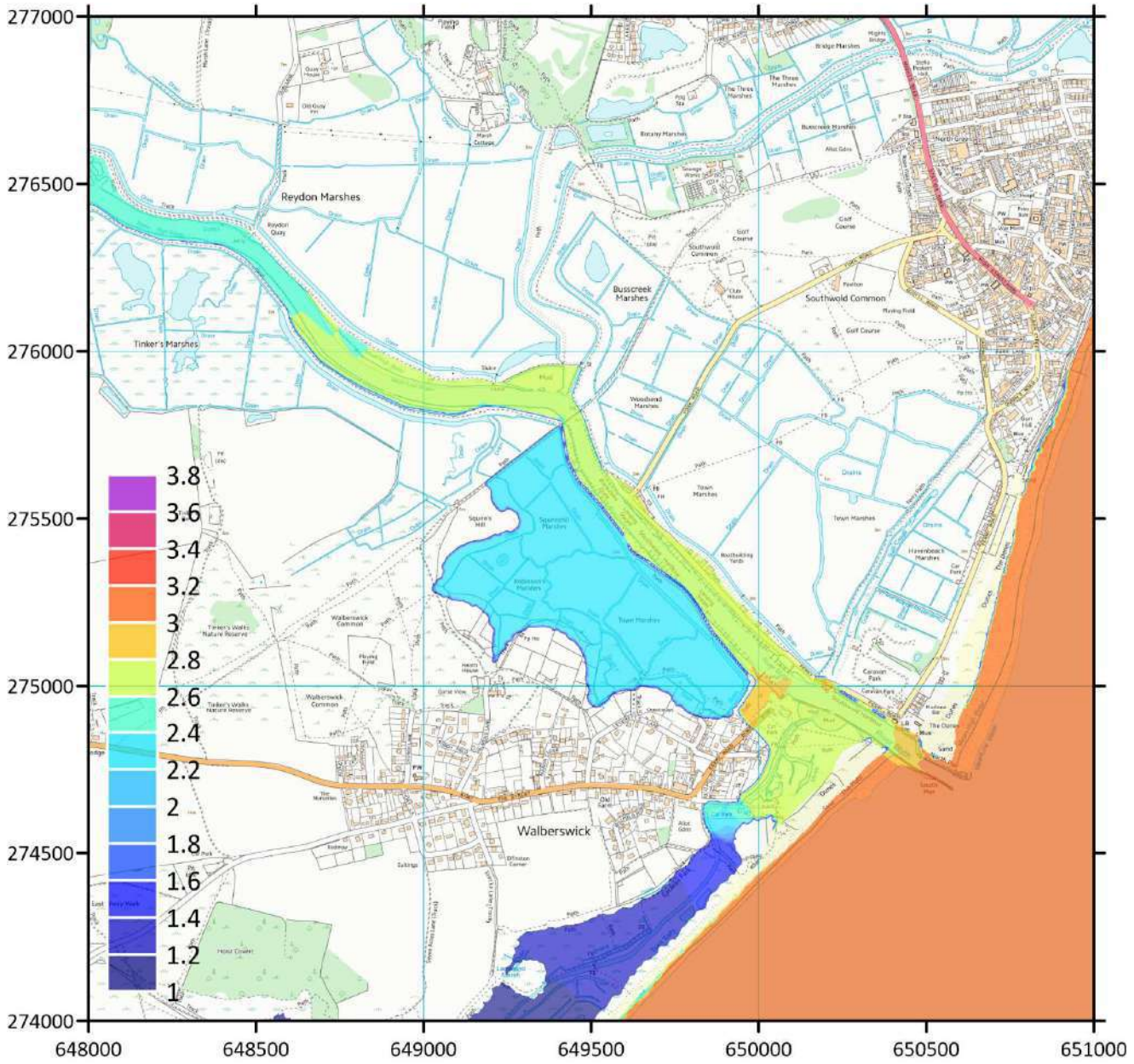
2013 event:
S1b - Raise defences
+ spillway (open at 2.5m WL)
Zoom in (downstream)



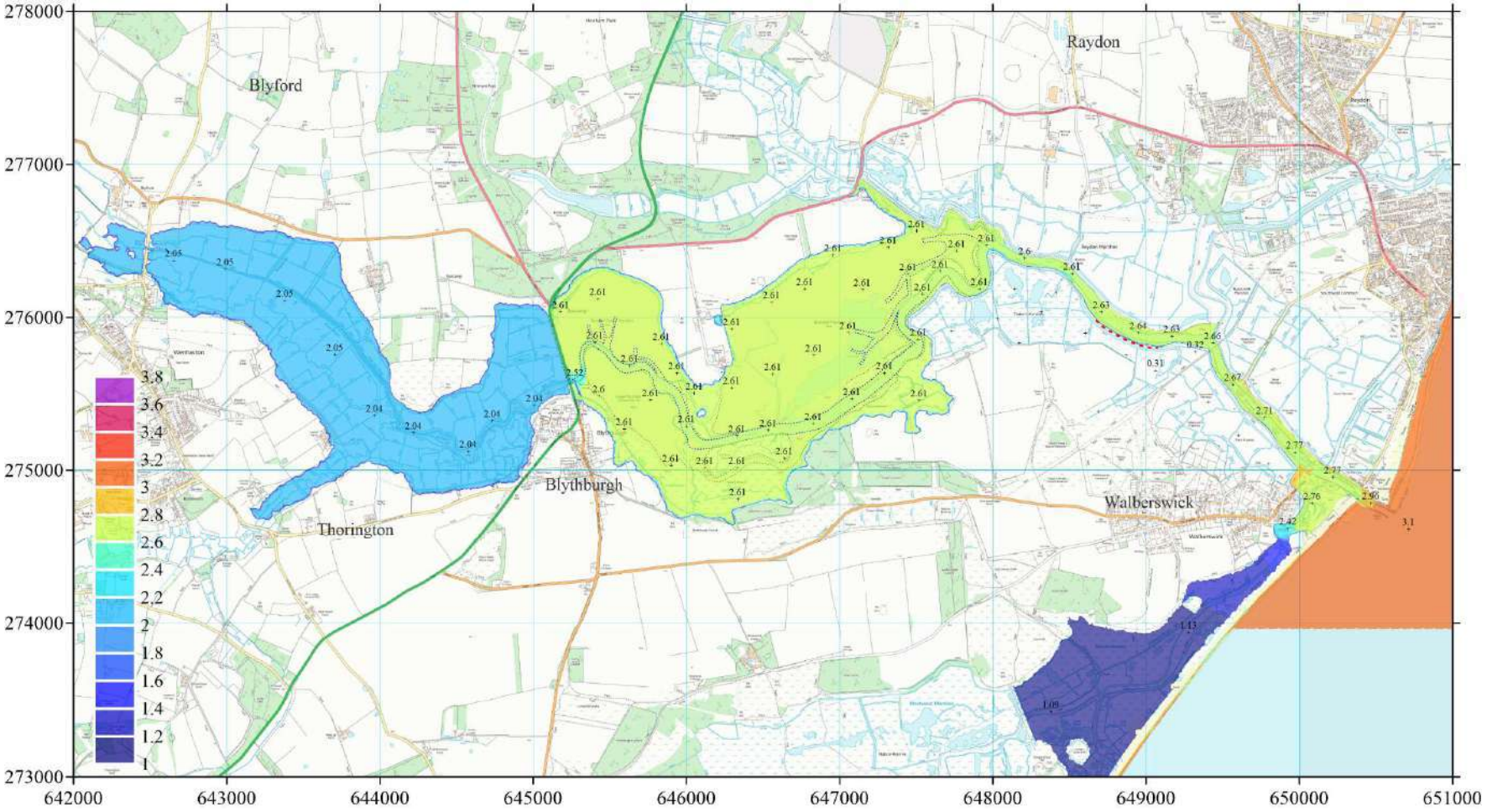
2013 event: S1c - Raise defences + spillway (open at 2.7m WL)



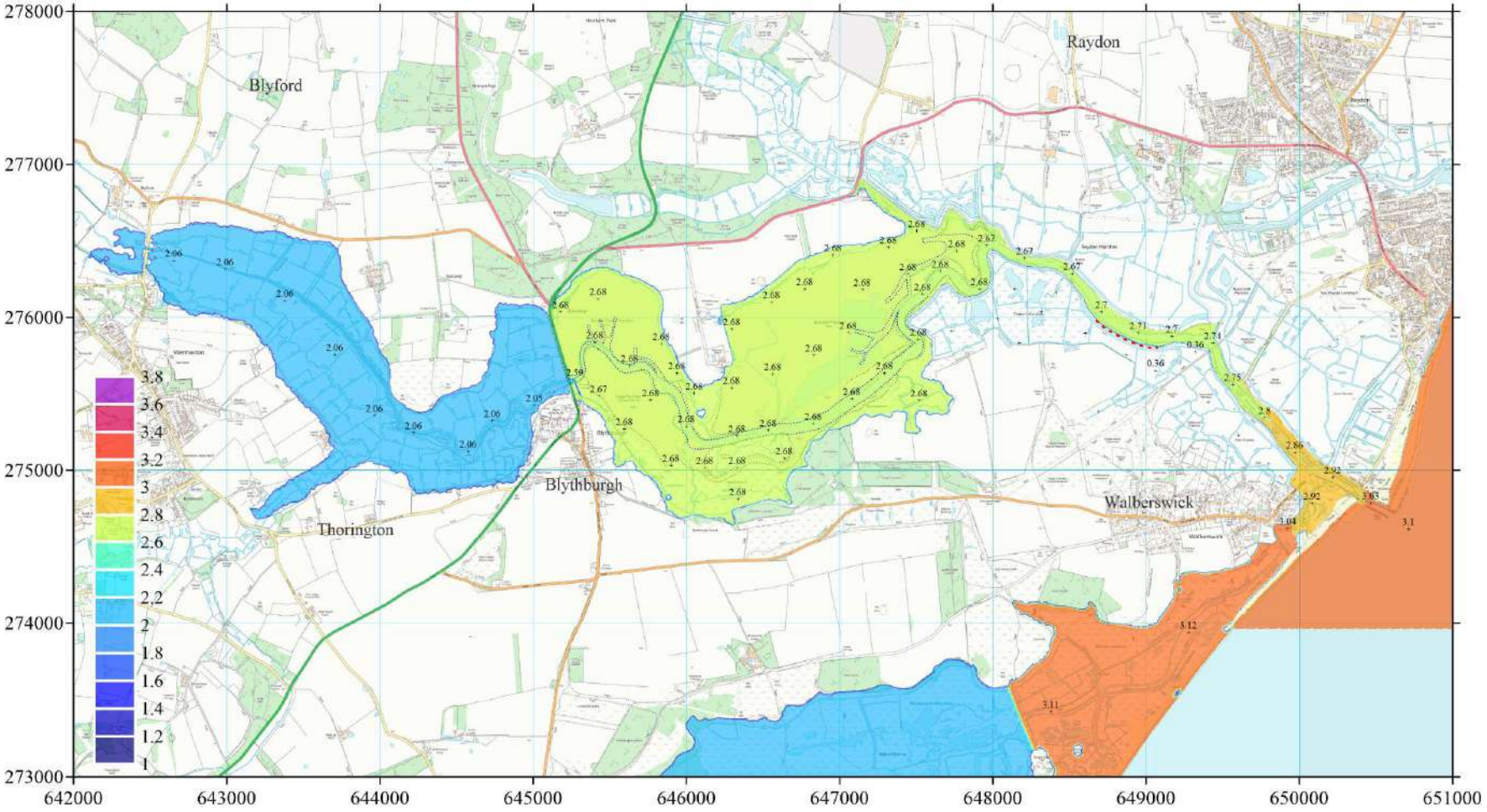
2013 event:
S1c - Raise defences
+ spillway (open at 2.7m WL)
Zoom in (downstream)



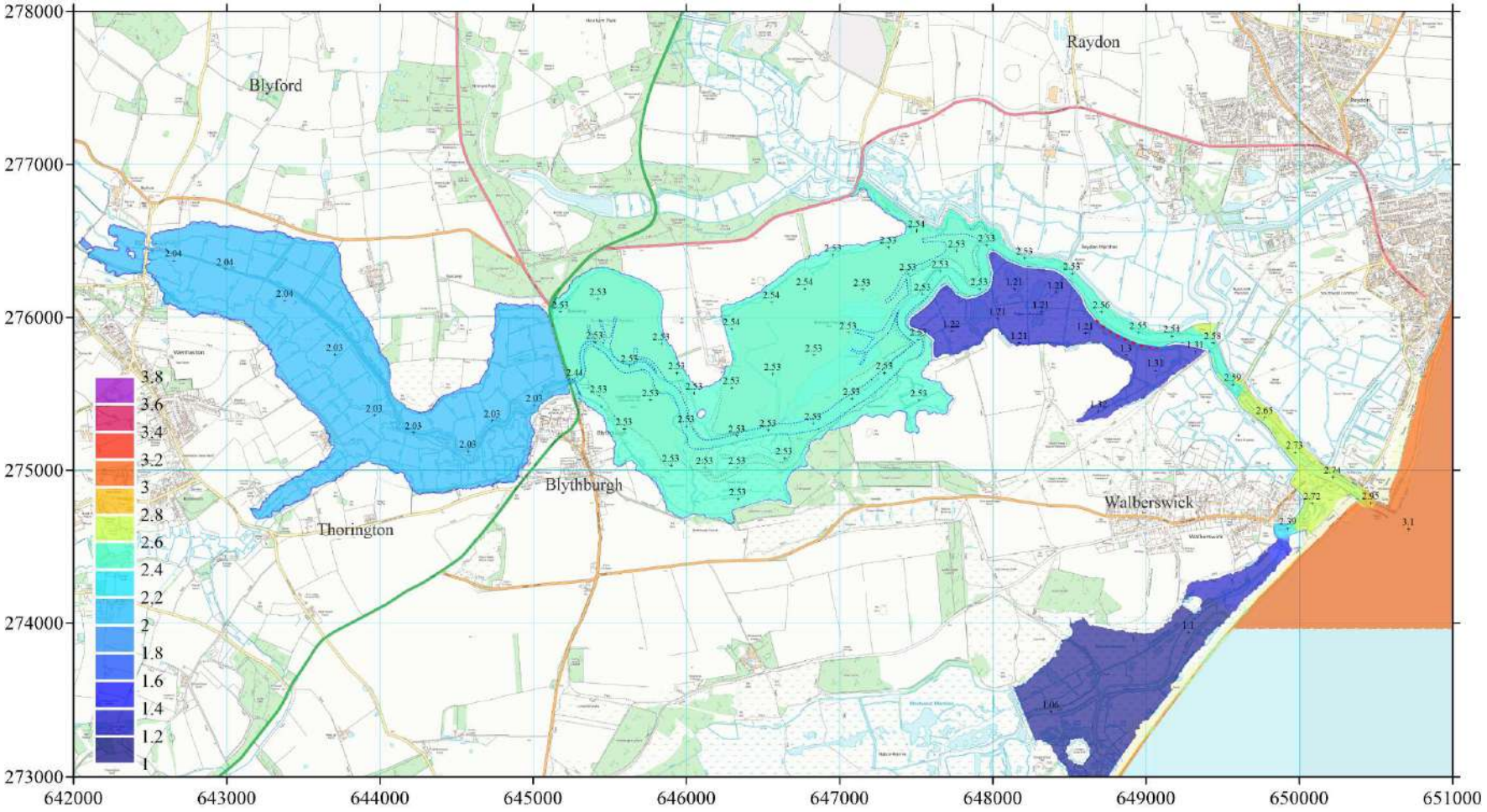
2013 event: S2 - Raise defences + 500m passive spillway at 2.55mOD, Walberswick dunes defended



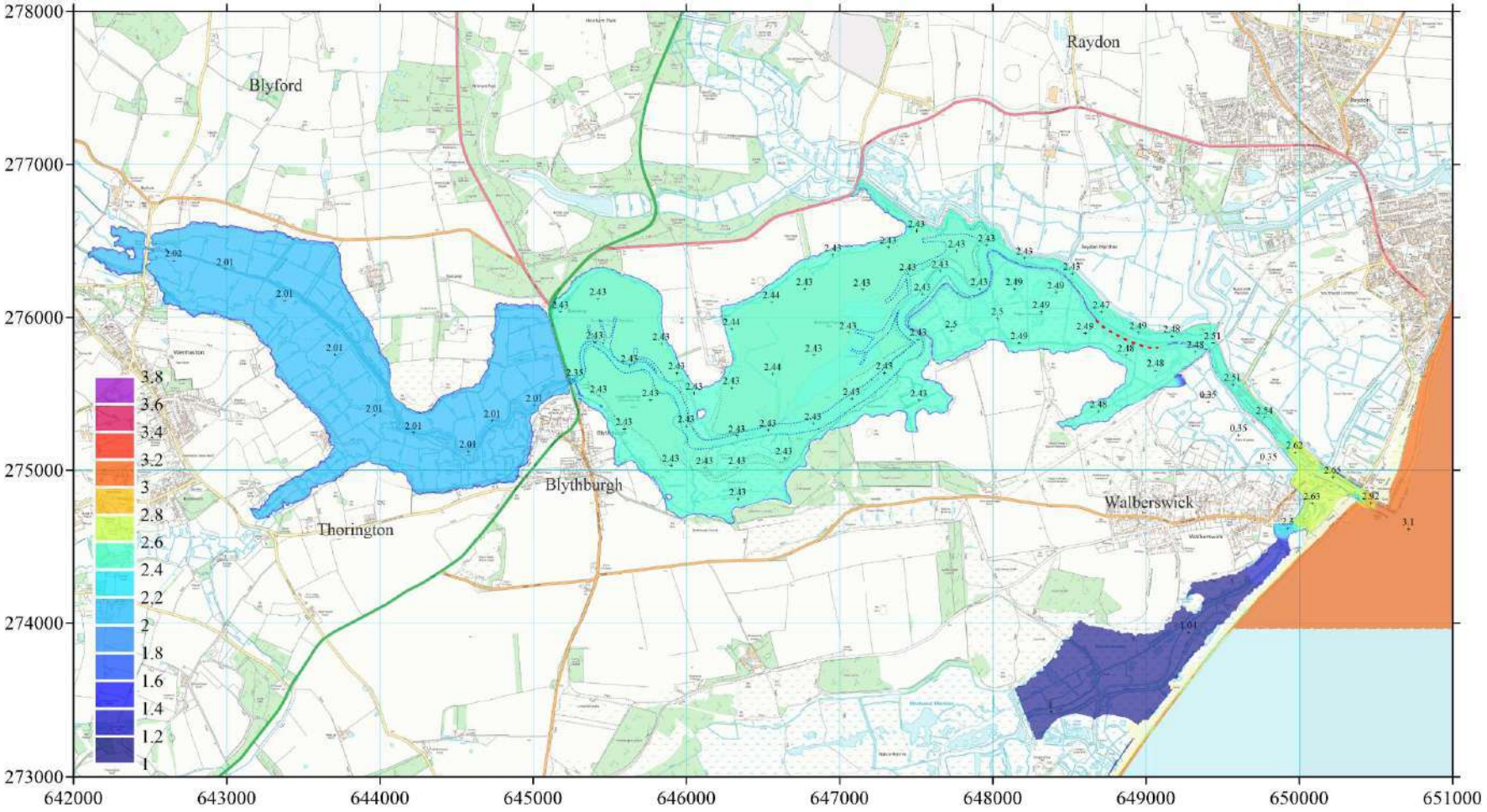
2013 event: S3 - Raise defences + 500m passive spillway at 2.55mOD, Walberswick dunes undefended



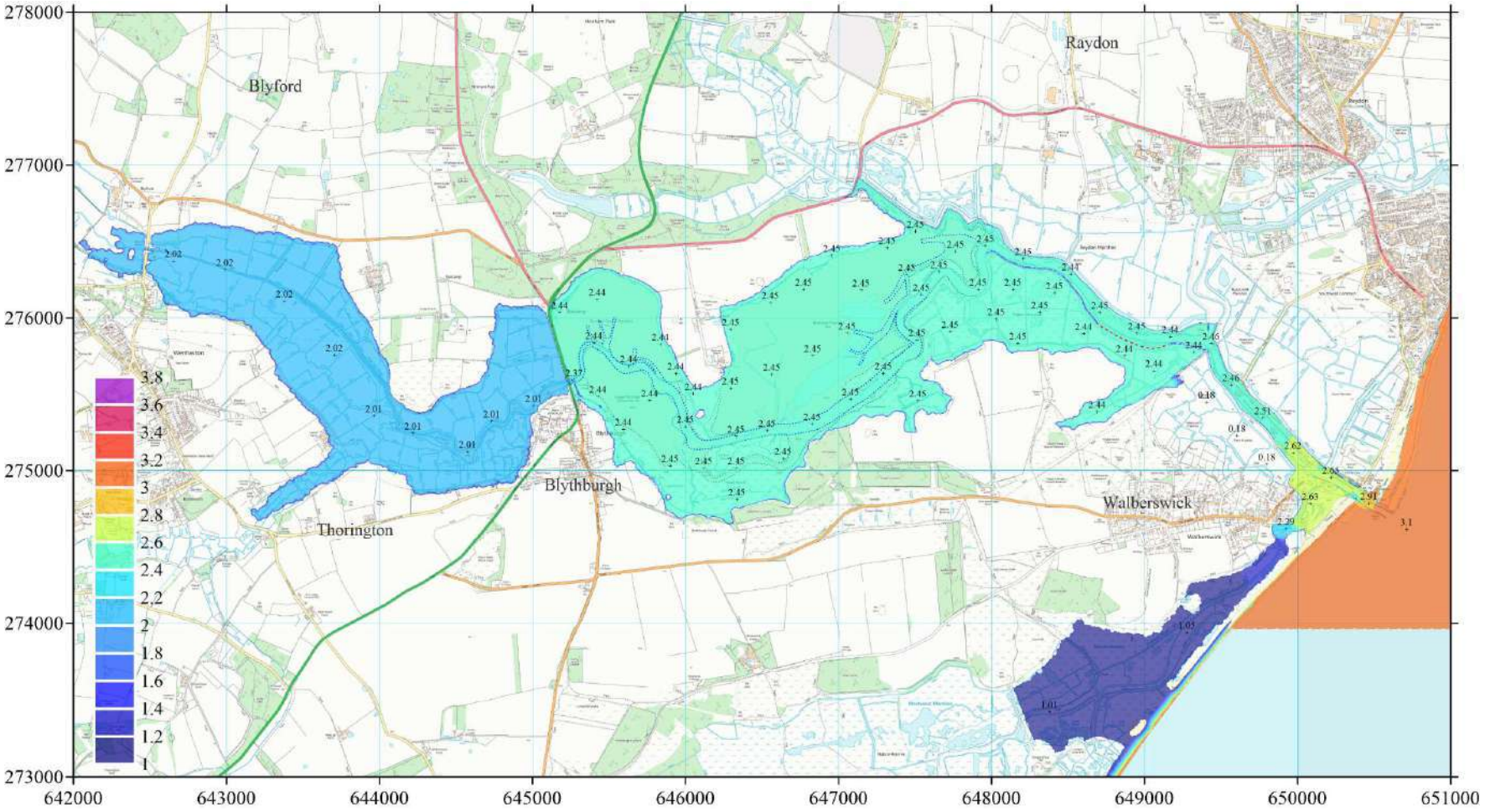
2013 event: S4 - Raise defences + 500m passive spillway at 2.35mOD, Walberswick dunes defended



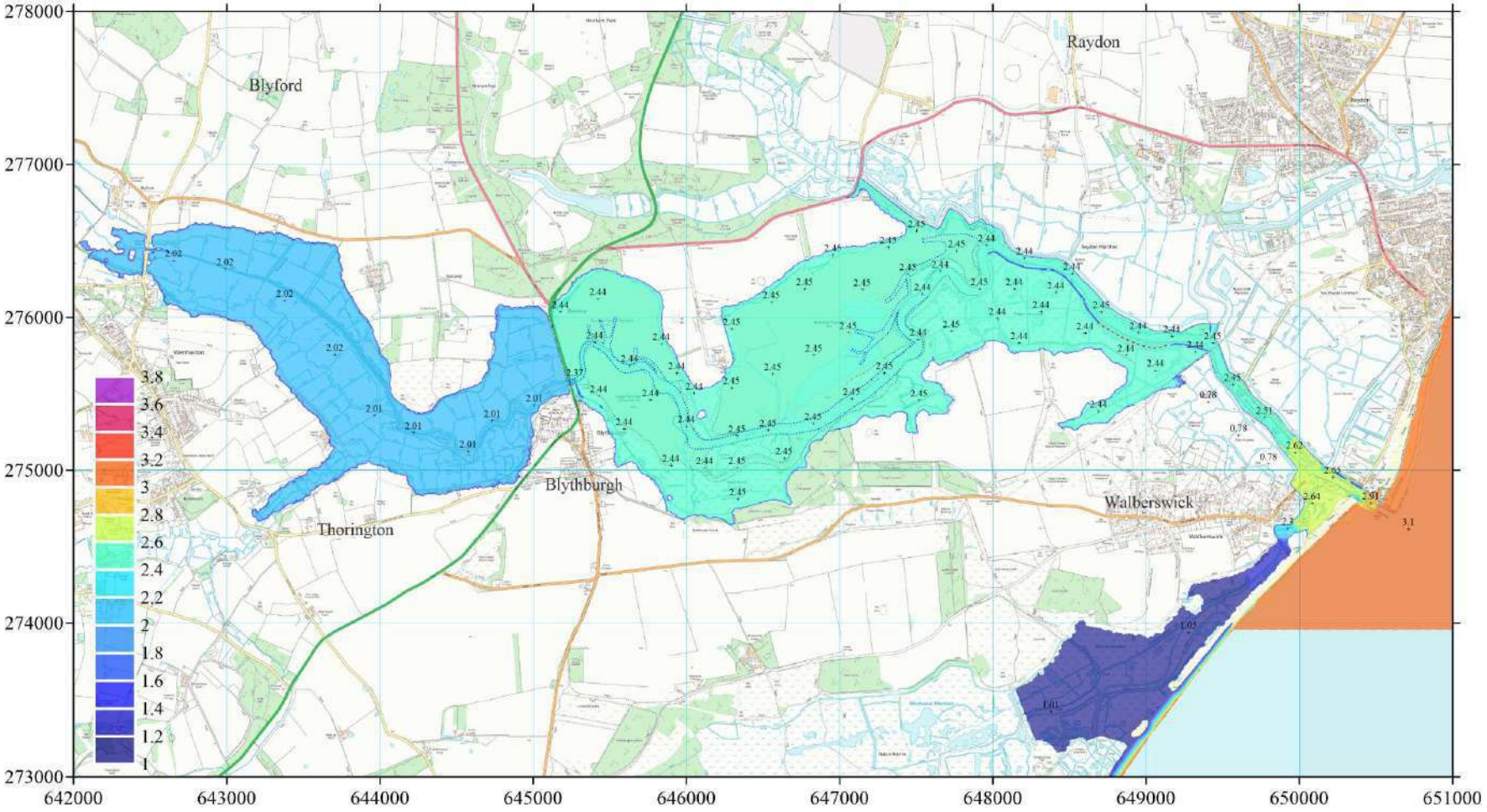
2013 event: S8 - Raise defences + 500m passive spillway at 2.00mOD, Walberswick dunes defended



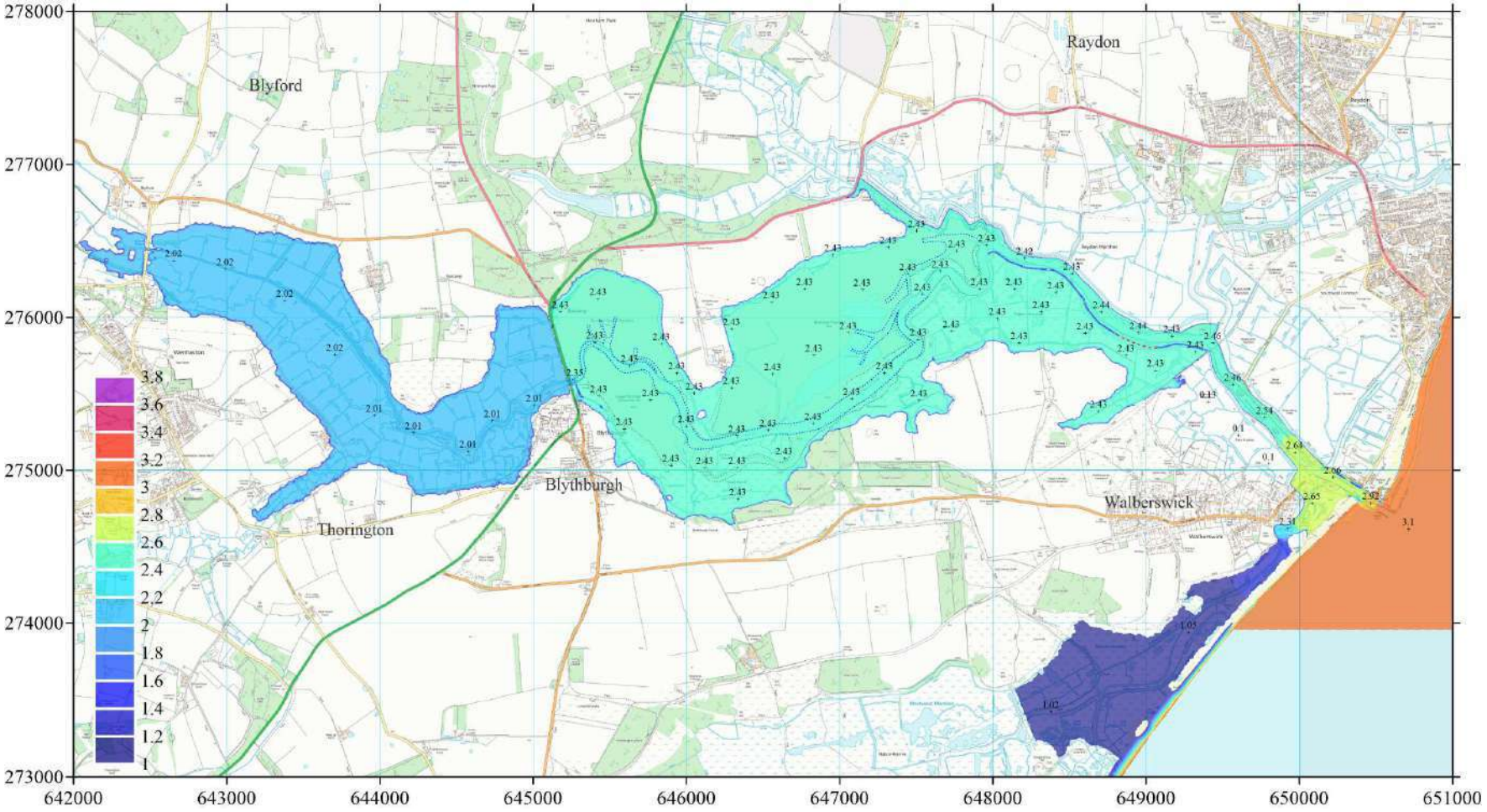
2013 event: S9 - Raise downstream defences only + 500m passive spillway at 2.00mOD, Walberswick dunes defended



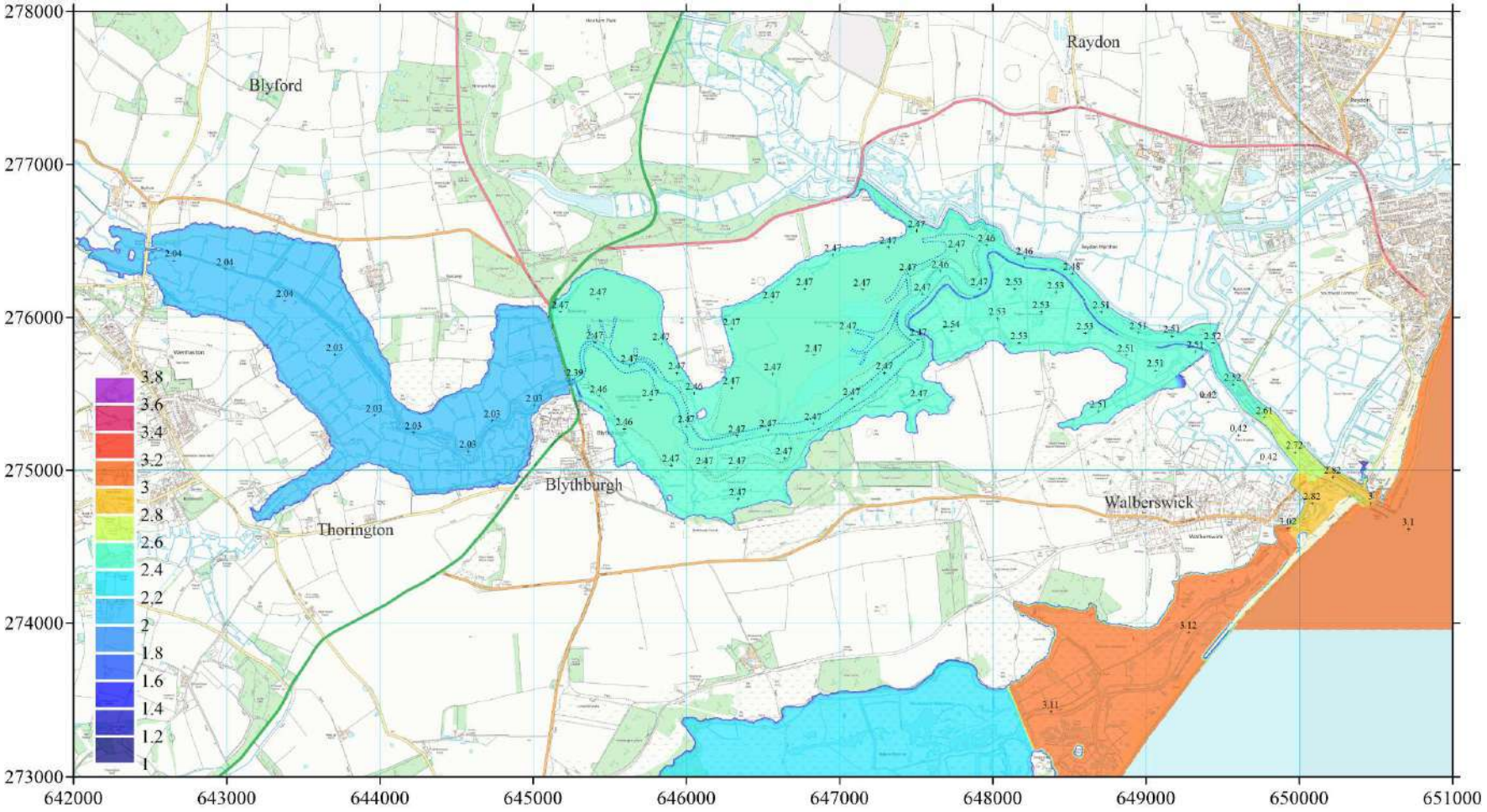
2013 event: S11 - Raise downstream defences only + 500m passive spillway at 2.00mOD, culverts open into Robinson's Marsh, Walberswick dunes defended



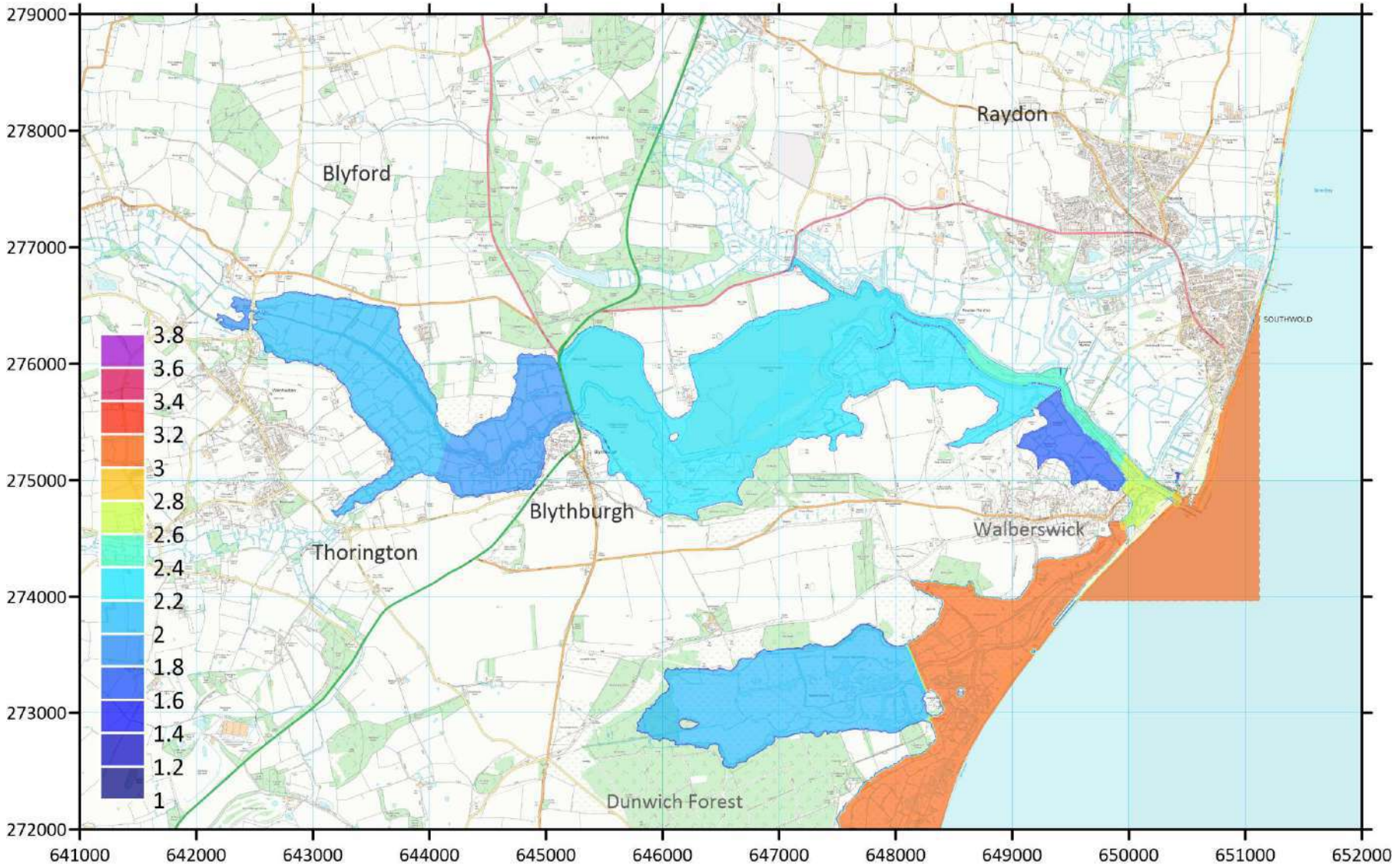
2013 event: S10 - Raise downstream defences only + 250m passive spillway at 2.00mOD, Walberswick dunes defended



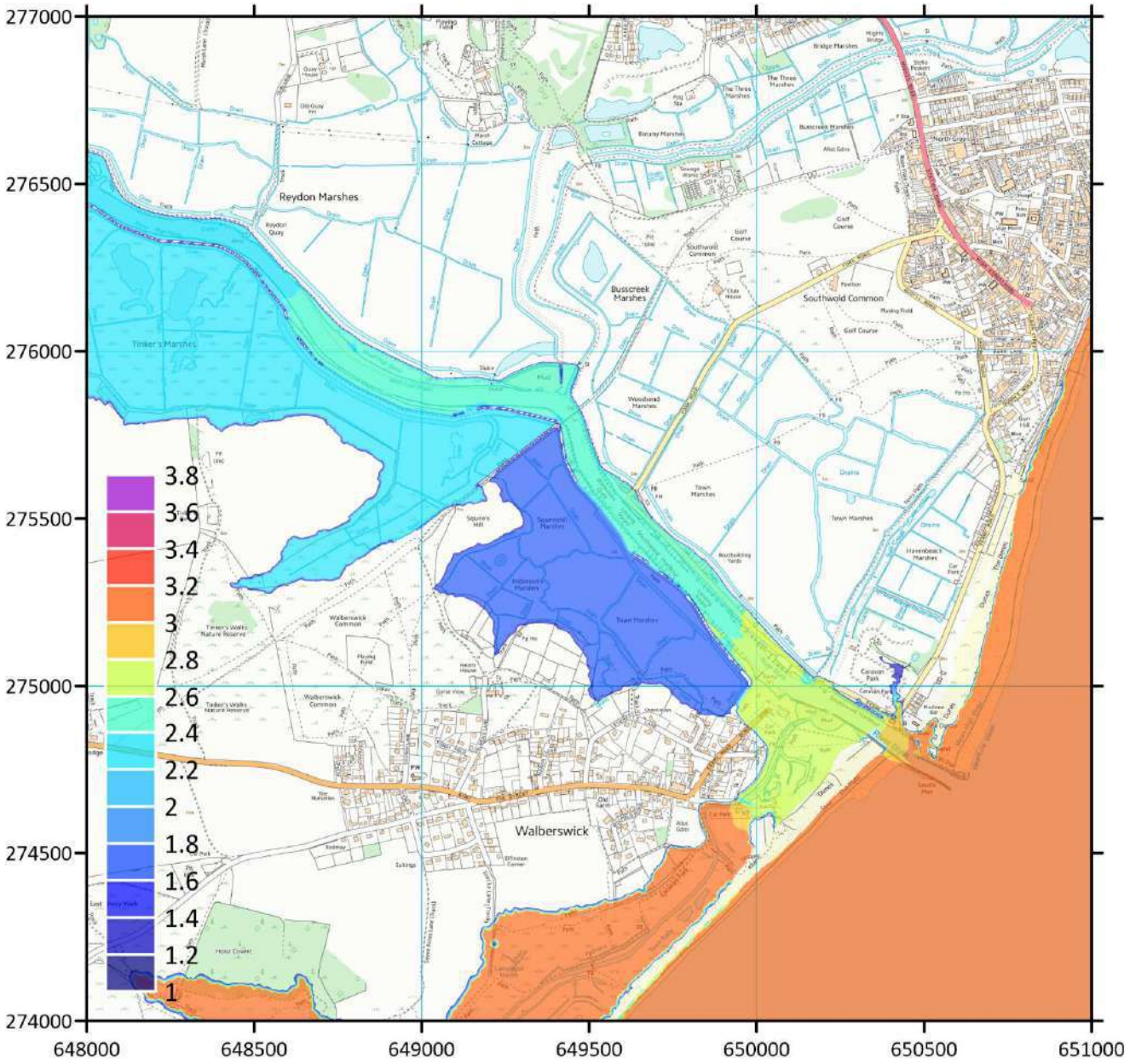
2013 event: S13 - Raise downstream defences only + 250m passive spillway at 2.00mOD, Walberswick dunes undefended



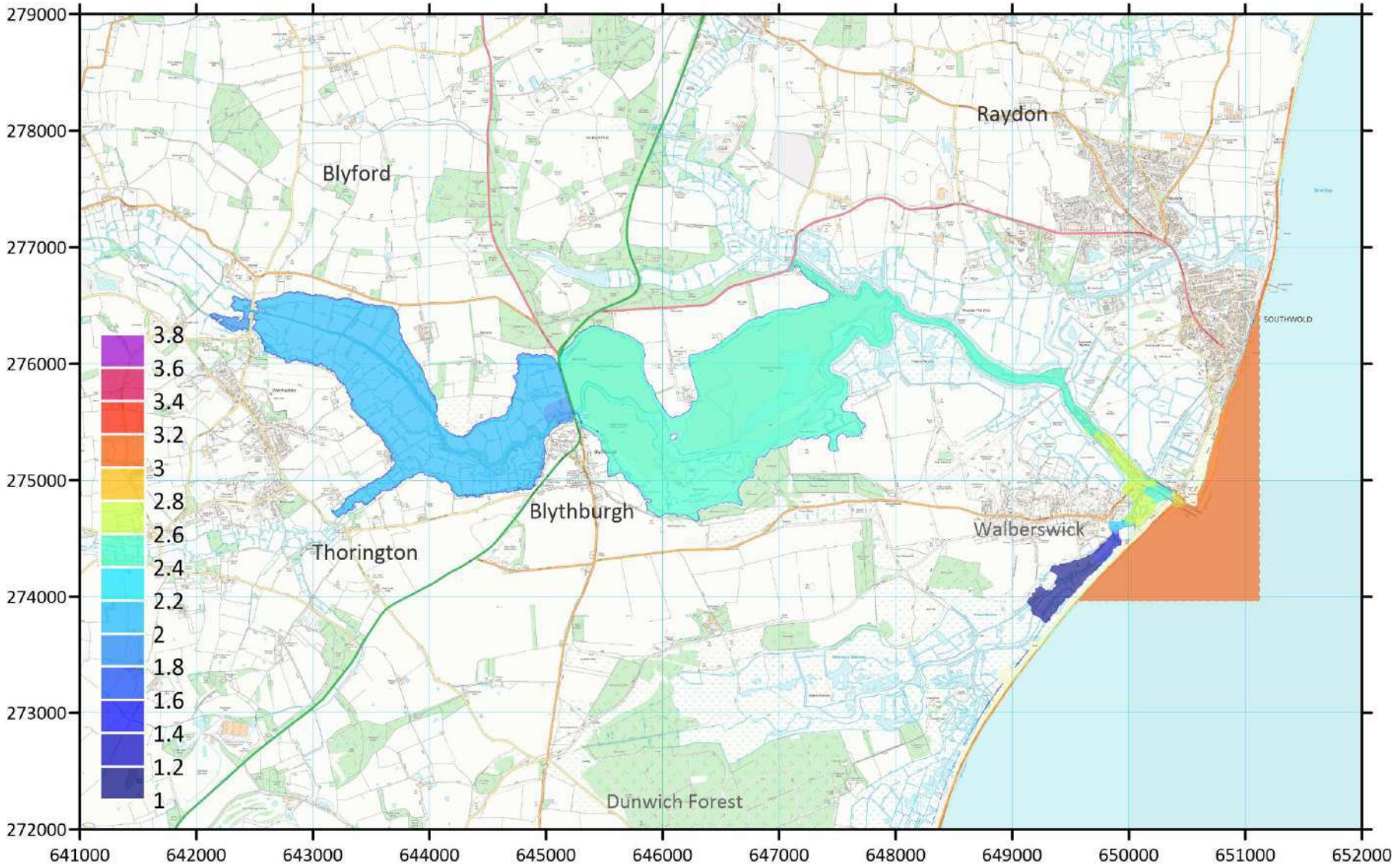
2013 event: G0 - Present day defences, narrow channel



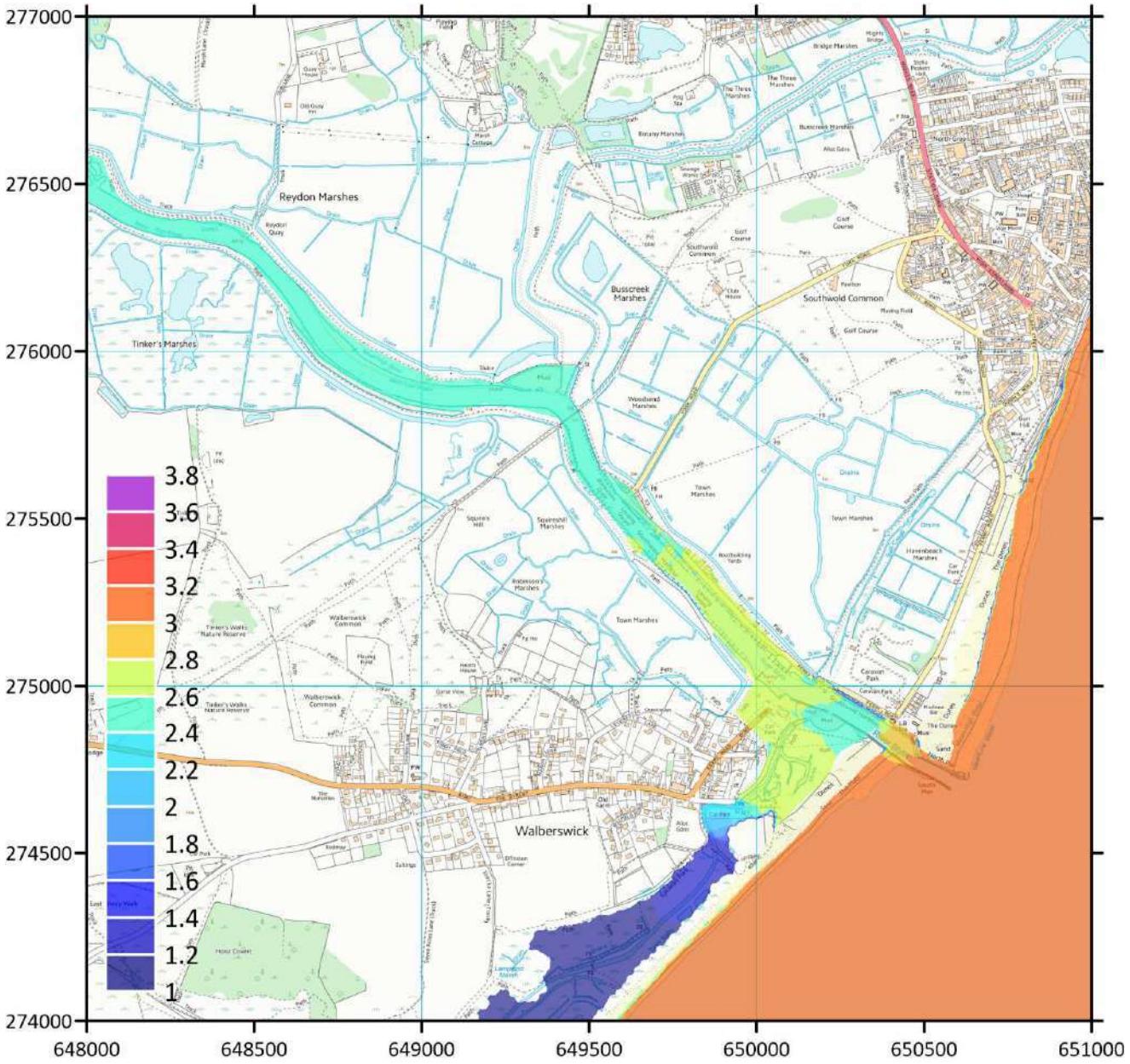
2013 event:
G0 - Present day defences,
narrow channel
Zoom-in (downstream)



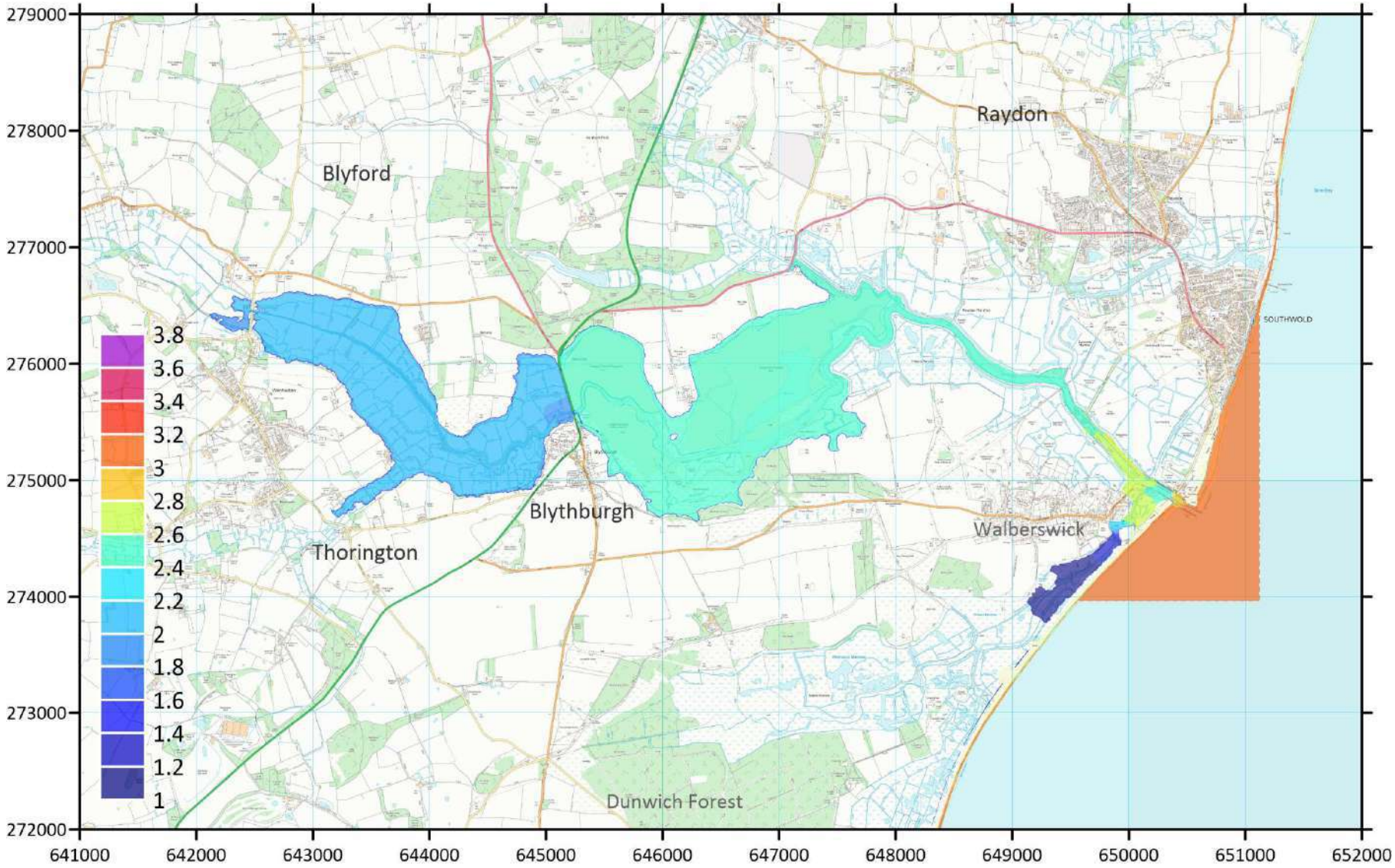
2013 event: G2a – Raise estuary defences, narrow channel



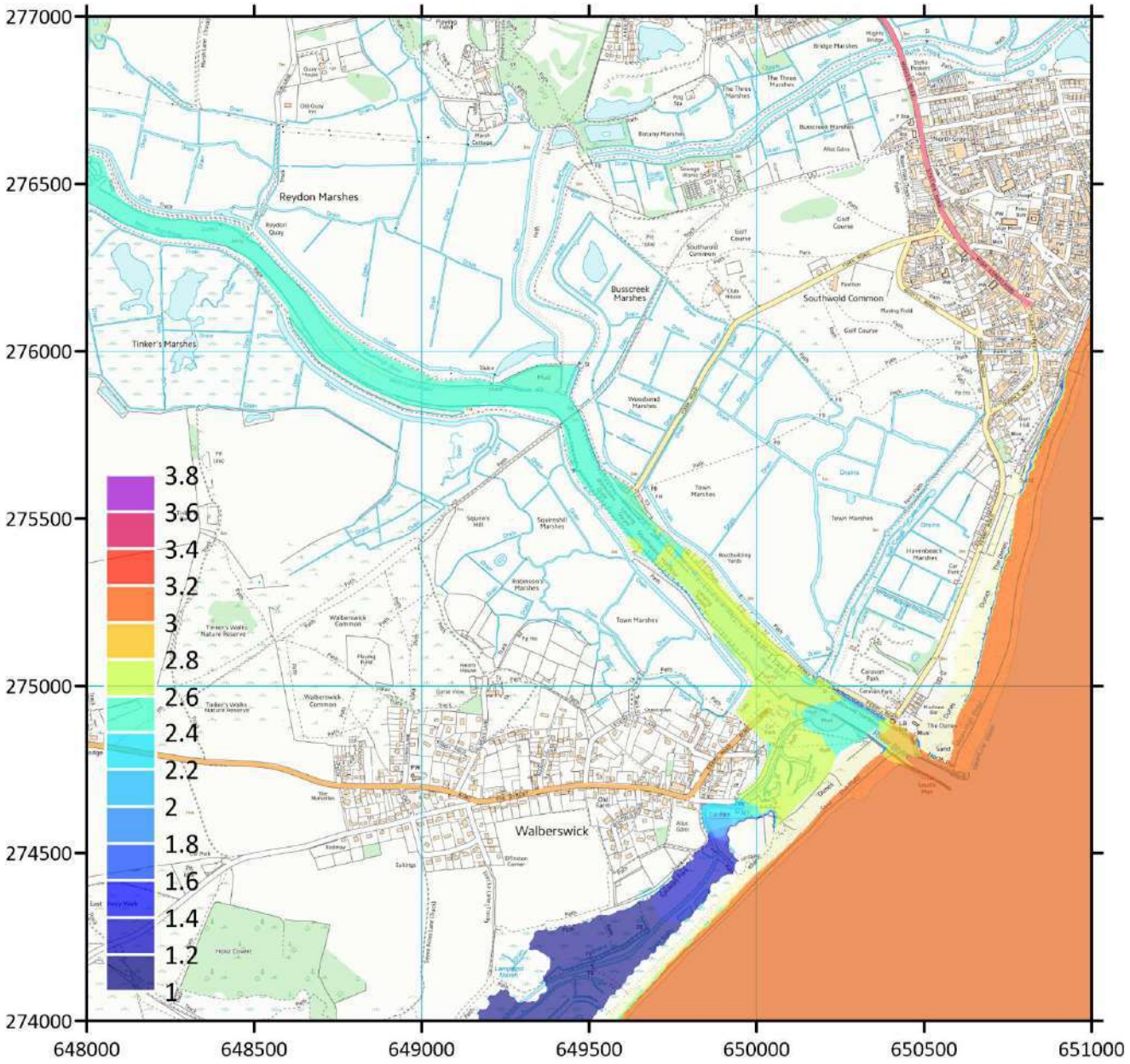
2013 event:
G2a – Raise estuary defences,
narrow channel
Zoom-in (downstream)



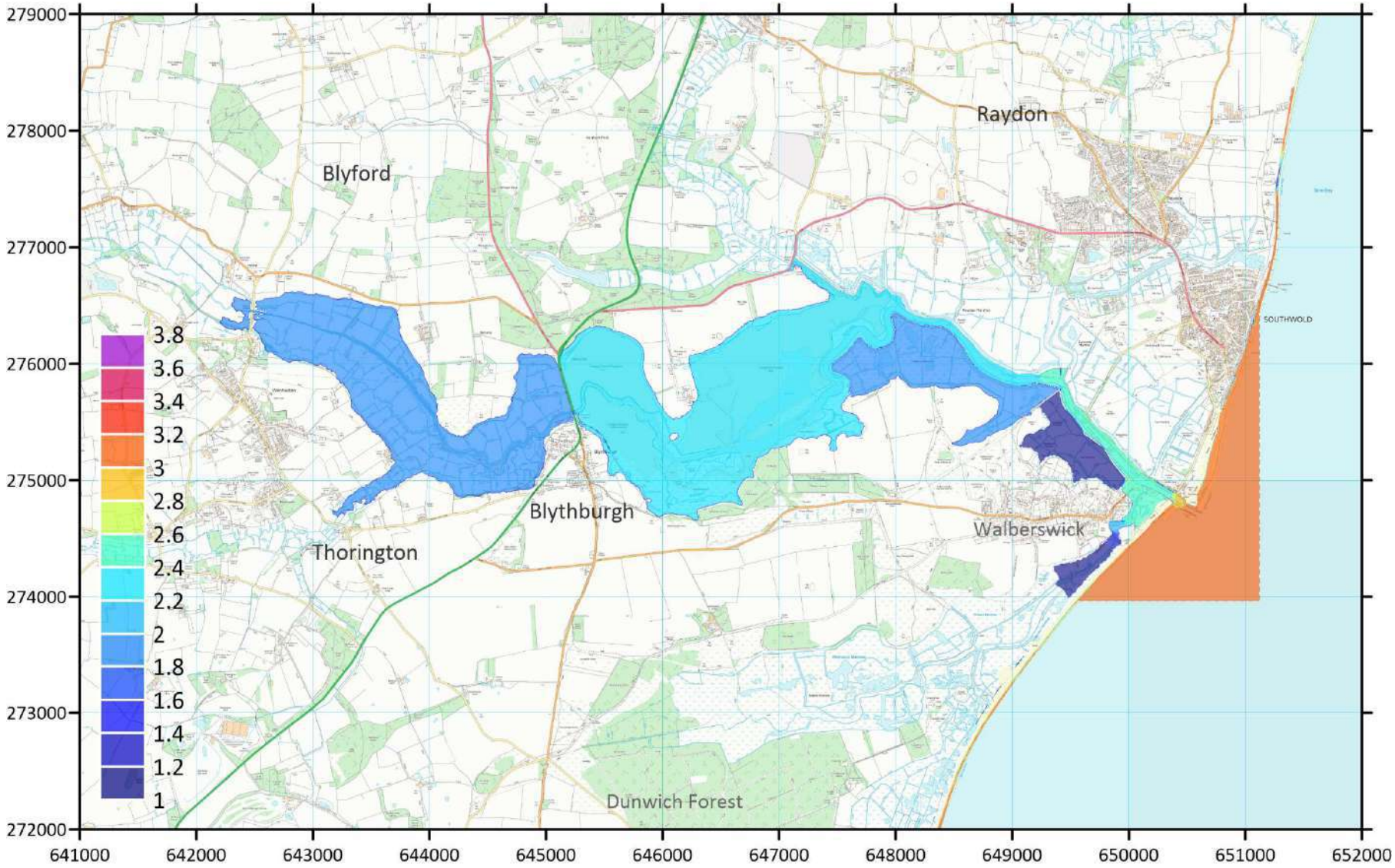
2013 event: G2b – Raise estuary defences, narrow channel with culverts



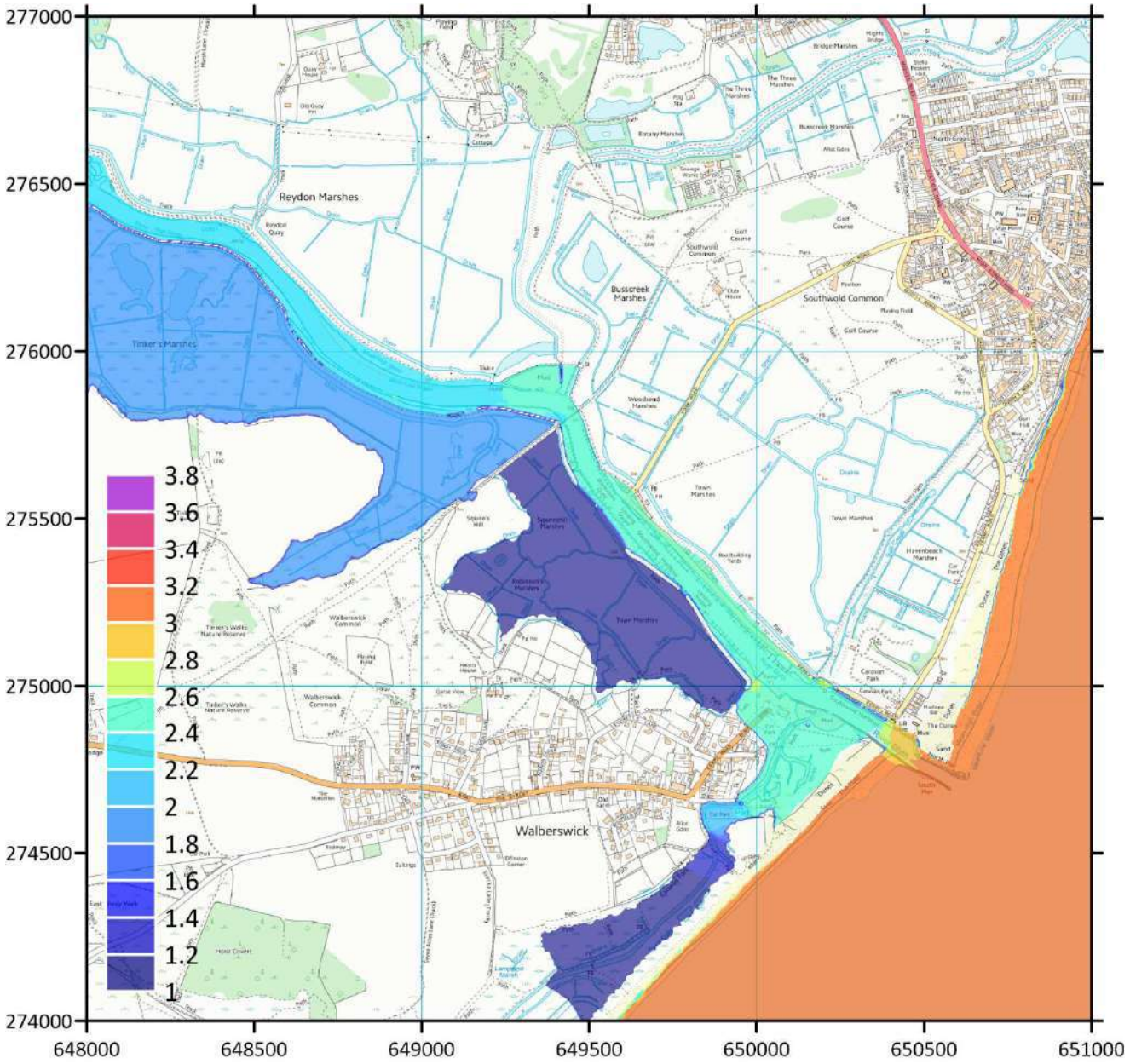
2013 event: G2b –
Raise estuary defences, narrow channel with culverts
Zoom-in (downstream)



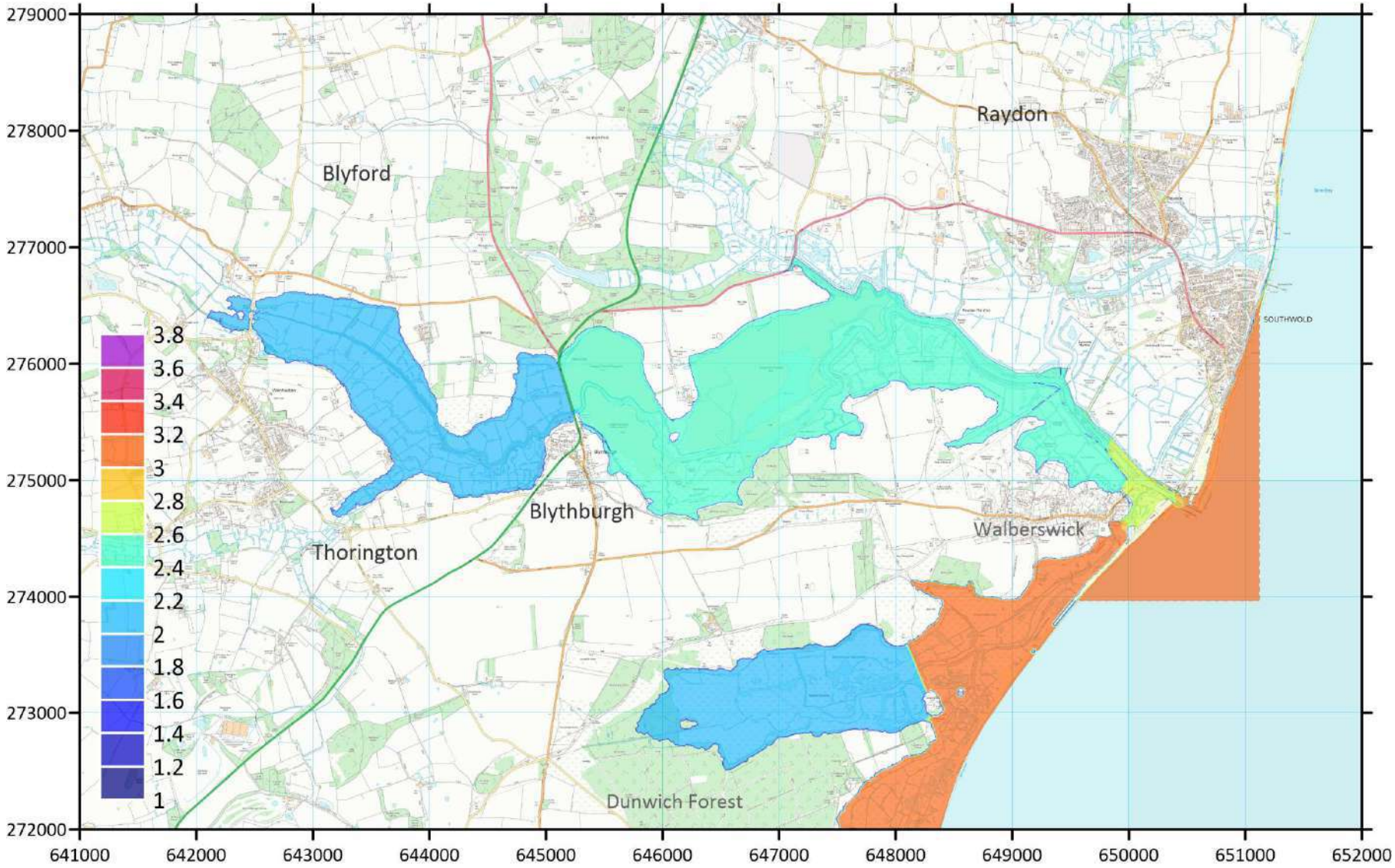
2013 event: G3 – SMP Policy, narrow channel



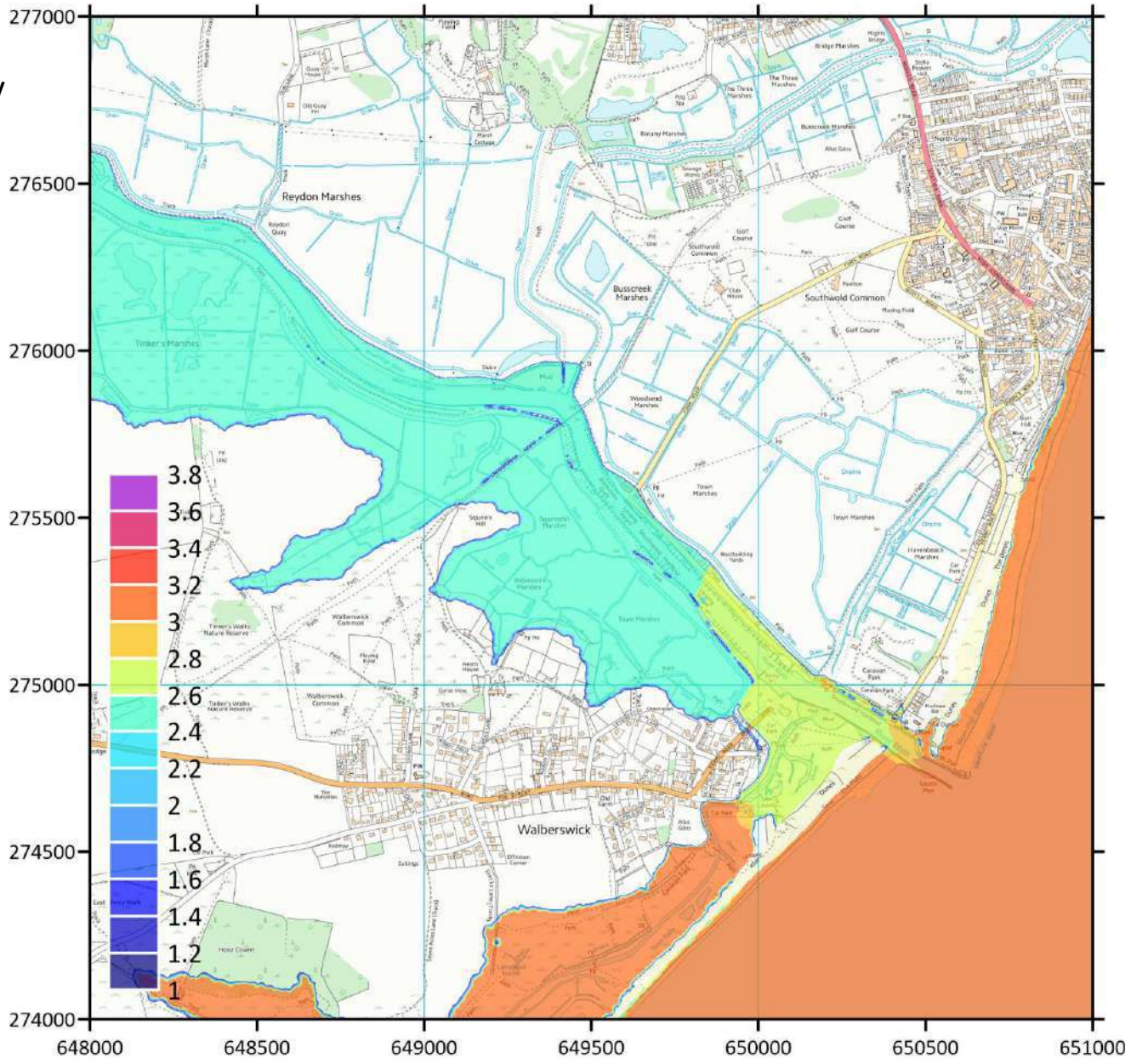
2013 event:
G3 – SMP Policy,
narrow channel
Zoom-in (downstream)



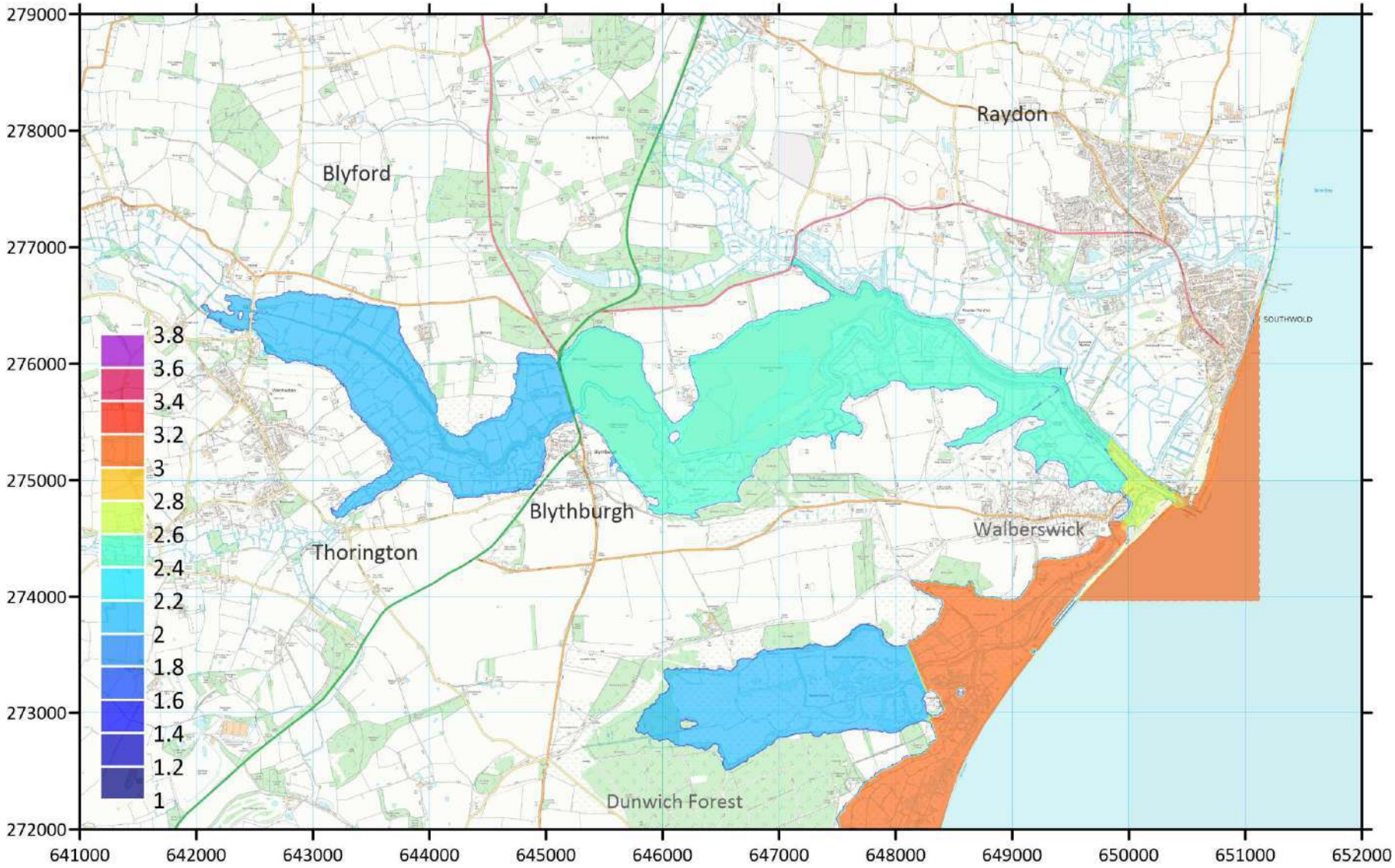
2013 event: E0 - Present-day estuary defences (Baseline), Marshes raised 300mm



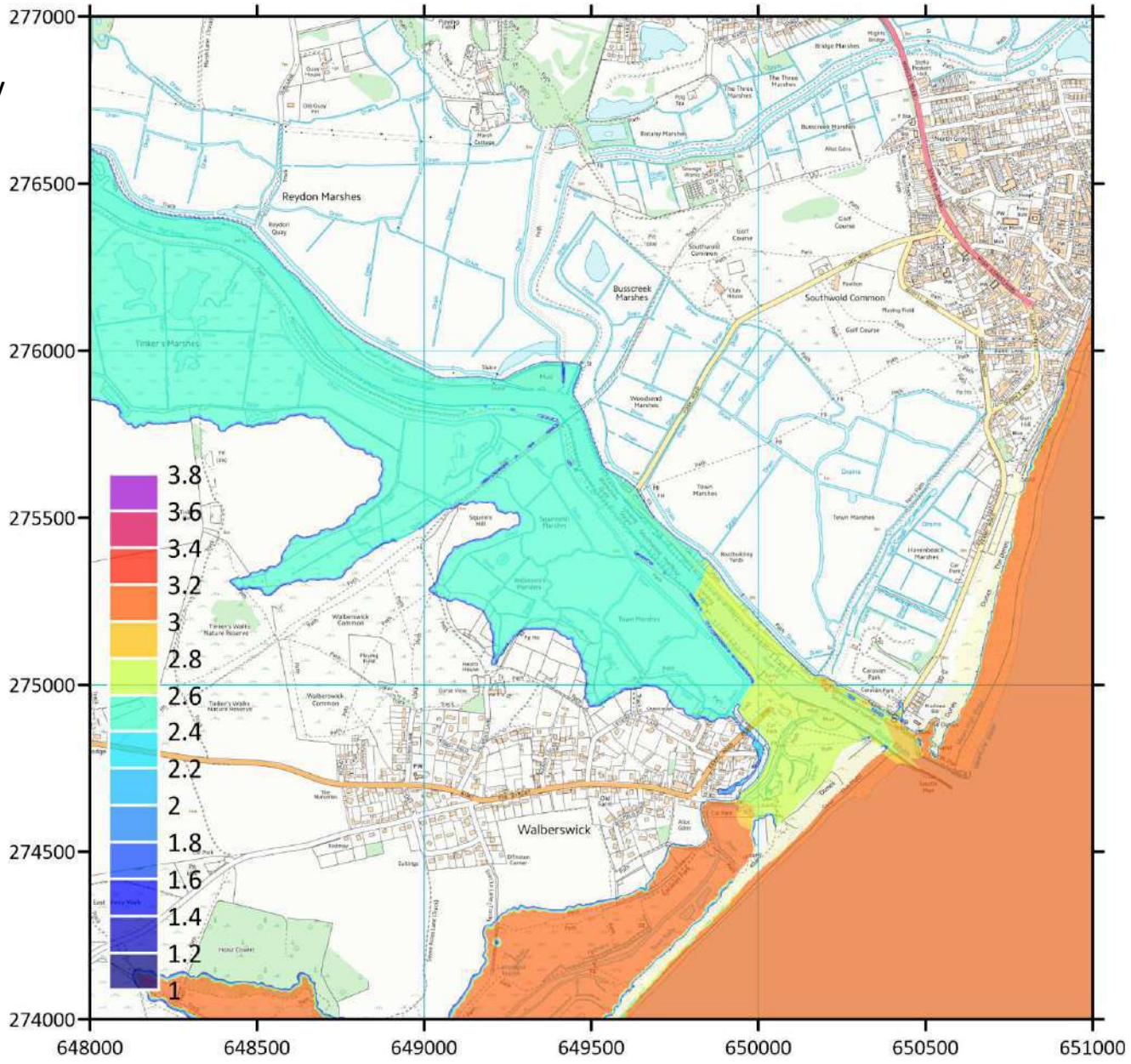
2013 event:
E0 - Present-day estuary defences (Baseline),
Marshes raised 300mm
Zoom-in (downstream)



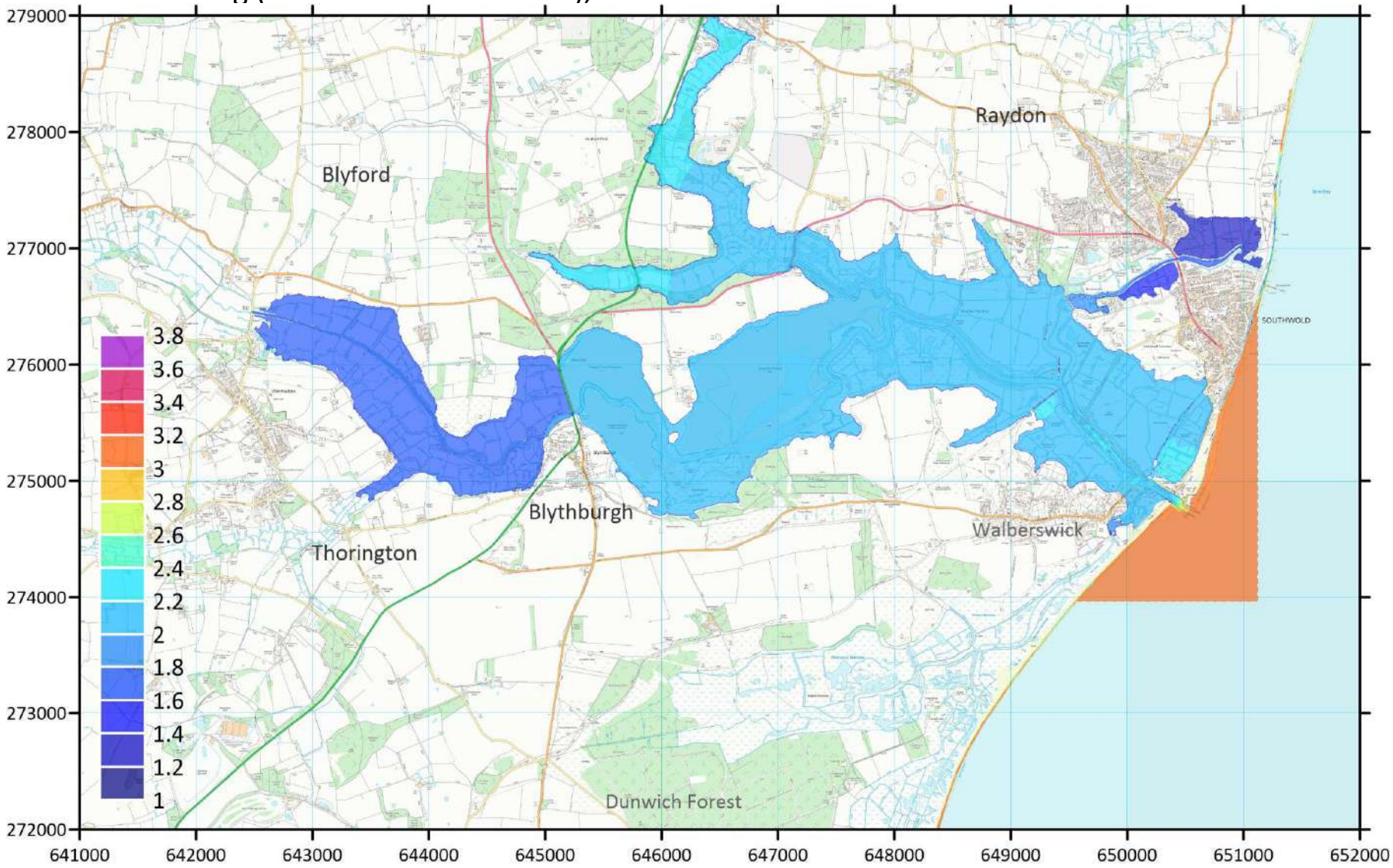
2013 event: E0 - Present-day estuary defences (Baseline), Marshes raised 600mm



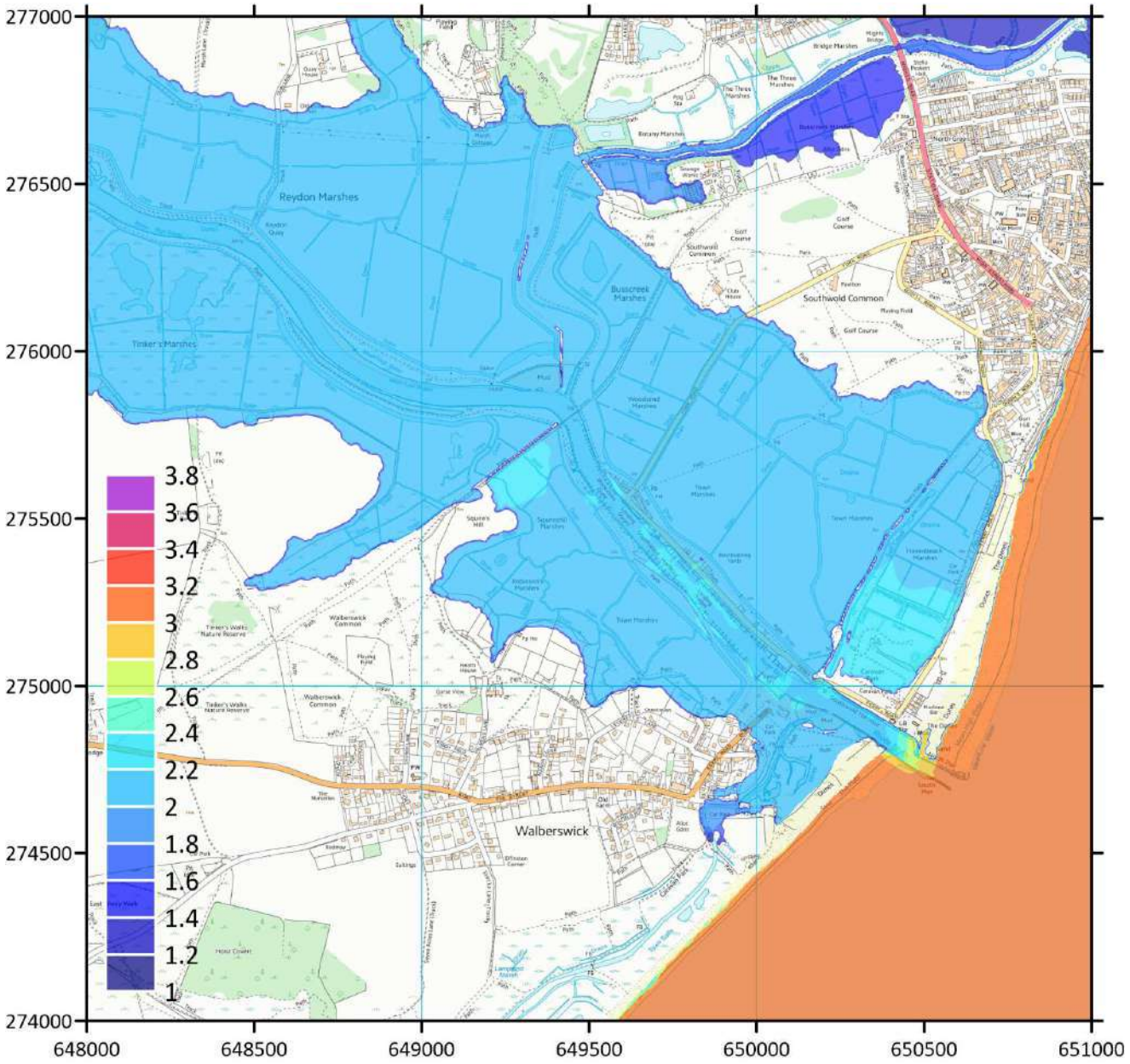
2013 event:
E0 - Present-day estuary defences (Baseline),
Marshes raised 600mm
Zoom-in (downstream)



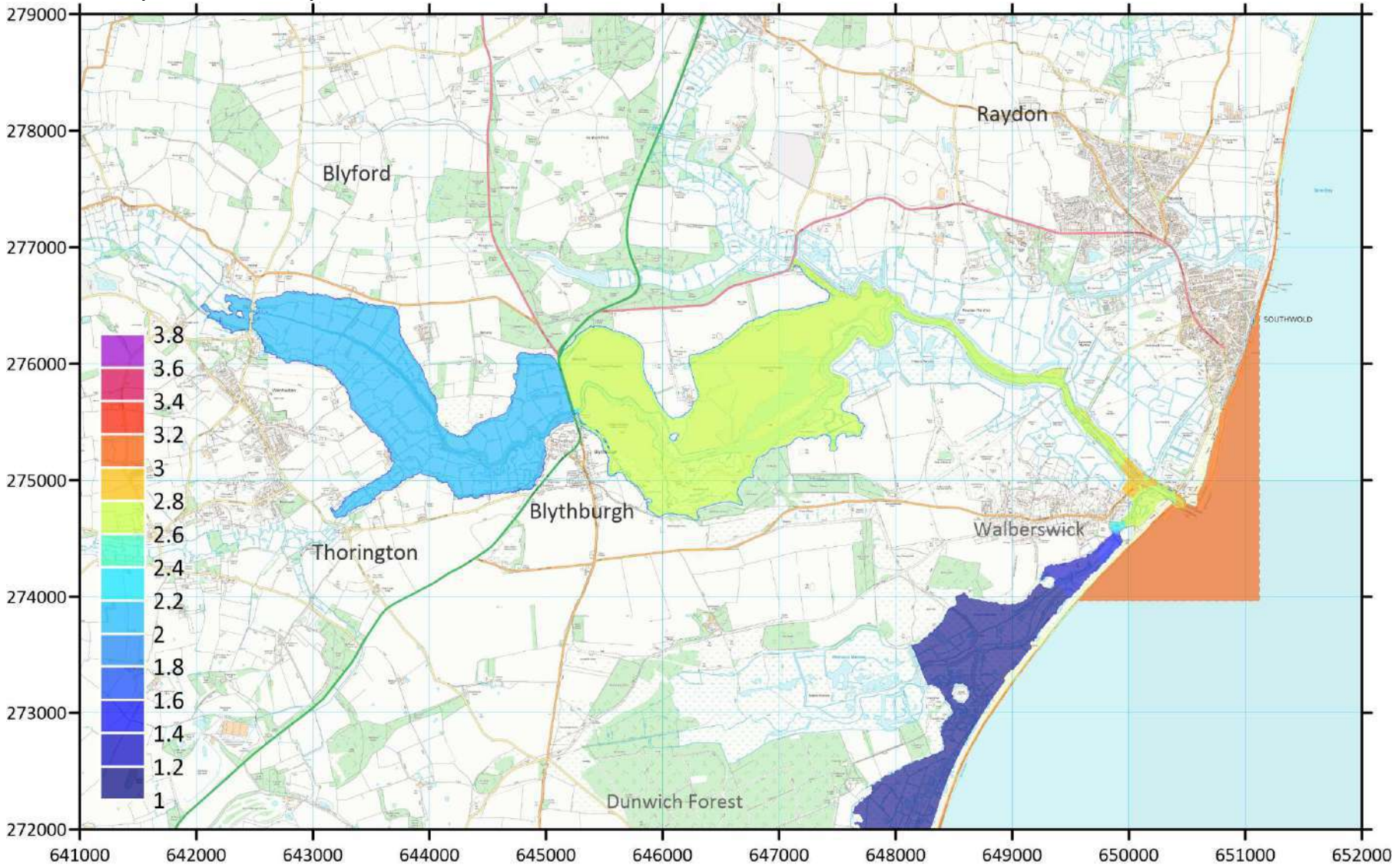
2013 event: E1 – Do Nothing (All embankments failed), Marshes raised 300mm



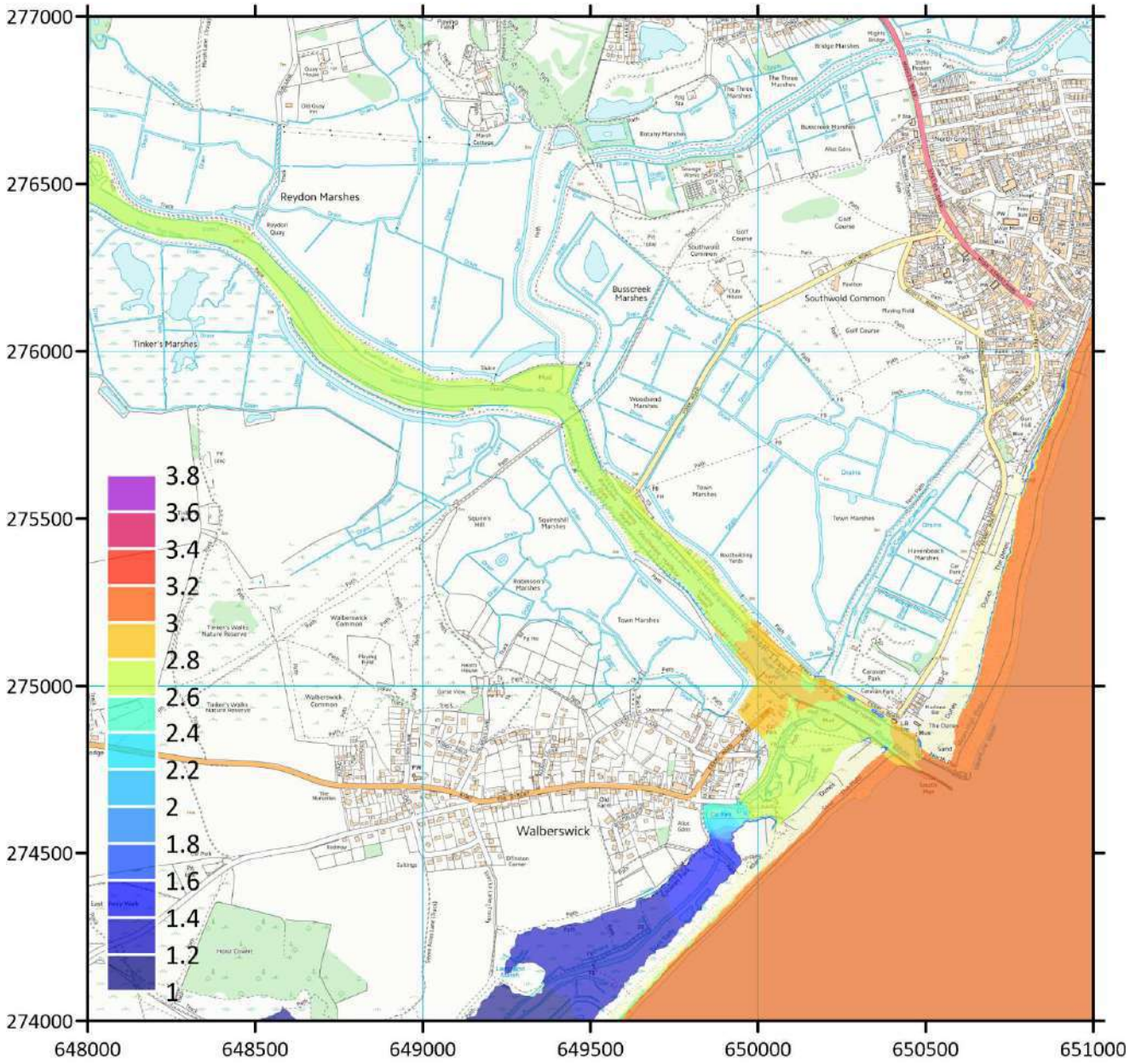
2013 event:
E1 – Do Nothing (All embankments failed), Marshes raised 300mm, Zoom-in (downstream)



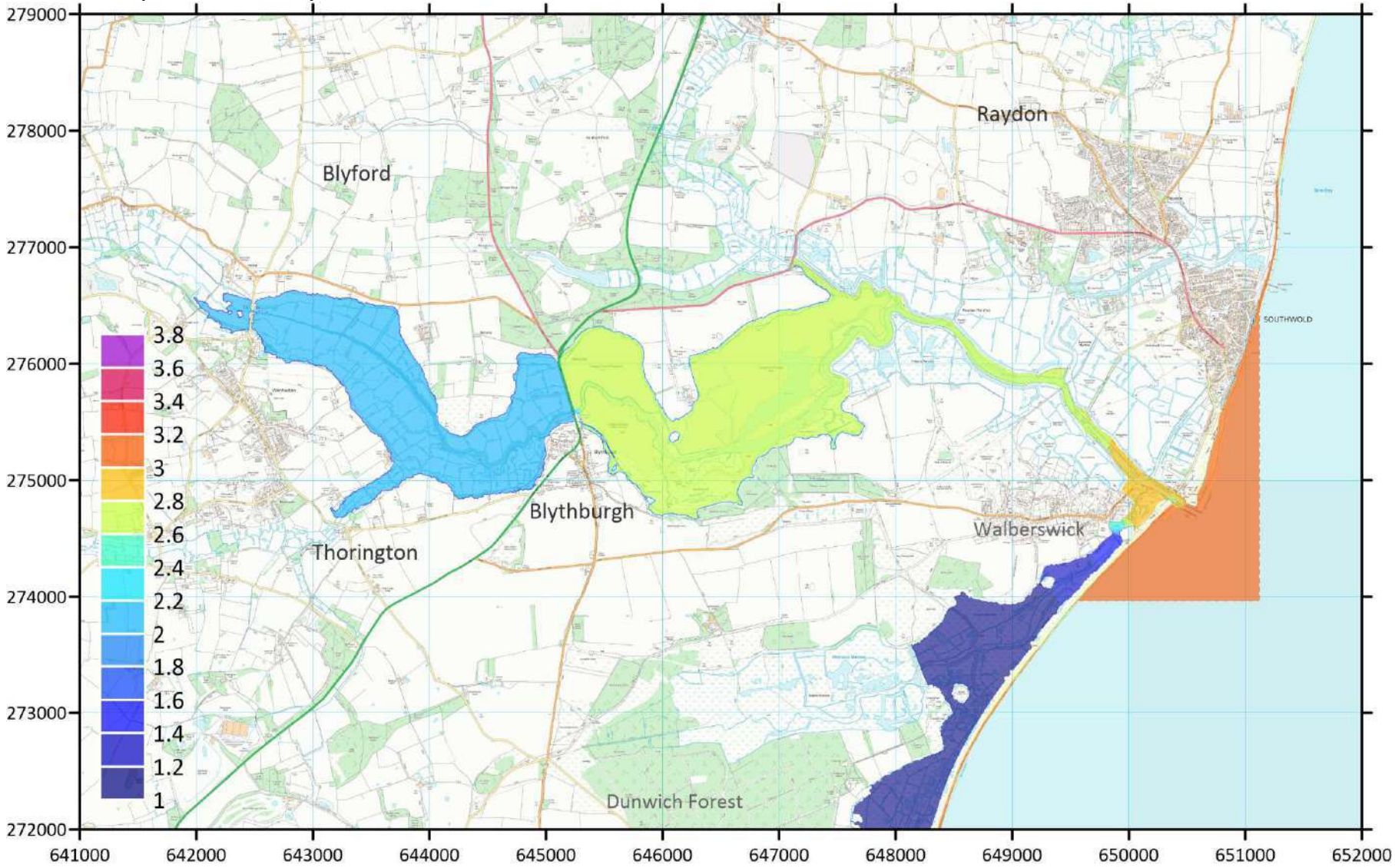
2013 event: E2 – Improve estuary defences, Marshes raised 300mm



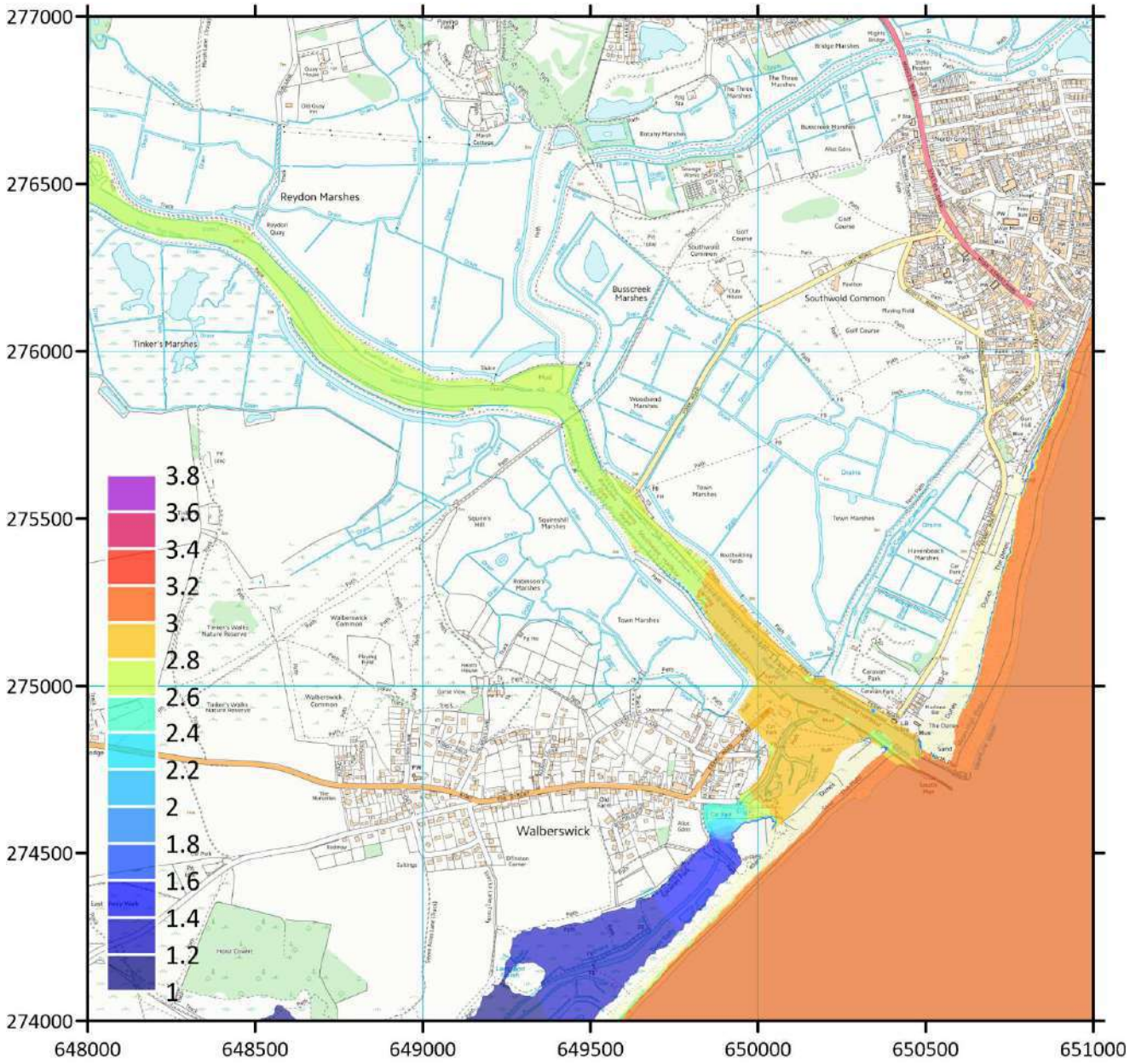
2013 event:
E2 – Improve estuary defences,
Marshes raised 300mm
Zoom-in (downstream)



2013 event: E2 – Improve estuary defences, Marshes raised 600mm

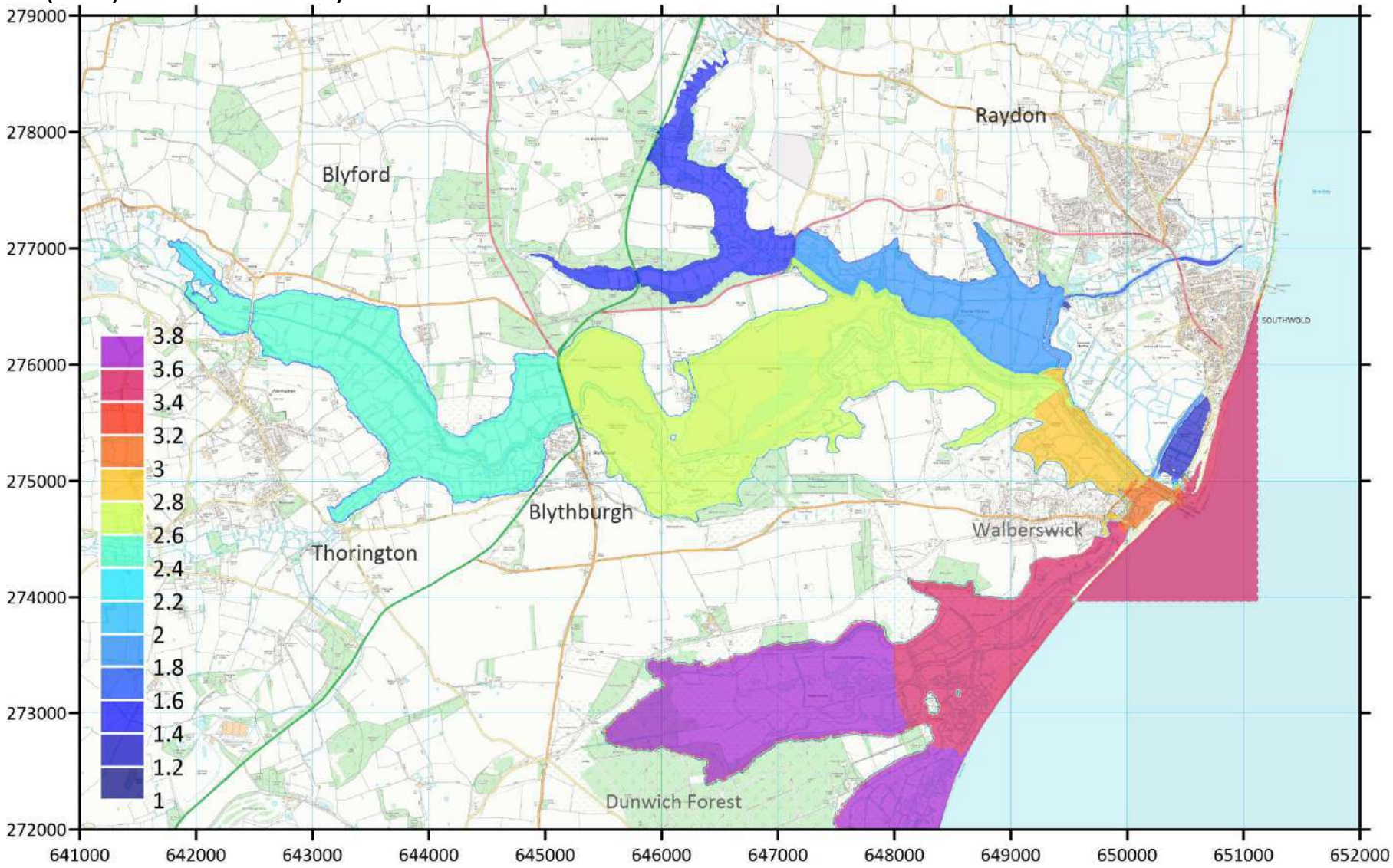


2013 event:
E2 – Improve estuary defences,
Marshes raised 600mm
Zoom-in (downstream)

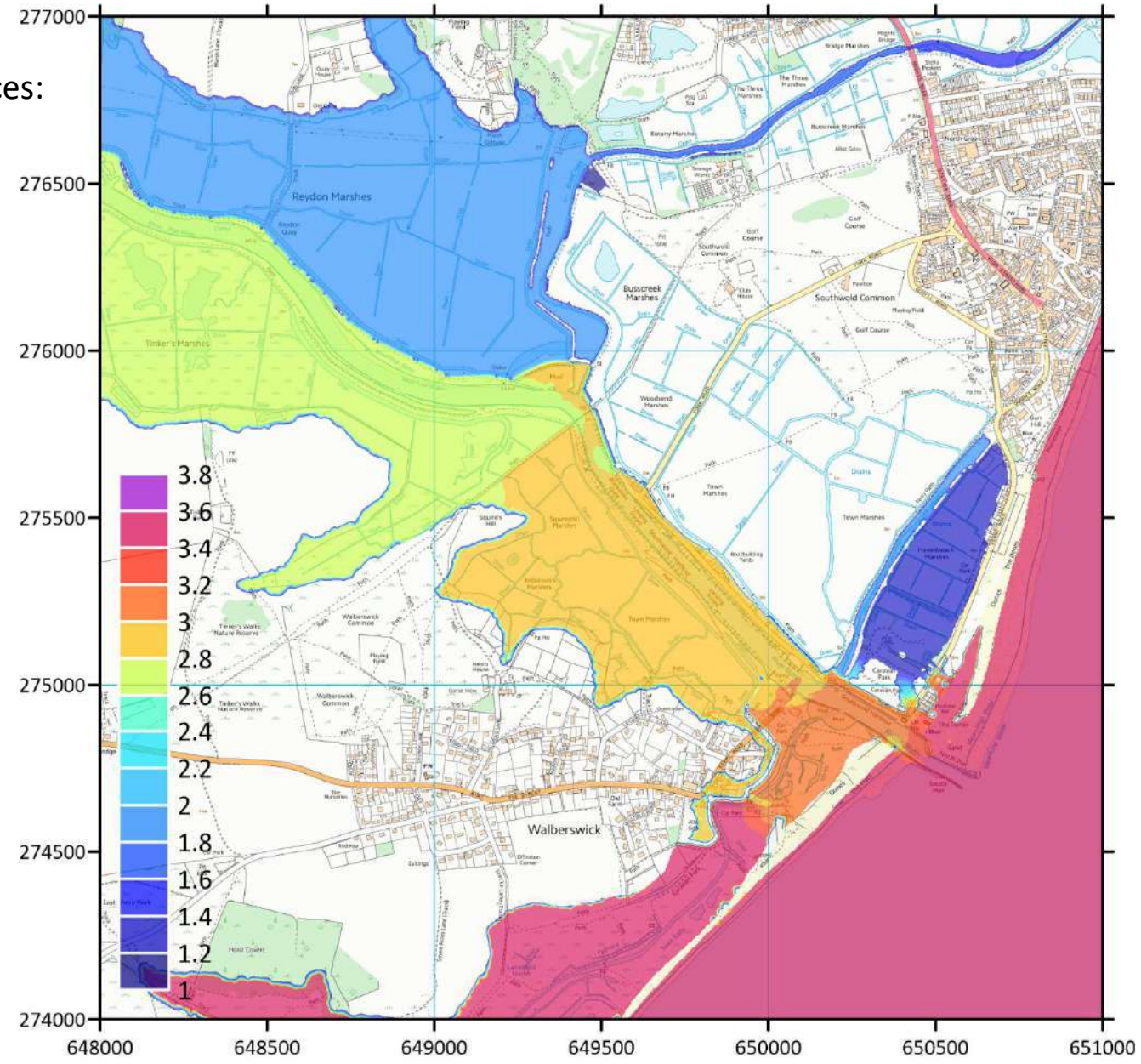


2013 event in 2070
RCP8.5, 95%

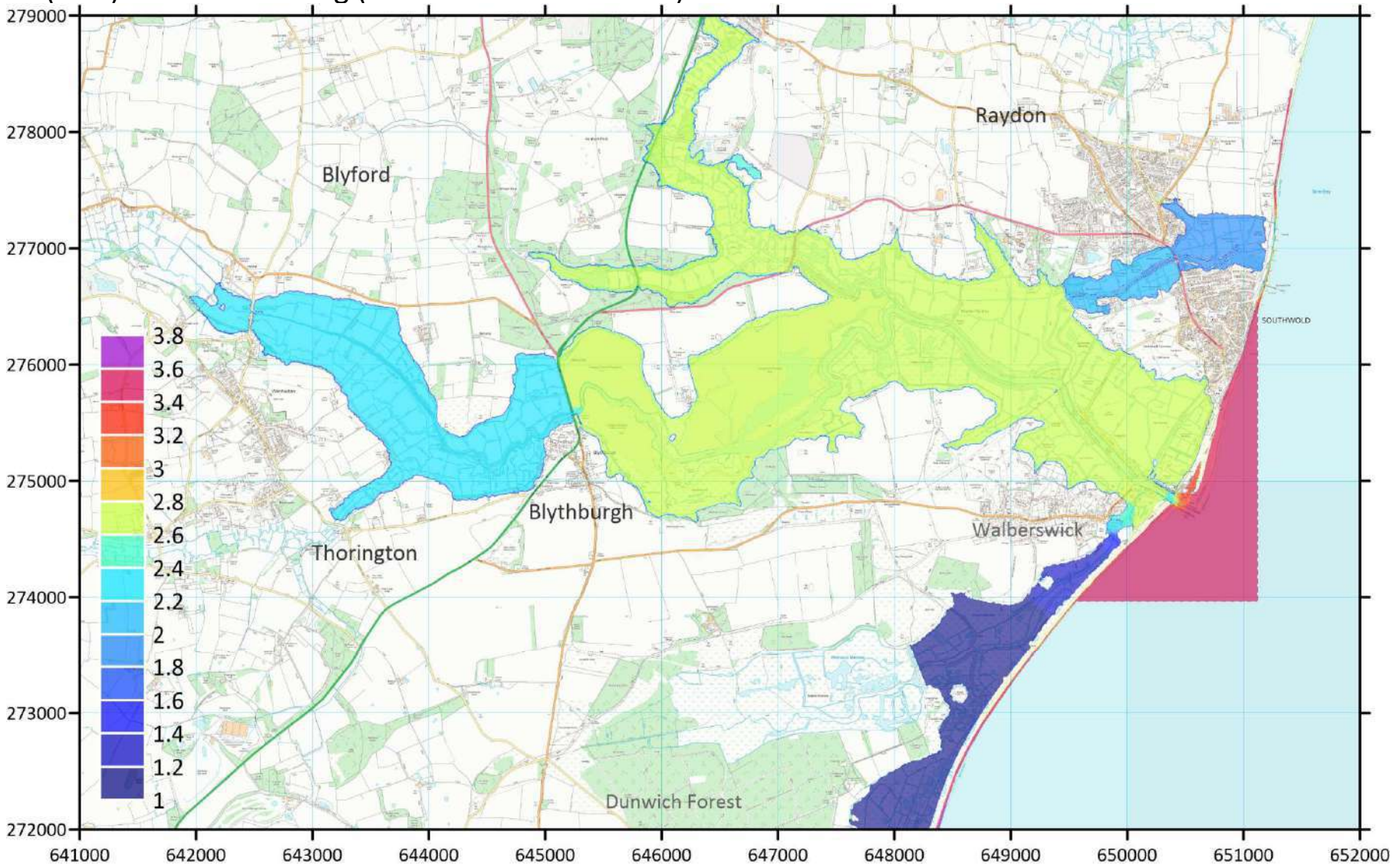
2070 RCP8.5 (95%): E0 - Present day defences



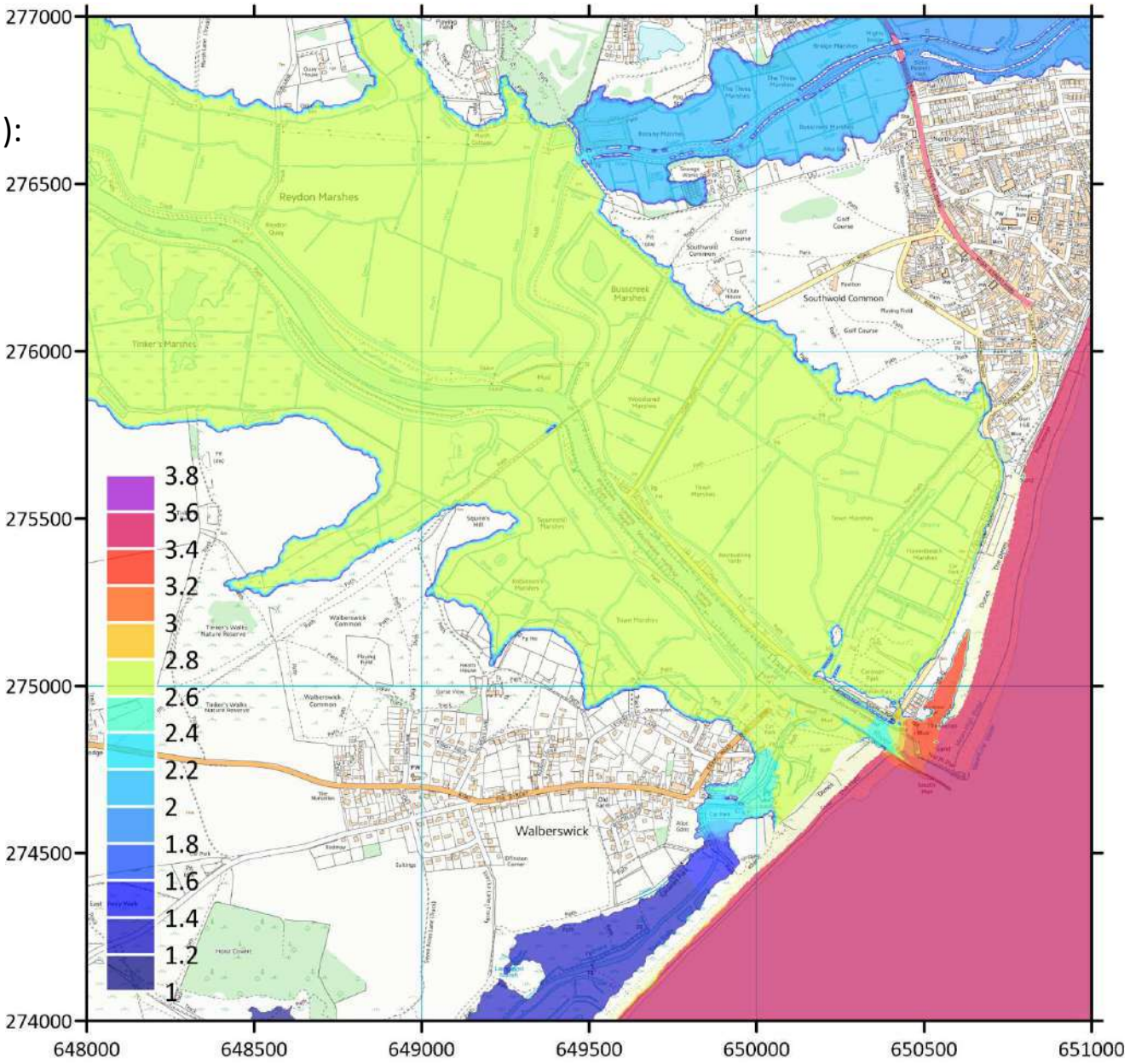
2070 RCP8.5 (95%):
E0 - Present day defences:
Zoom in (downstream)



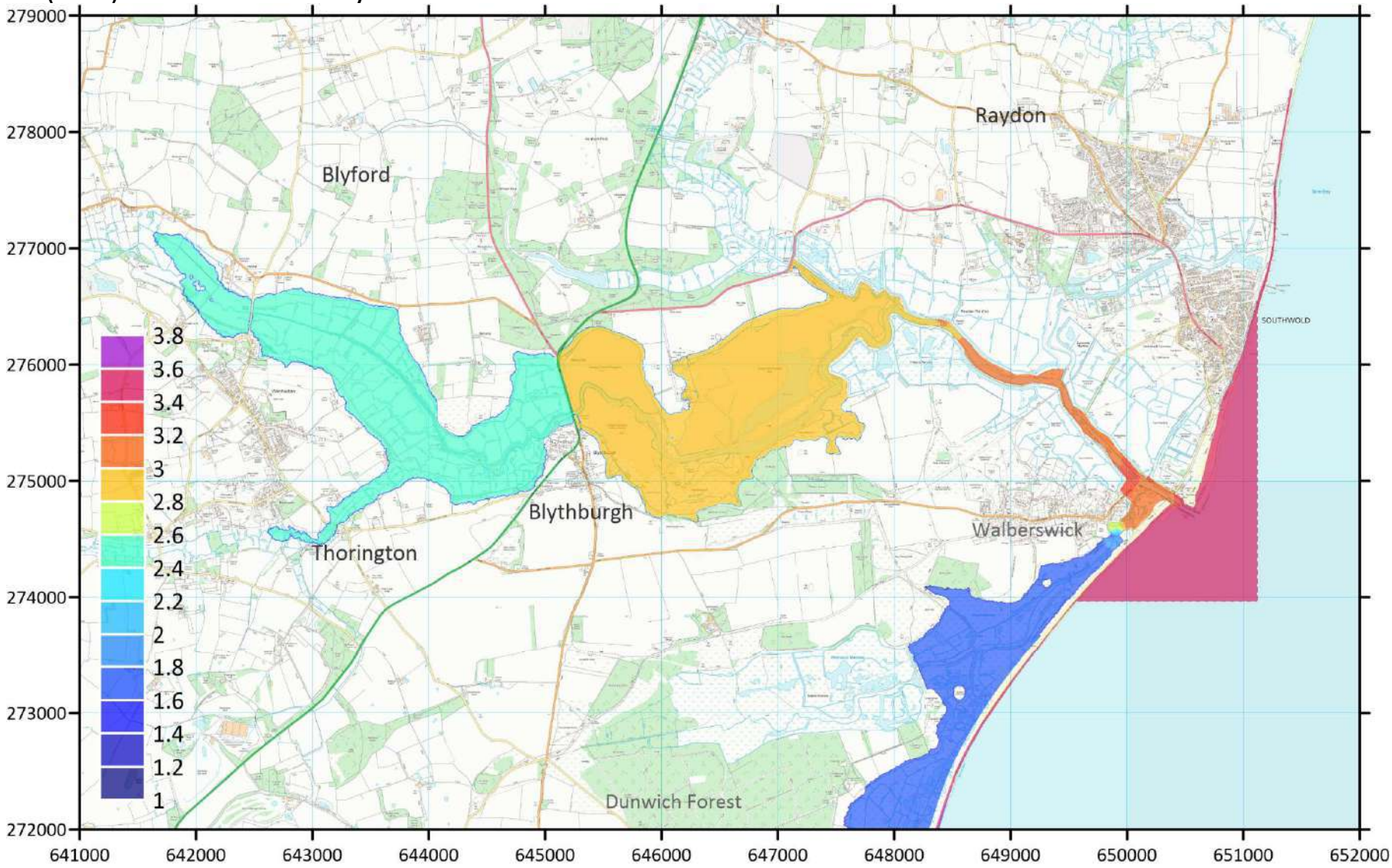
2070 RCP8.5 (95%): E1 – Do Nothing (All embankments failed)



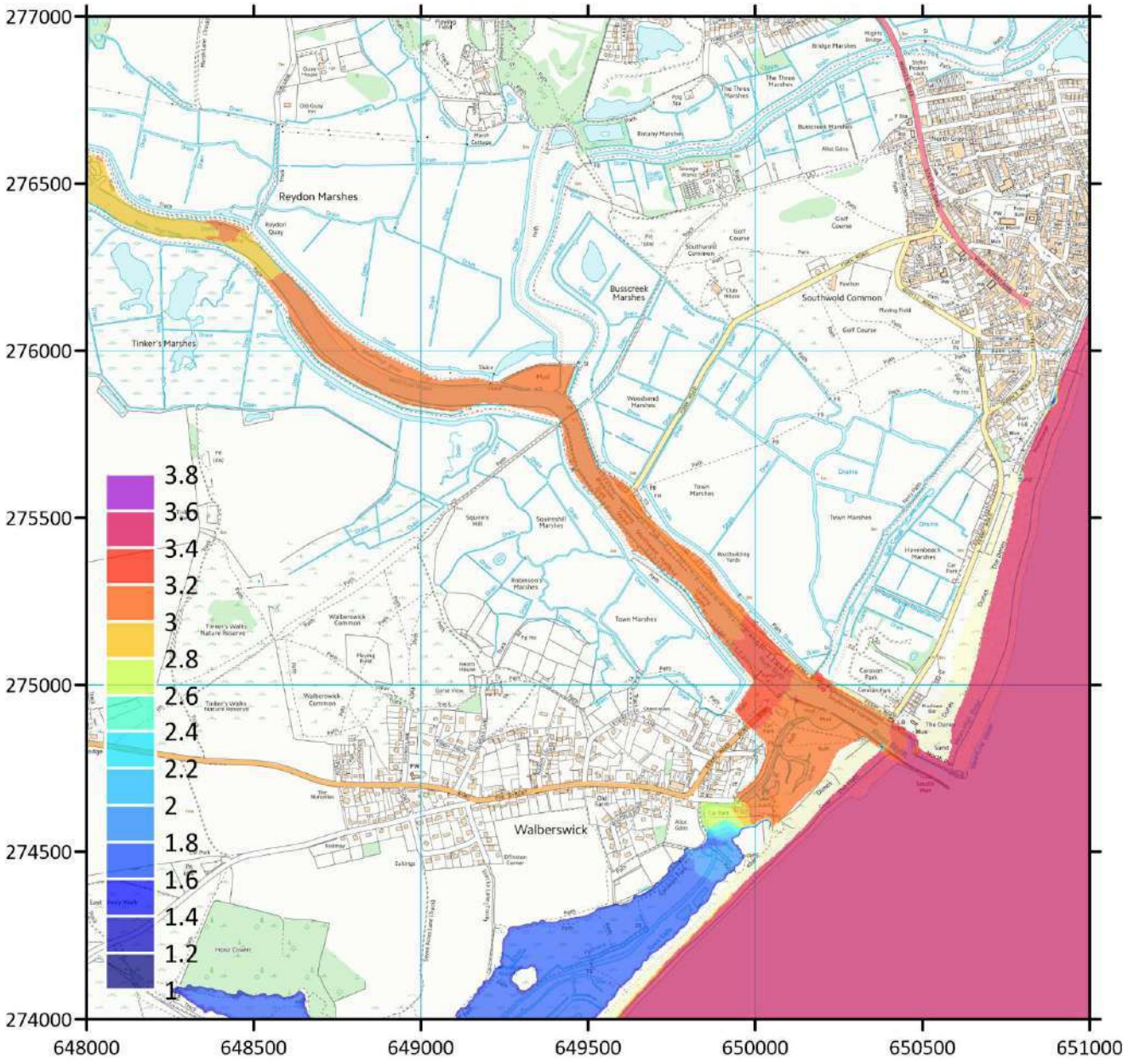
2070 RCP8.5 (95%):
E1 – Do Nothing
(All embankments failed):
Zoom in (downstream)



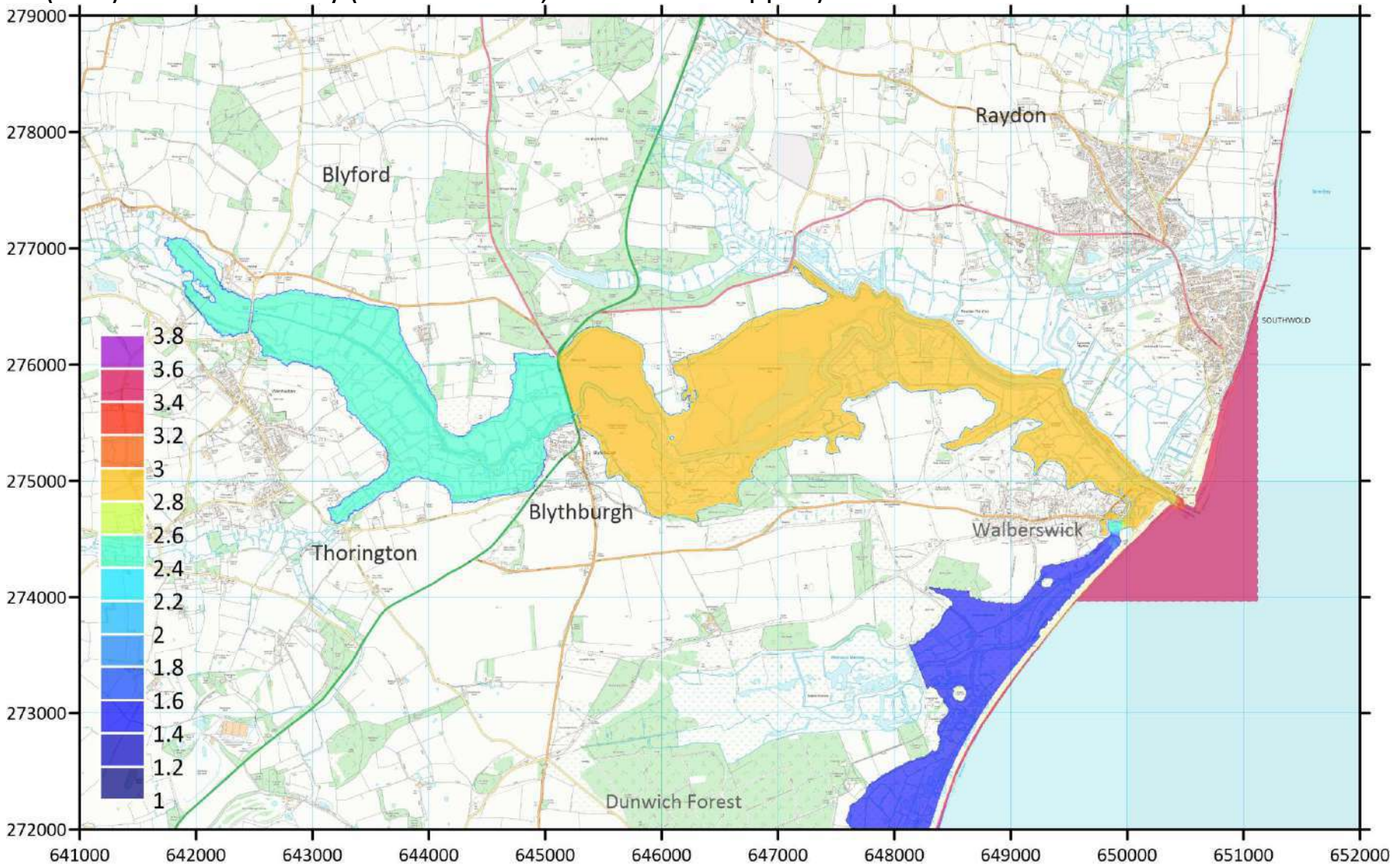
2070 RCP8.5 (95%): E2 - Raise estuary defences



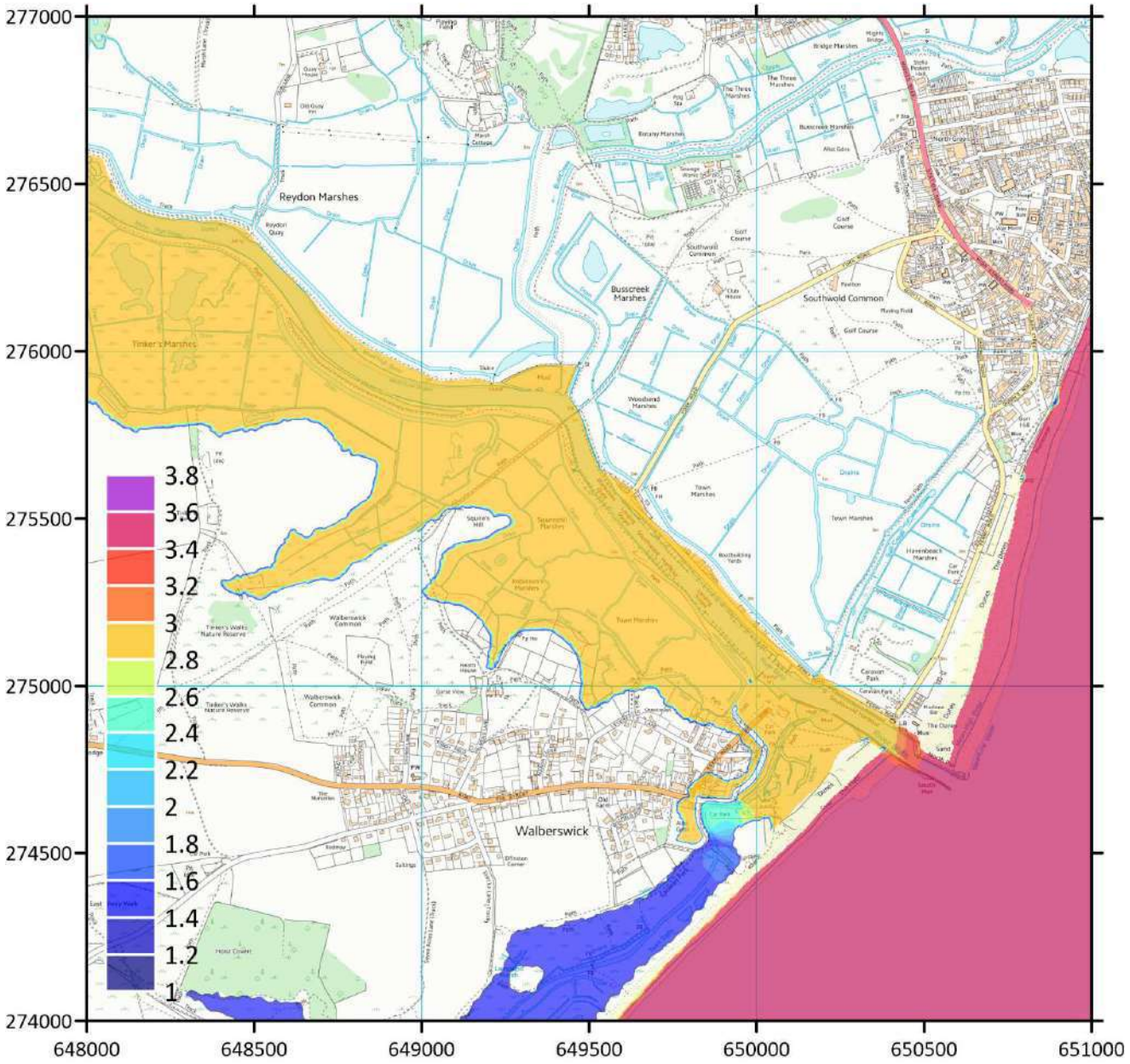
2070 RCP8.5 (95%):
E2 - Raise estuary defences:
Zoom in (downstream)



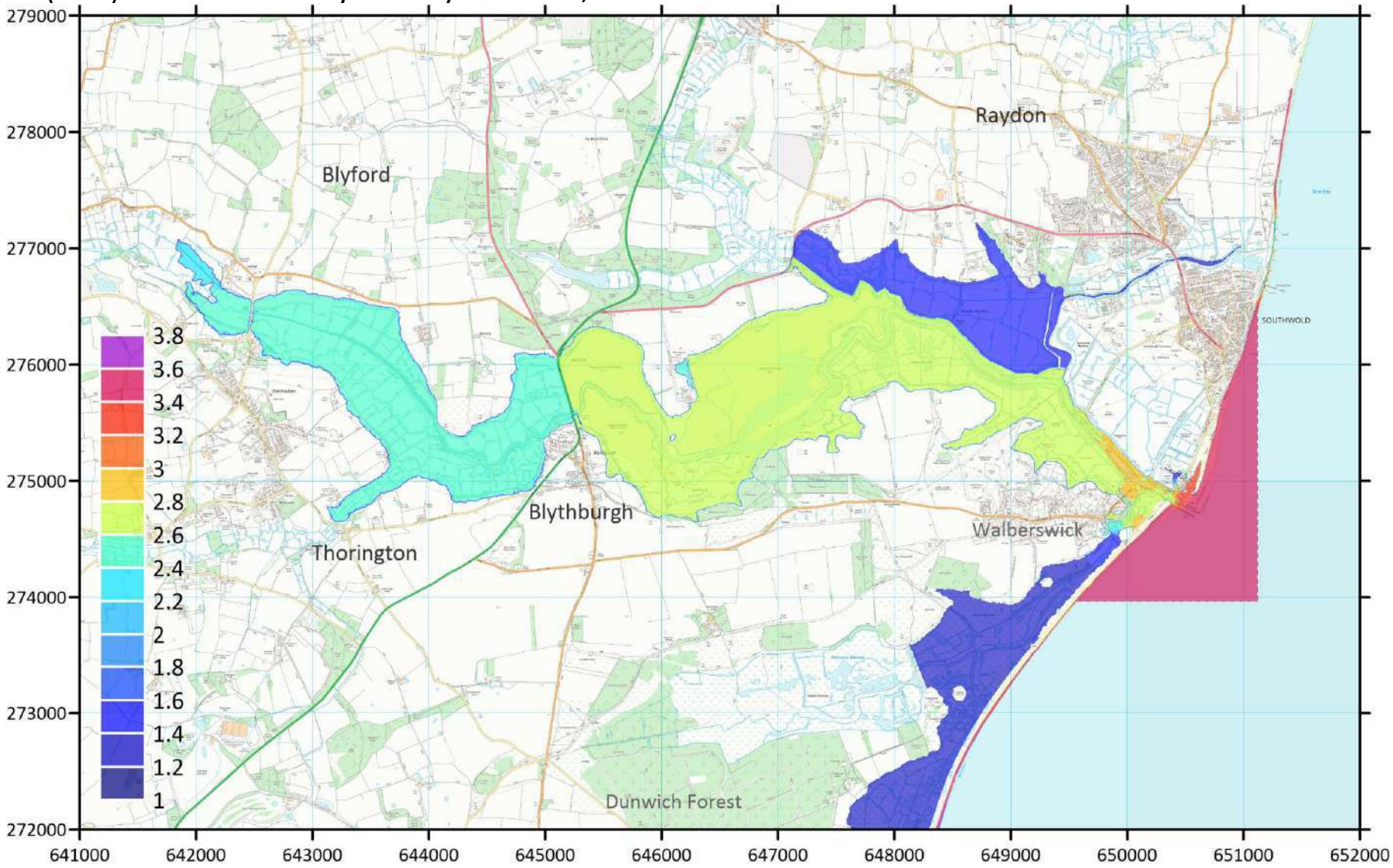
2070 RCP8.5 (95%): E3 – SMP Policy (Raise N banks, S banks overtopped)



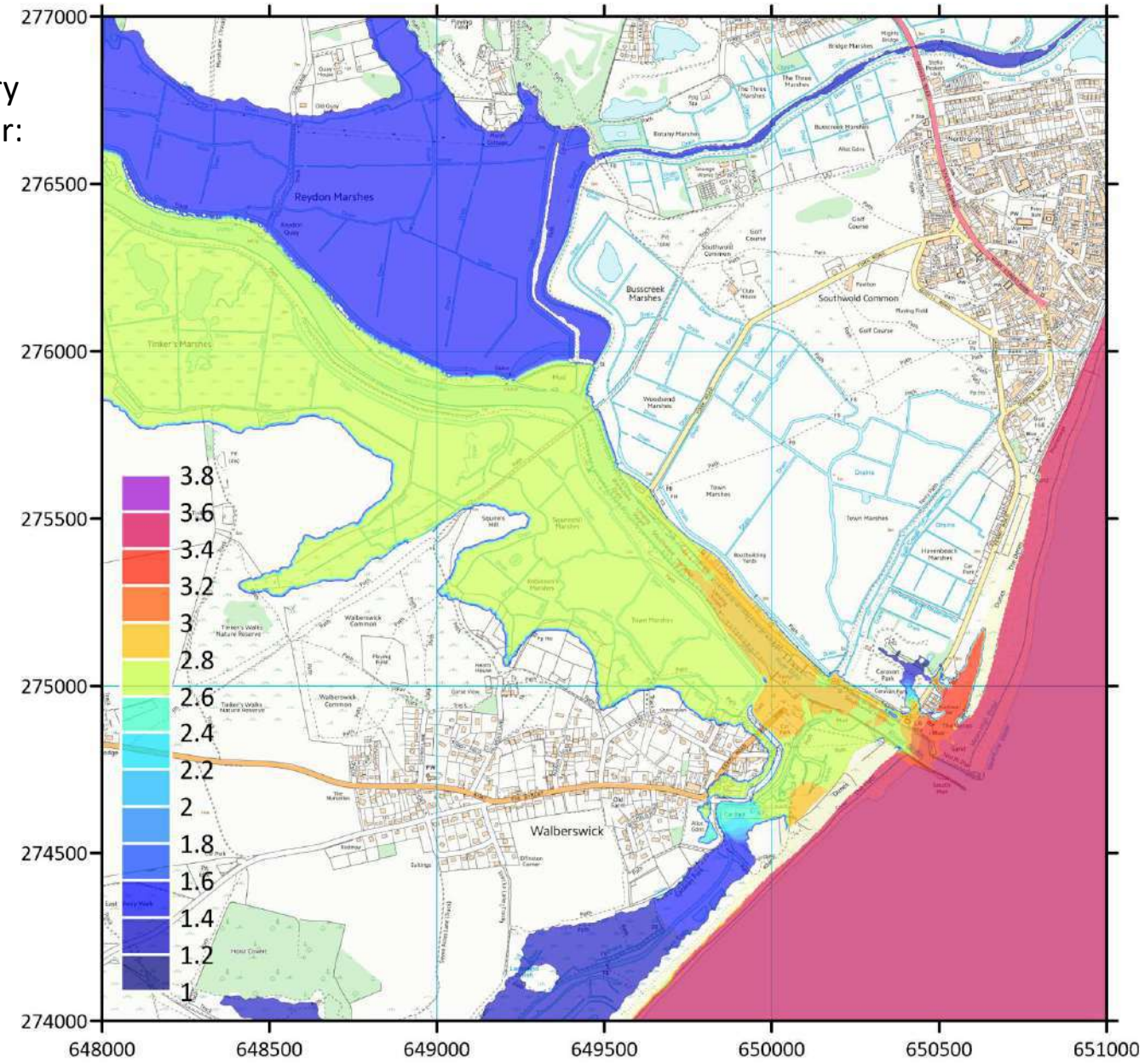
2070 RCP8.5 (95%):
E3 – SMP Policy
(Raise N banks,
S banks overtopped)
Zoom in (downstream)



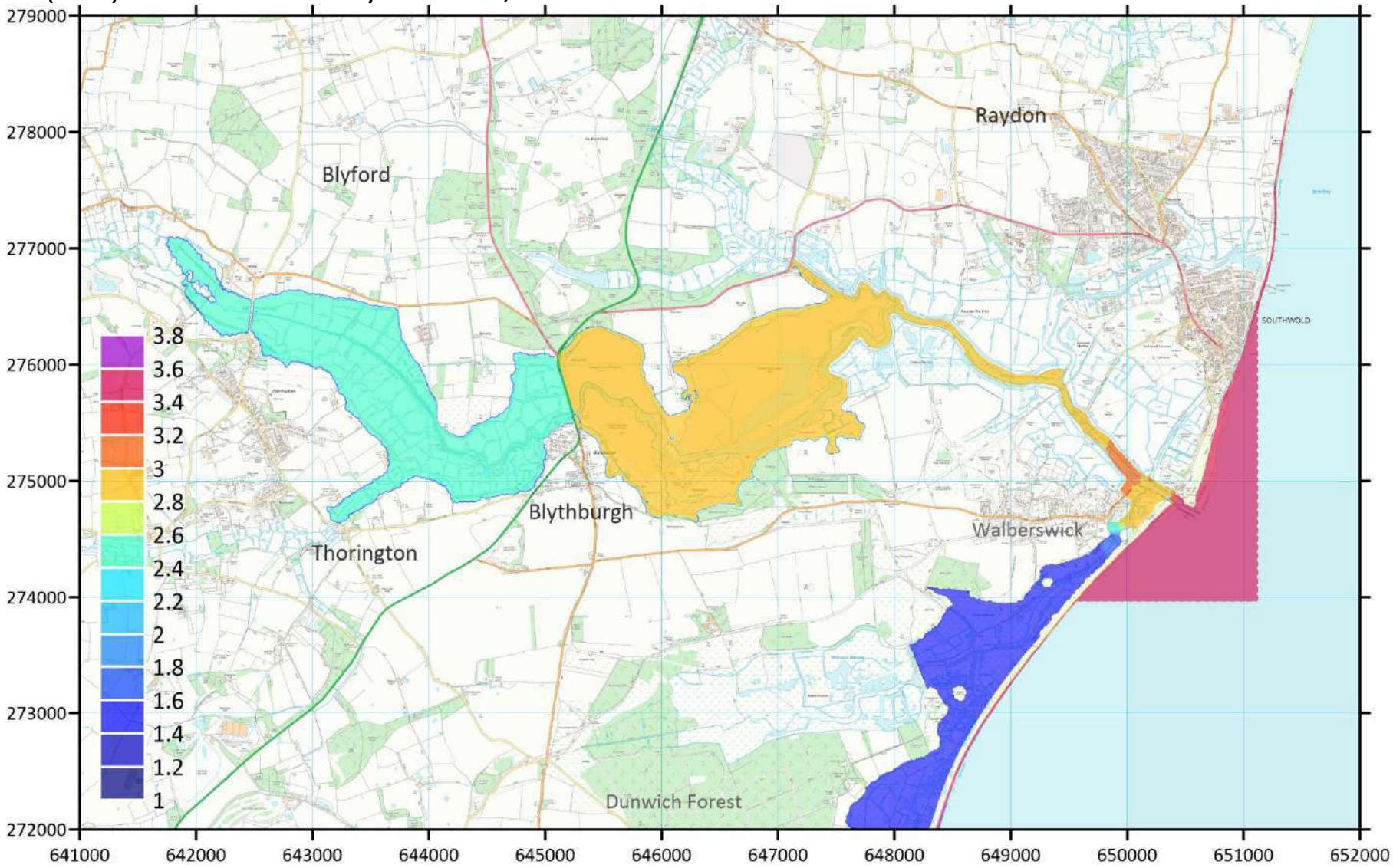
2070 RCP8.5 (95%): H0 - Present day estuary defences, reduced S Pier



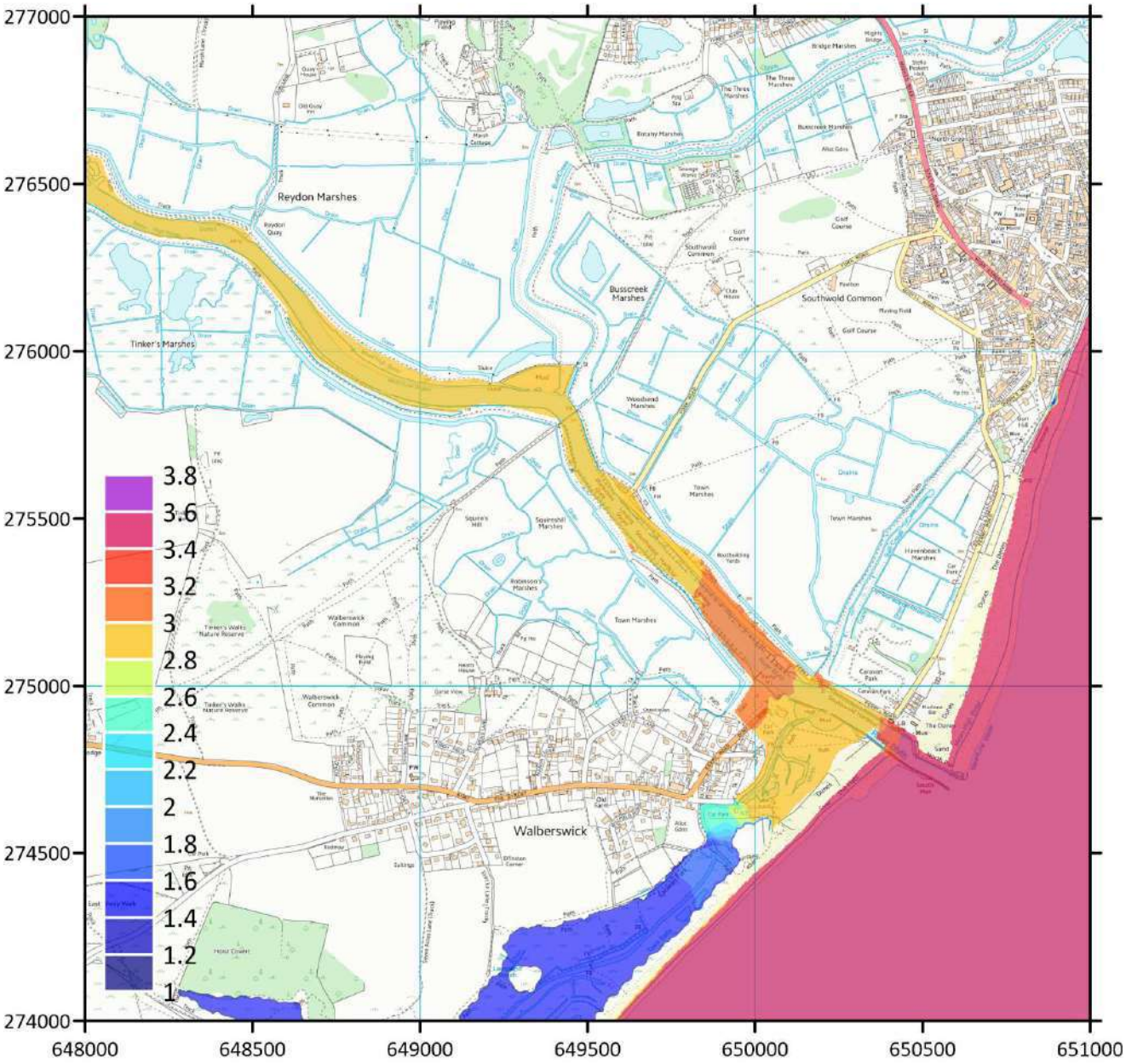
2070 RCP8.5 (95%):
H0 – Present day estuary defences, reduced S Pier:
Zoom in (downstream)



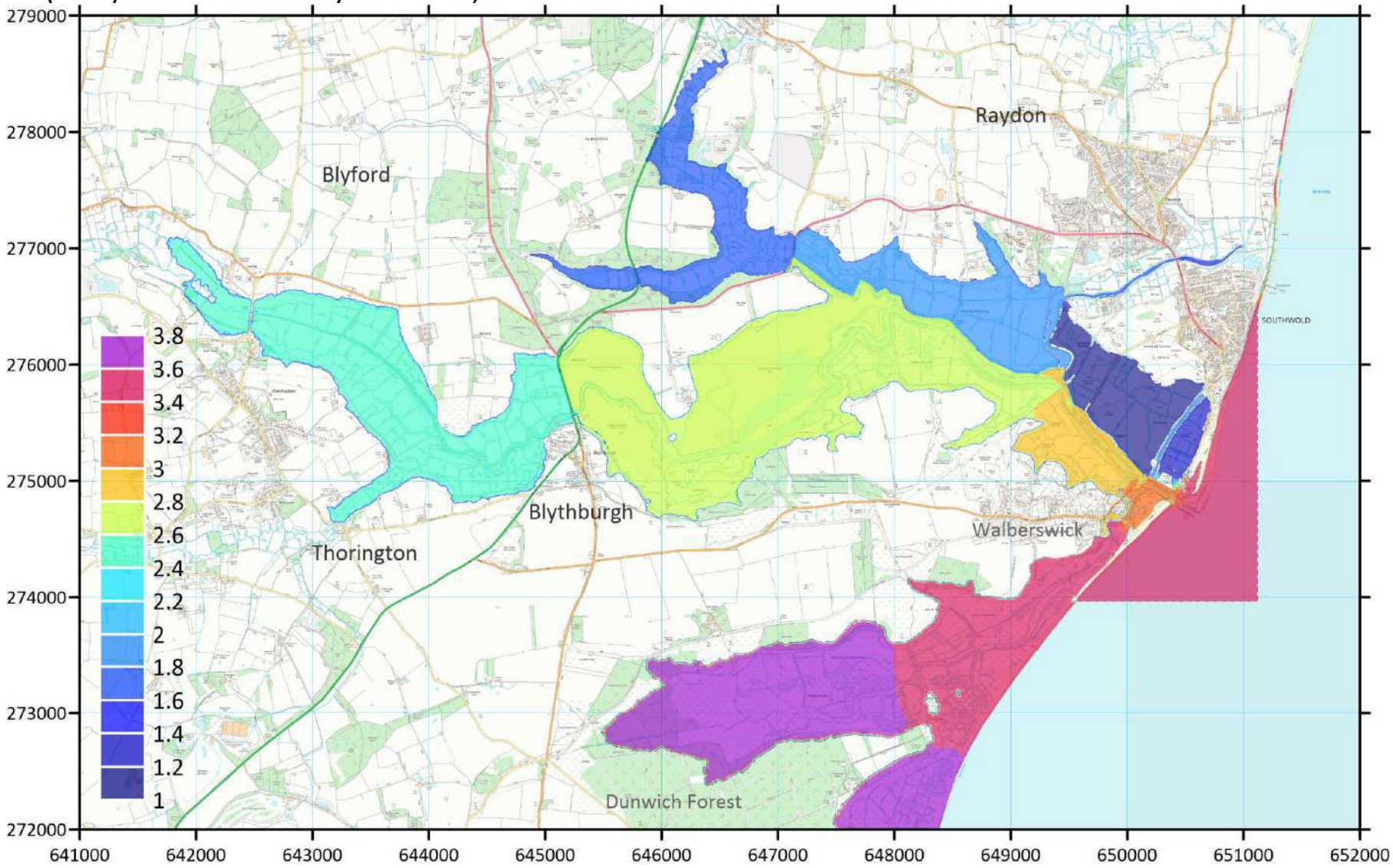
2070 RCP8.5 (95%): G2 – Raise estuary defences, narrow channel



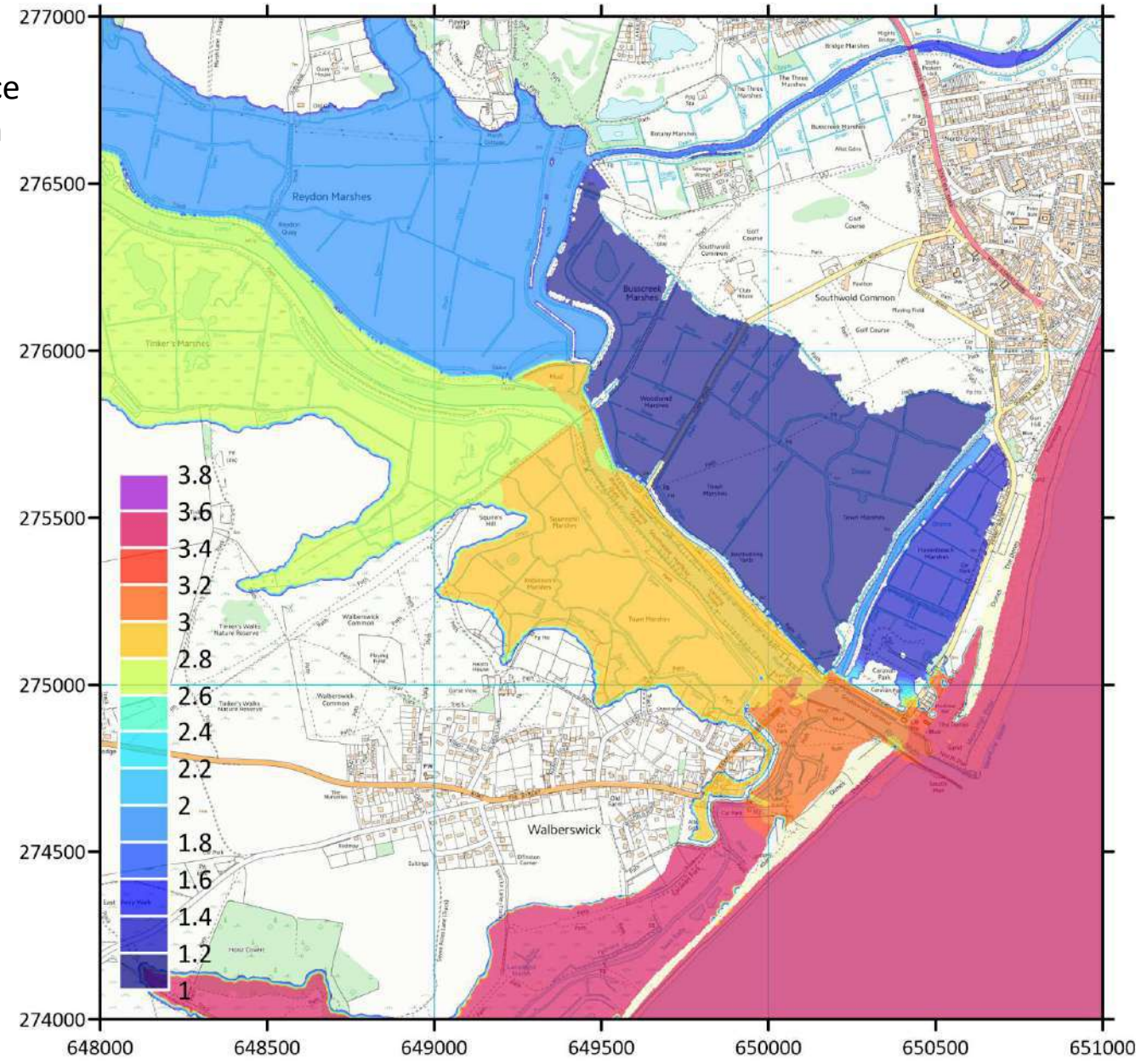
2070 RCP8.5 (95%):
G2 – Raise estuary defences, narrow channel
Zoom in (downstream)



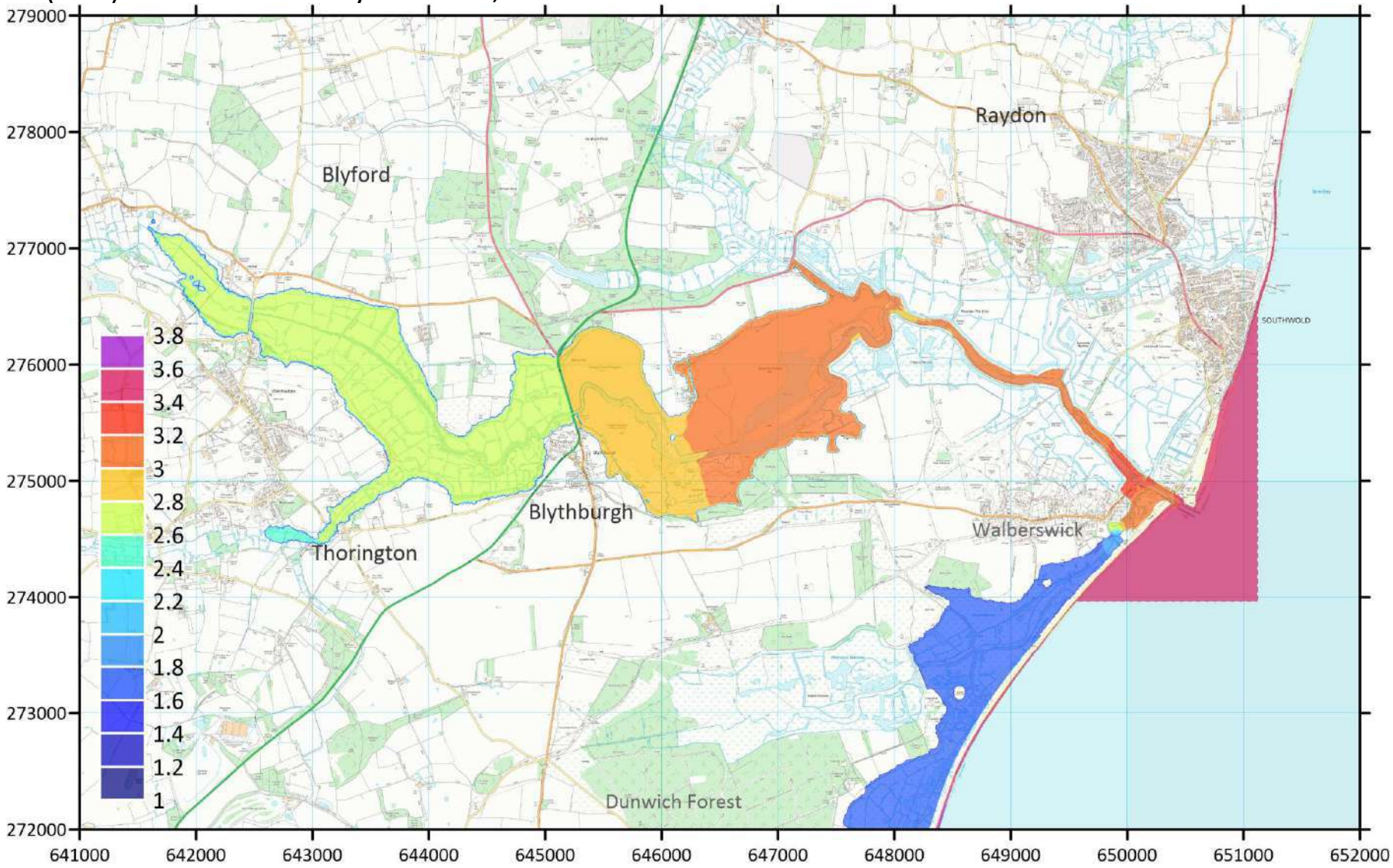
2070 RCP8.5 (95%): E0 - Present day defences, Marshes raised 300mm



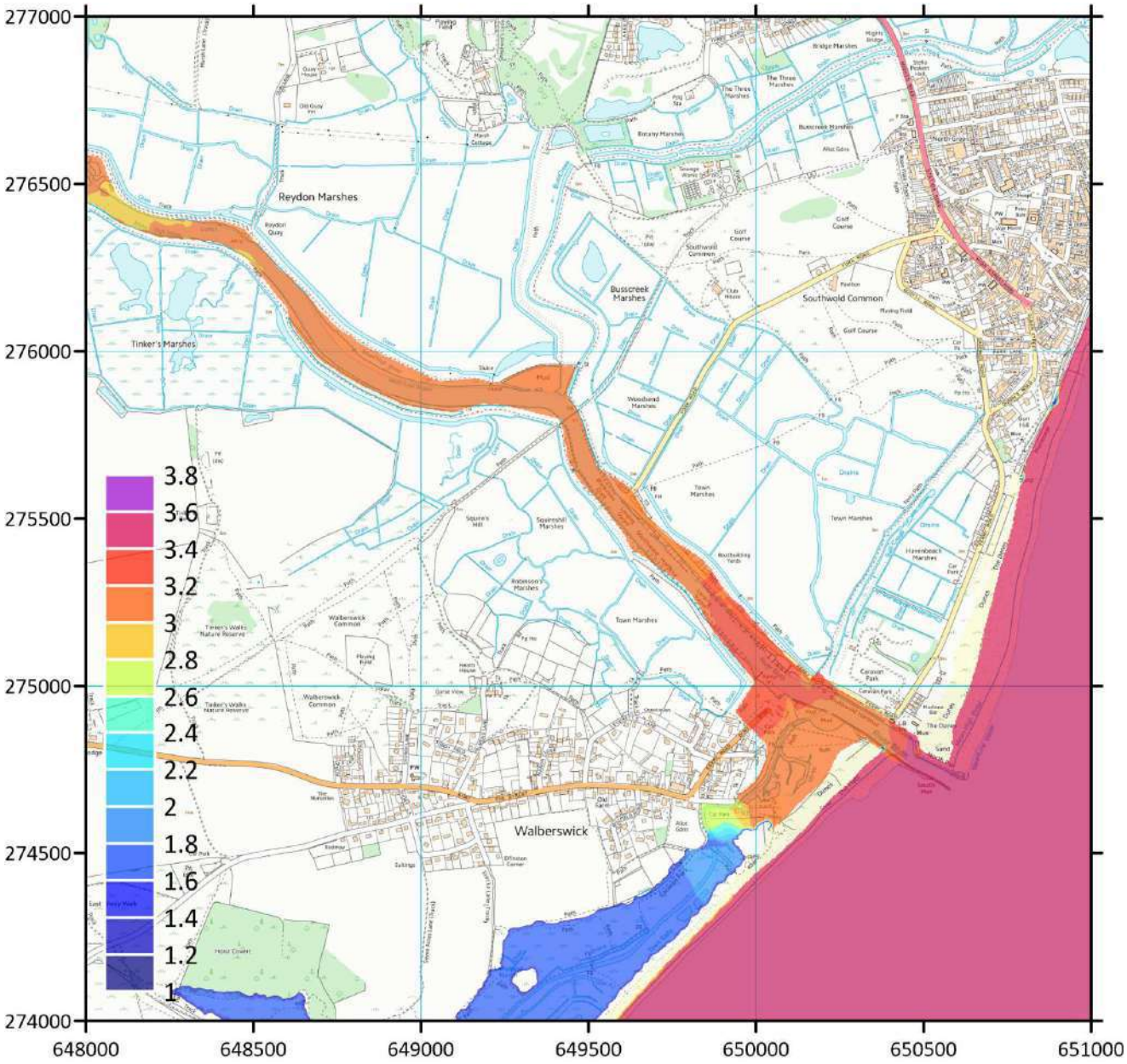
2070 RCP8.5 (95%):
E0 - Present day defence
Marshes raised 300mm
Zoom in (upstream)



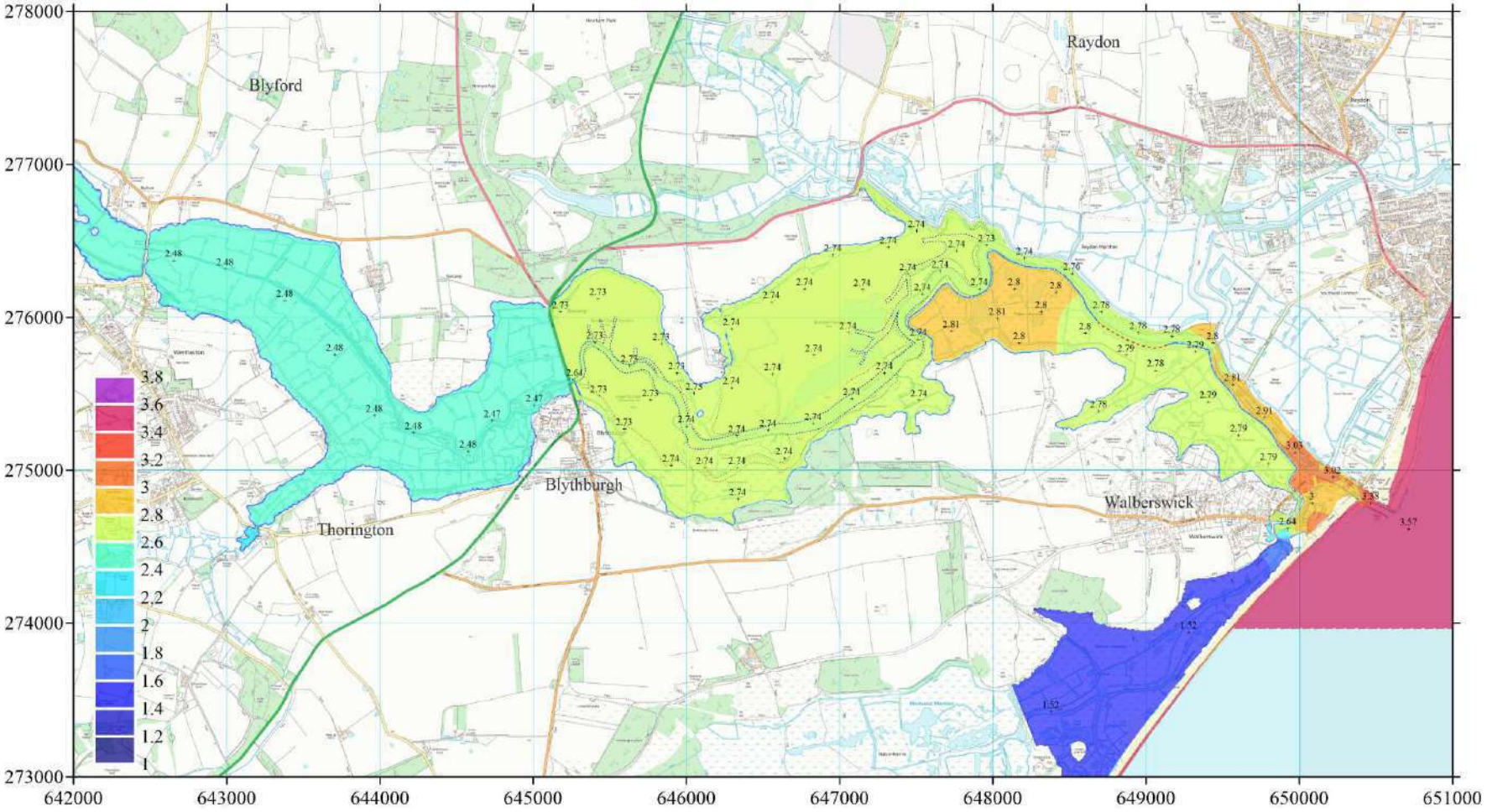
2070 RCP8.5 (95%): E2 - Raise estuary defences, Marsh levels raised 300mm



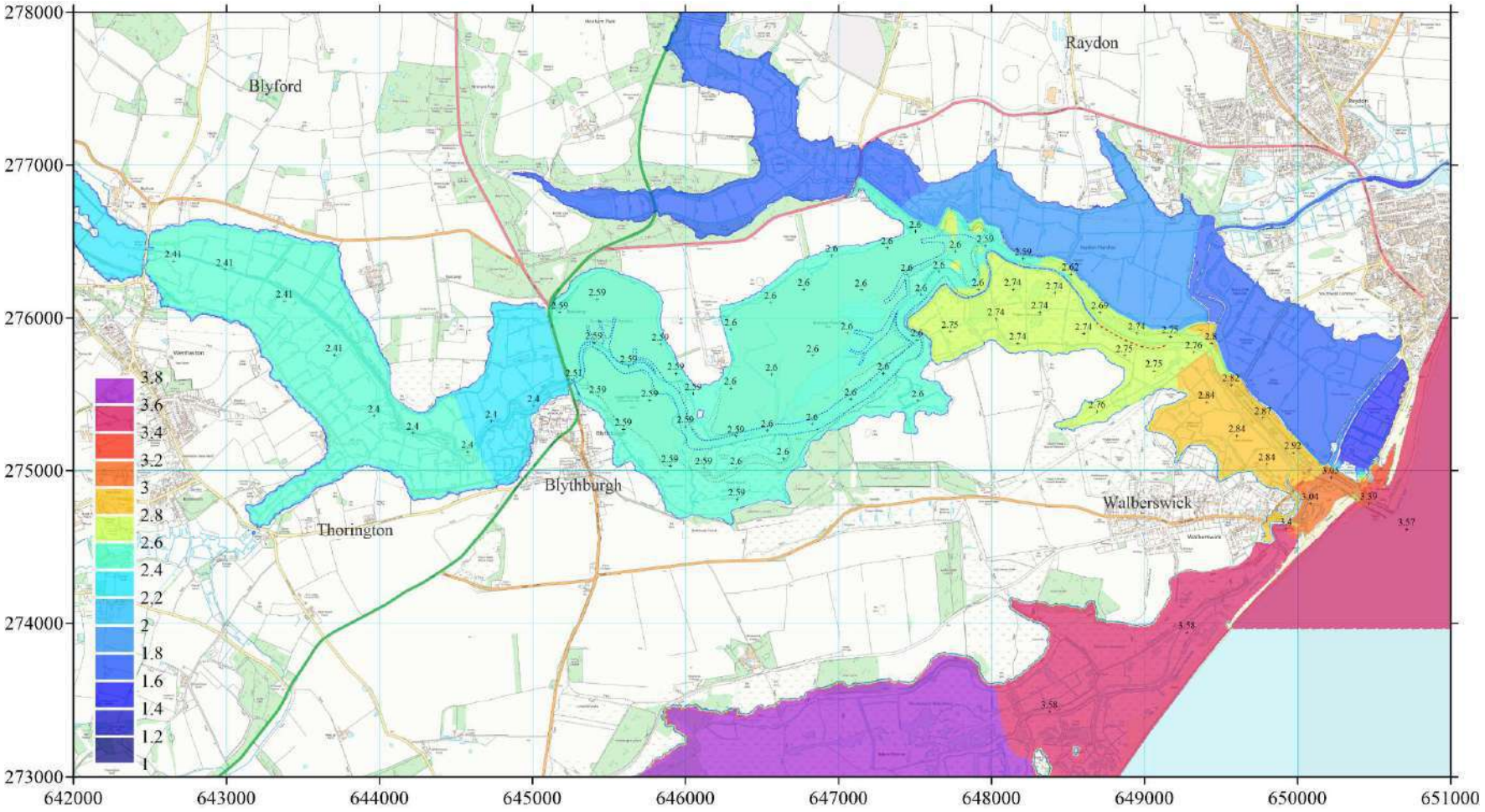
2070 RCP8.5 (95%):
E2 - Raise estuary defences
Marsh levels raised 300mm
Zoom in (downstream)



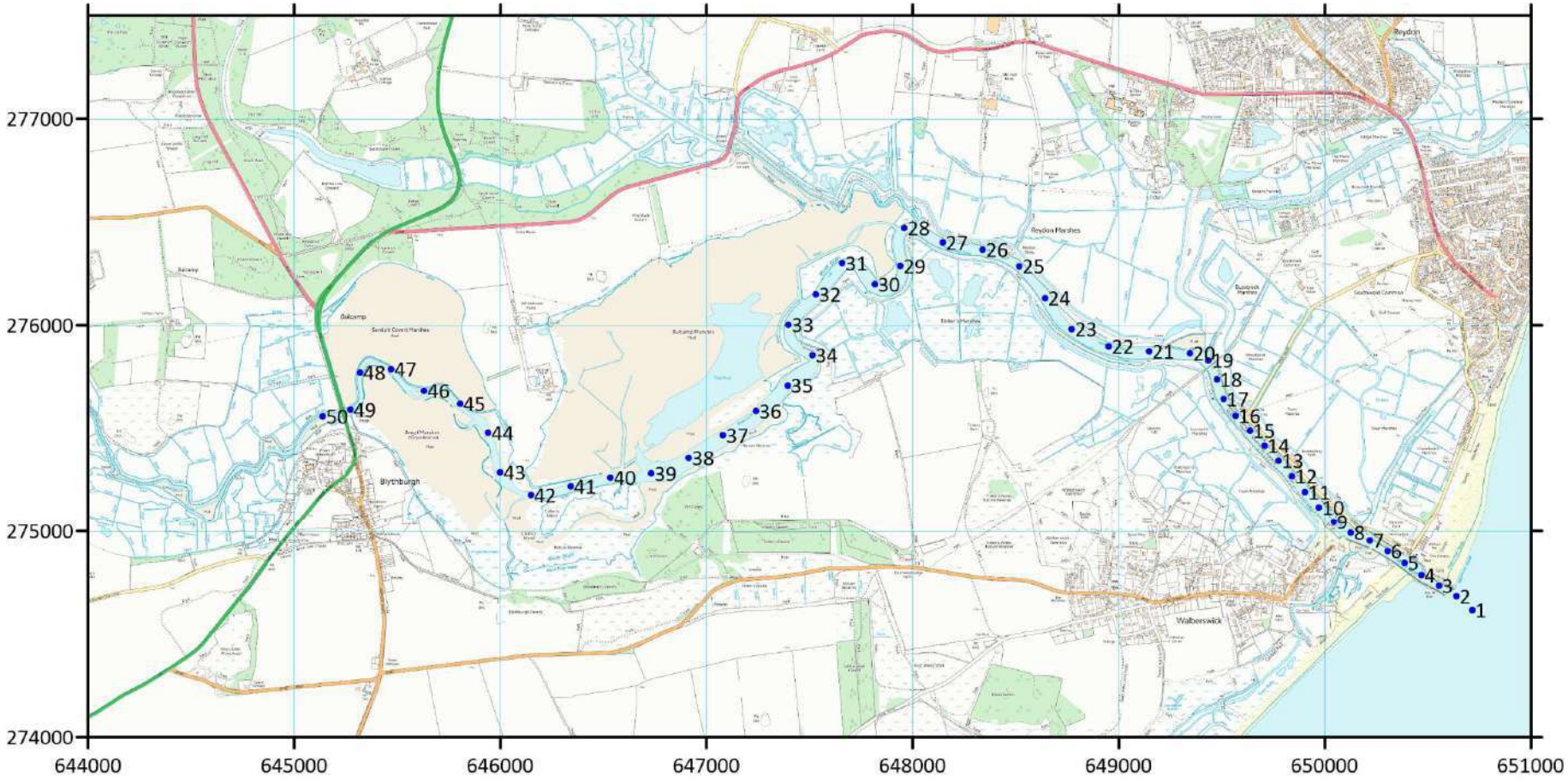
2070 RCP8.5 (95%): S5 - Raise defences + 500m passive spillway at 2.35mOD, Walberswick dunes defended



2070 RCP8.5 (95%): S12U - Raise defences + 500m passive spillway at 2.00mOD, Walberswick dunes undefended

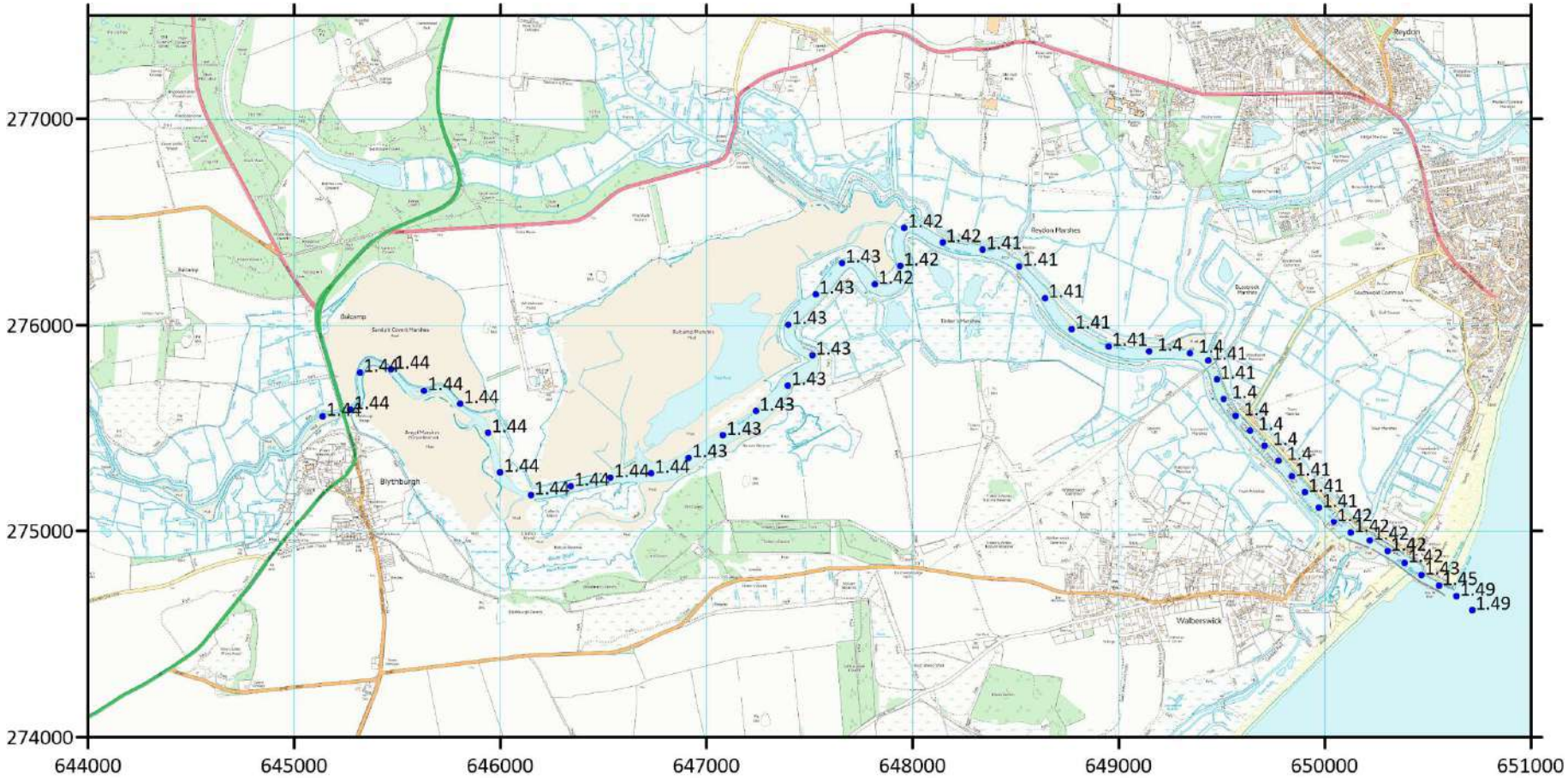


Output locations for maximum water levels and current speeds

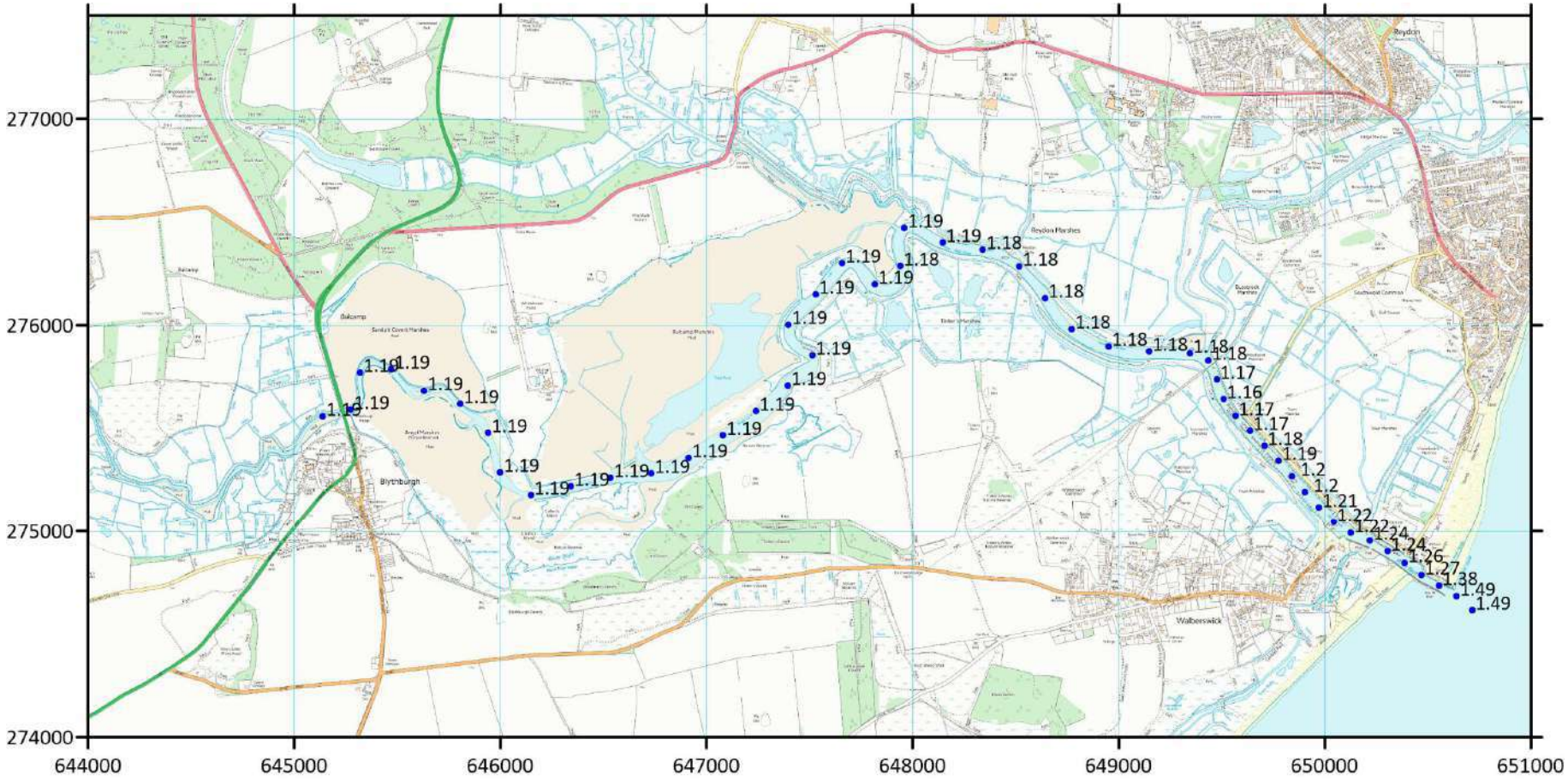


2020

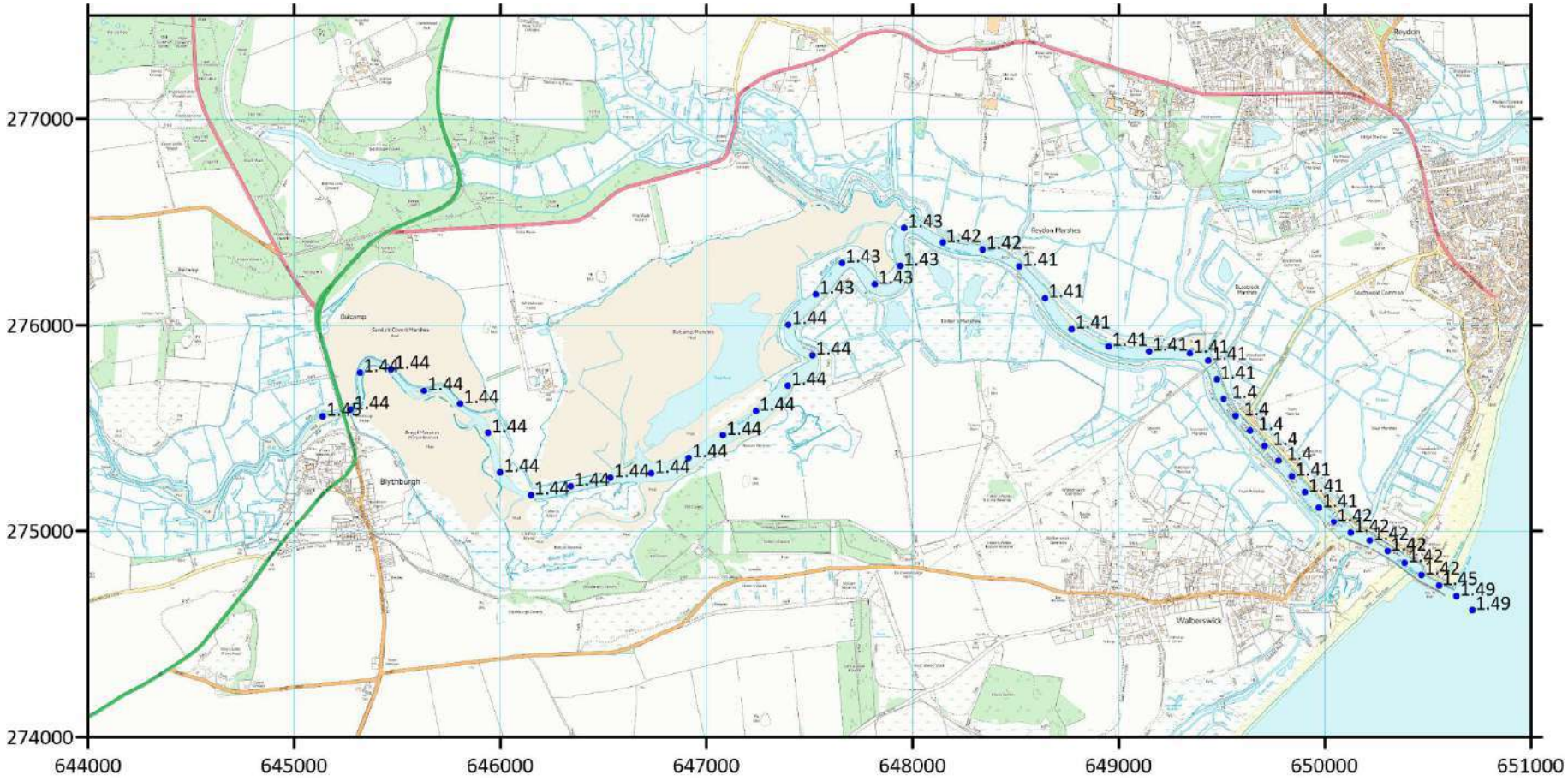
2020: E0 - Present-day estuary defences



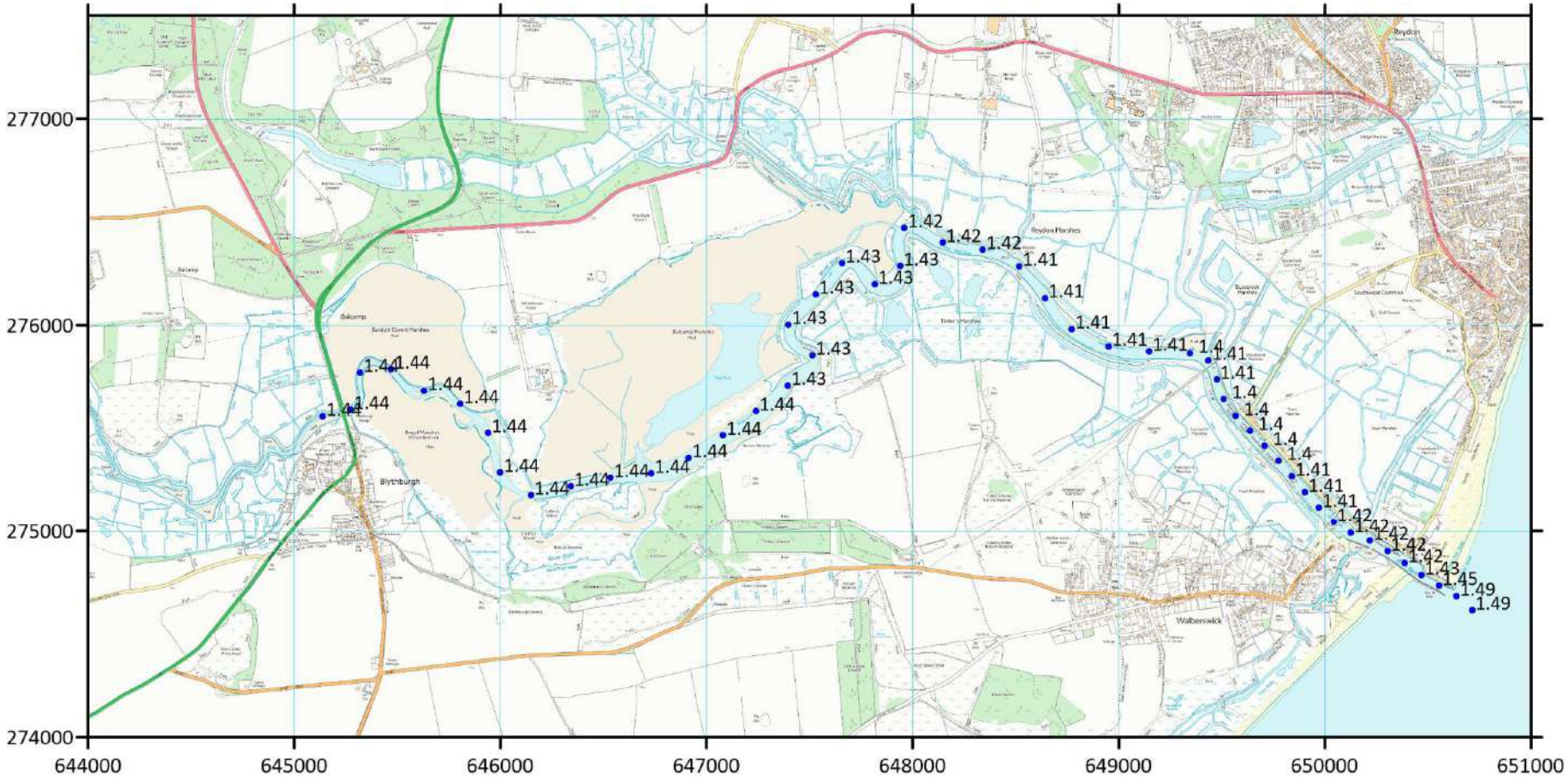
2020: E1 – Do Nothing (All embankments failed)



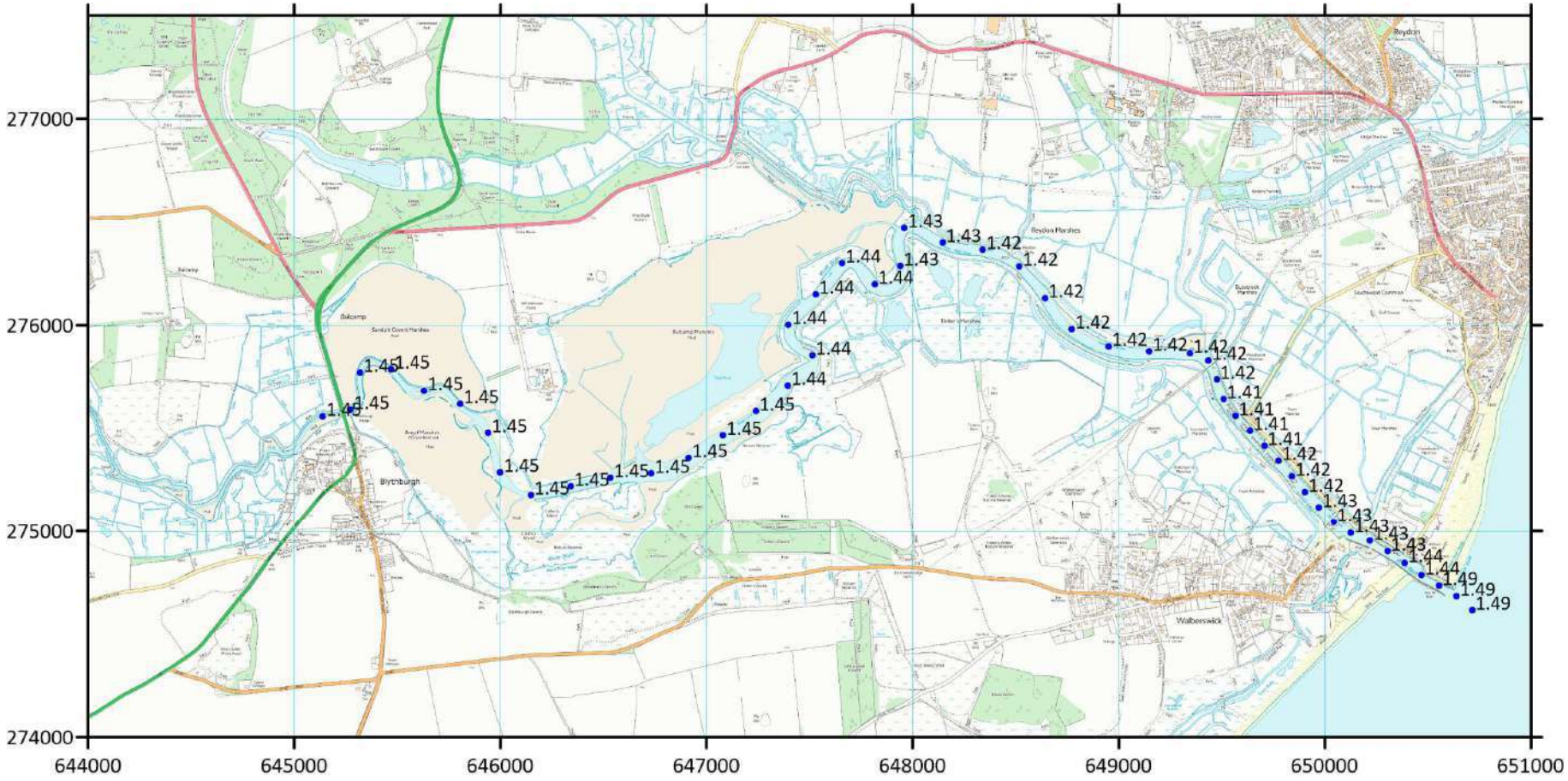
2020: E2 - Raise estuary defences



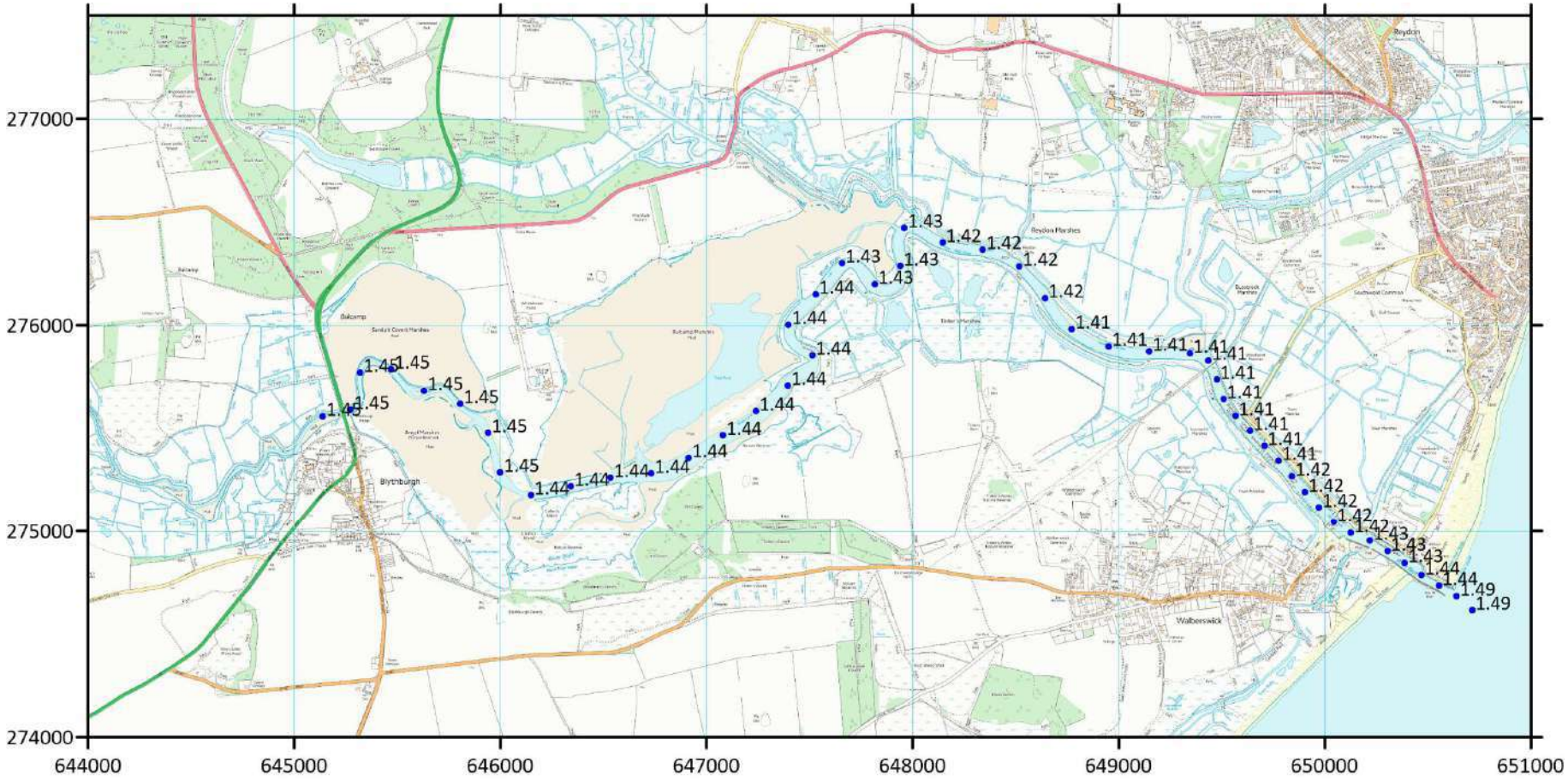
2020: E3 – SMP Policy (Raise N banks, S banks overtopped)



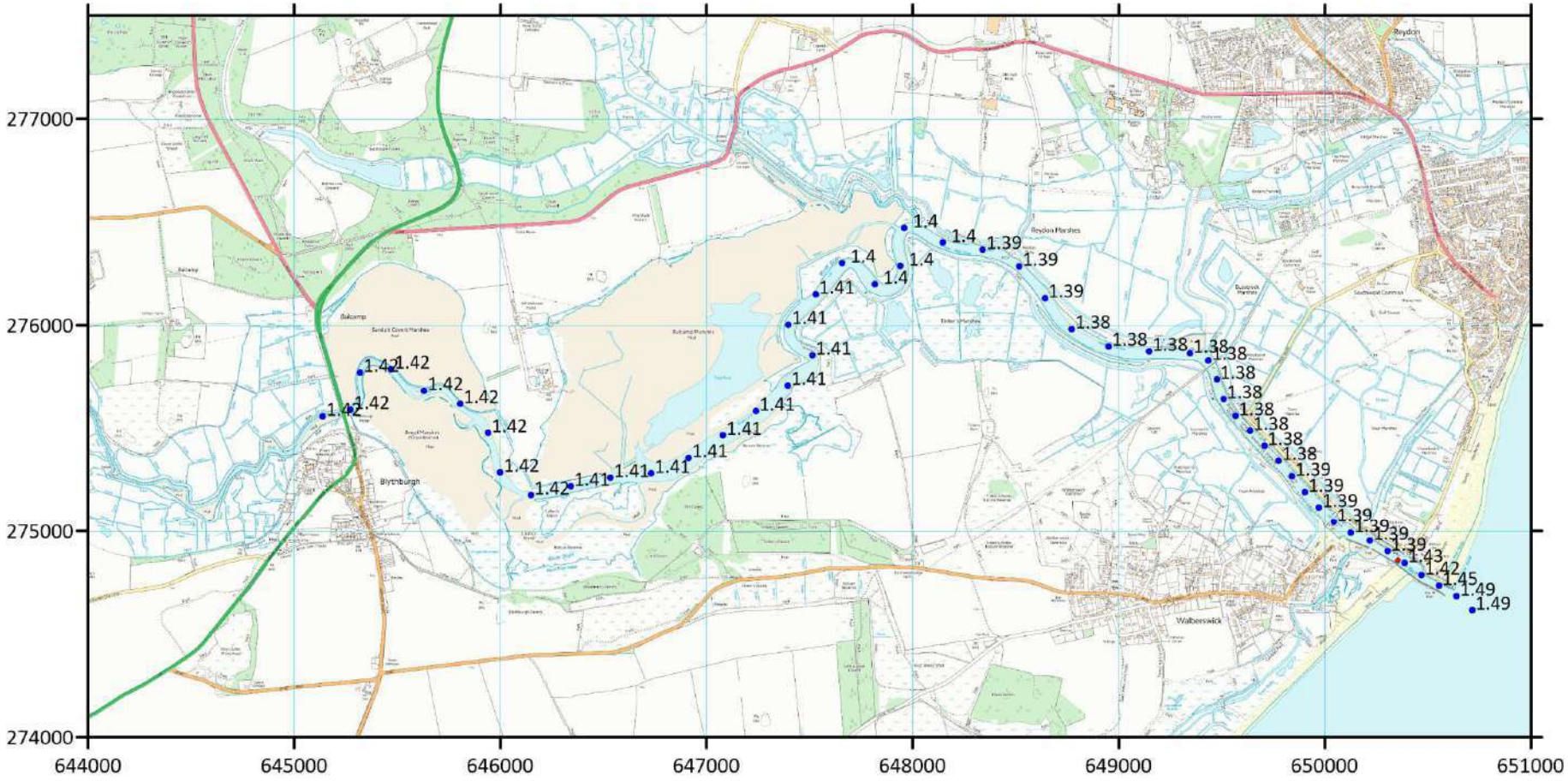
2020: H0 - Present day estuary defences, short S Pier



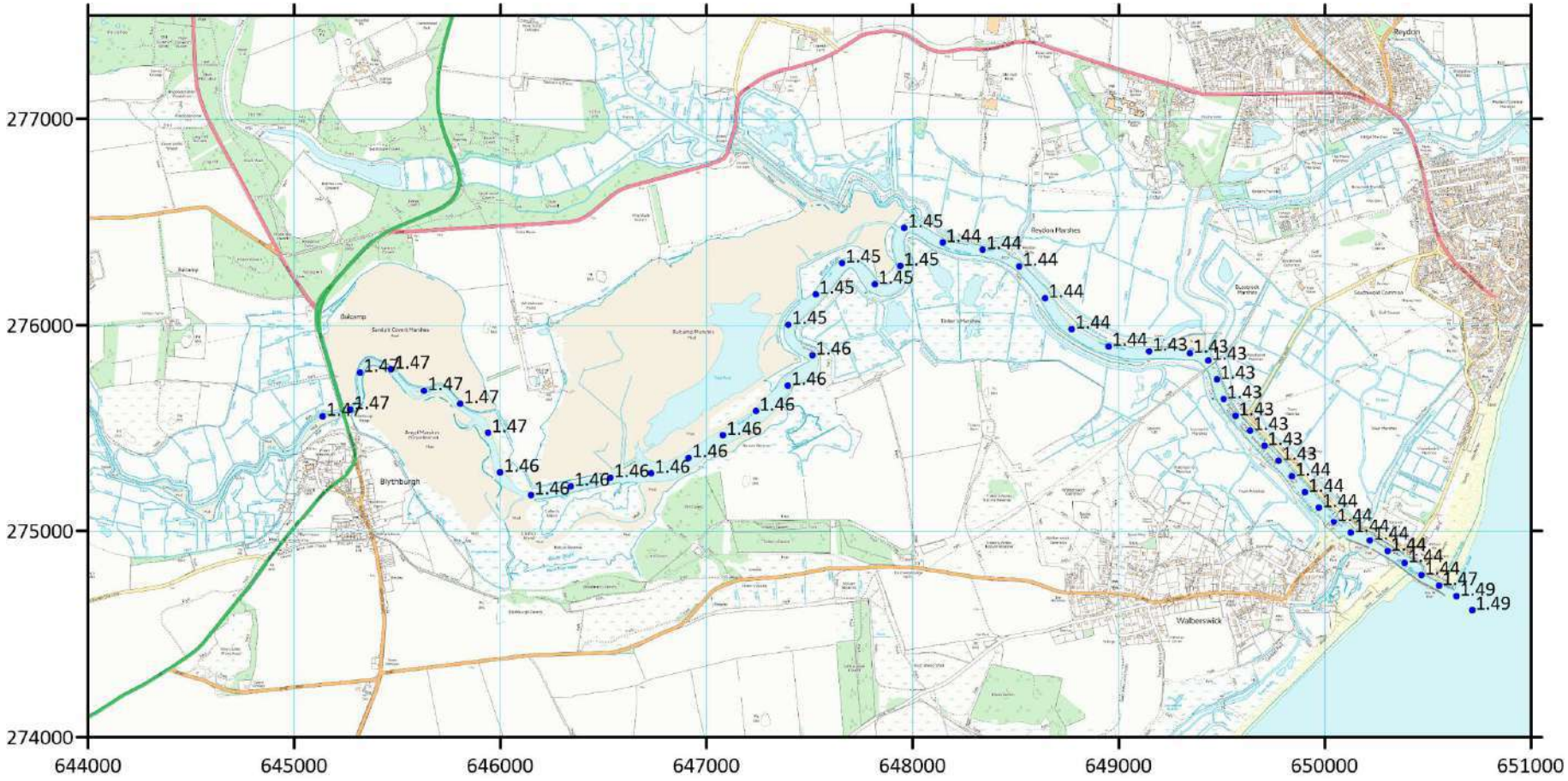
2020: F0 - Present day estuary defences, solid S Pier



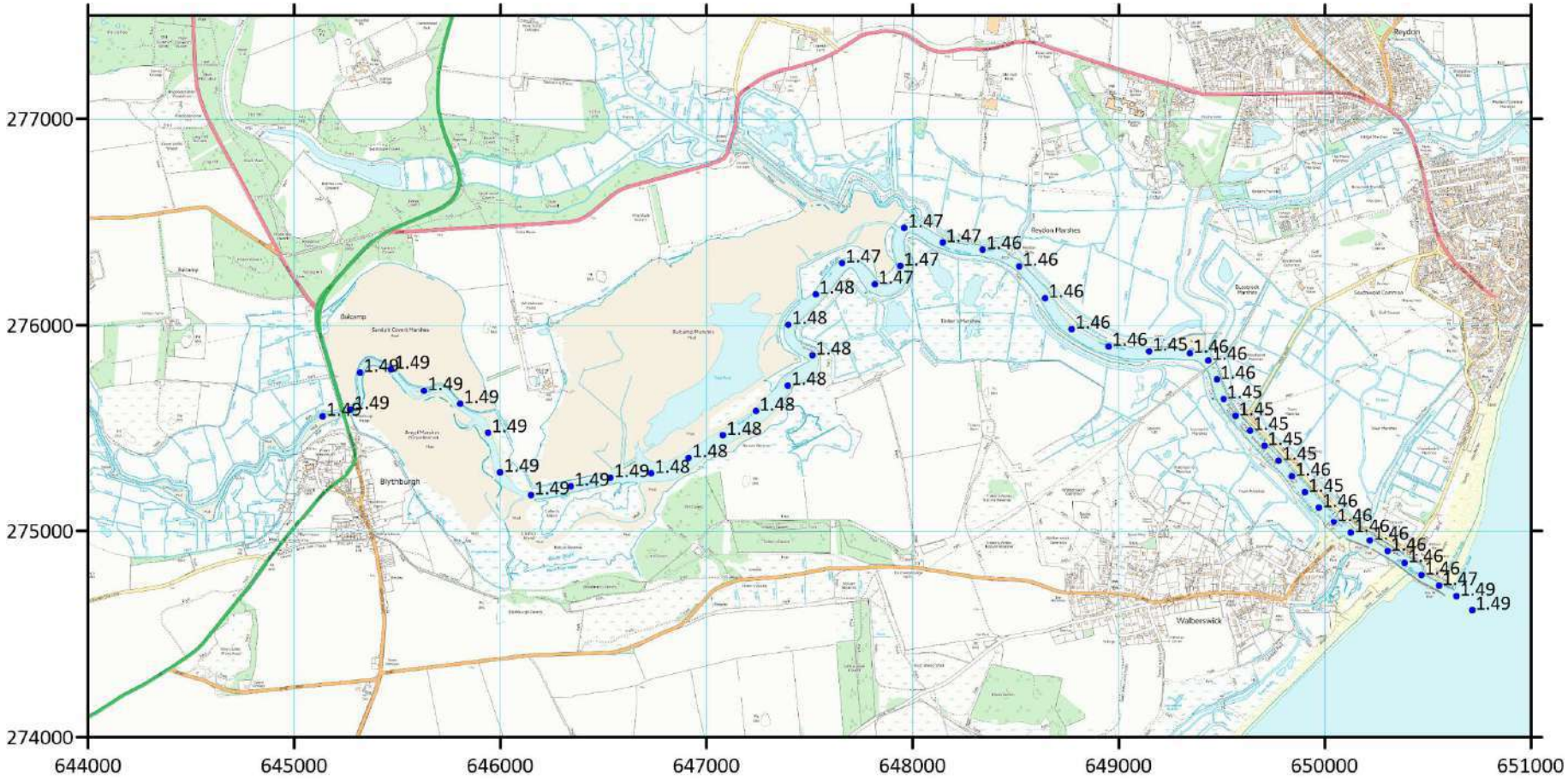
2020: G0 - Present day estuary defences, narrow channel



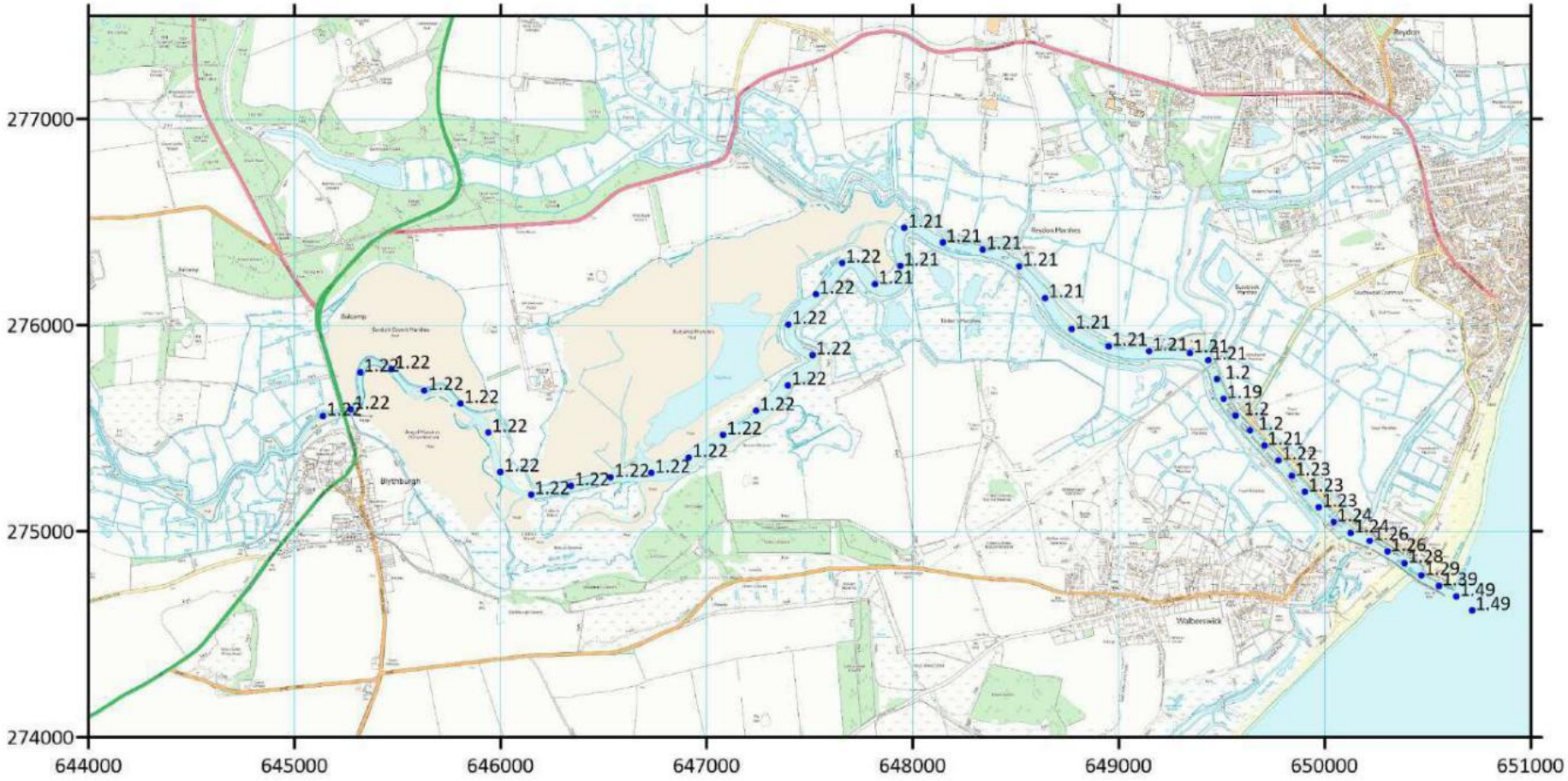
2020: E0 - Present day estuary defences, marshes raised 300mm



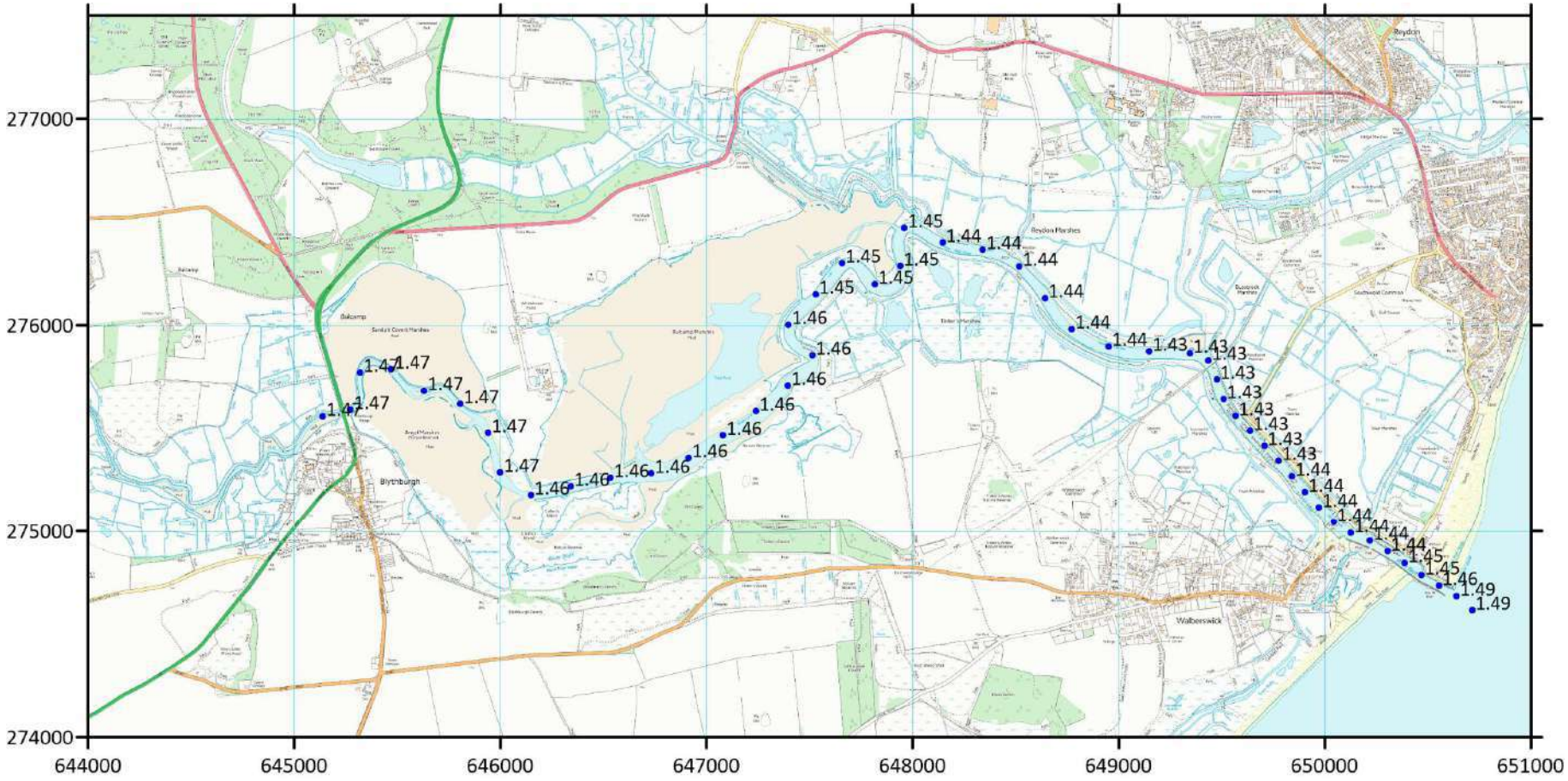
2020: E0 - Present day estuary defences, marshes raised 600mm



2020: E1 – Do Nothing, marshes raised 300mm



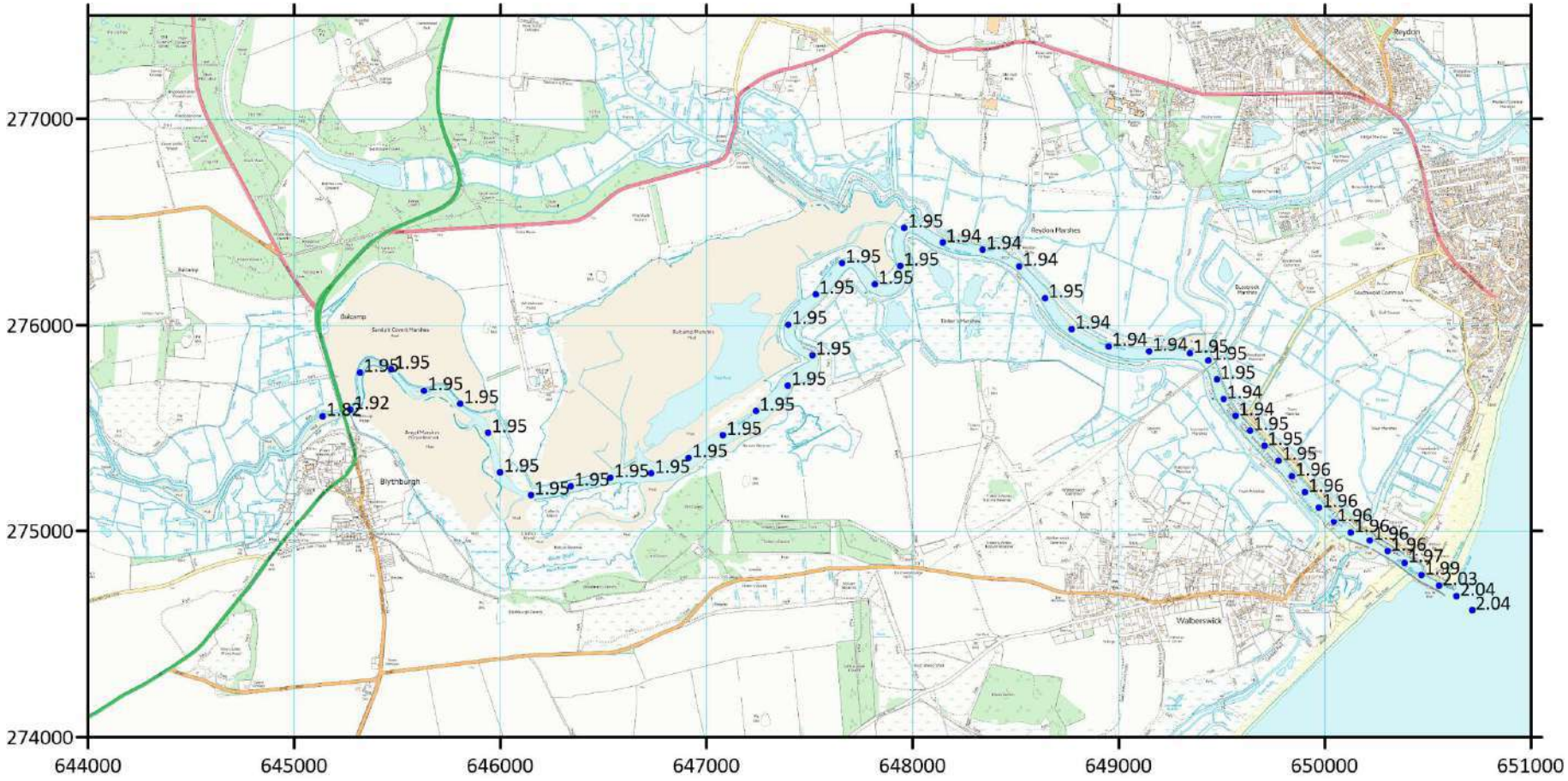
2020: E2 – Raise estuary defences, marshes raised 300mm



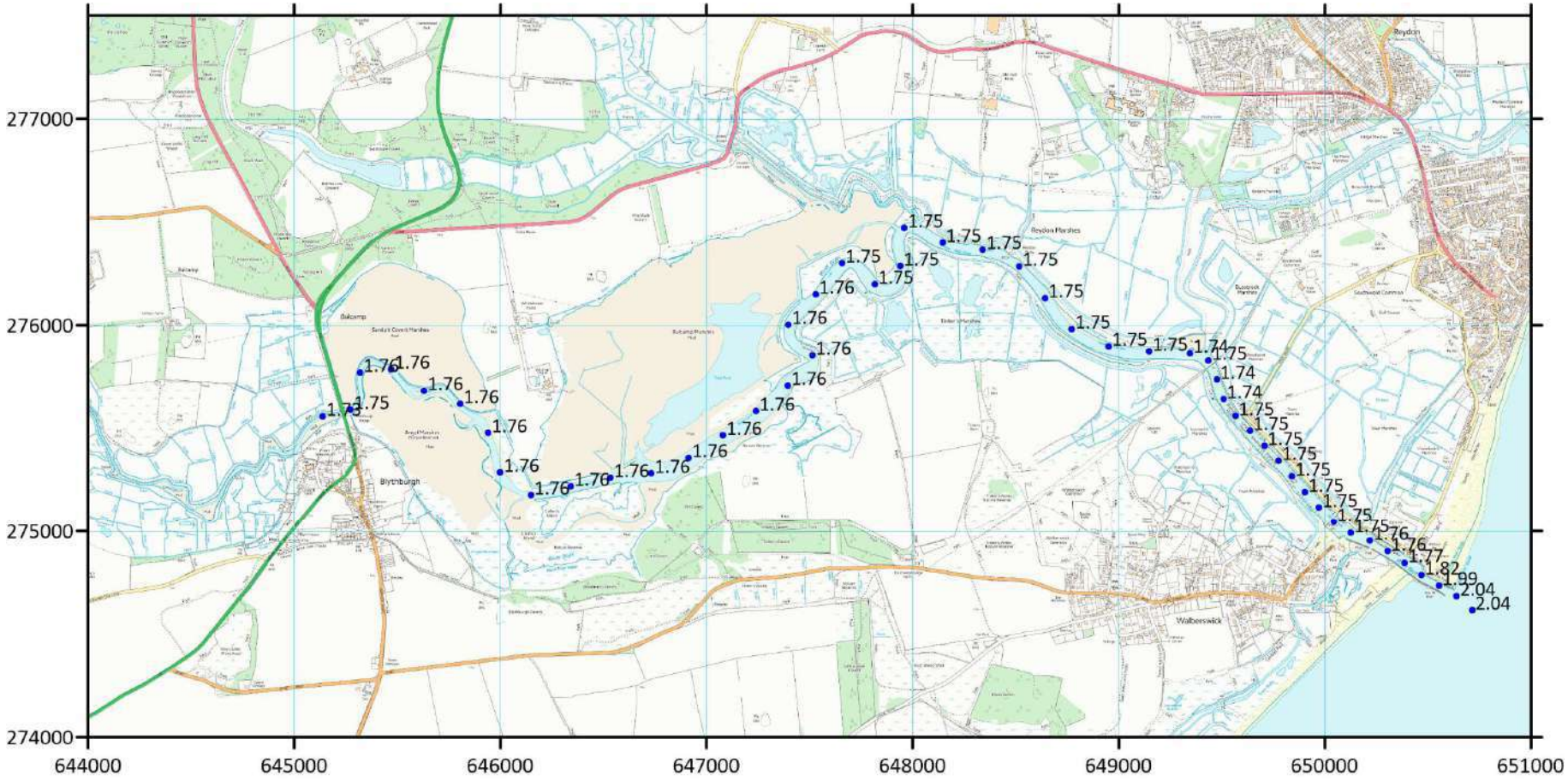
2020: E2 – Raise estuary defences, marshes raised 600mm

2020 conditions in 2070
RCP2.6, 50%

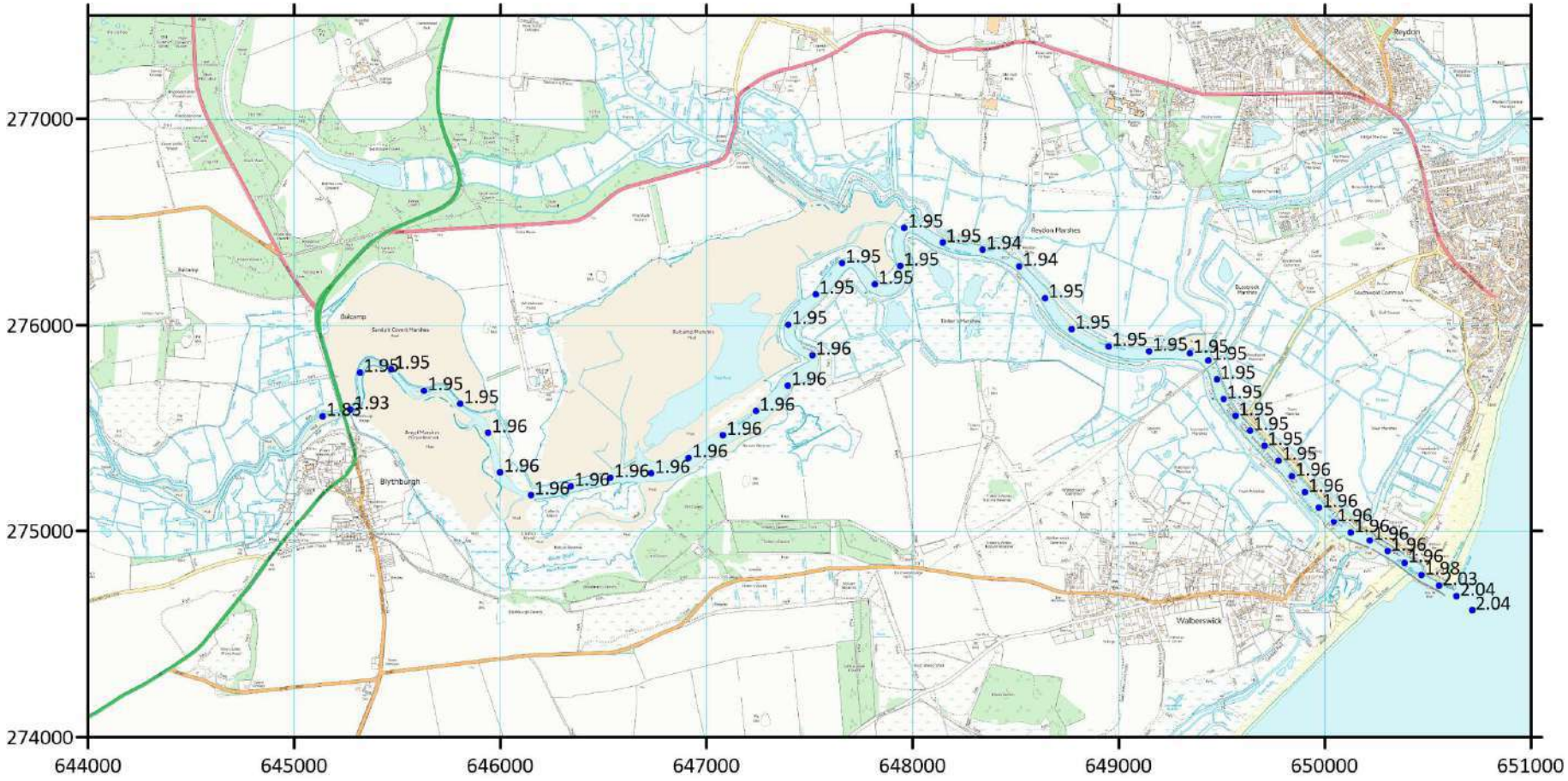
2070, RCP2.6 (50%): E0 - Present-day estuary defences



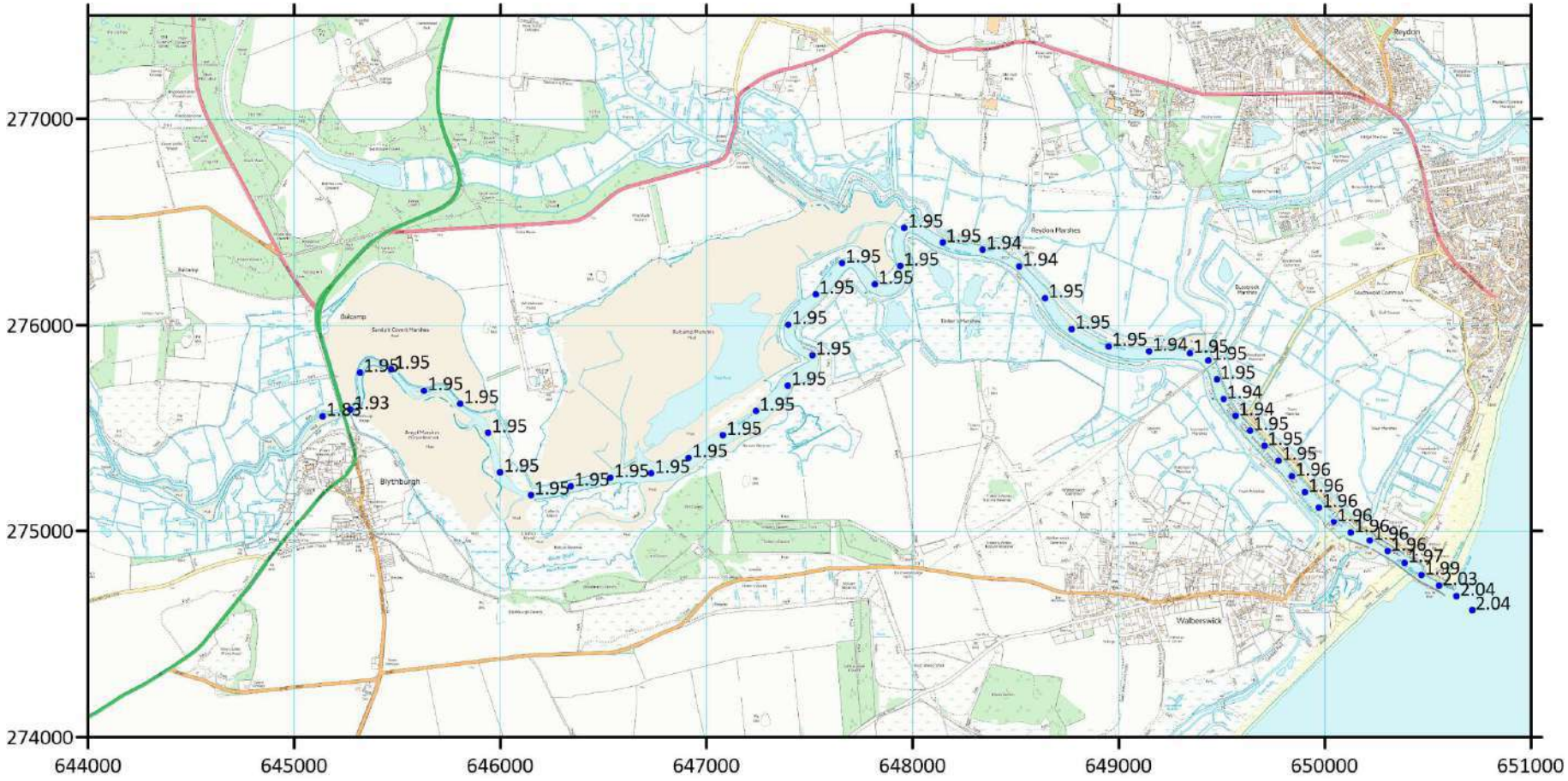
2070, RCP2.6 (50%): E1 – Do Nothing (All embankments failed)



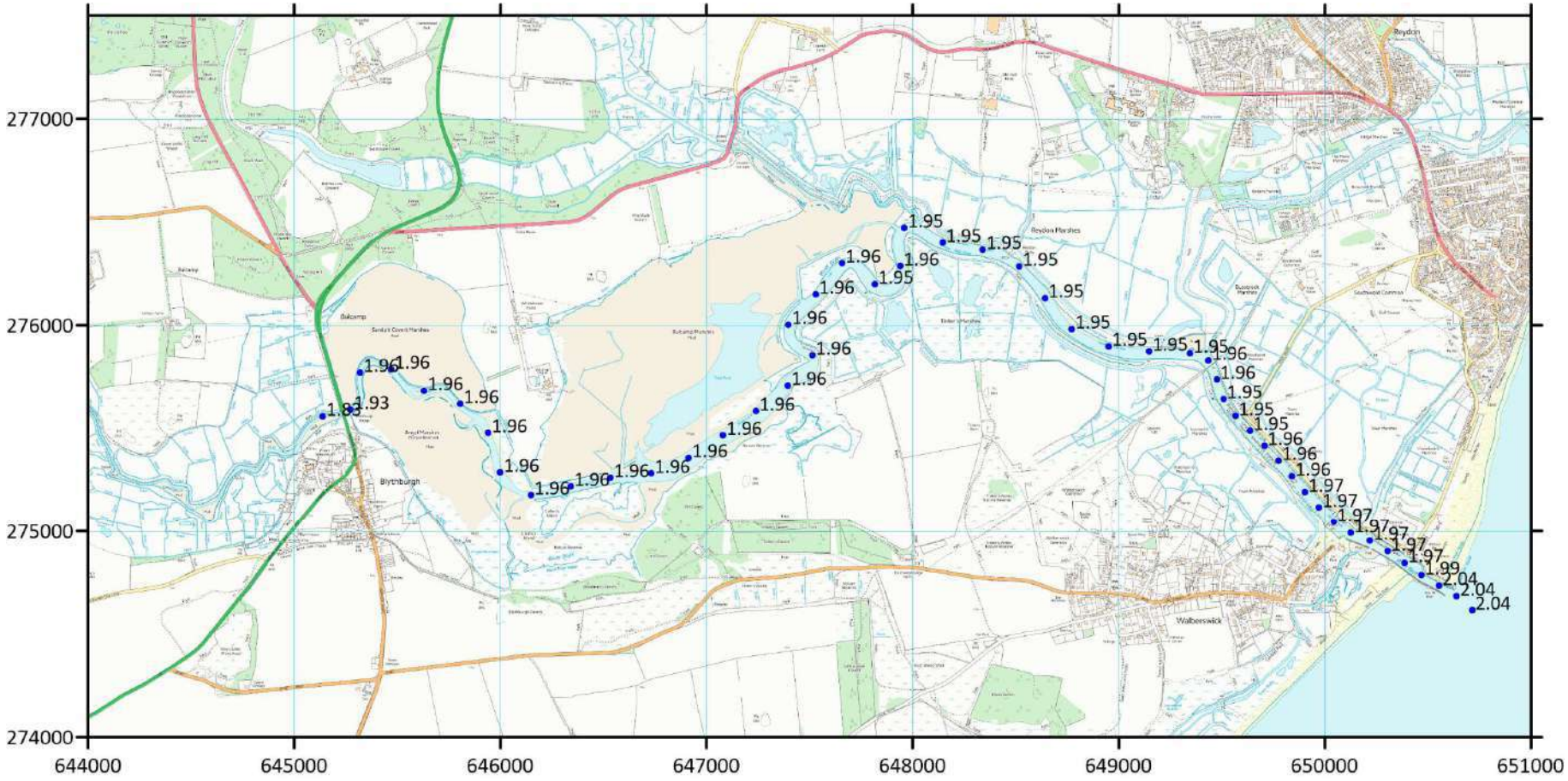
2070, RCP2.6 (50%): E2 - Raise estuary defences



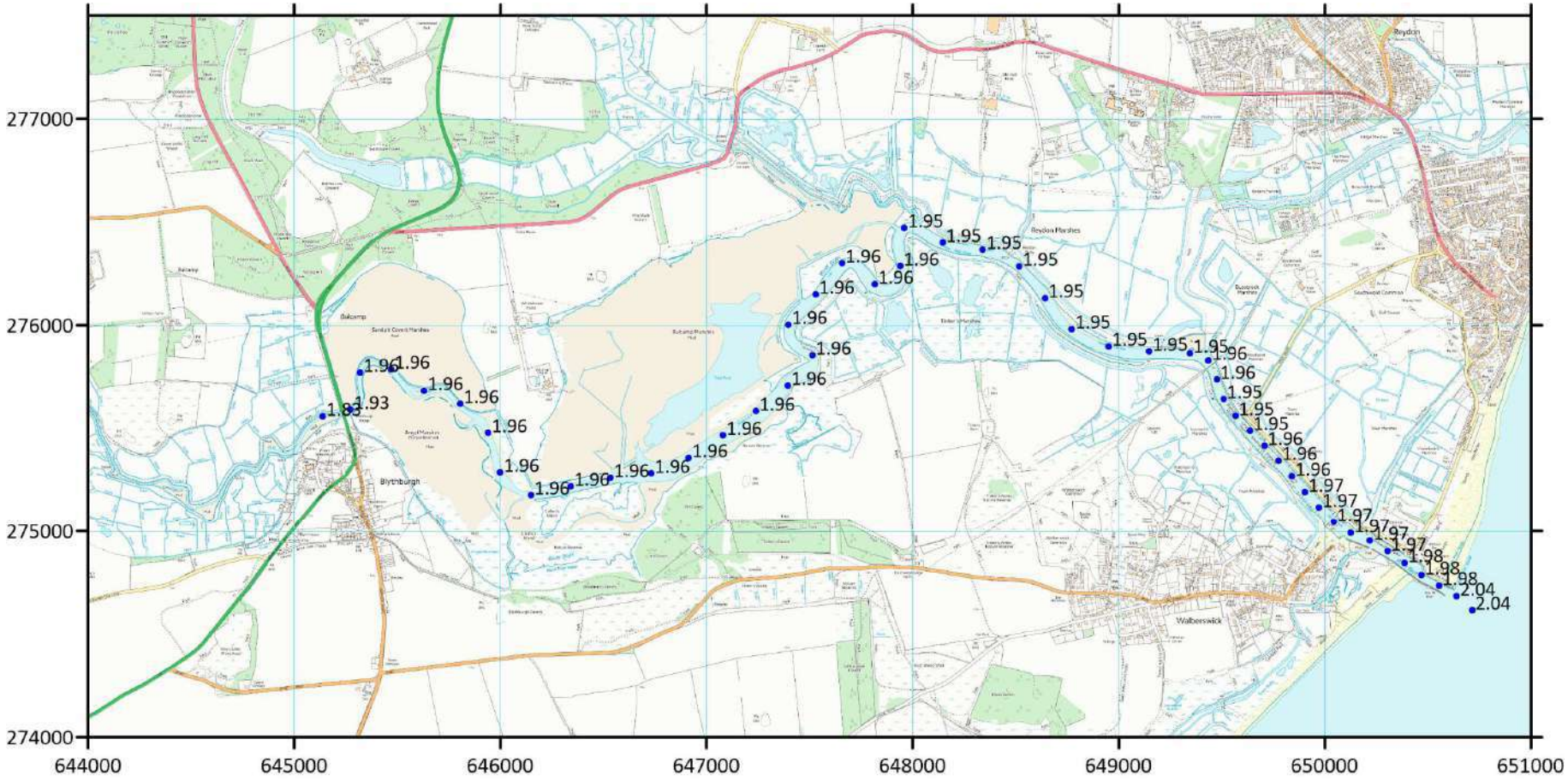
2070, RCP2.6 (50%): E3 – SMP Policy (Raise N banks, S banks overtopped)



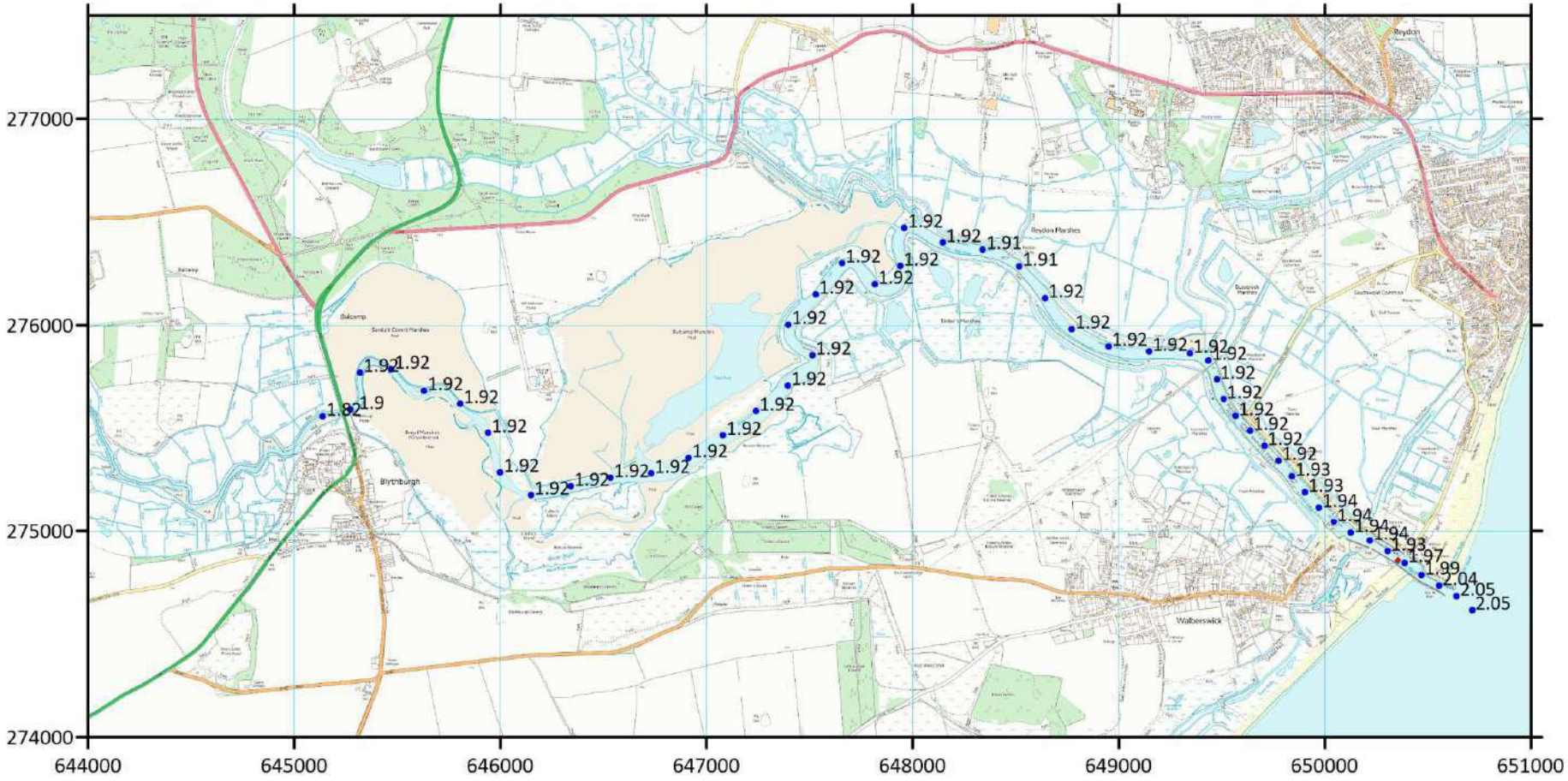
2070, RCP2.6 (50%): H0 - Present day estuary defences, reduced S Pier



2070, RCP2.6 (50%): F0 - Present day estuary defences, solid S Pier

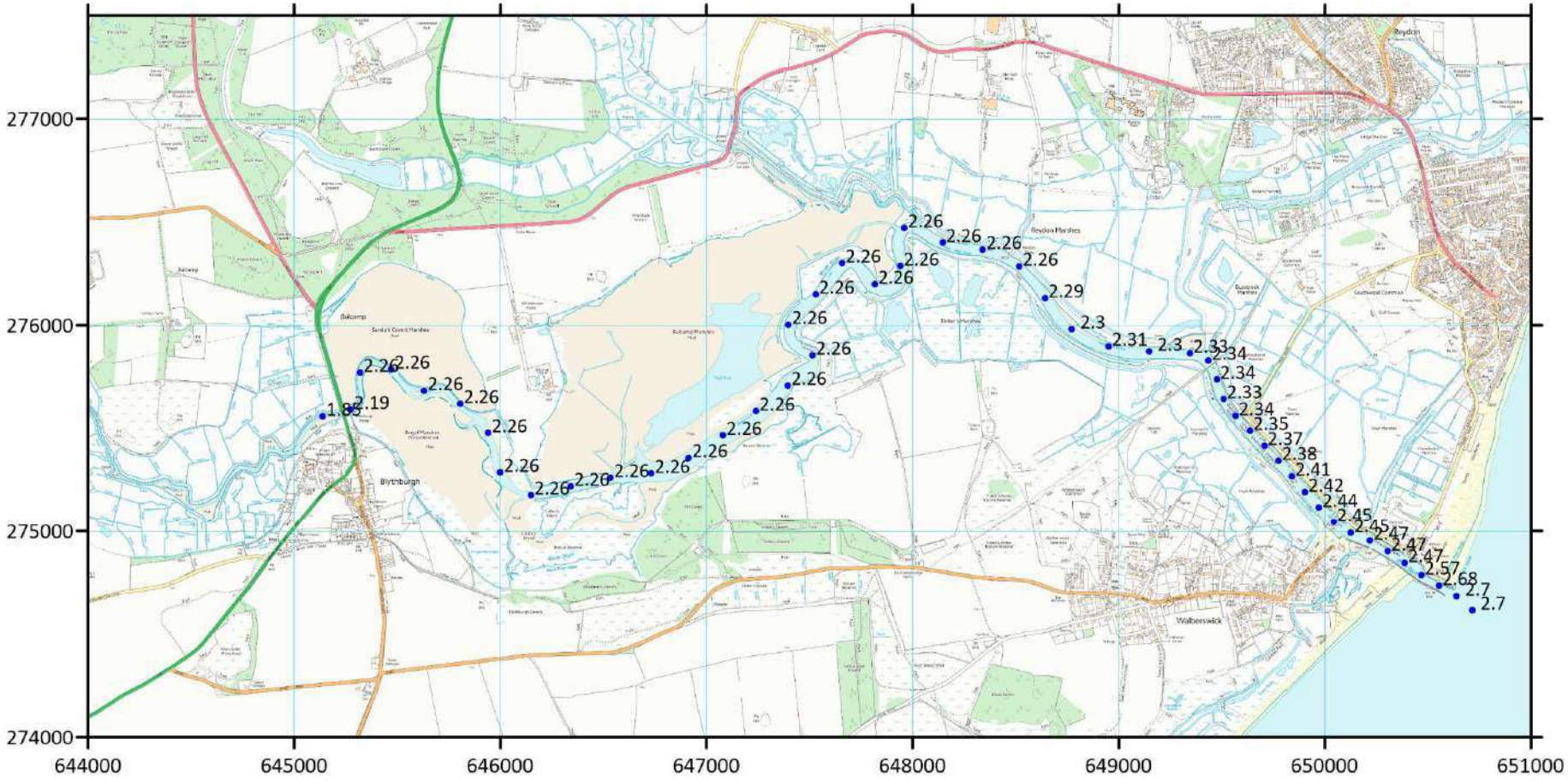


2070, RCP2.6 (50%): G0 - Present day estuary defences, narrow channel

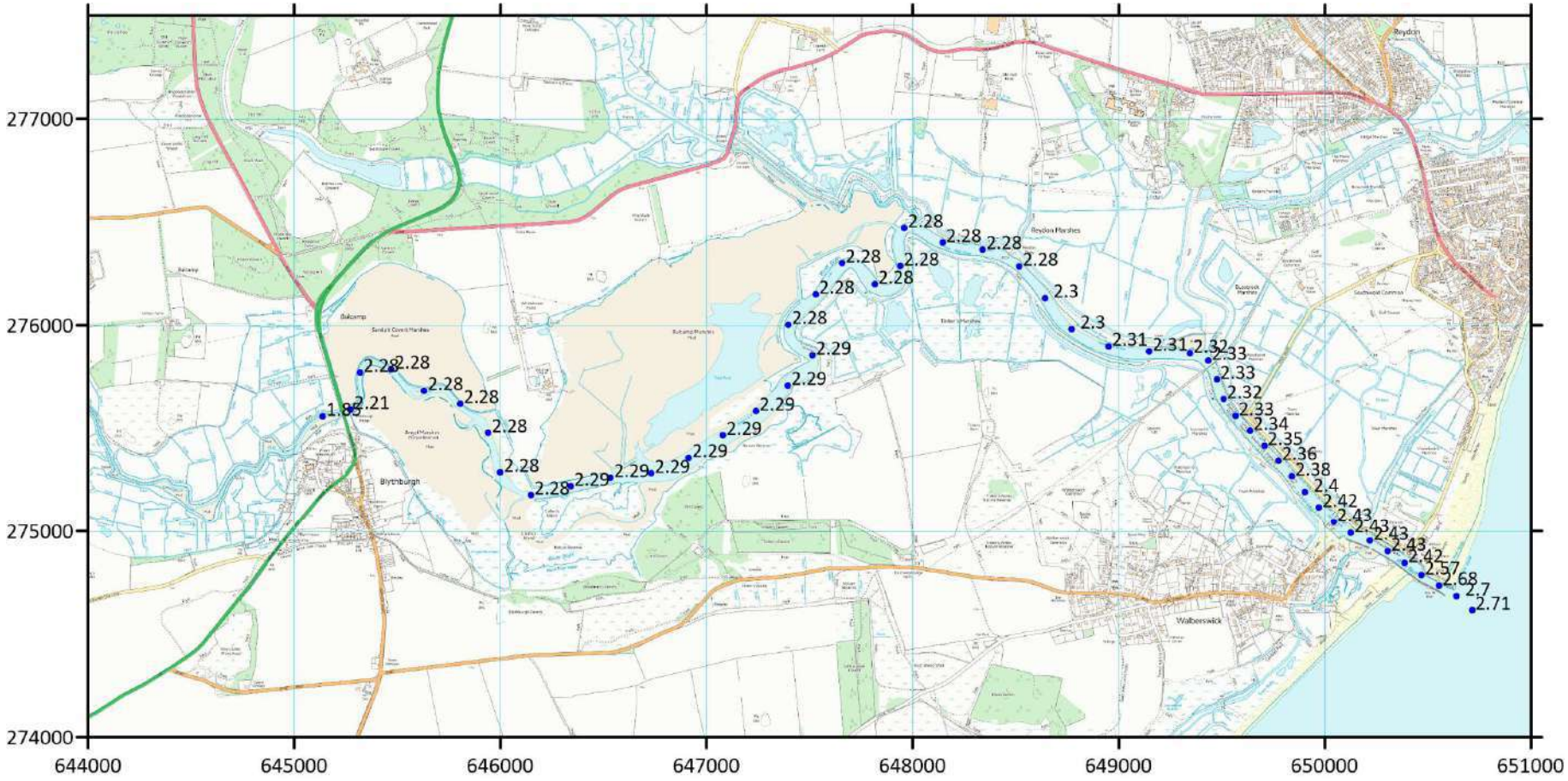


2.7m Sea Level
(2013 event conditions -0.4m)

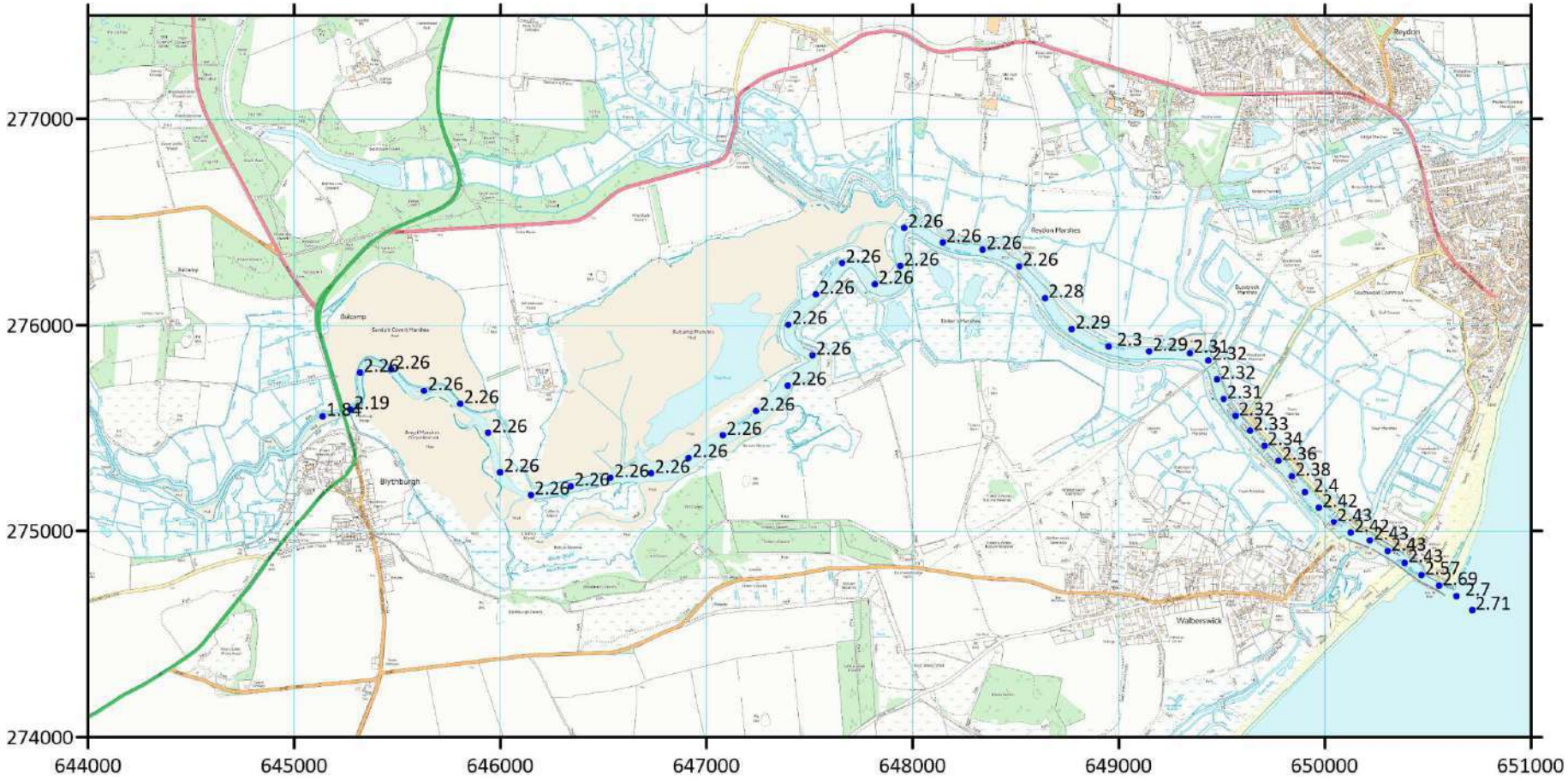
2013 event -0.4m: E0 - Present-day estuary defences



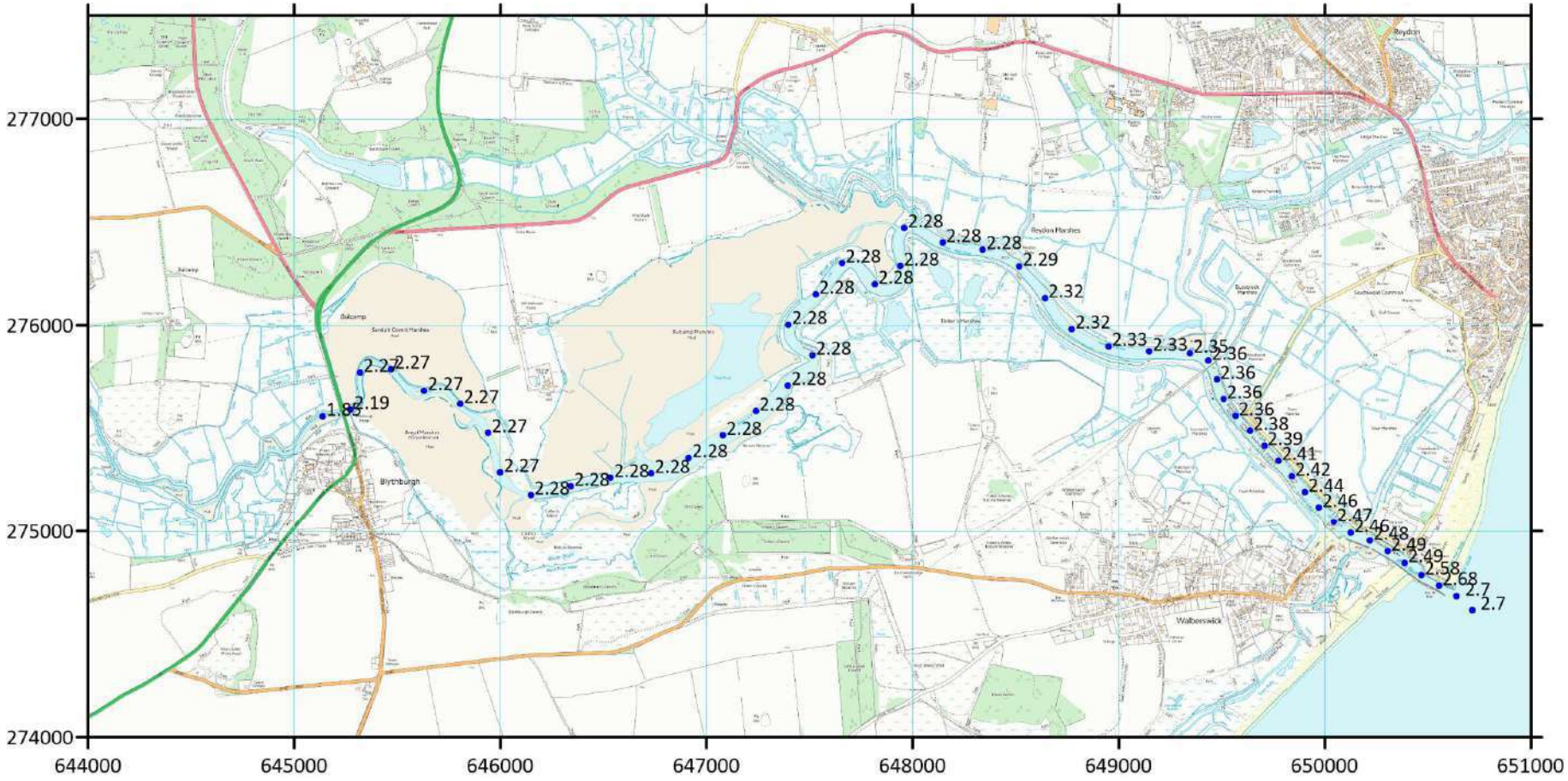
2013 event -0.4m: E2 - Raise estuary defences



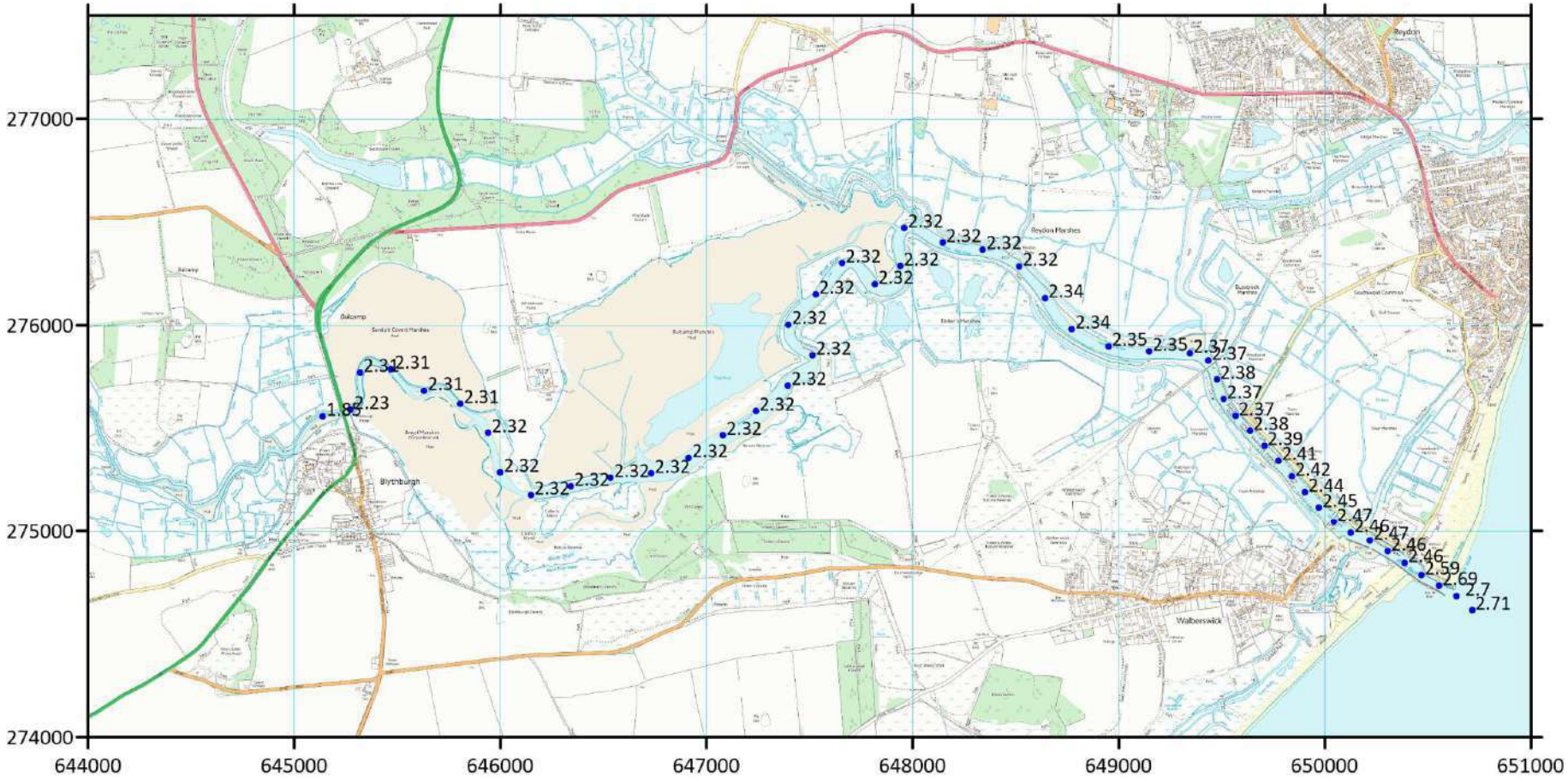
2013 event -0.4m: E3 – SMP Policy (Raise N banks, S banks overtopped)



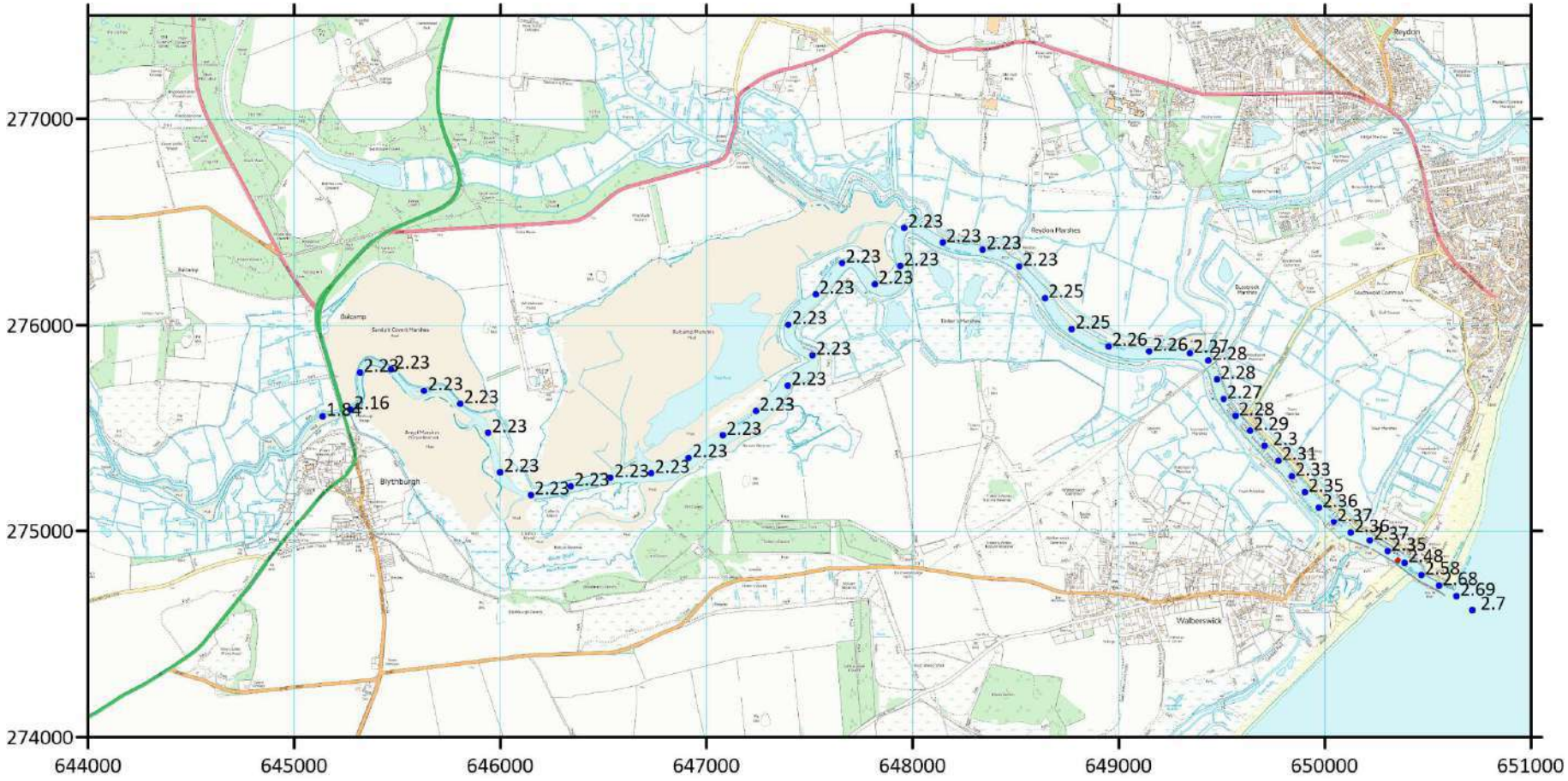
2013 event -0.4m: E0 - Present-day estuary defences, marshes raised 300mm



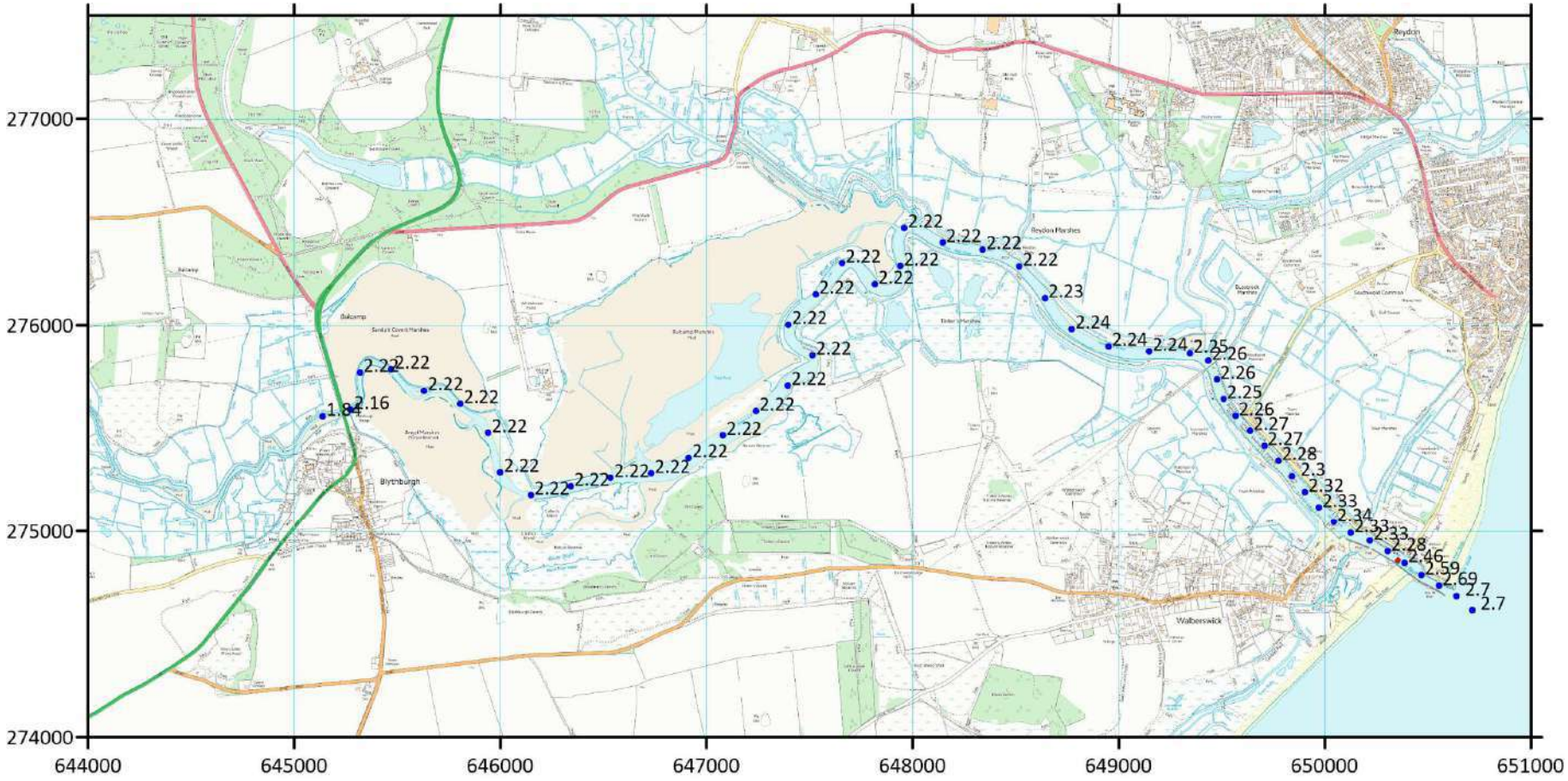
2013 event -0.4m: E2 - Raise estuary defences, marshes raised 300mm



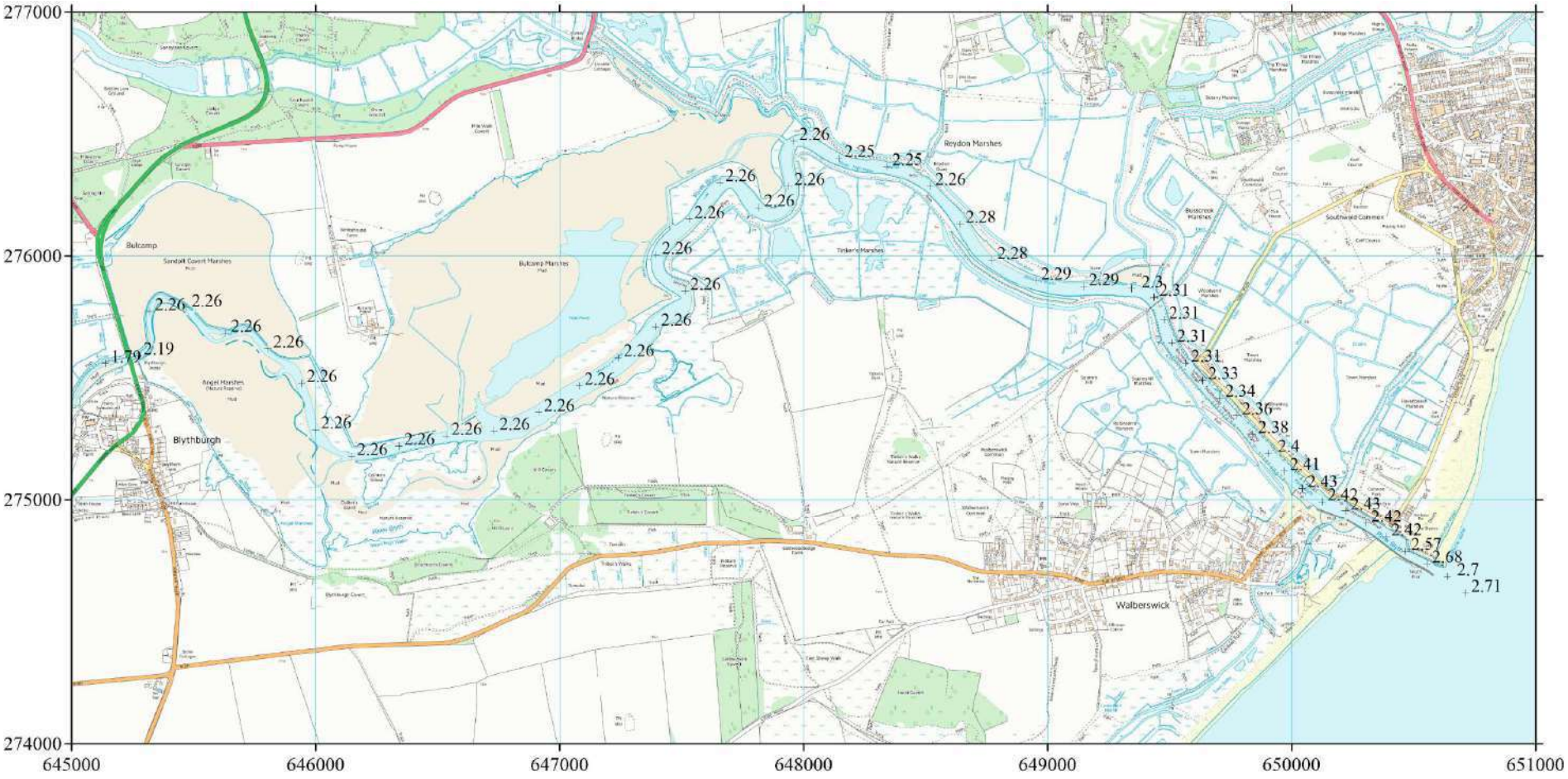
2013 event -0.4m: G0 - Present-day estuary defences, narrow channel



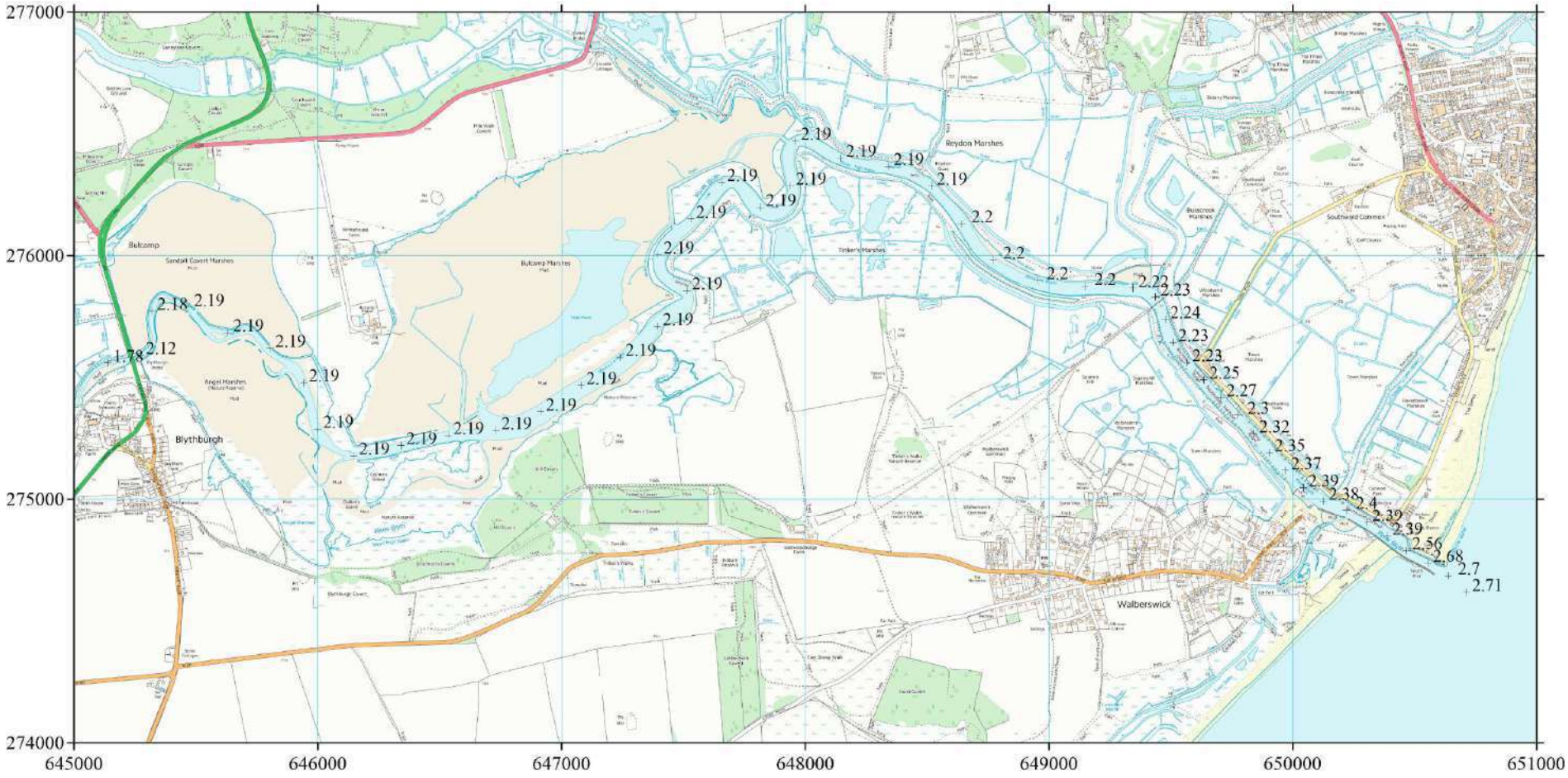
2013 event -0.4m: G2 – Raise estuary defences, narrow channel



2013 event -0.4m: S6 – Passive Spillway at 2.20m

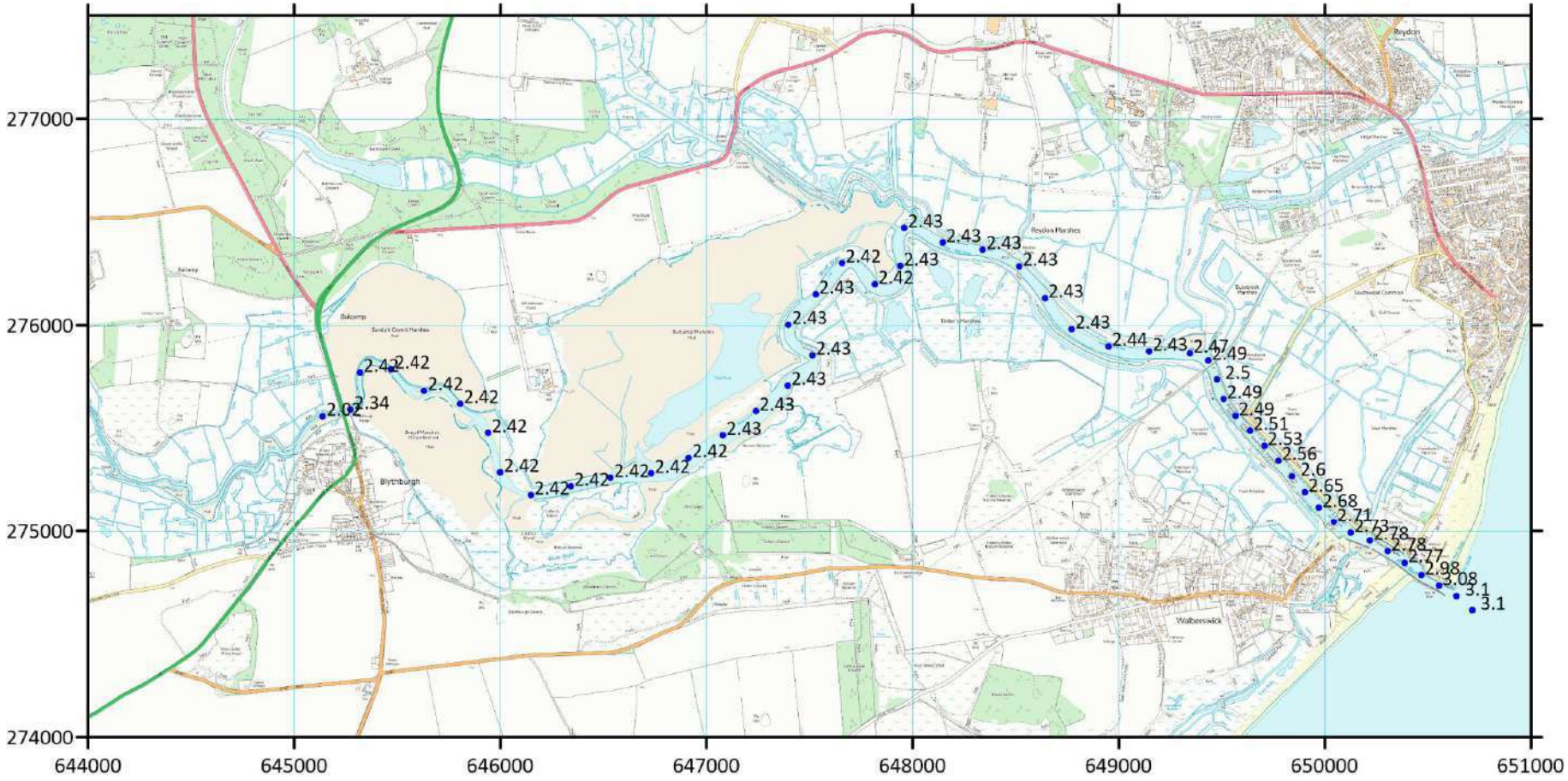


2013 event -0.4m: S7 – Passive Spillway at 2.00m

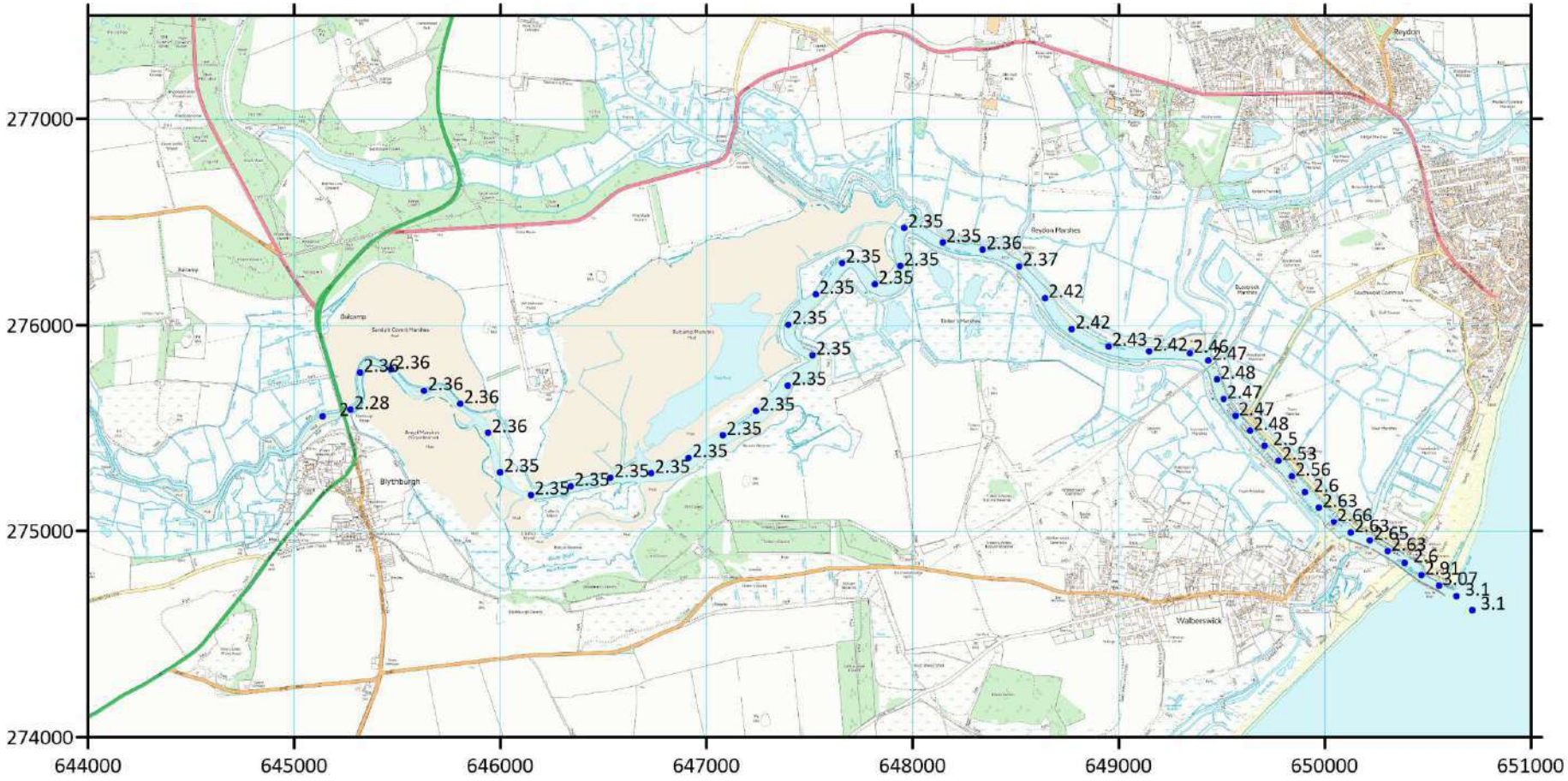


2013

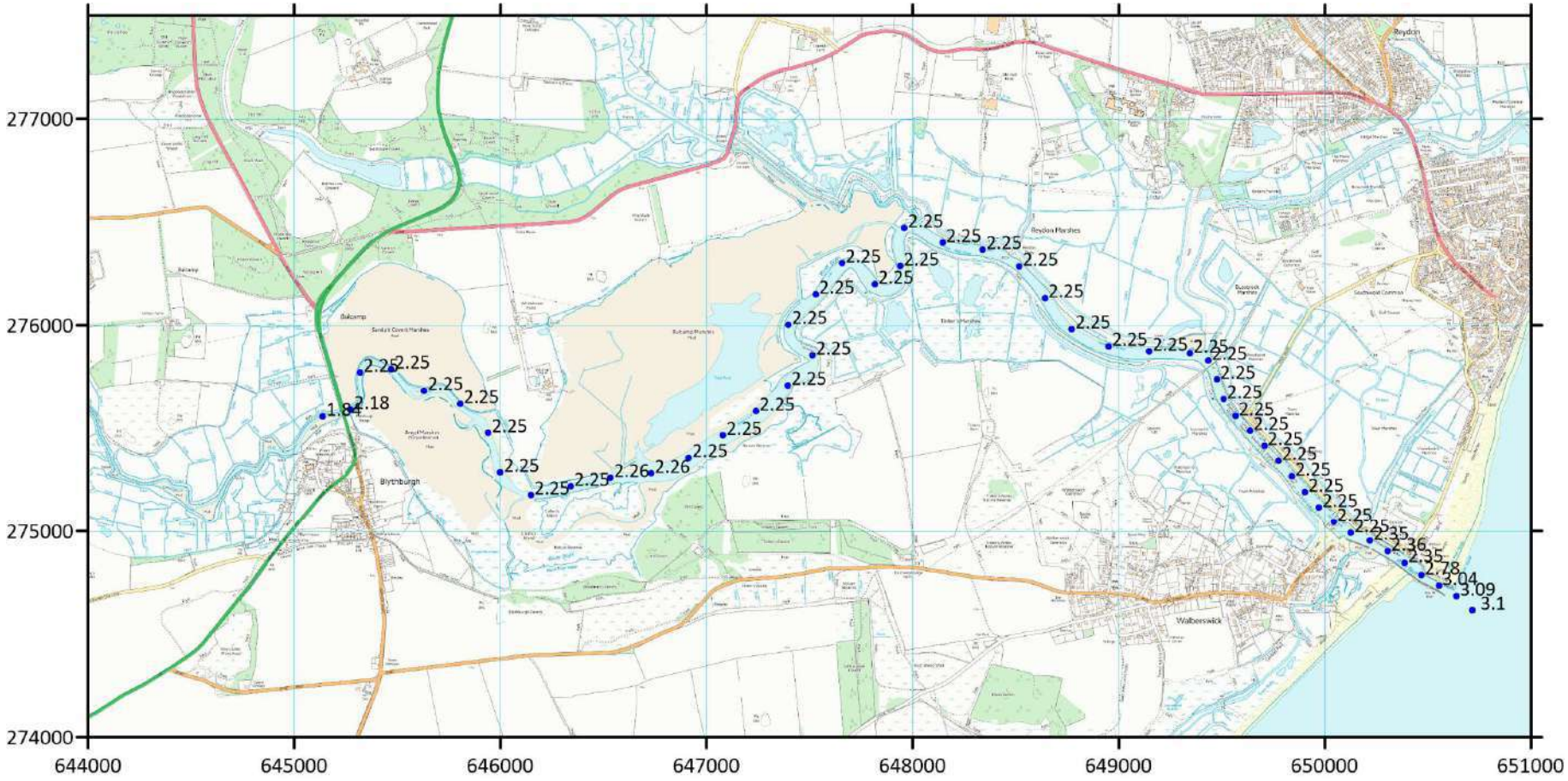
2013 event: E0 - Present-day estuary defences



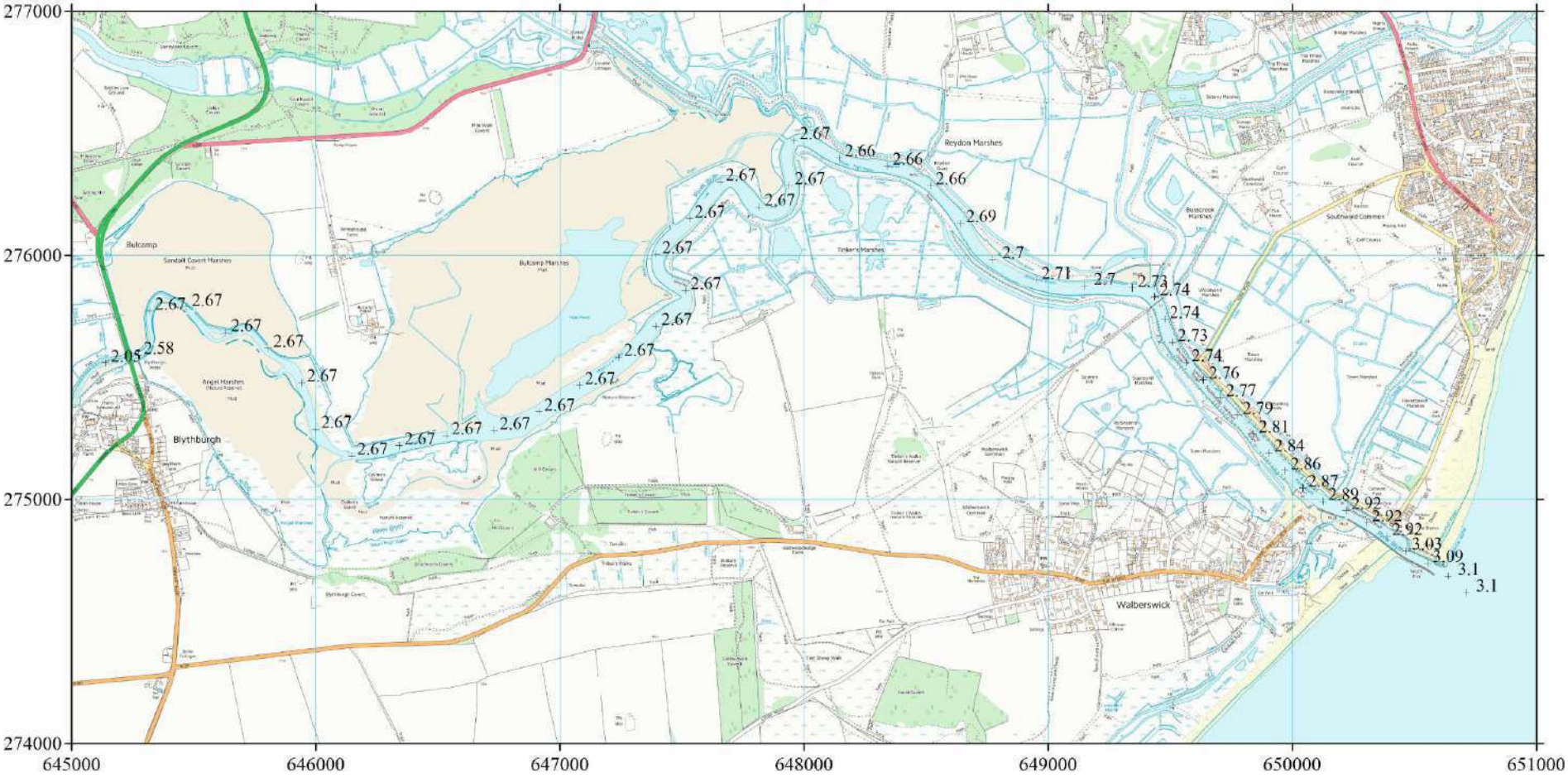
2013 event: E0 - Present-day estuary defences, Walberswick dunes defended



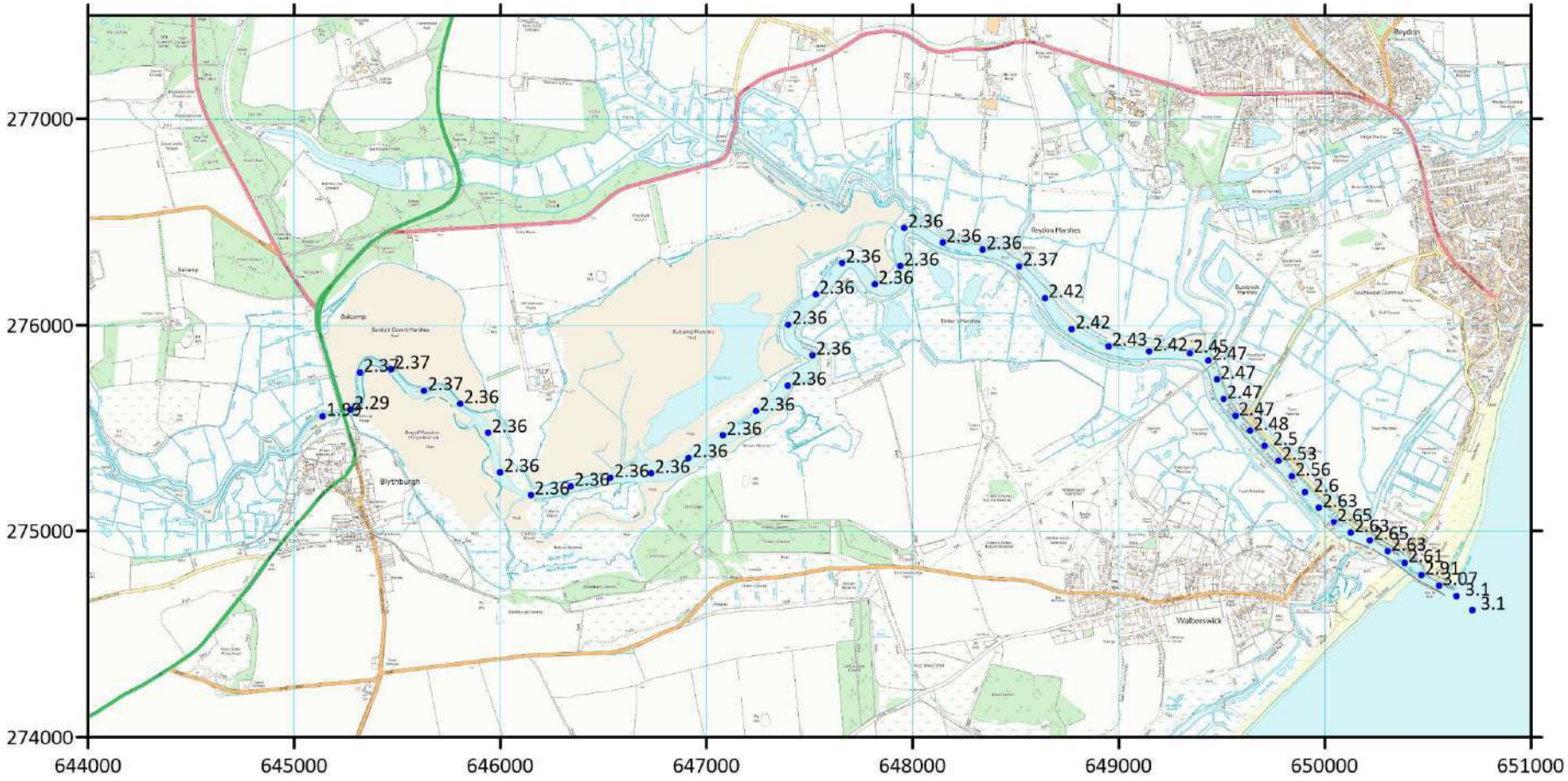
2013 event: E1 – Do Nothing (All embankments failed)



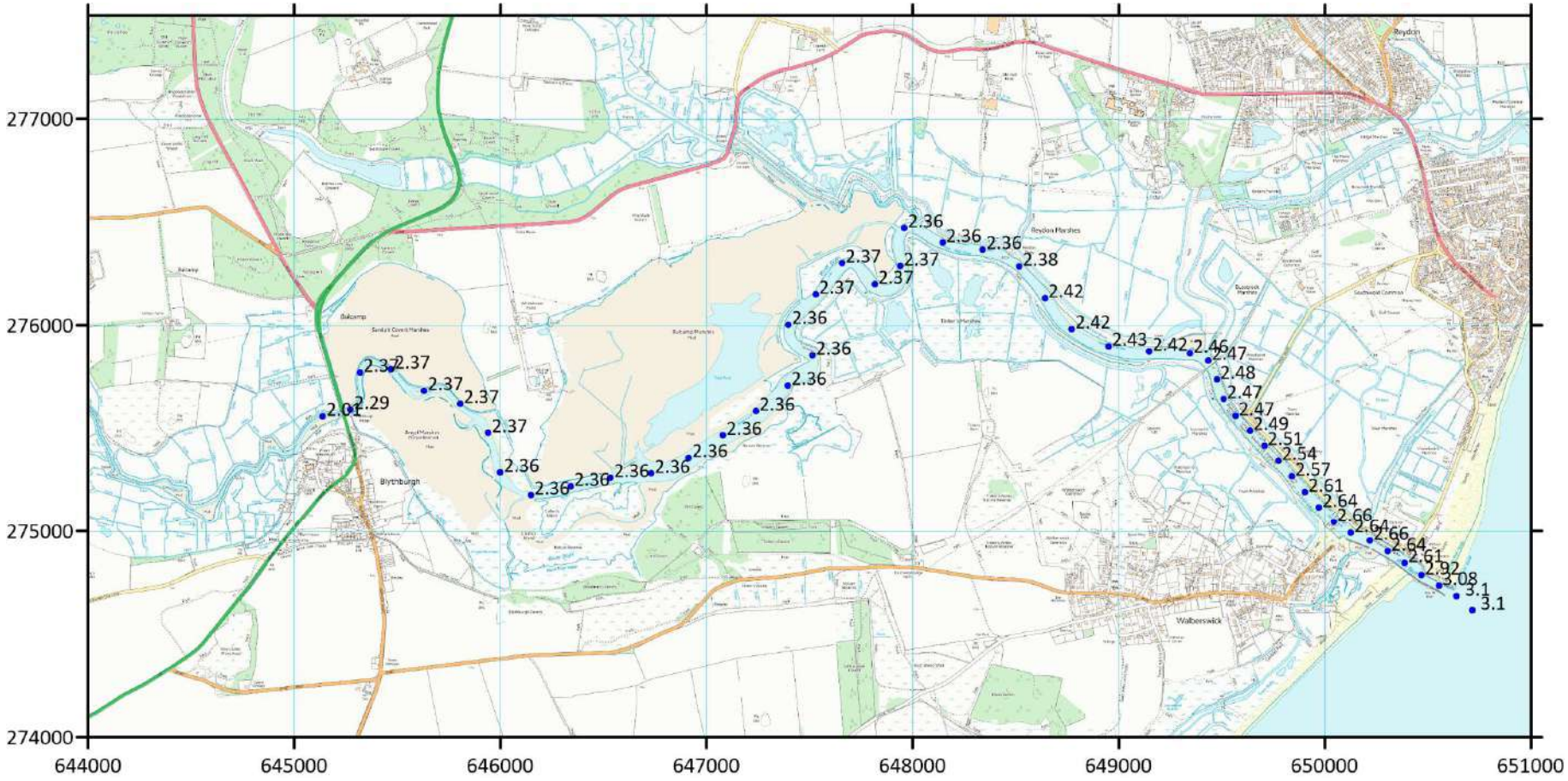
2013 event: E2 - Raise estuary defences



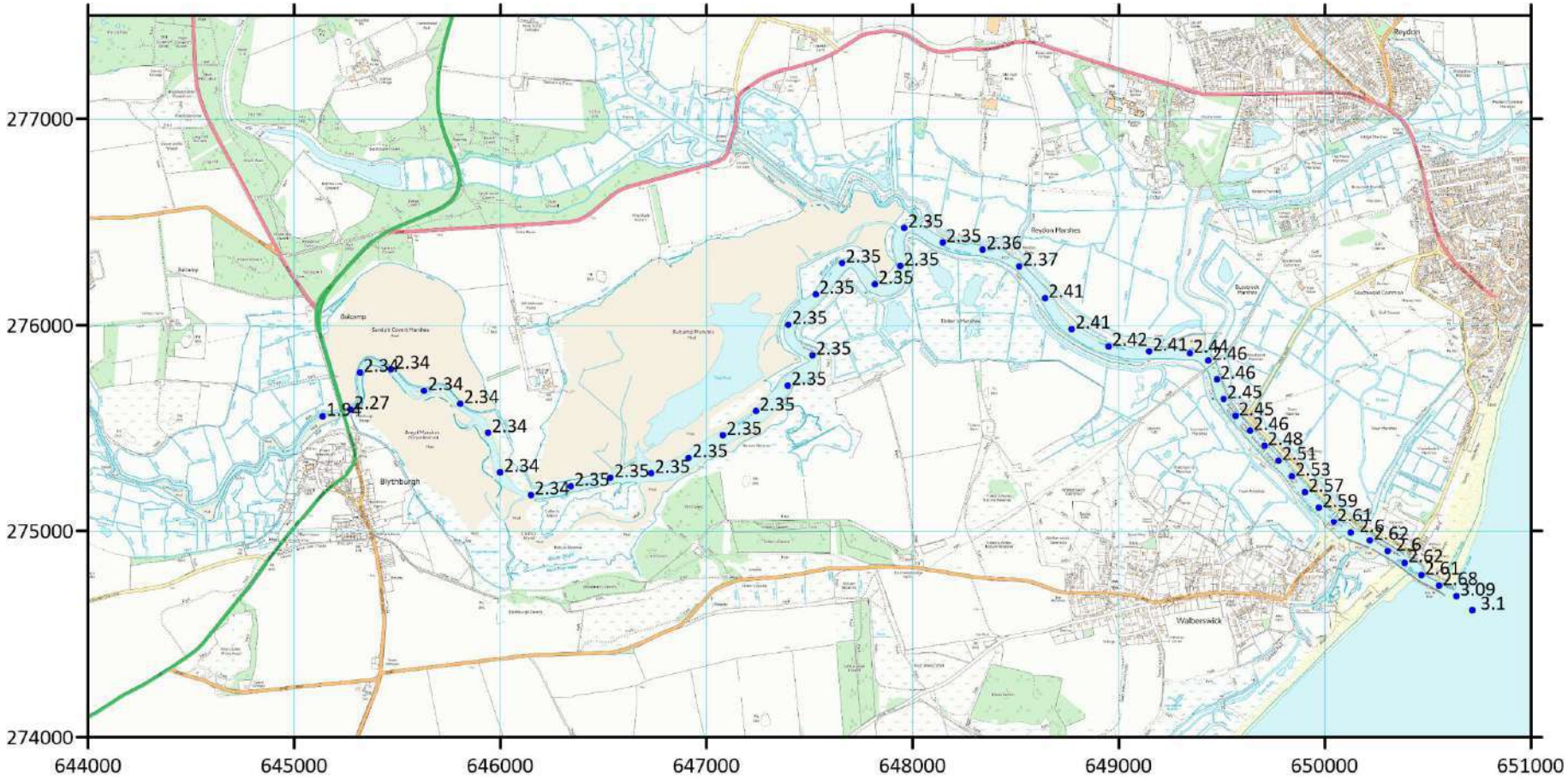
2013 event: E3 – SMP Policy (Raise N banks, S banks overtopped)



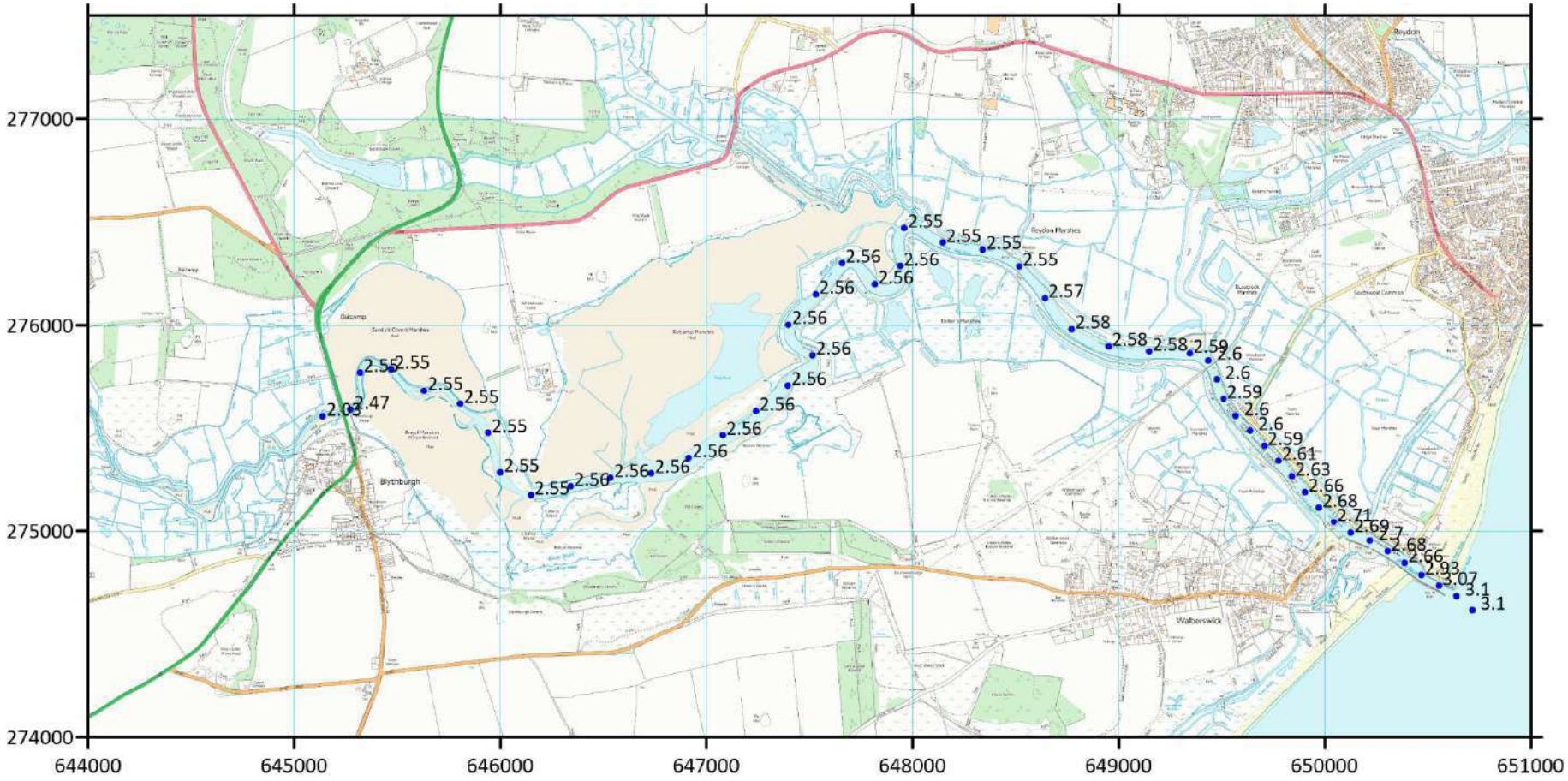
2013 event: H0 - Present day estuary defences, short S Pier



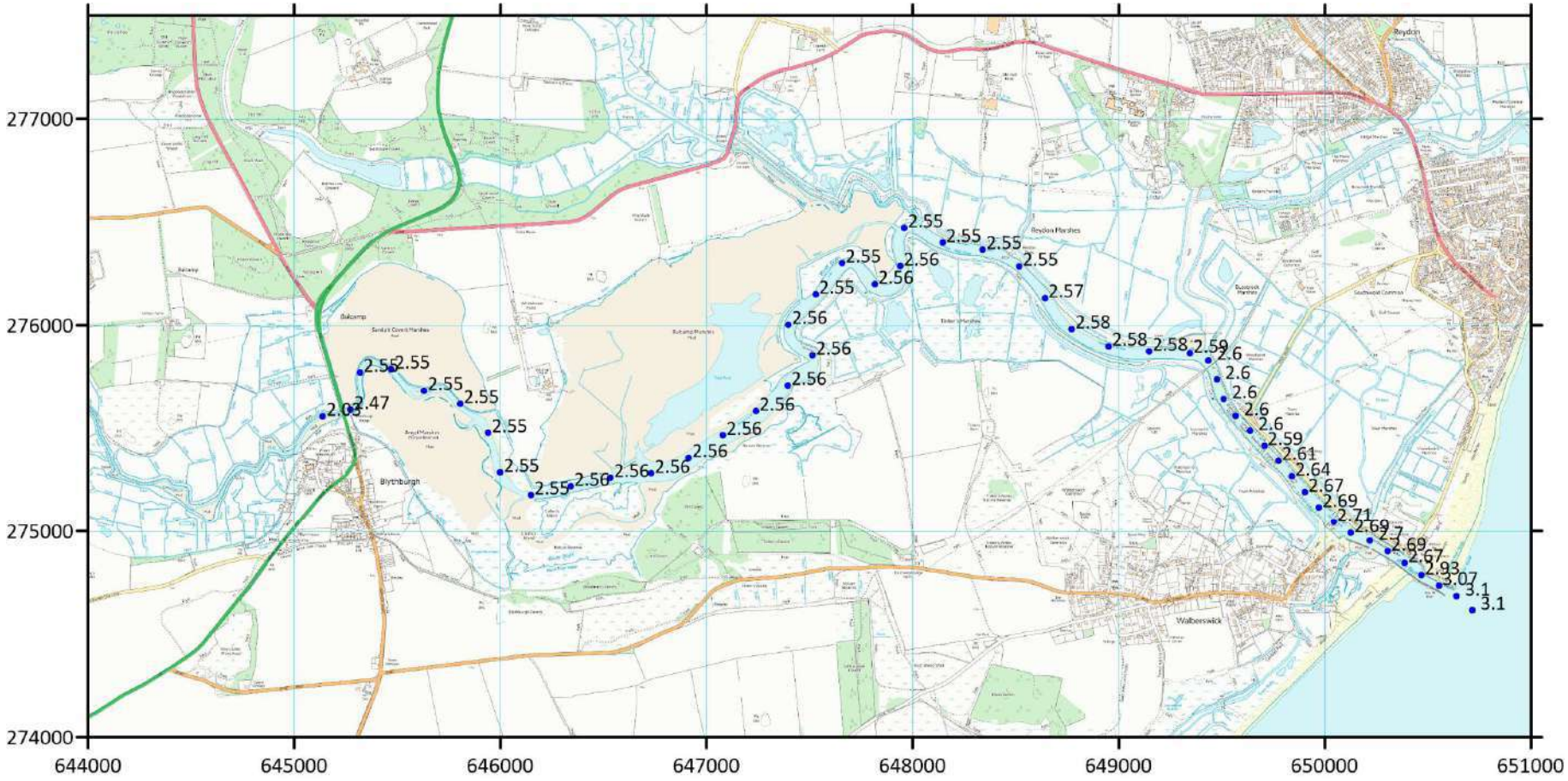
2013 event: F0 - Present day estuary defences, solid S Pier



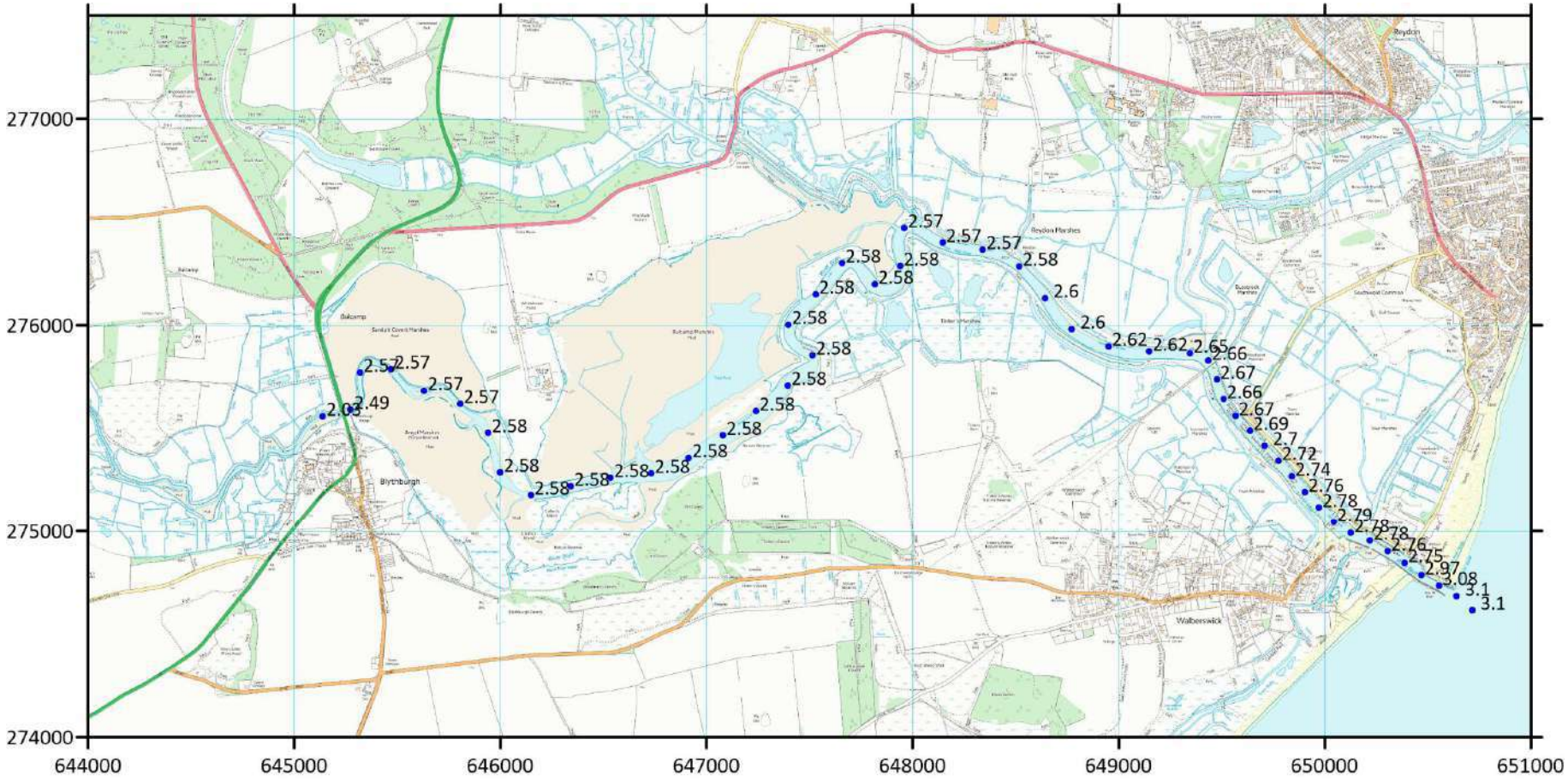
2013 event: S1a - Raise defences + spillway (open at +2.3m WL)



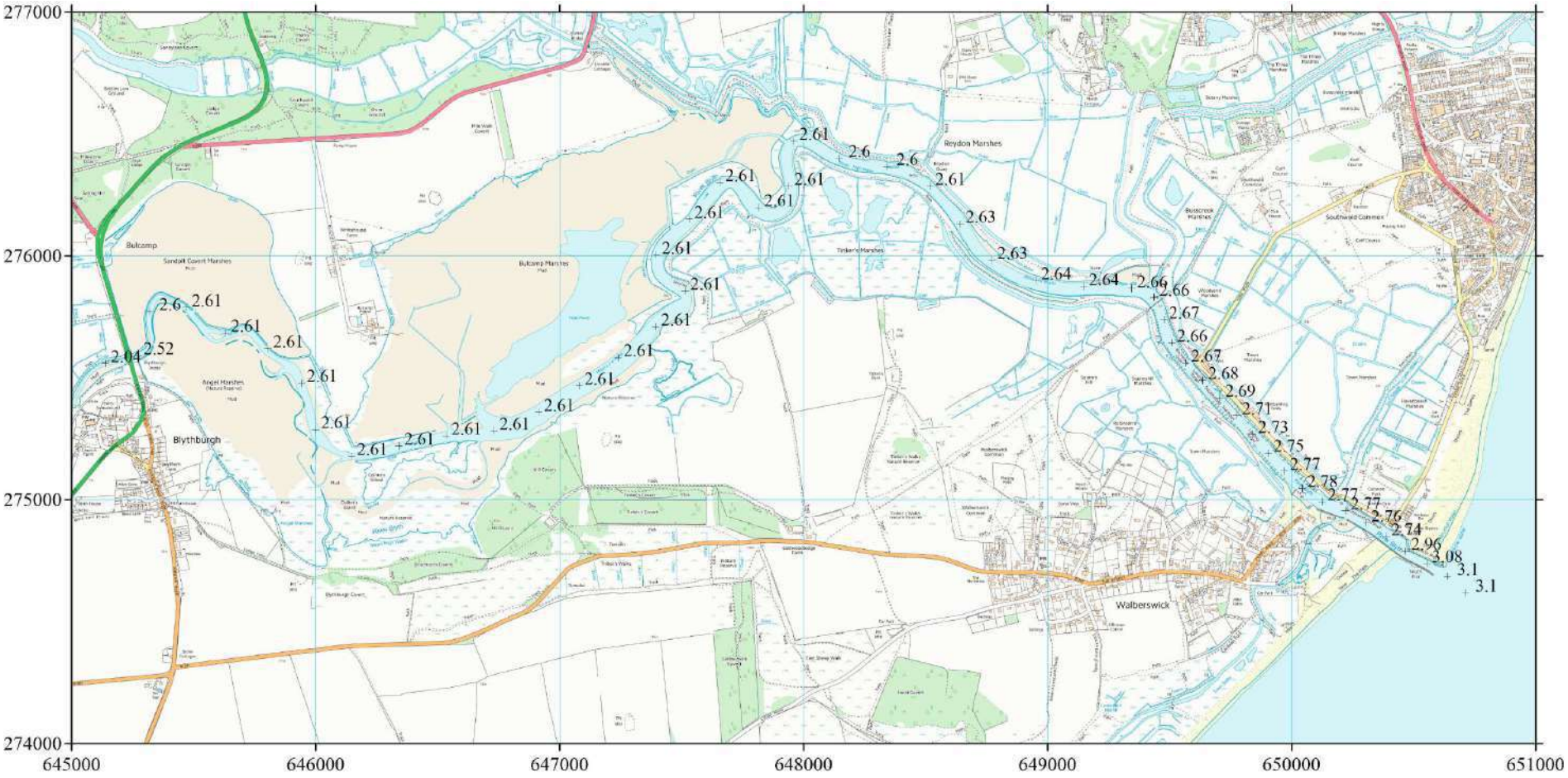
2013 event: S1b - Raise defences + spillway (open at +2.5m WL)



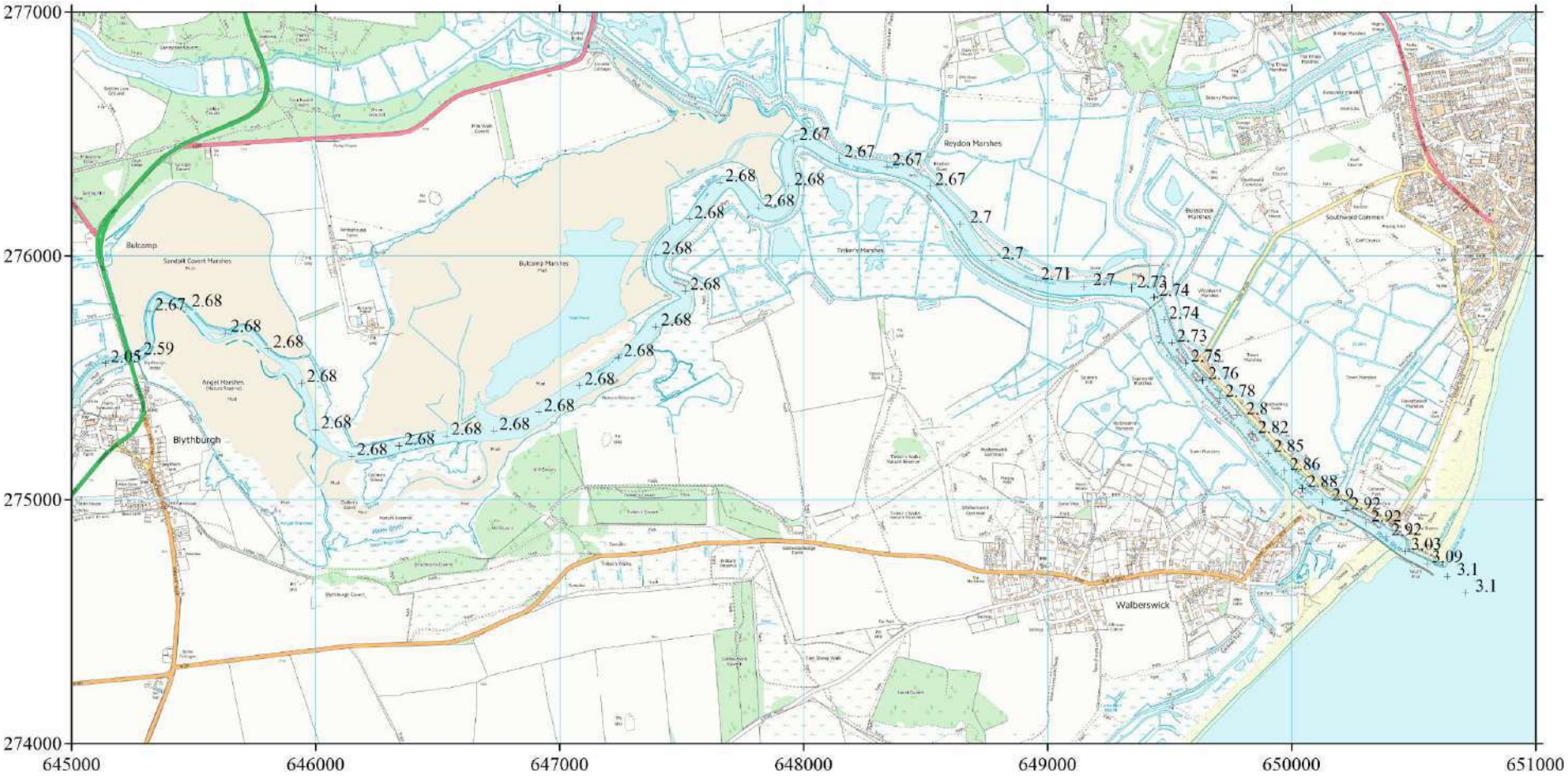
2013 event: S1c - Raise defences + spillway (open at +2.7m WL)



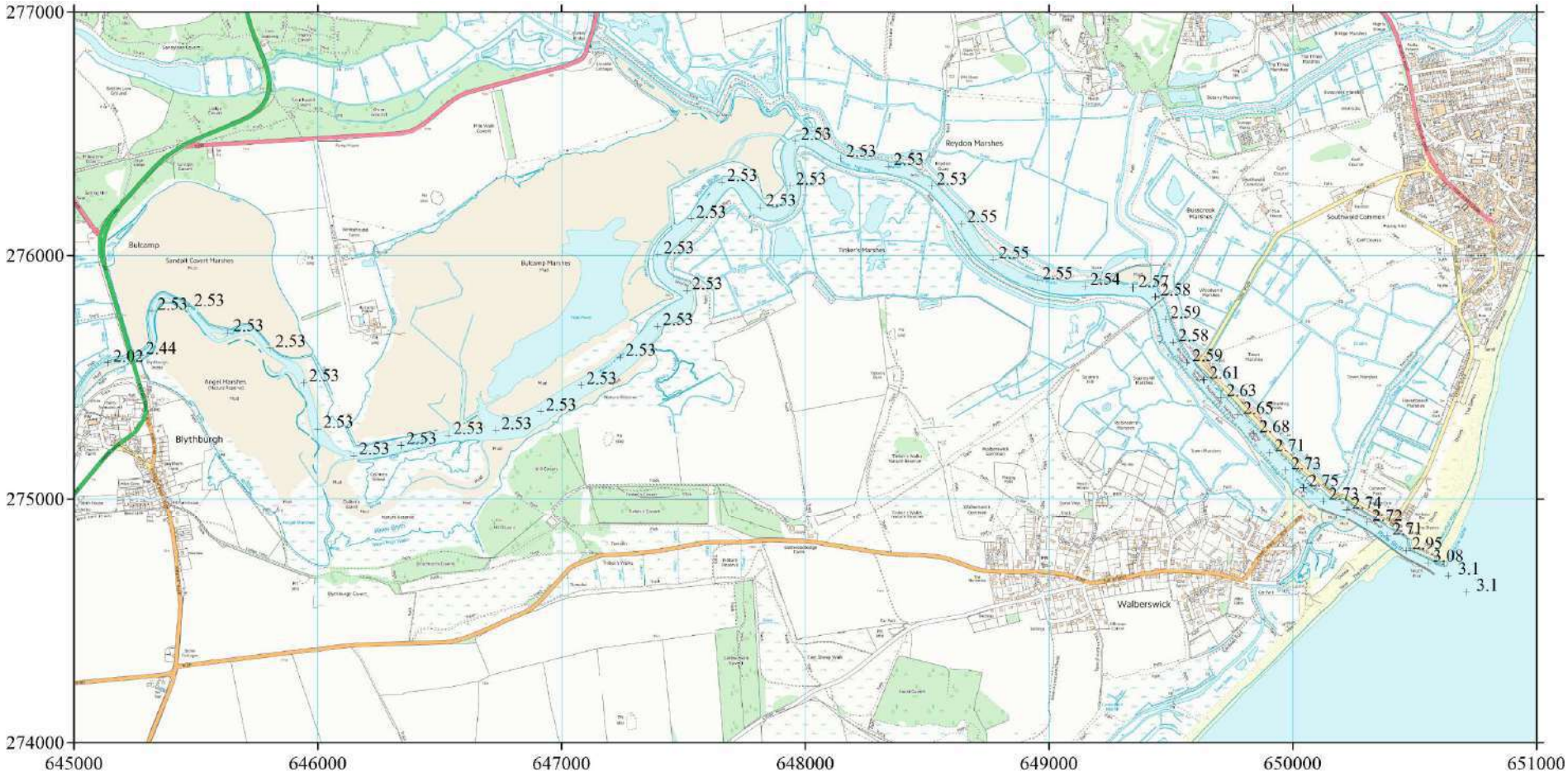
2013 event: S2 - Raise defences + 500m passive spillway at 2.55mOD, Walberswick dunes defended



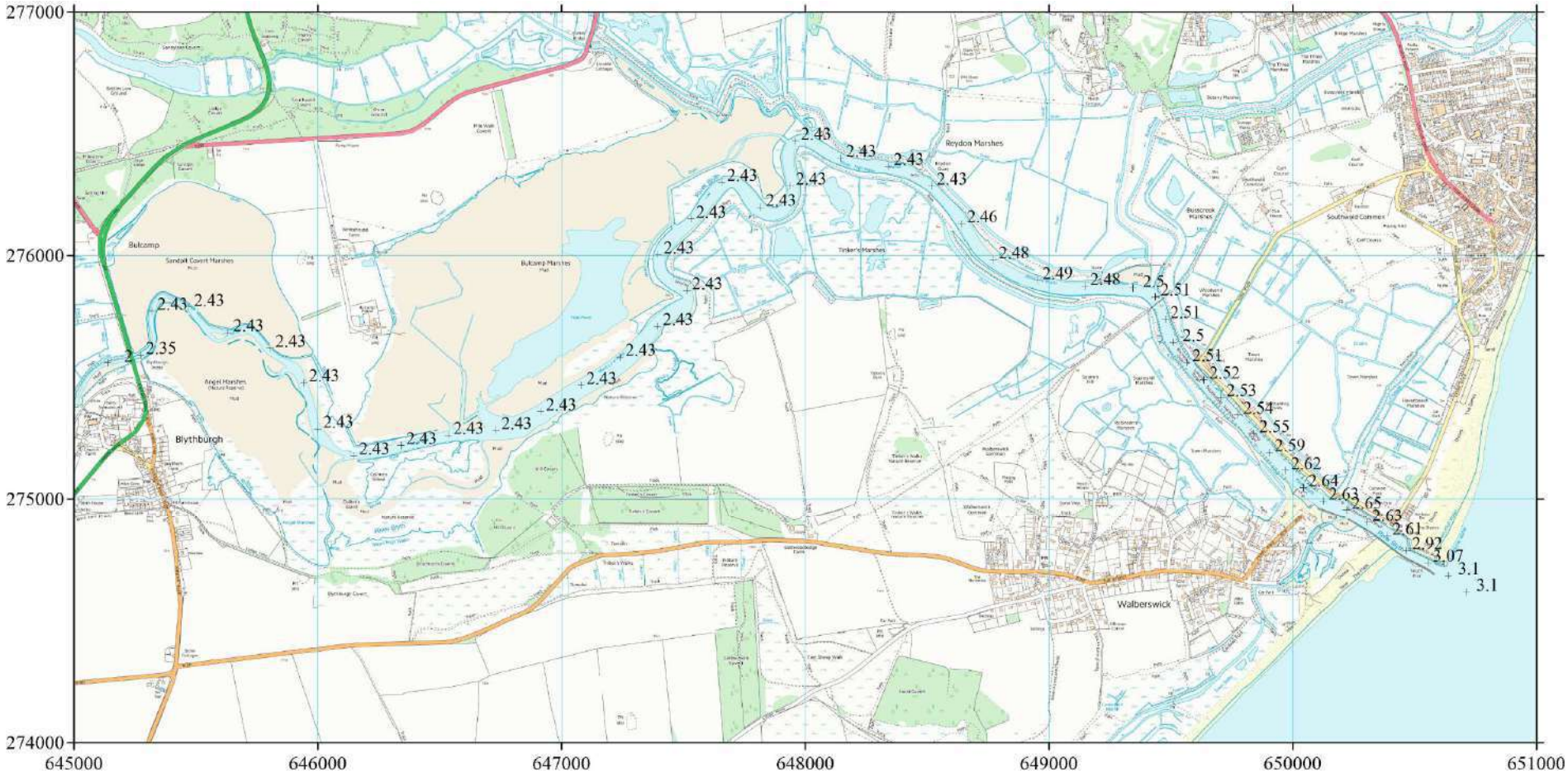
2013 event: S3 - Raise defences + 500m passive spillway at 2.55mOD, Walberswick dunes undefended



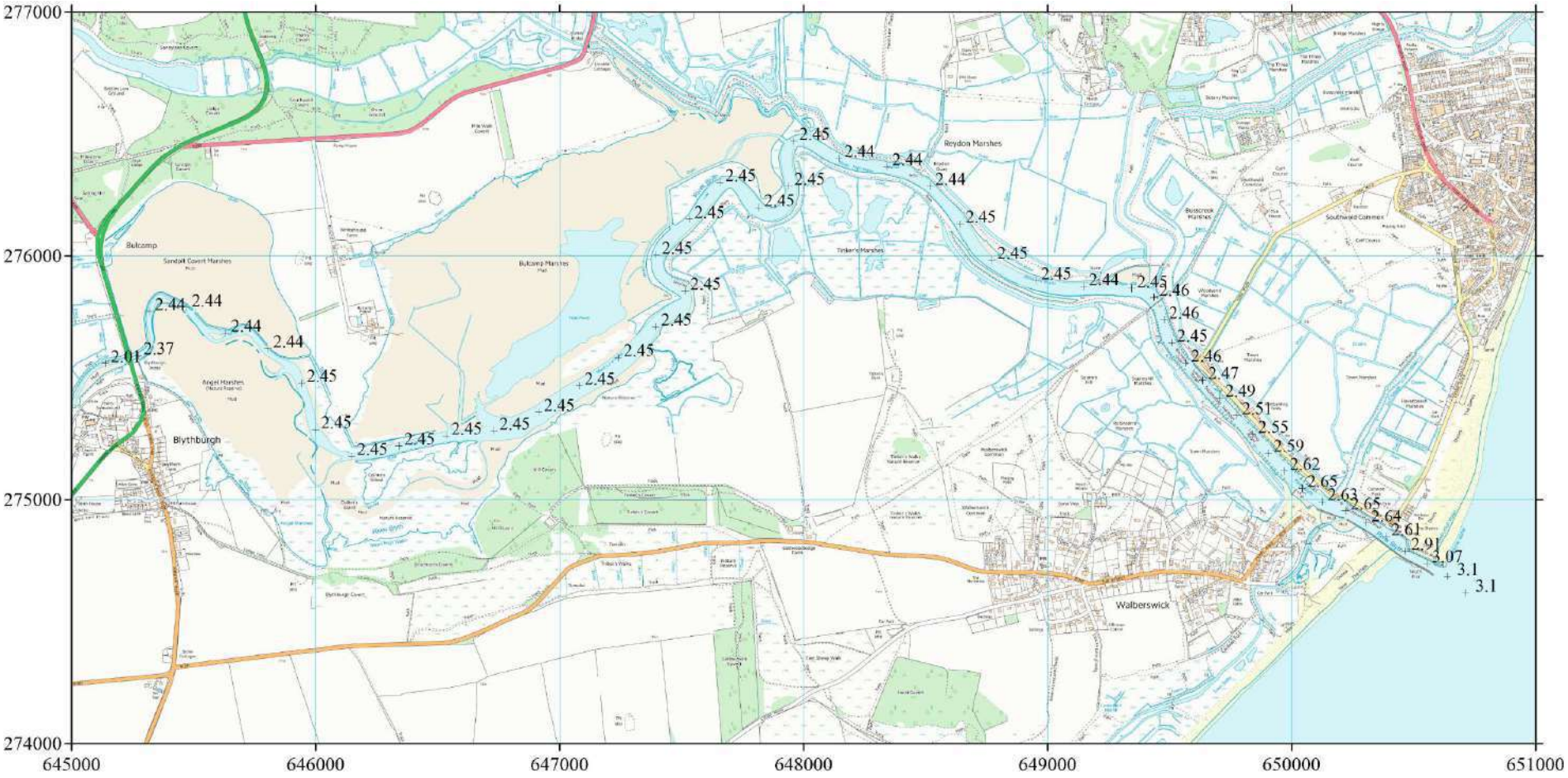
2013 event: S4 - Raise defences + 500m passive spillway at 2.35mOD, Walberswick dunes defended



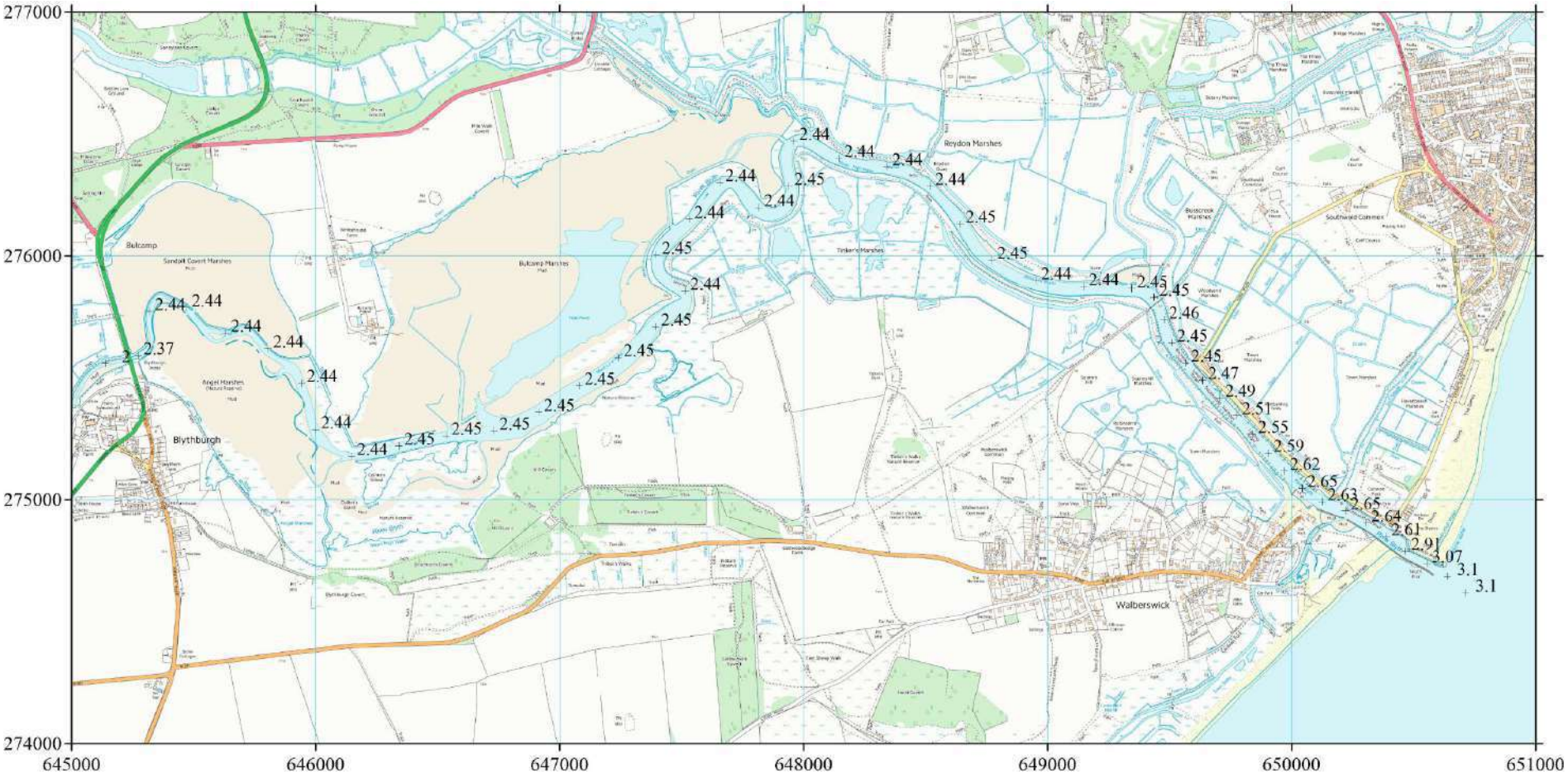
2013 event: S8 - Raise defences + 500m passive spillway at 2.00mOD, Walberswick dunes defended



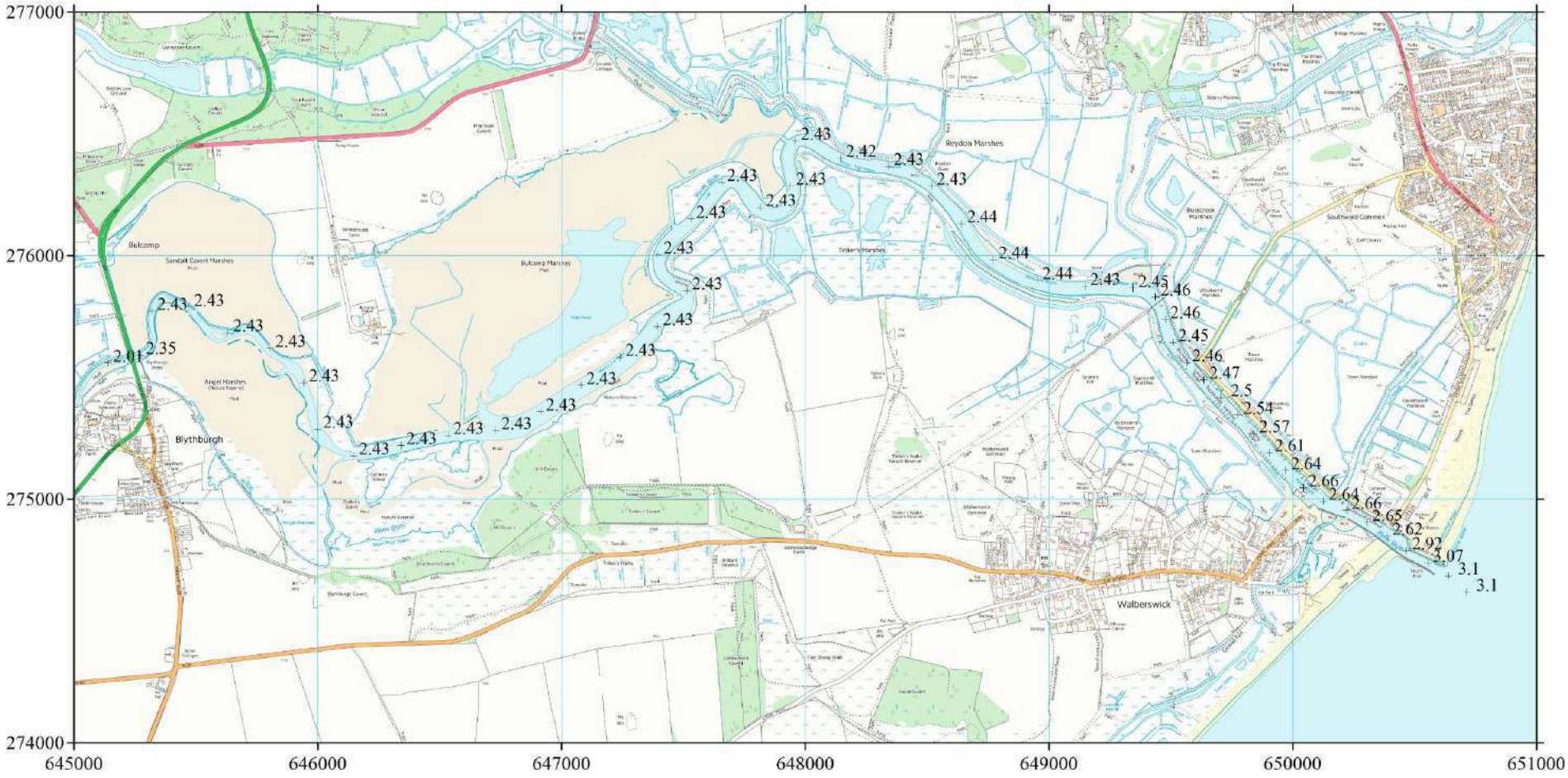
2013 event: S9 - Raise downstream defences only + 500m passive spillway at 2.00mOD, Walberswick dunes defended



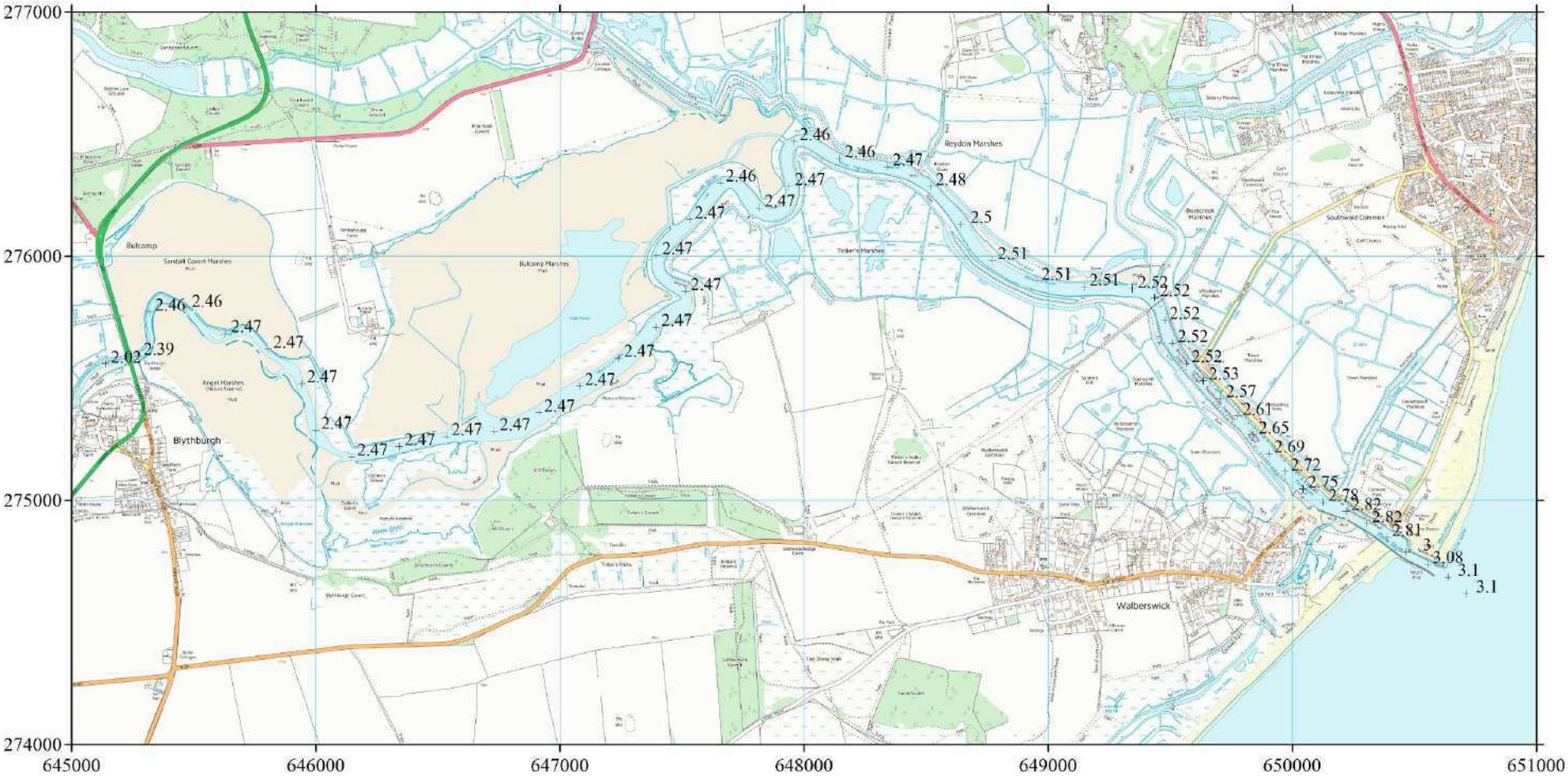
2013 event: S11 - Raise downstream defences only + 500m passive spillway at 2.00mOD, culverts open into Robinson's Marsh, Walberswick dunes defended



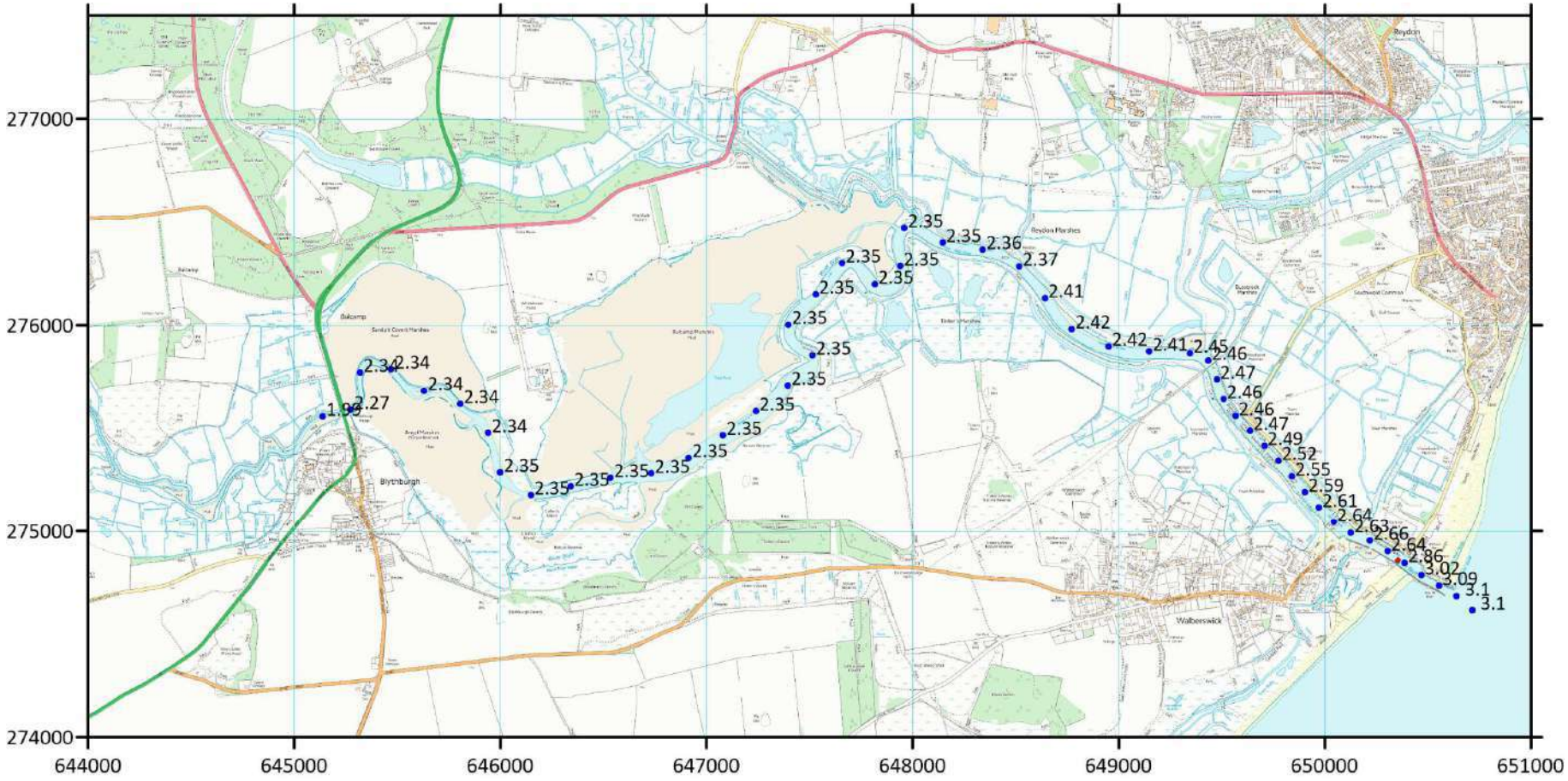
2013 event: S10 - Raise downstream defences only + 250m passive spillway at 2.00mOD, Walberswick dunes defended



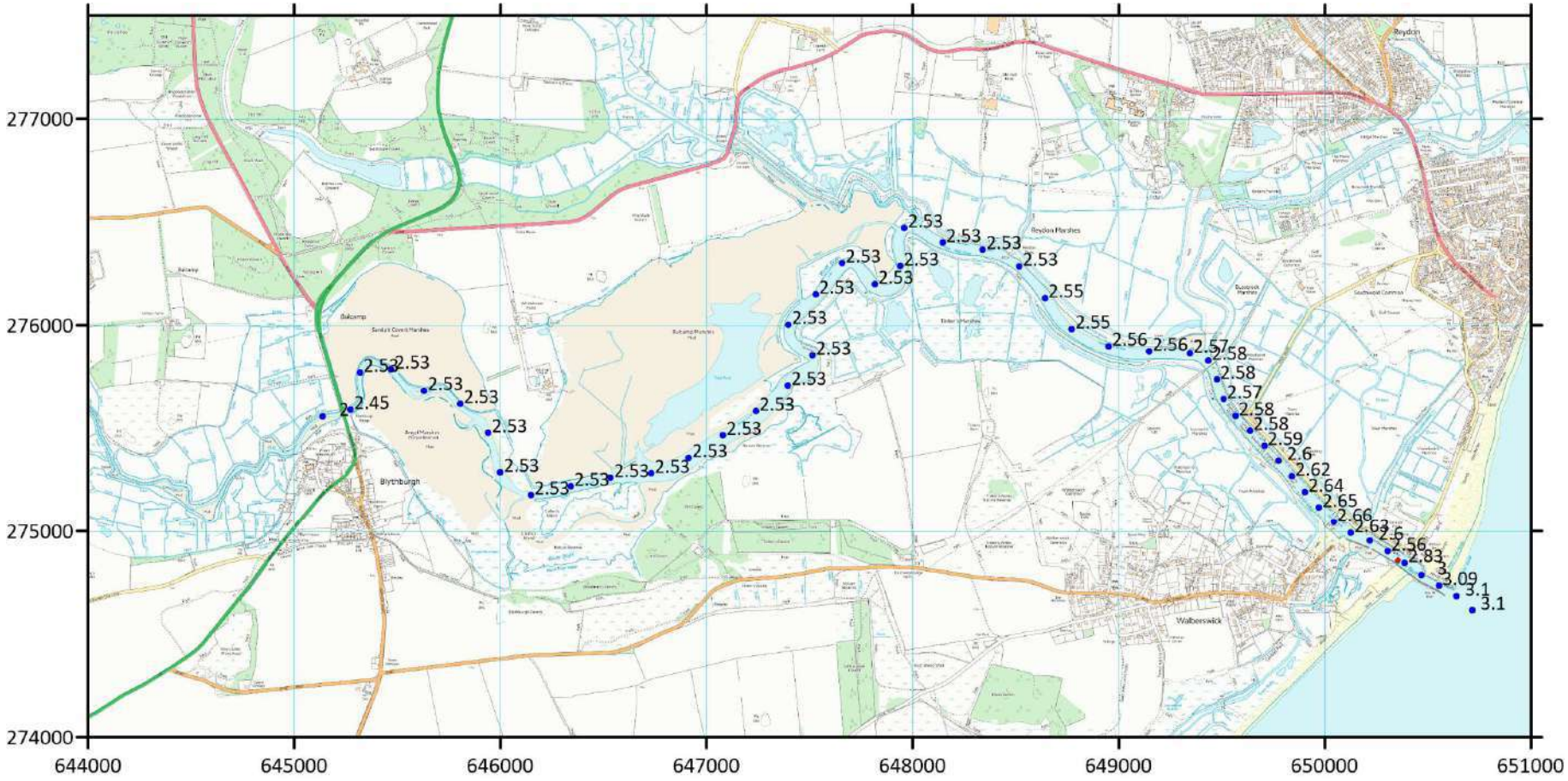
2013 event: S13 - Raise downstream defences only + 250m passive spillway at 2.00mOD, Walberswick dunes undefended



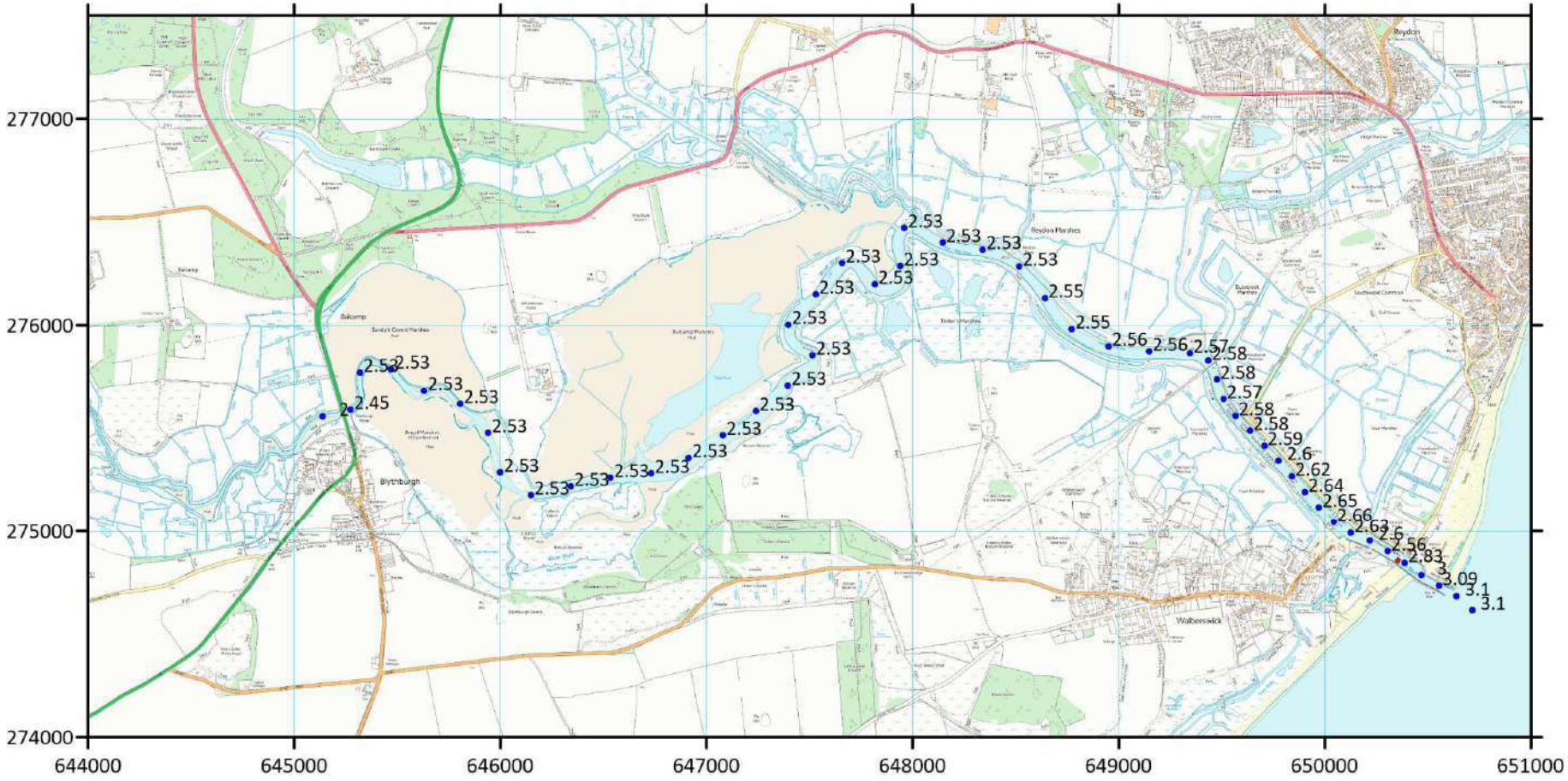
2013 event: G0 - Present day estuary defences, narrow channel



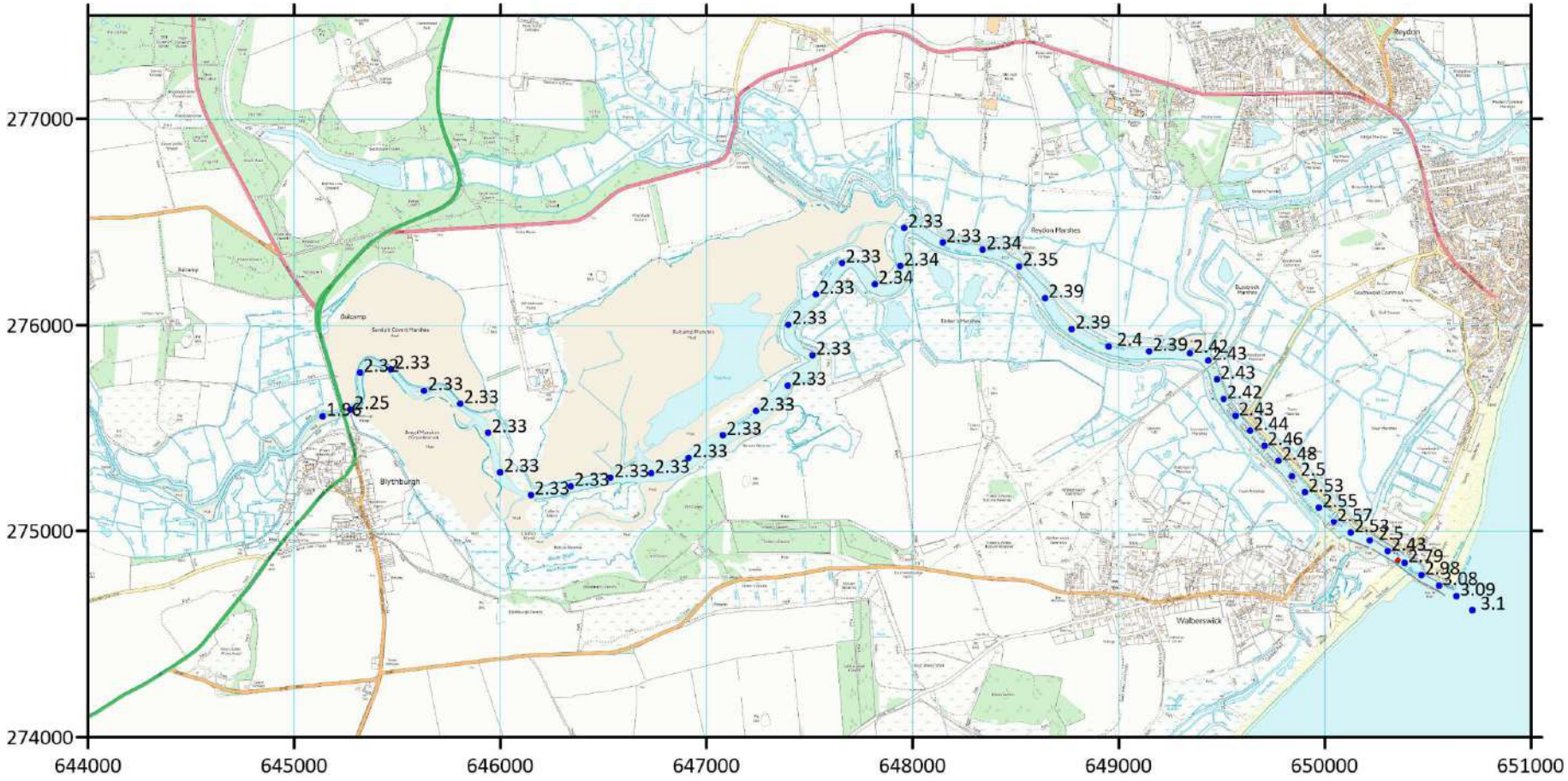
2013 event: G2a – Raise estuary defences, narrow channel



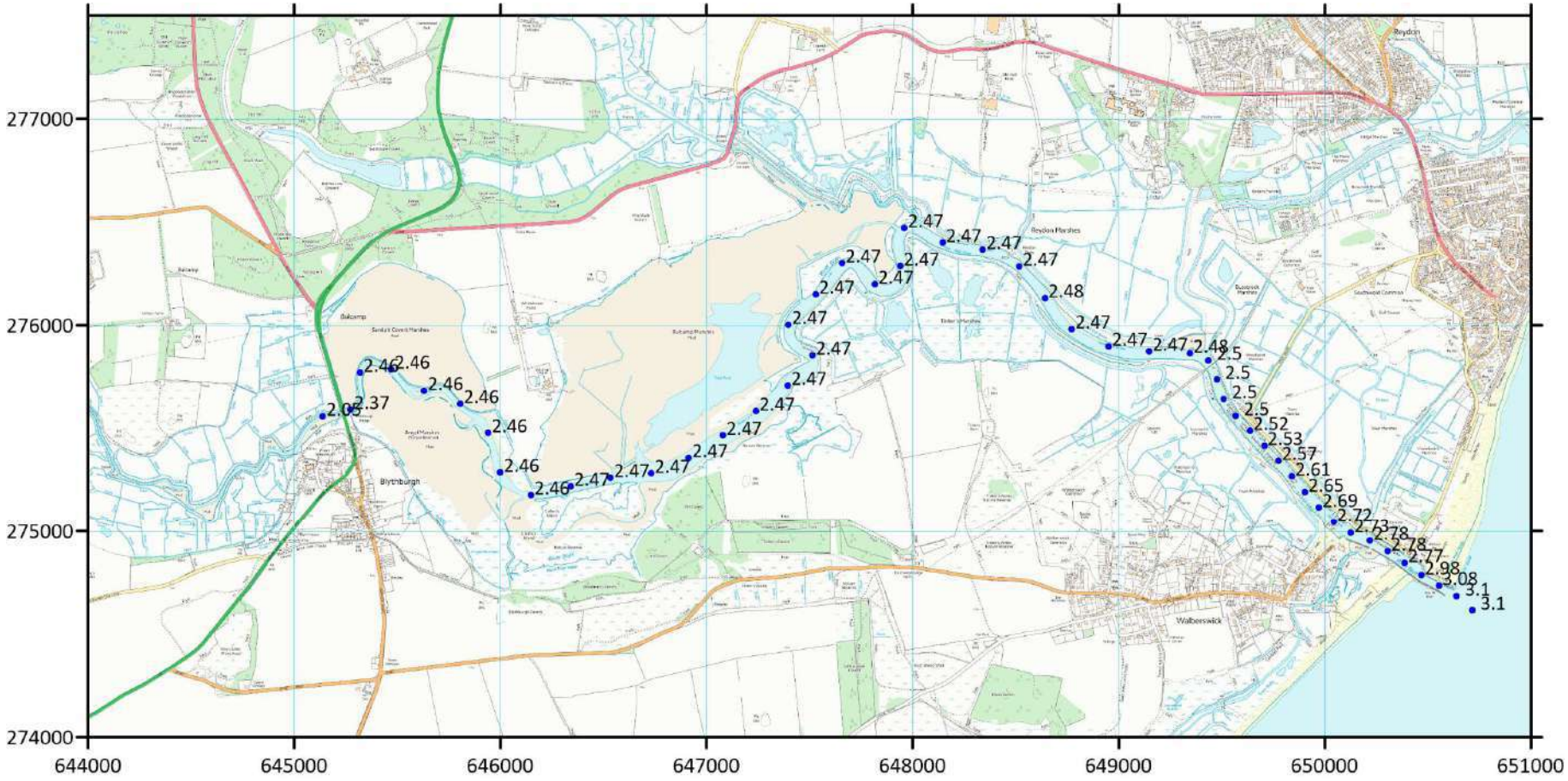
2013 event: G2b – Raise estuary defences, narrow channel with culverts



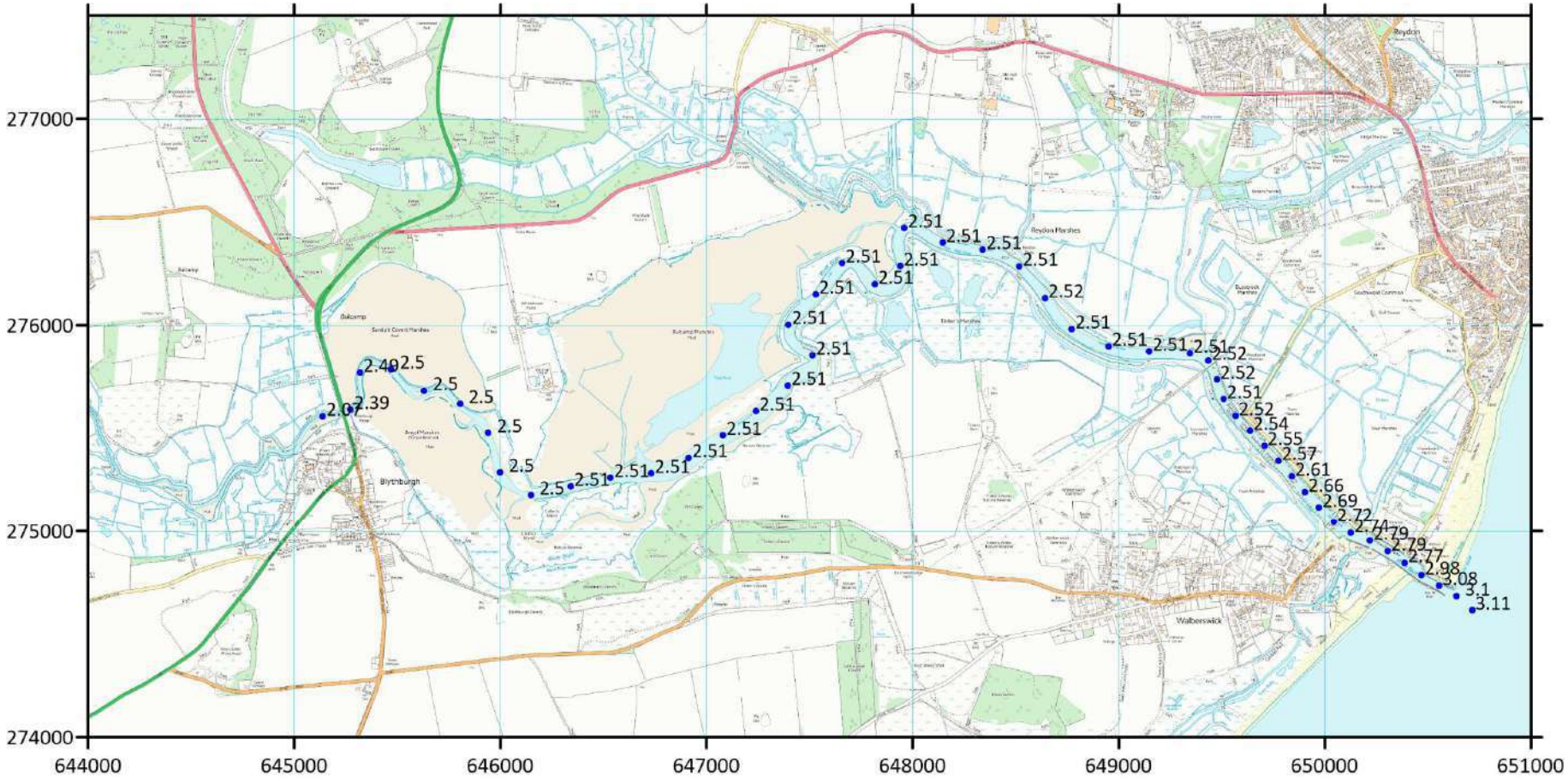
2013 event: G3 – SMP Policy, narrow channel



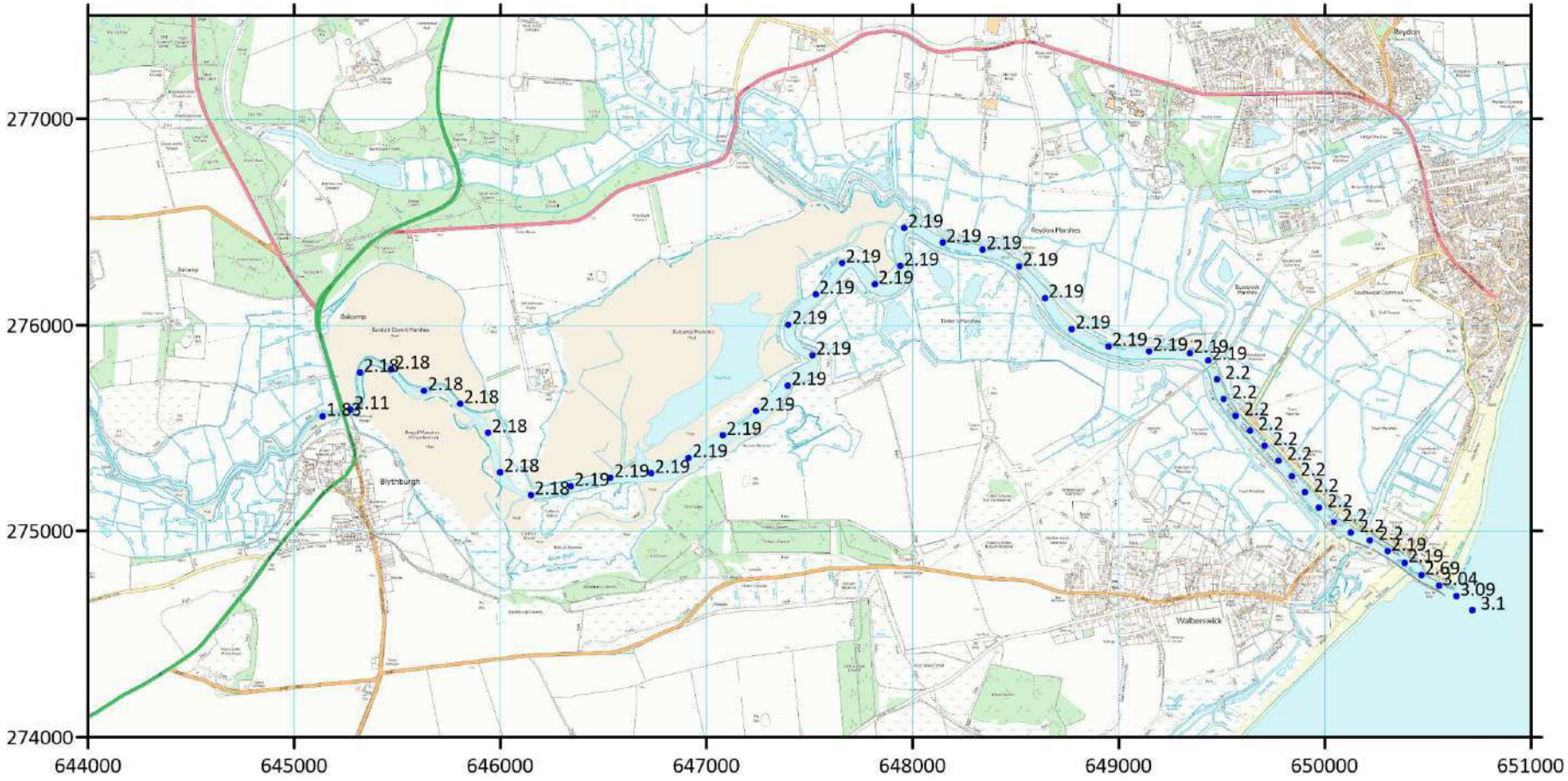
2013 event: E0 - Present-day estuary defences, marshes raised 300mm



2013 event: E0 - Present-day estuary defences, marshes raised 600mm



2013 event: E1 – Do Nothing, marshes raised 300mm

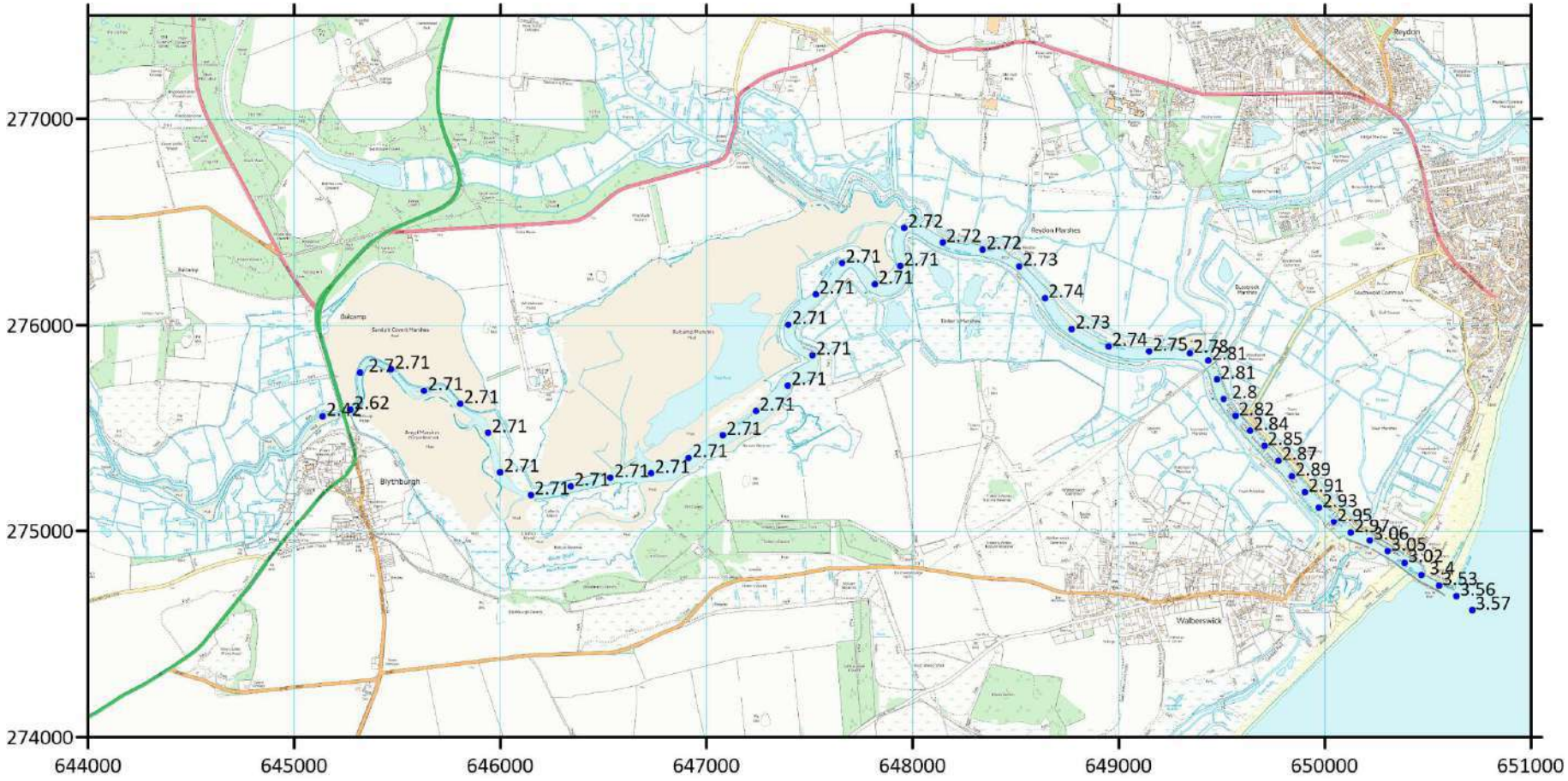


2013 event: E2 - Raise estuary defences, marshes raised 300mm

2013 event: E2 - Raise estuary defences, marshes raised 600mm

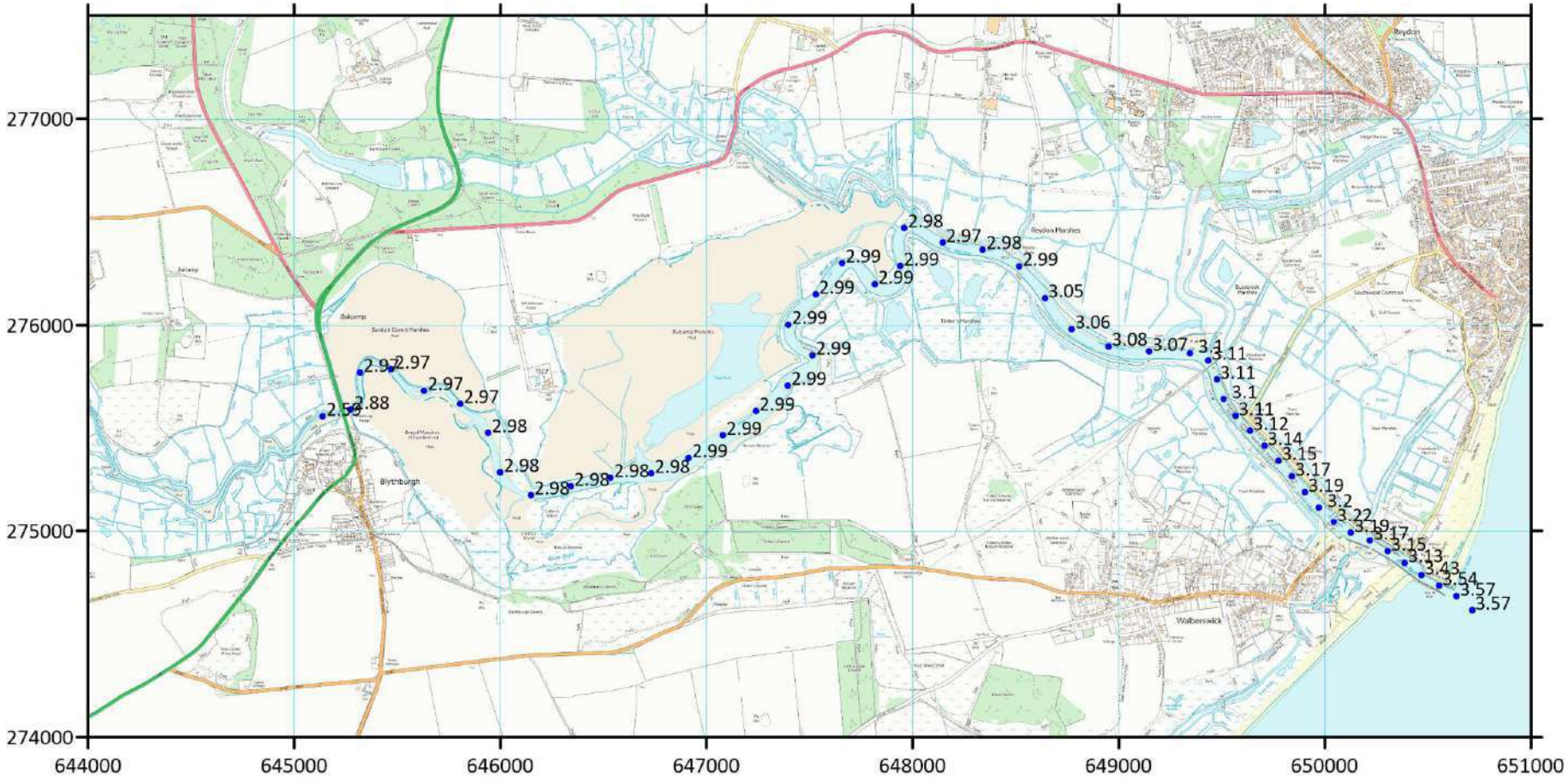
2013 event conditions in 2070
RCP8.5, 95%

2070, RCP8.5 (95%): E0 - Present-day estuary defences

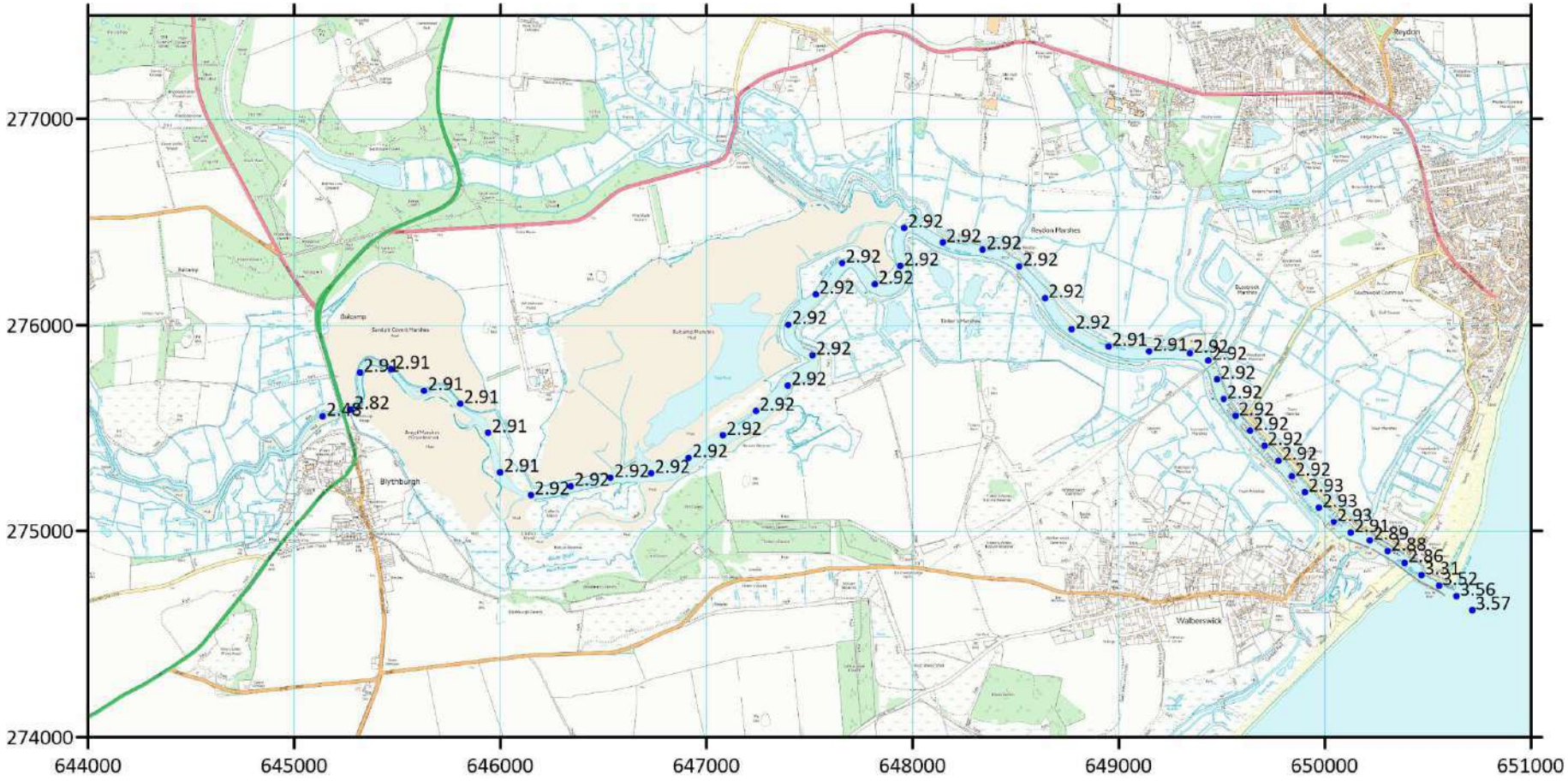


2070, RCP8.5 (95%): E1 – Do Nothing (All embankments failed)

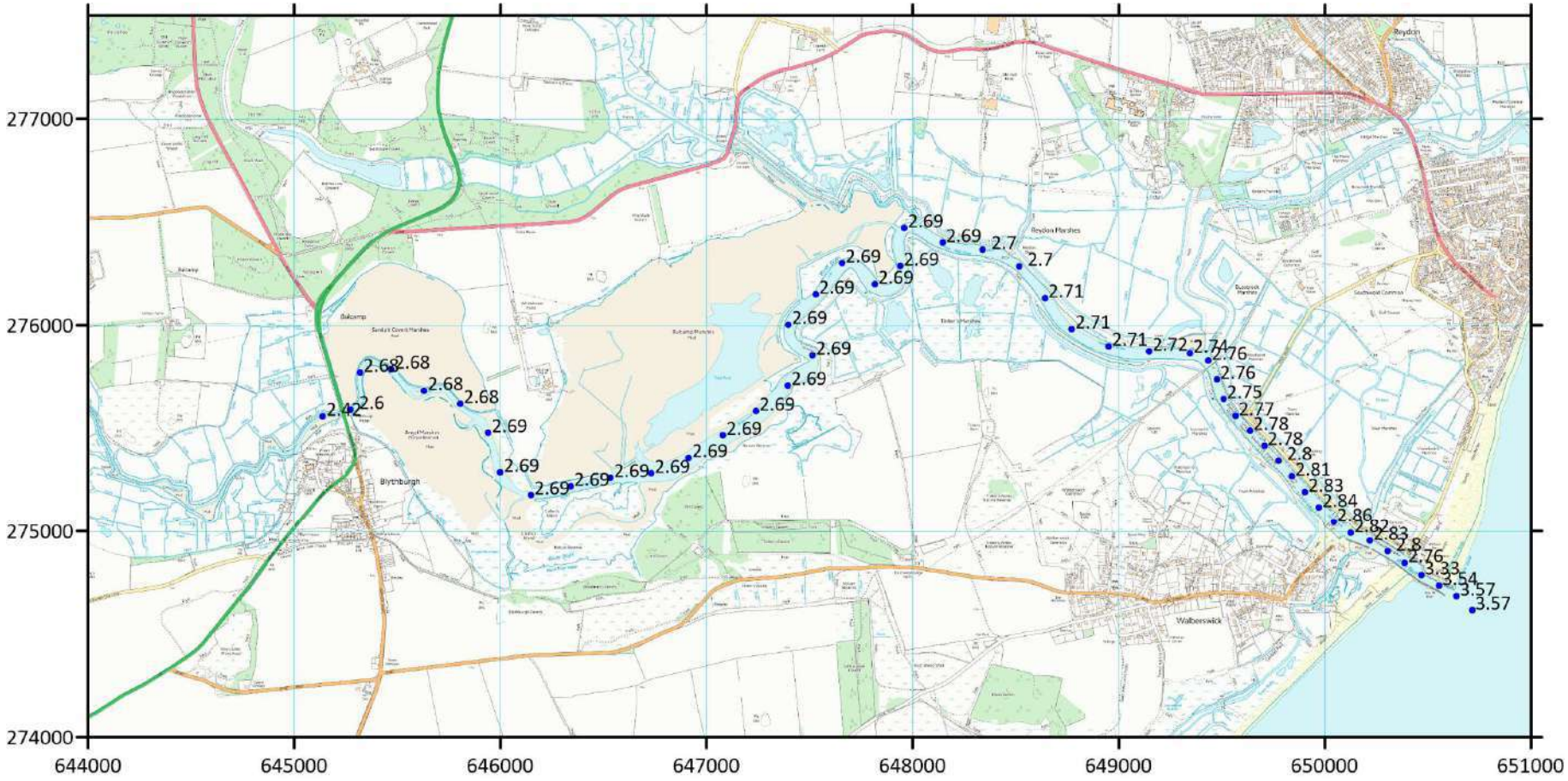
2070, RCP8.5 (95%): E2 - Raise estuary defences



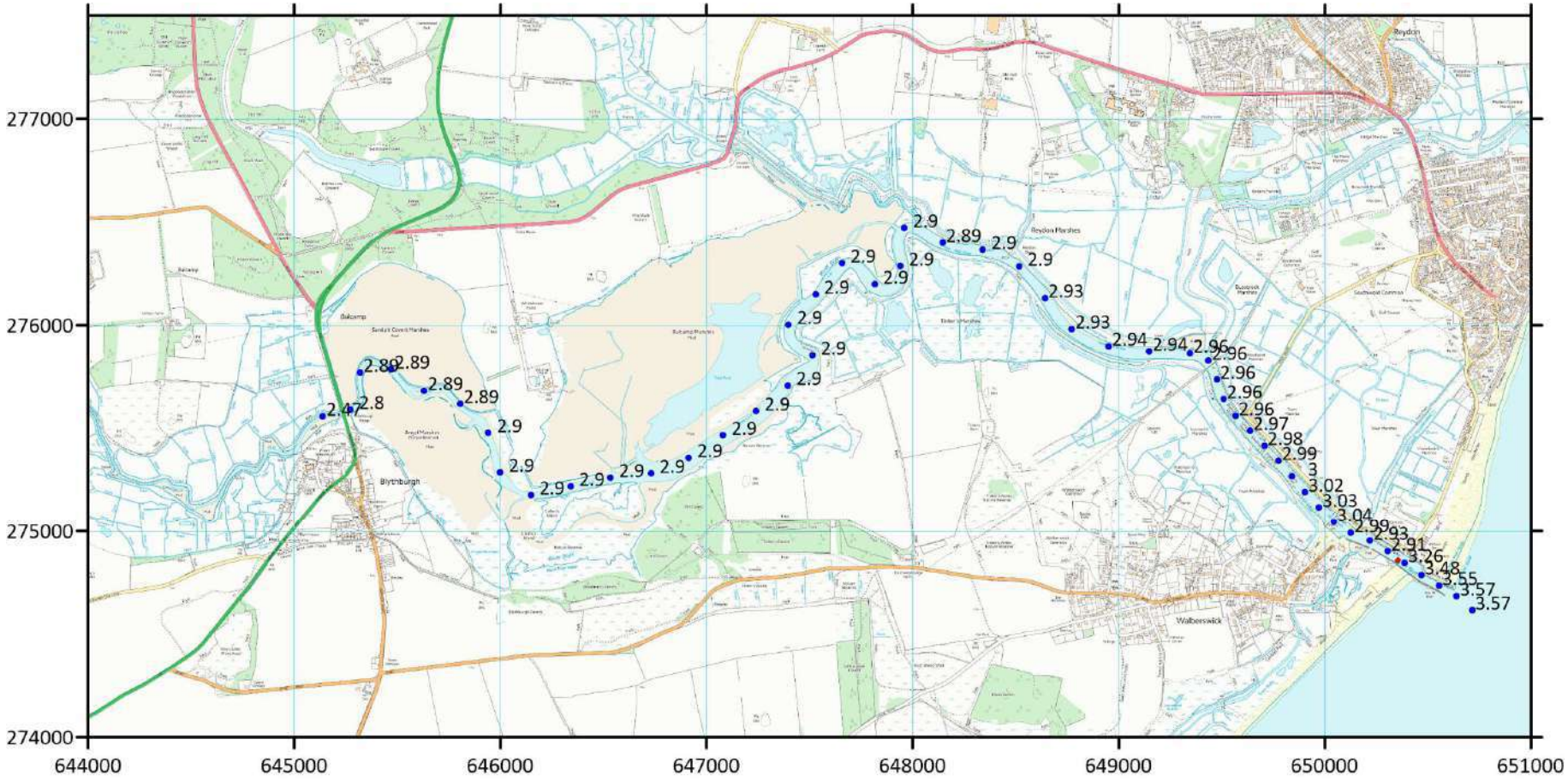
2070, RCP8.5 (95%): E3 – SMP Policy (Raise N banks, S banks overtopped)



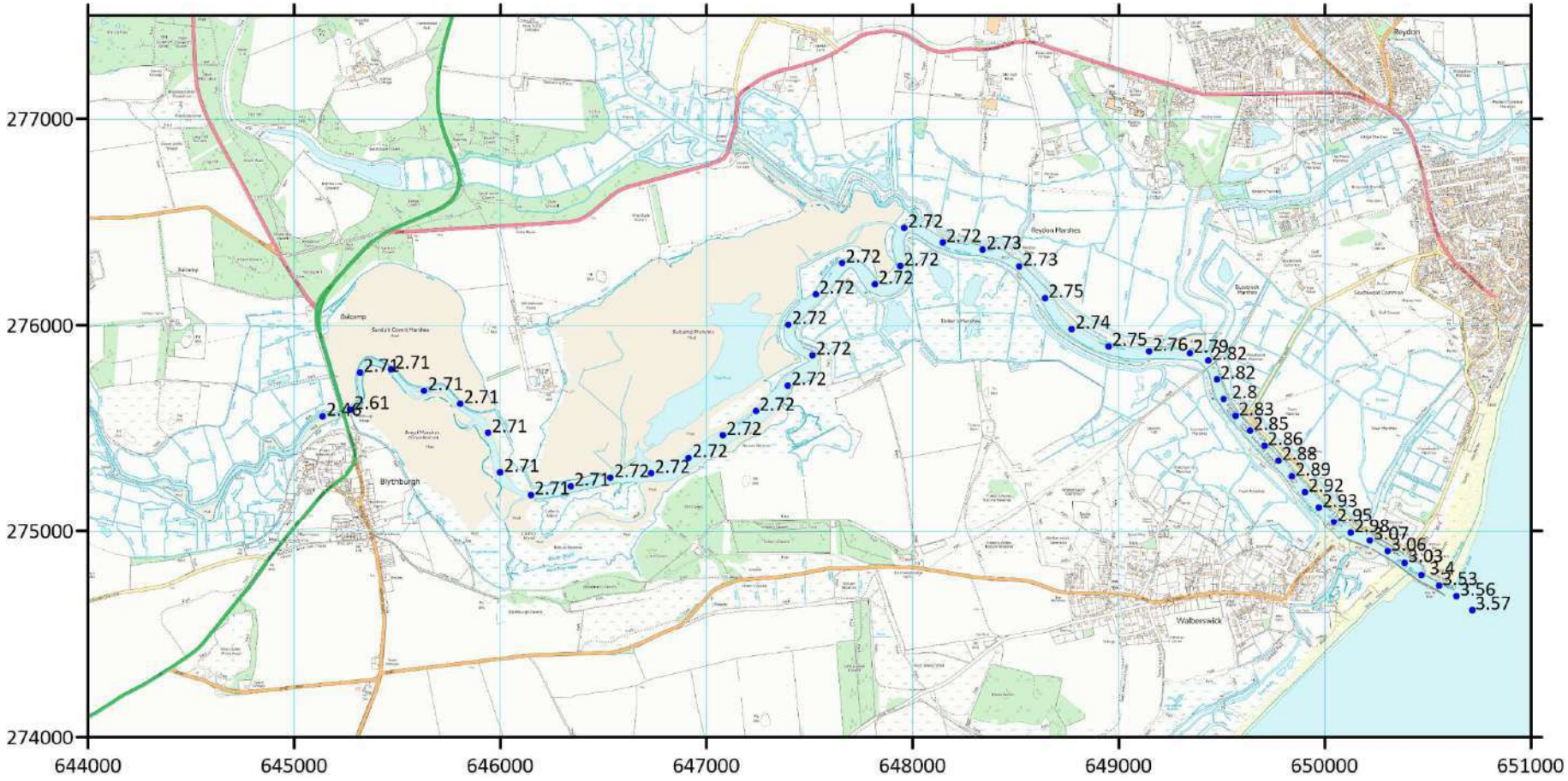
2070, RCP8.5 (95%): H1 - Present day estuary defences, short S Pier



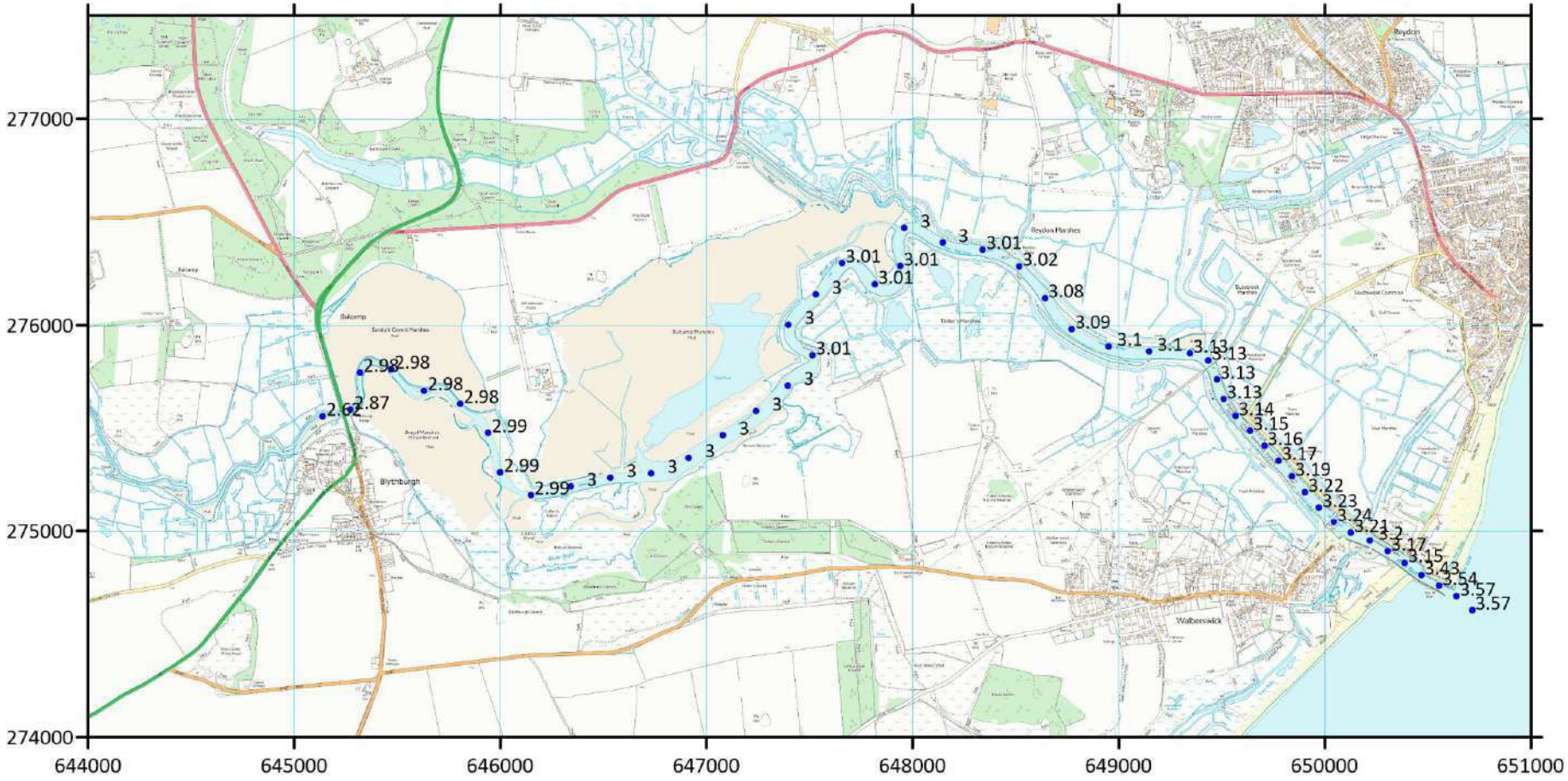
2070, RCP8.5 (95%): G6 - Raise estuary defences, narrow channel



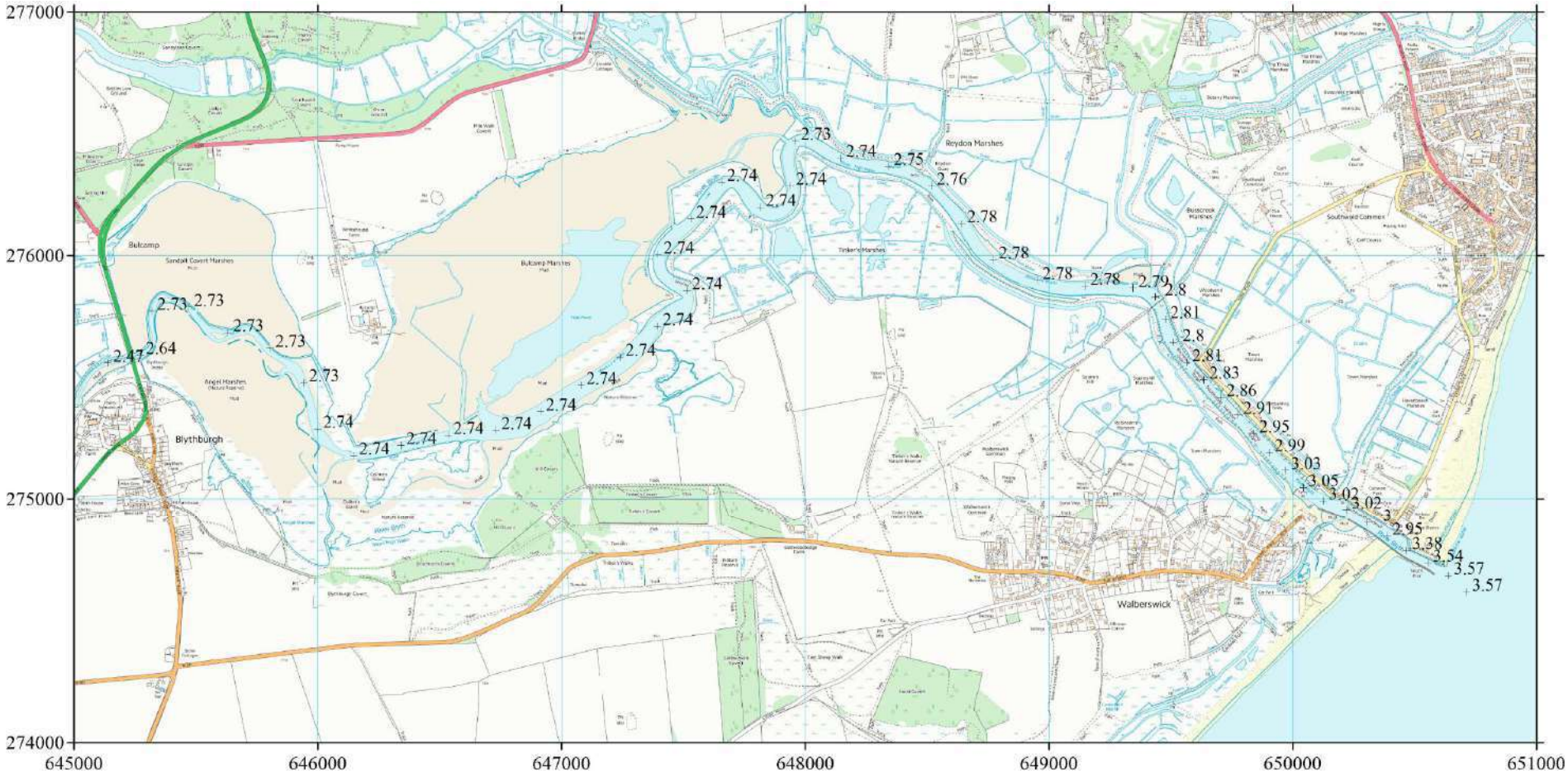
2070, RCP8.5 (95%): E0 - Present-day estuary defences, marshes raised 300mm



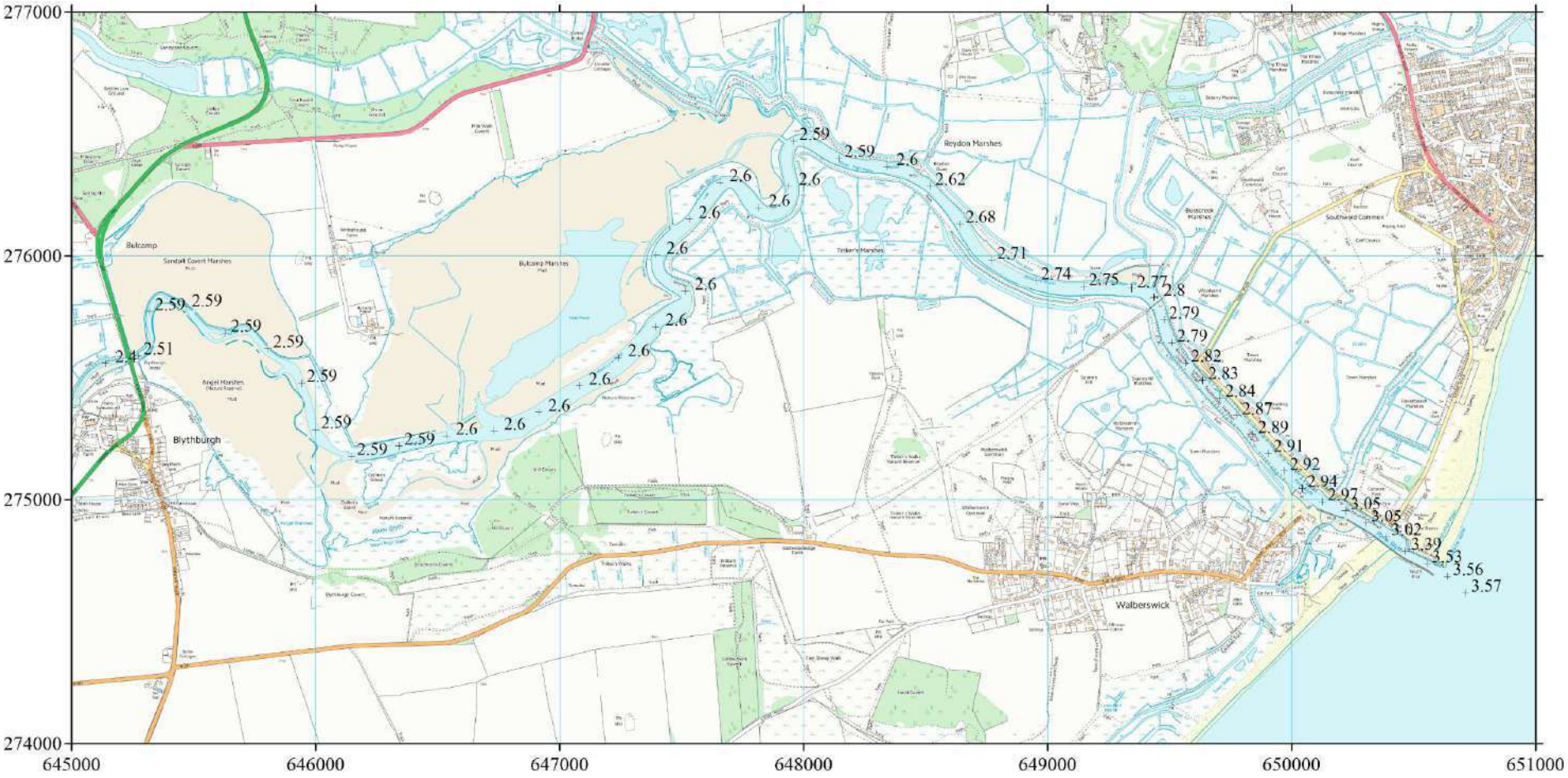
2070, RCP8.5 (95%): E2 – Raise estuary defences, marshes raised 300mm



2070 RCP8.5 (95%): S5 - Raise defences + 500m passive spillway at 2.35mOD, Walberswick dunes defended

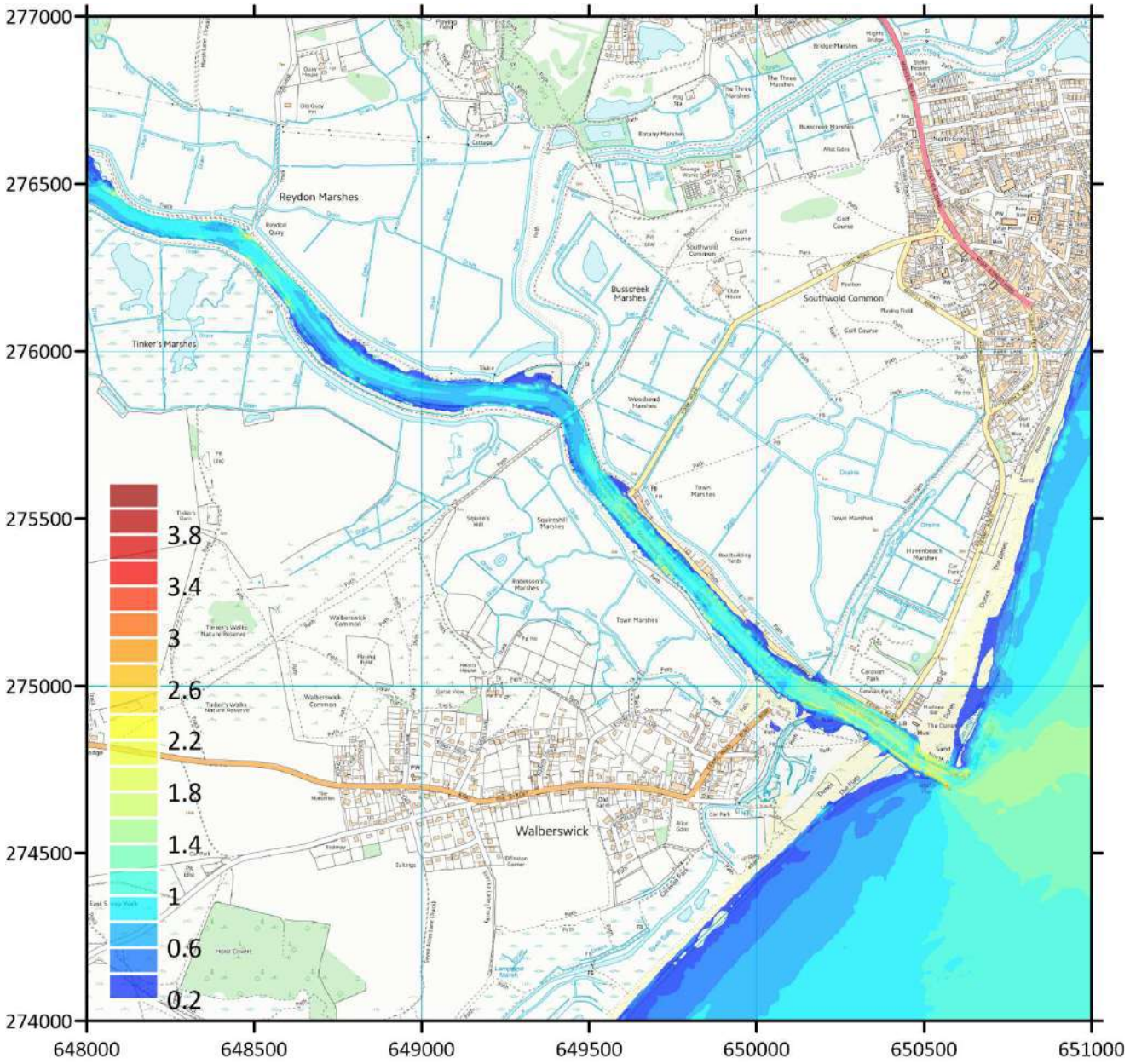


2070 RCP8.5 (95%): S12U - Raise defences + 500m passive spillway at 2.00mOD, Walberswick dunes undefended



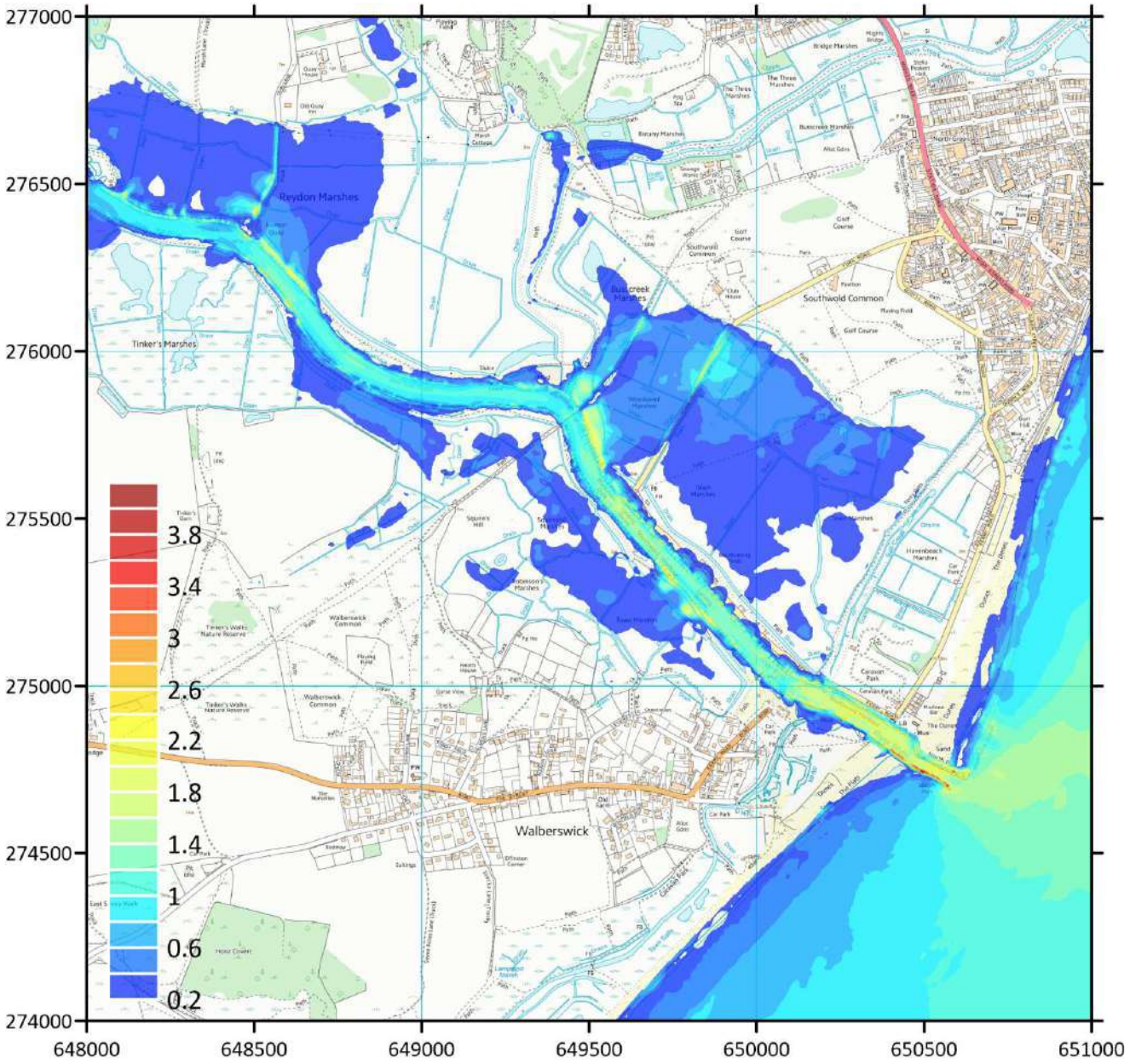
2020

2020: E0 - Present-day estuary defences



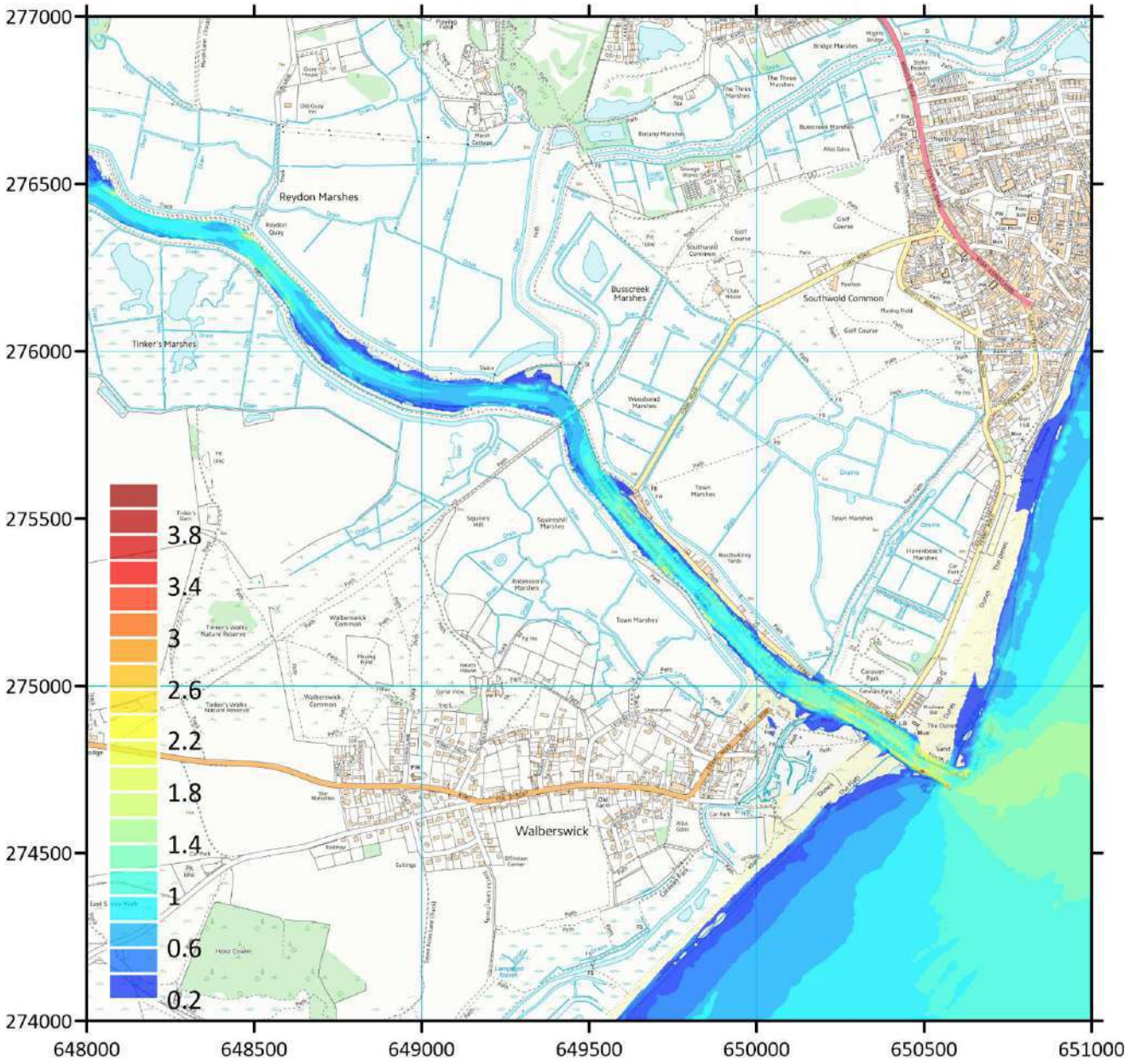
2020: E0 - Present-day estuary defences

2020: E1 – Do Nothing
All embankments failed (undefended)



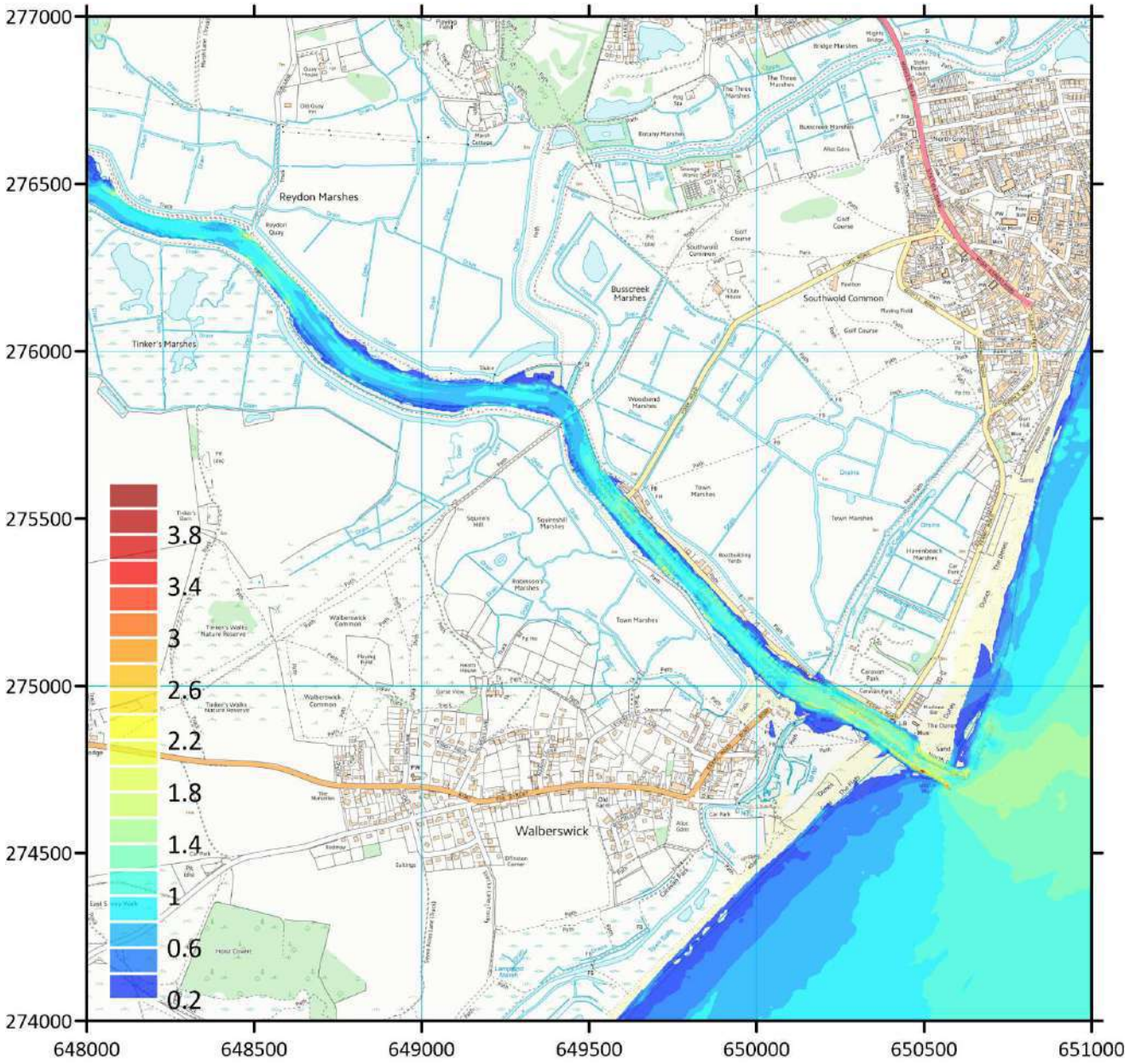
2020: E1 – Do Nothing
All embankments failed (undefended)

2020: E2 - Raise estuary defences



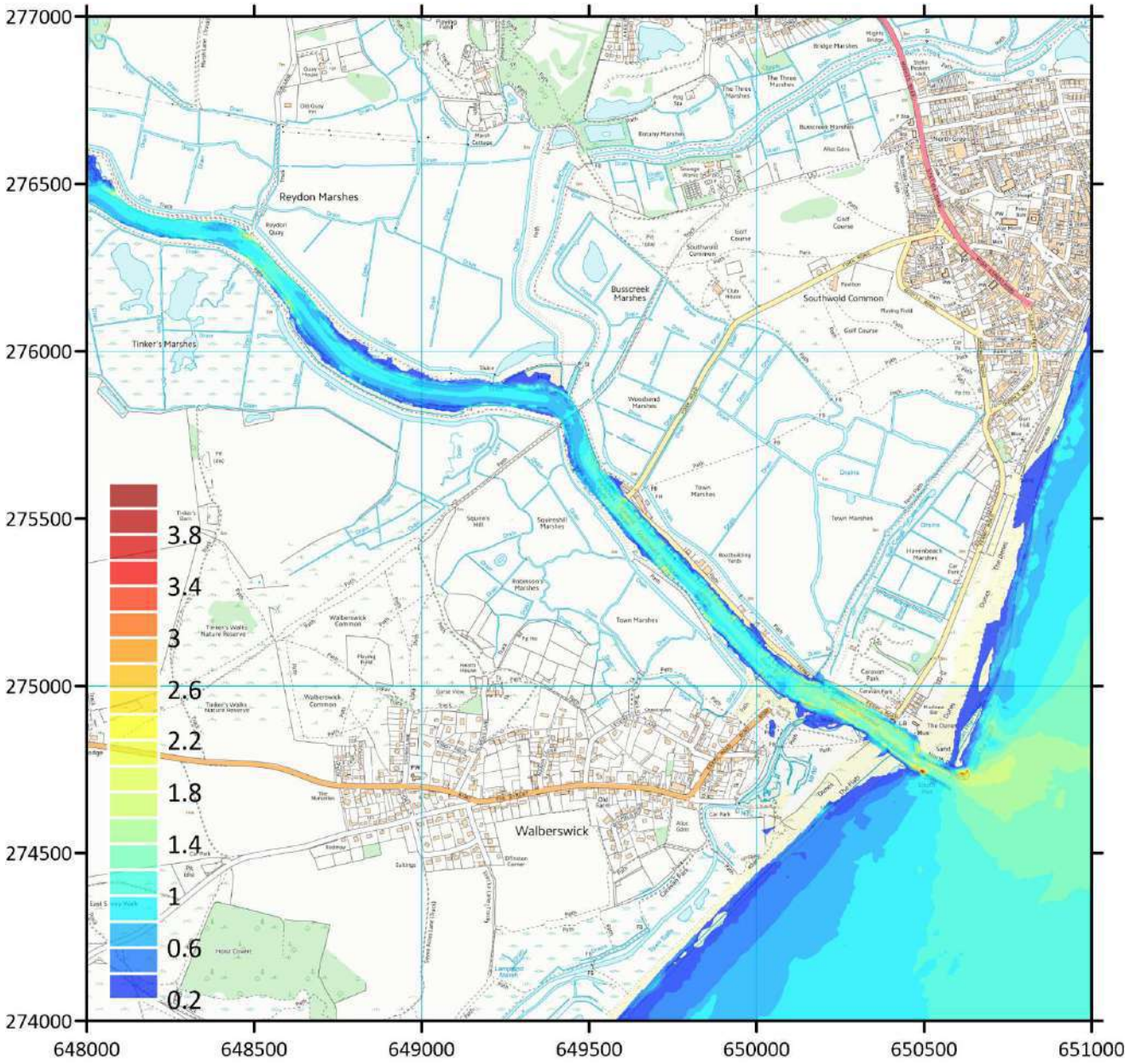
2020: E2 - Raise estuary defences

2020: E3 – SMP Policy
(Raise N banks,
S banks overtopped)



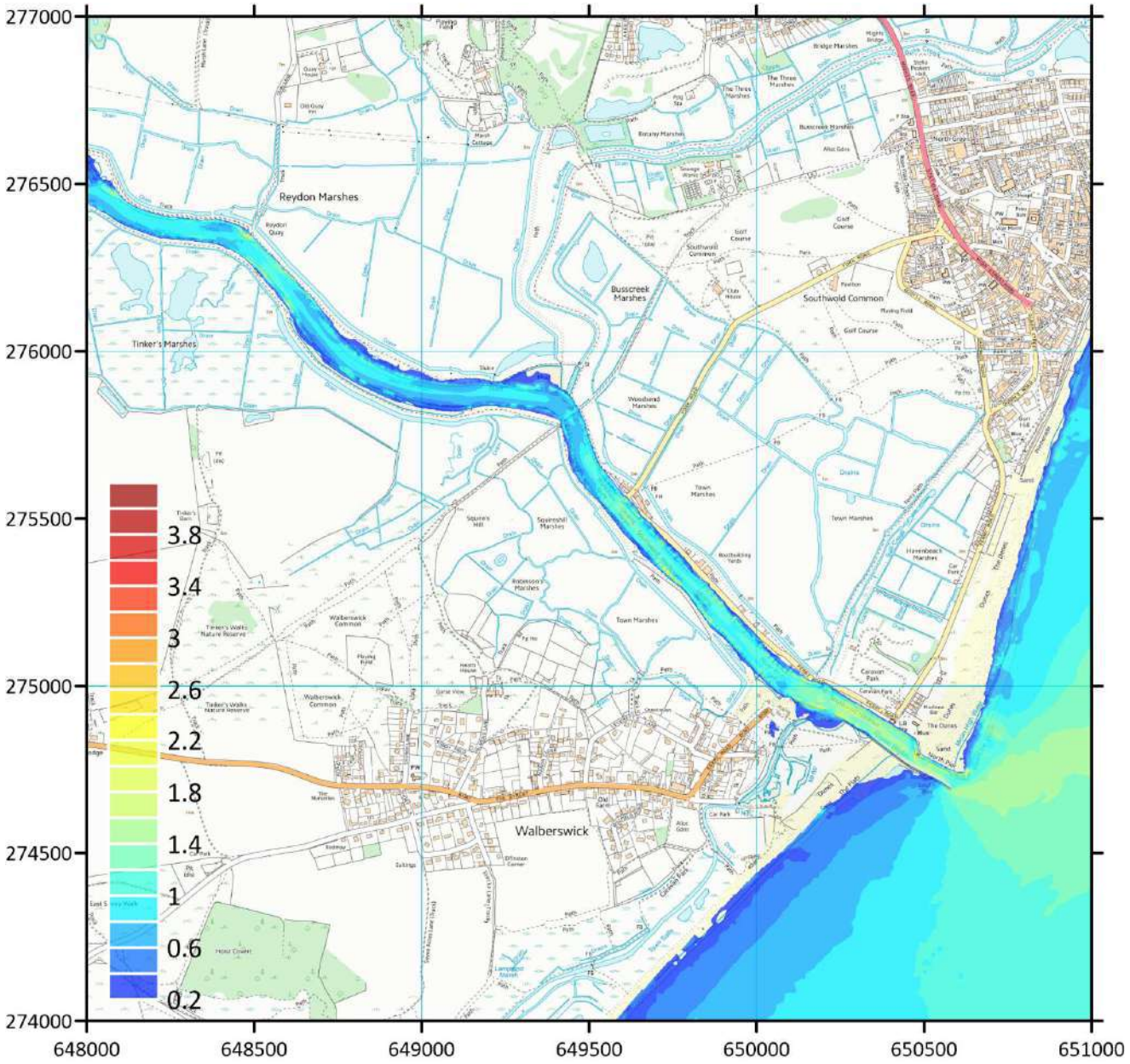
2020: E3 – SMP Policy
(Raise N banks,
S banks overtopped)

2020: H0 - Present day estuary defences, reduced S Pier



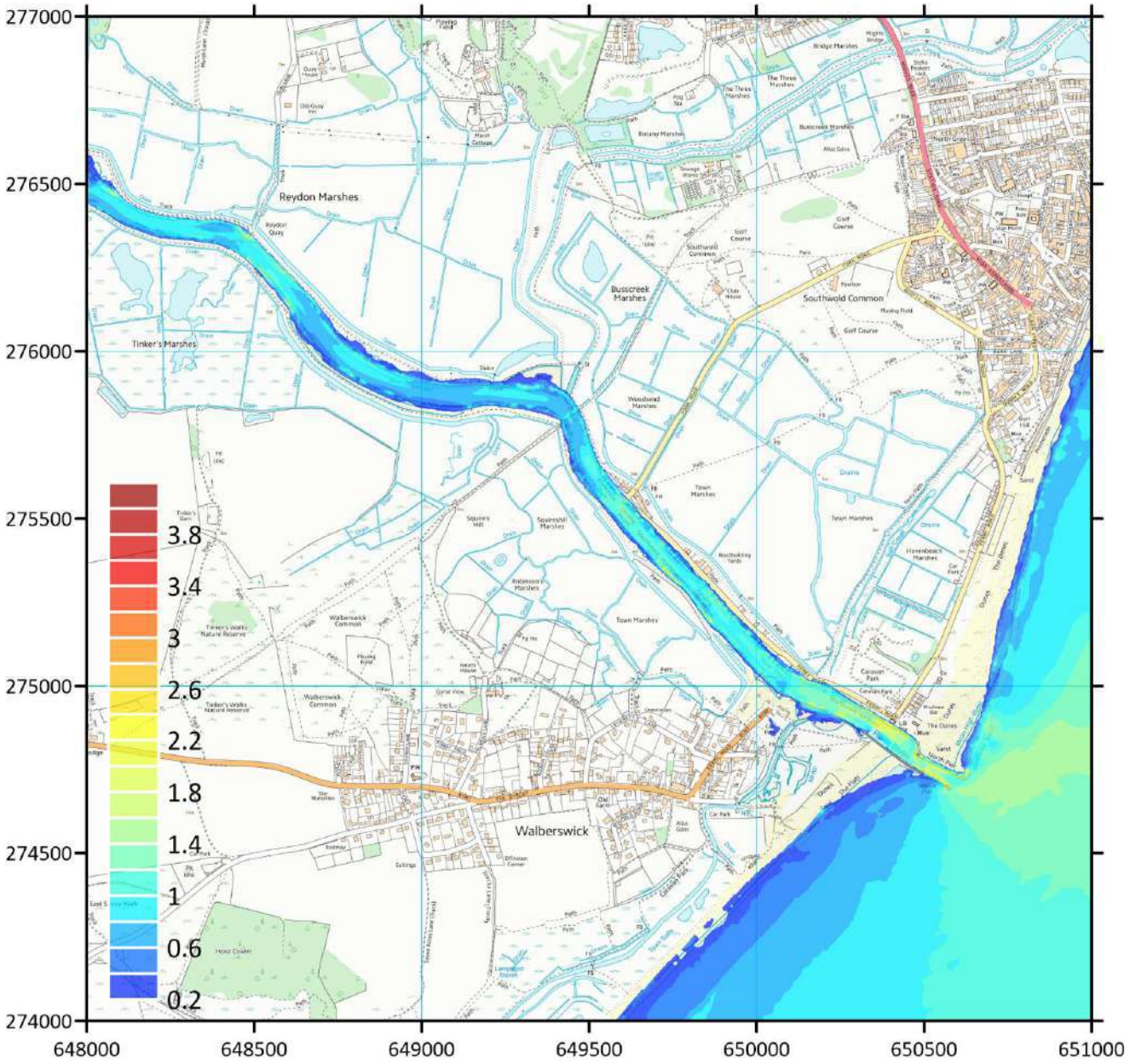
2020: H0 - Present day estuary defences, reduced S Pier

2020: F0 - Present day estuary defences, Solid S Pier



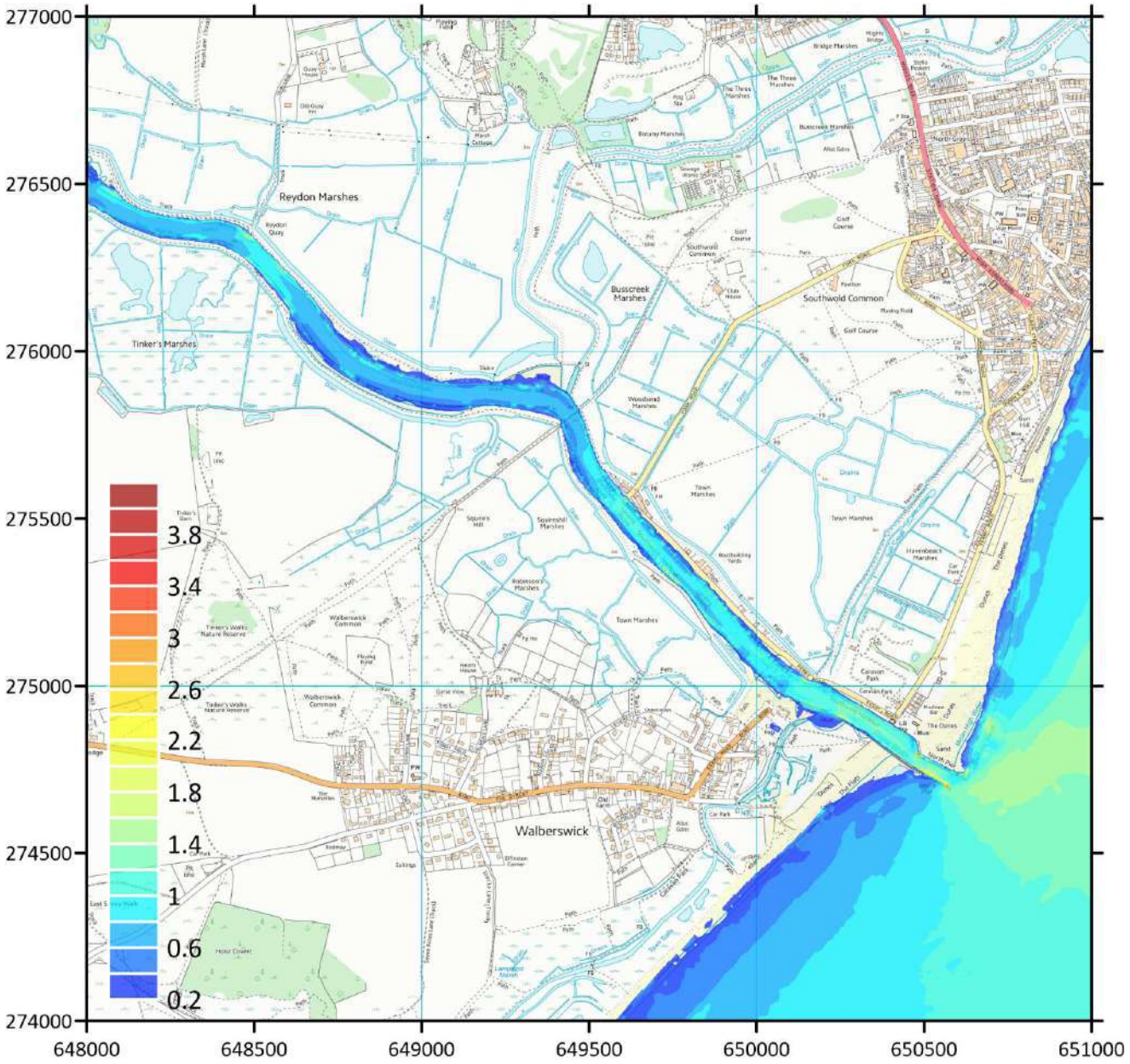
2020: F0 - Present day estuary defences, Solid S Pier

2020: G0 - Present day estuary defences, Narrow channel



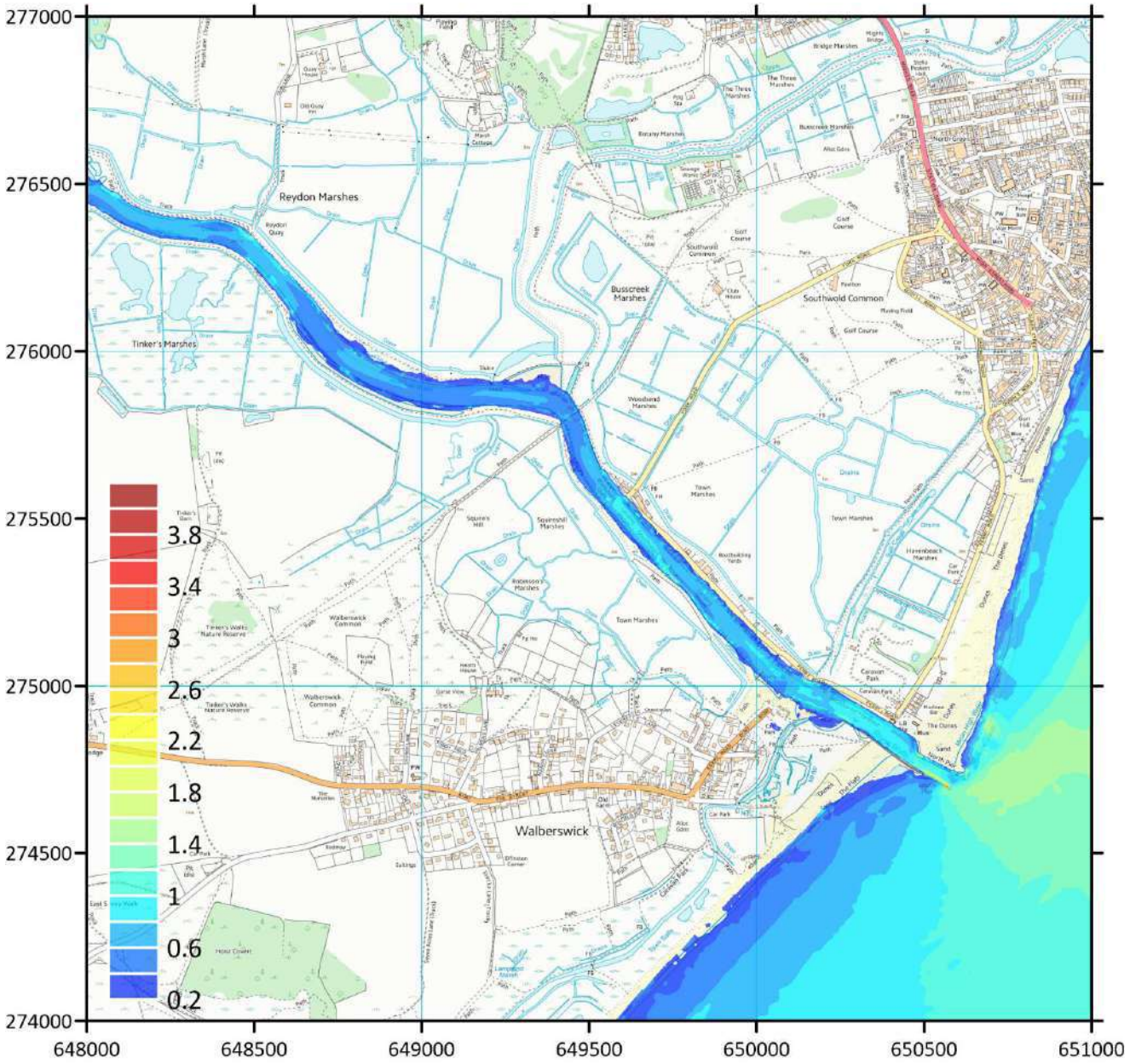
2020: G0 - Present day estuary defences, Narrow Channel

2020: E0 – Present-day estuary defences, marshes raised 300mm



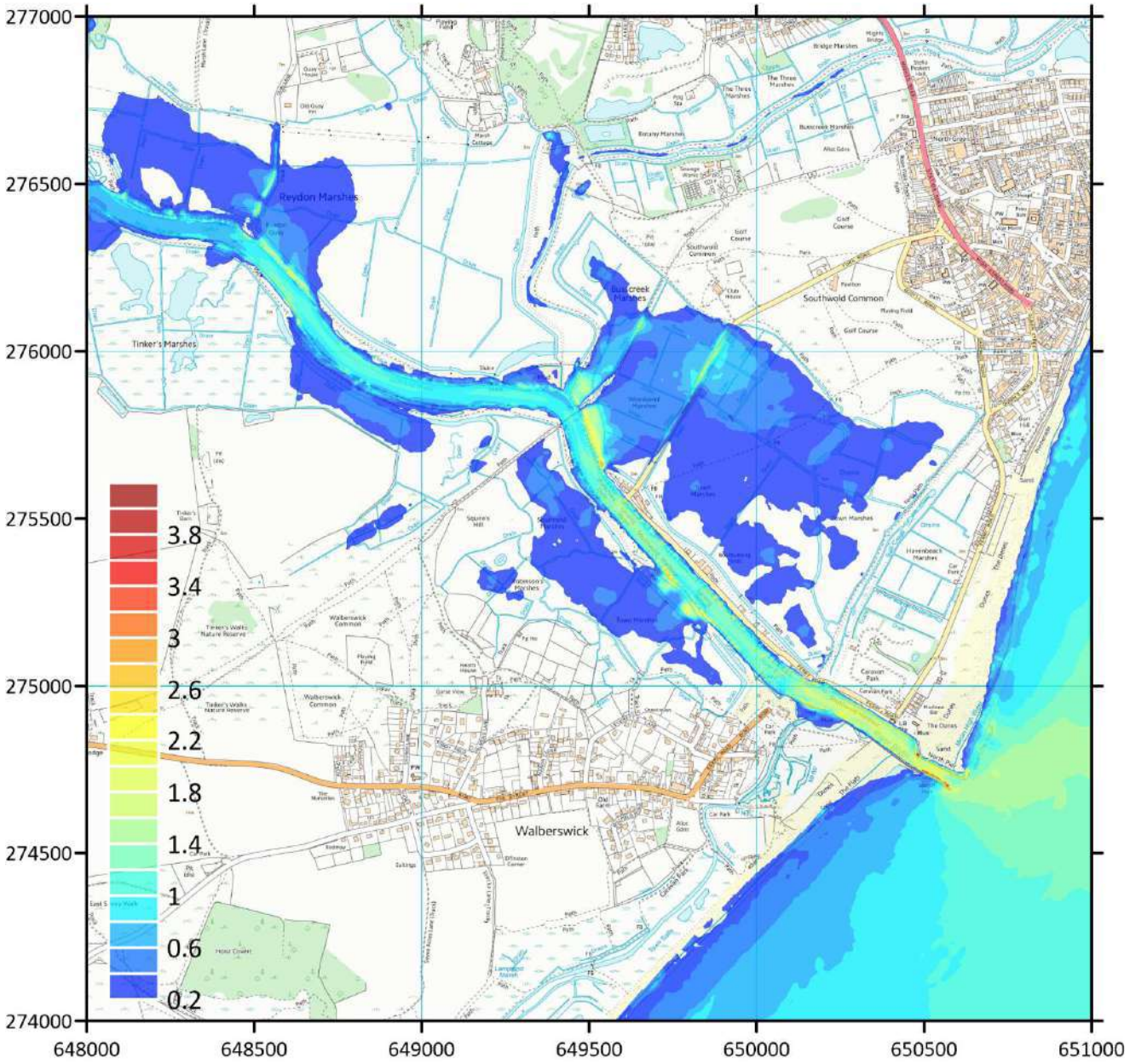
2020: E0 – Present-day estuary defences, marshes raised 300mm

2020: E0 – Present-day estuary defences, marshes raised 600mm



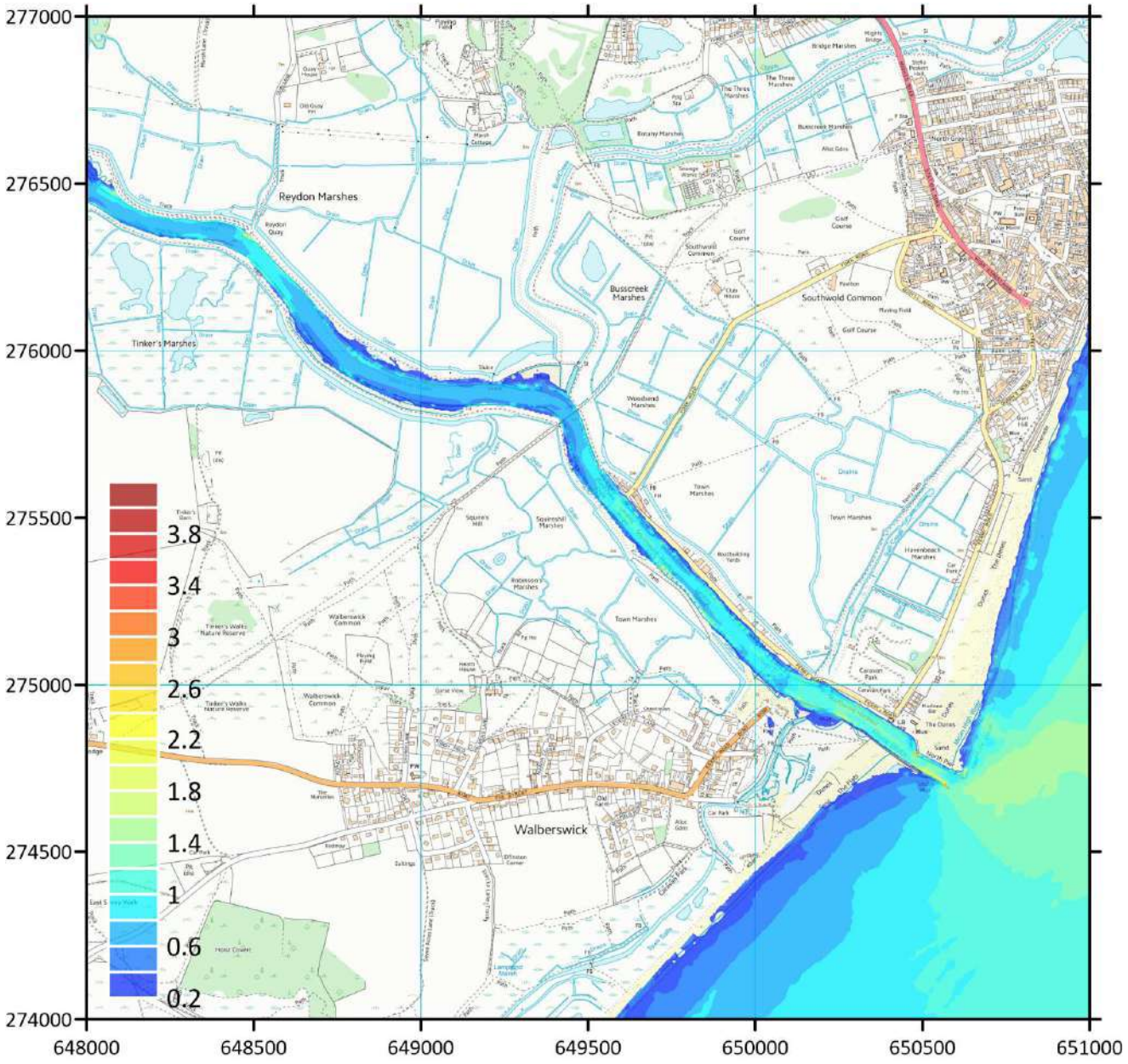
2020: E0 – Present-day estuary defences, marshes raised 600mm

2020: E1 – Do Nothing, all embankments failed (undefended), marshes raised 300mm



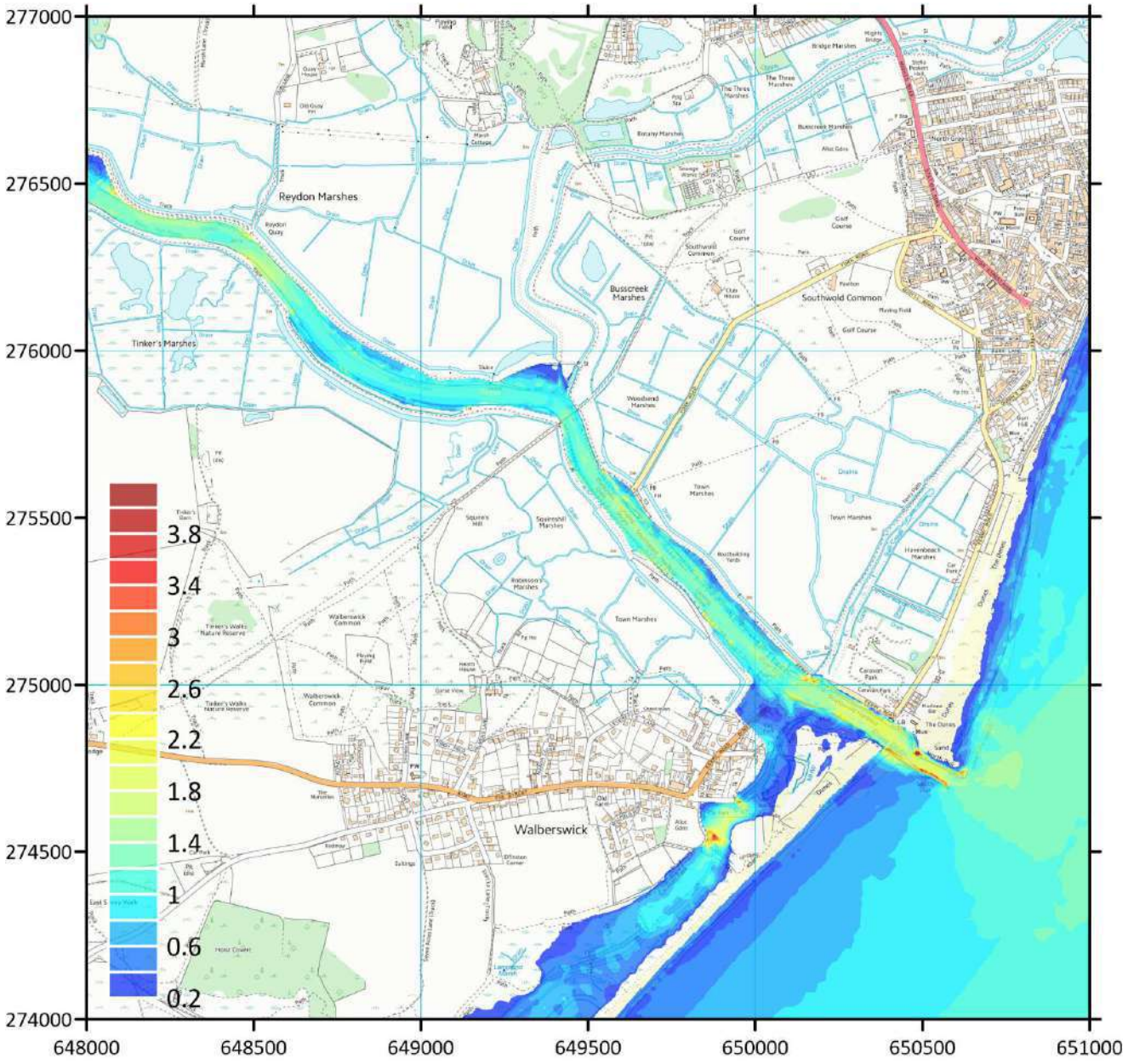
2020: E1 – Do Nothing, all embankments failed (undefended), marshes raised 300mm

2020: E2 - Raise estuary defences, marshes raised 300mm



2020: E2 - Raise estuary defences, marshes raised 300mm

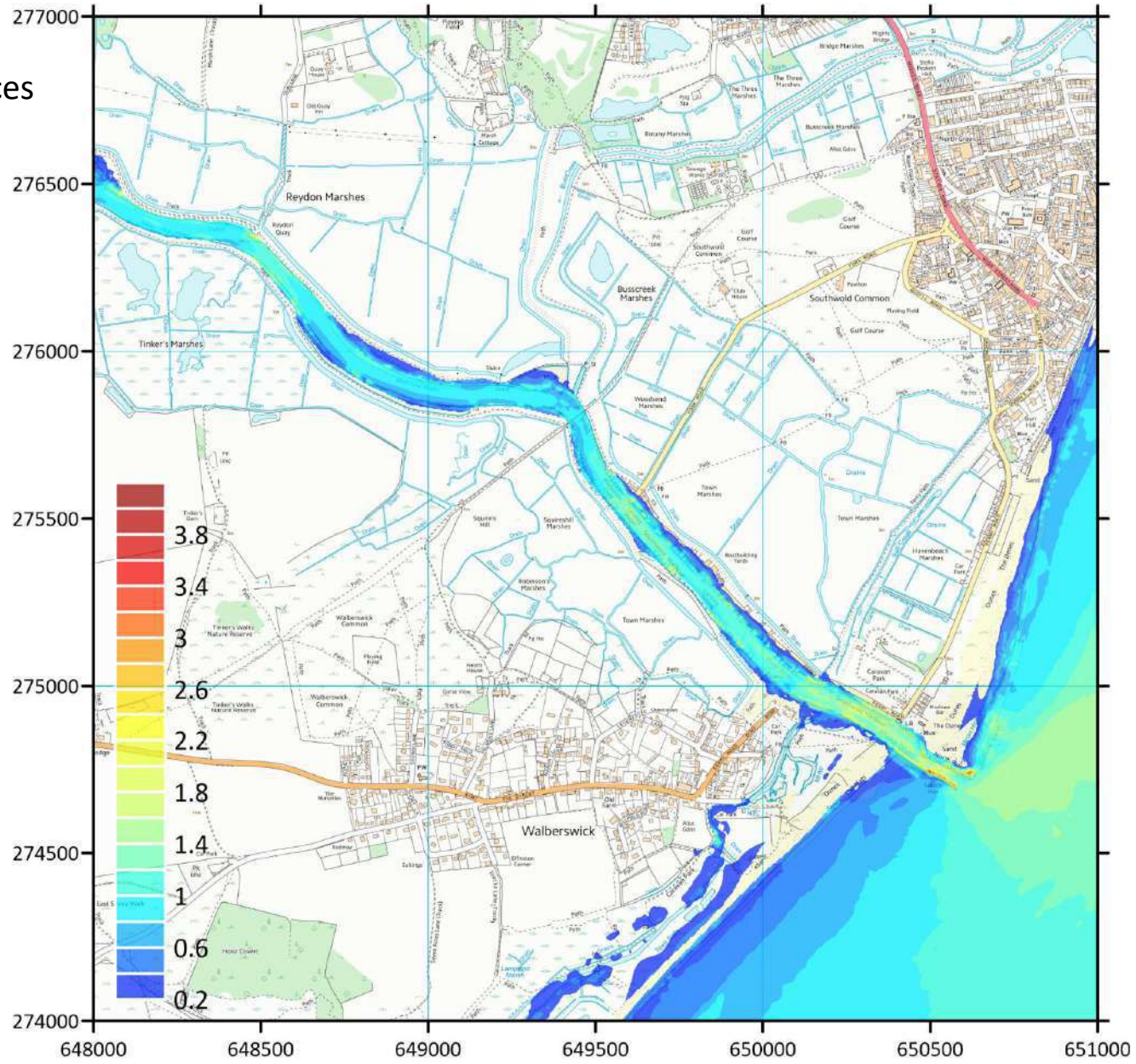
2020: E2 - Raise estuary defences, marshes raised 600mm



2020: E2 - Raise estuary defences, marshes raised 600mm

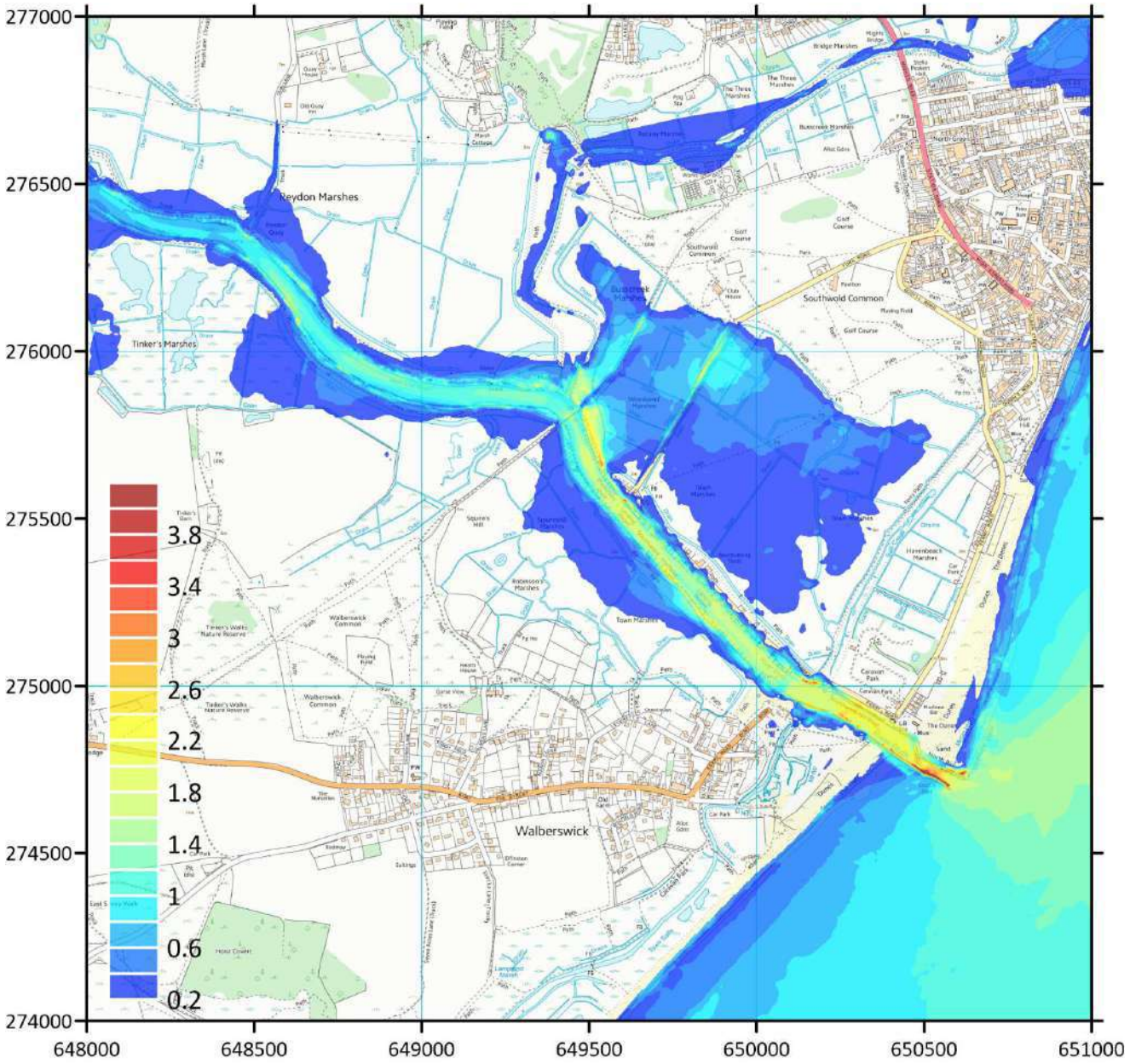
2020 conditions in 2070
RCP2.6, 50%

2070 RCP2.6 (50%):
E0 – Present day defences



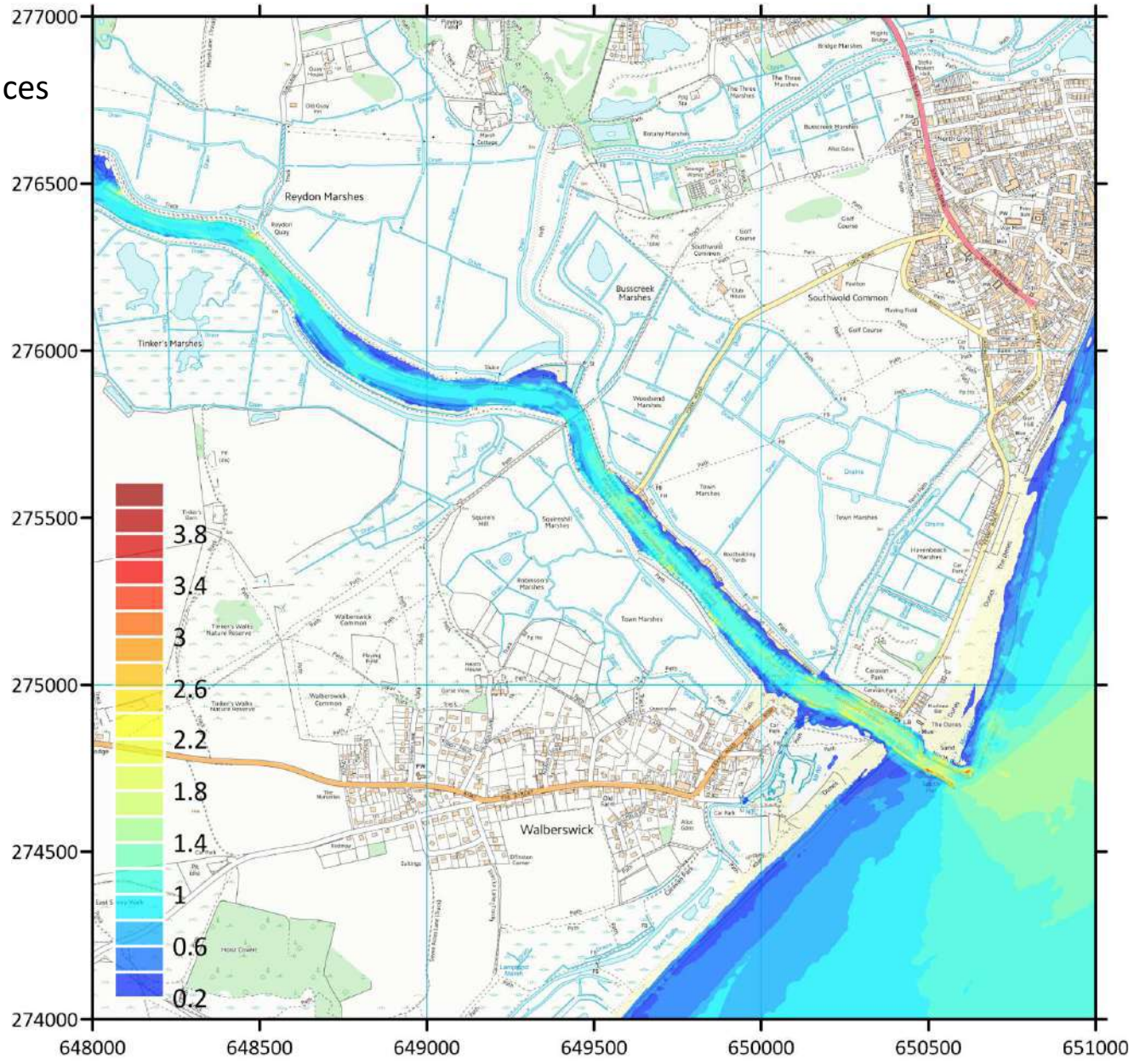
2070 RCP2.6 (50%):
E0 – Present day defences

2070 RCP2.6 (50%):
E1 – Do Nothing
All embankments failed (undefended)



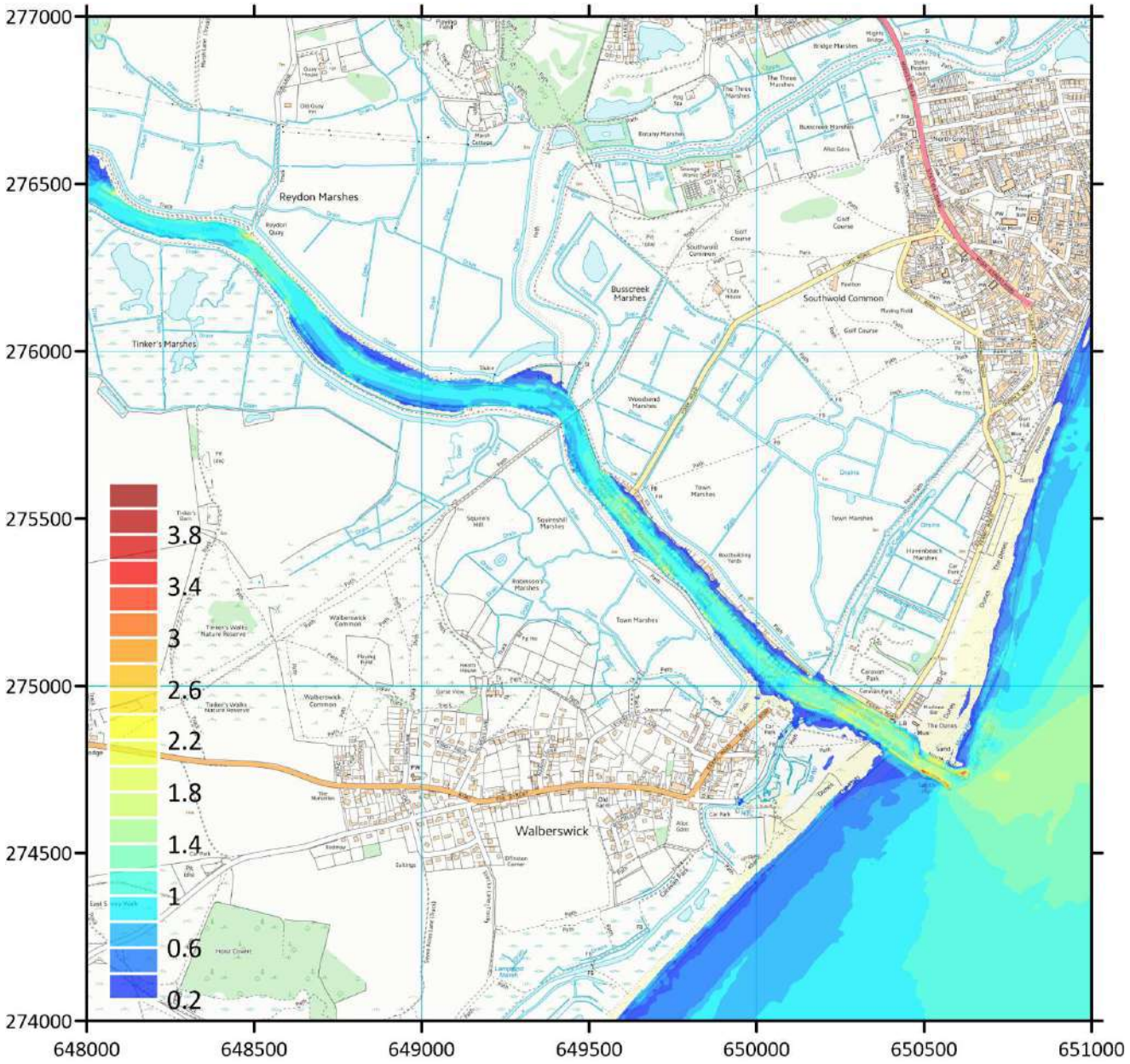
2070 RCP2.6 (50%):
E1 – Do Nothing
All embankments failed (undefended)

2070 RCP2.6 (50%):
E2 - Raise estuary defences



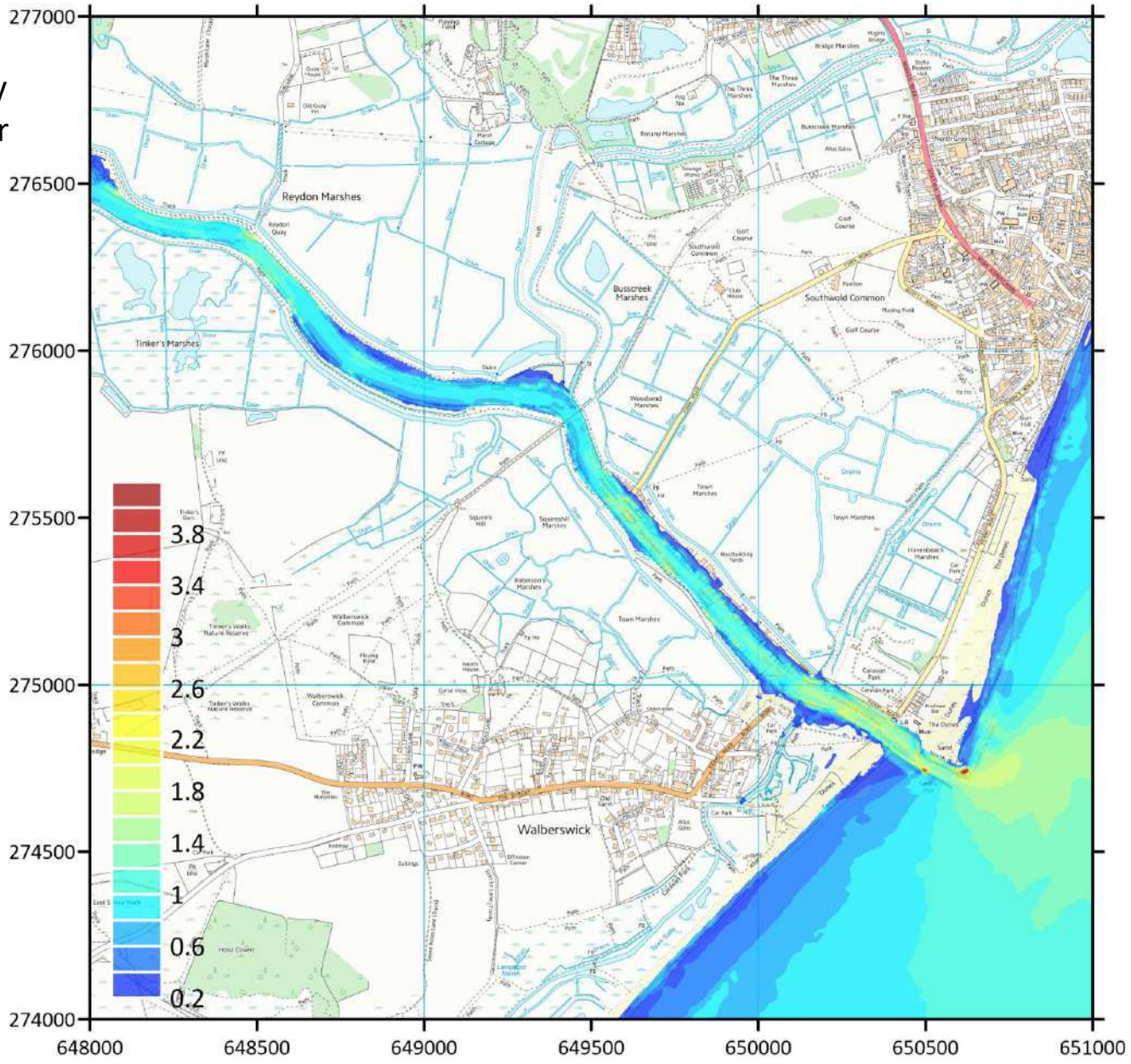
2070 RCP2.6 (50%):
E2 - Raise estuary defences

2070 RCP2.6 (50%):
E3 – SMP Policy
Raise N banks,
S banks overtopped



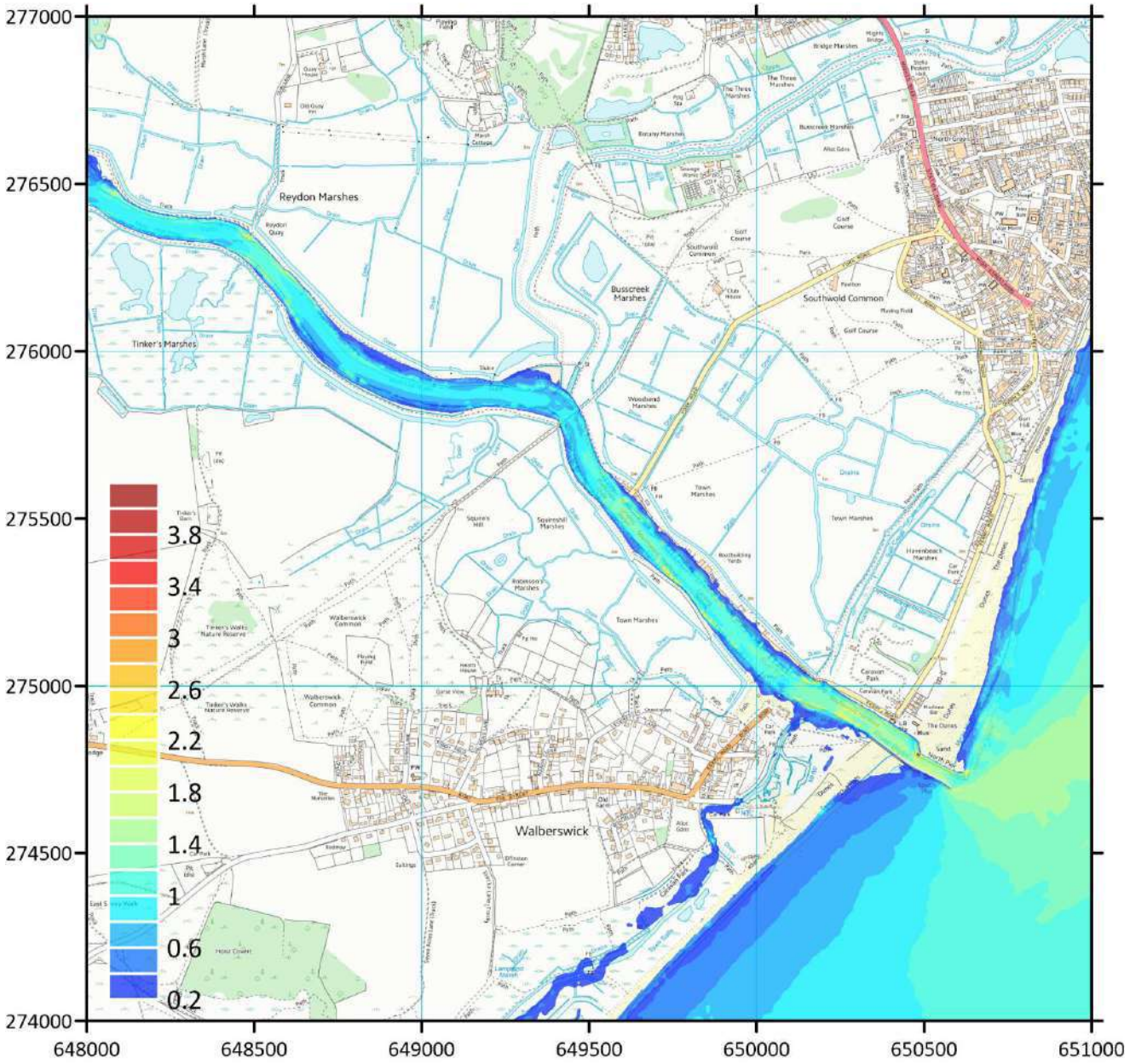
2070 RCP2.6 (50%):
E3 – SMP Policy
Raise N banks,
S banks overtopped

2070 RCP2.6 (50%):
H0 - Present day estuary defences, reduced S Pier



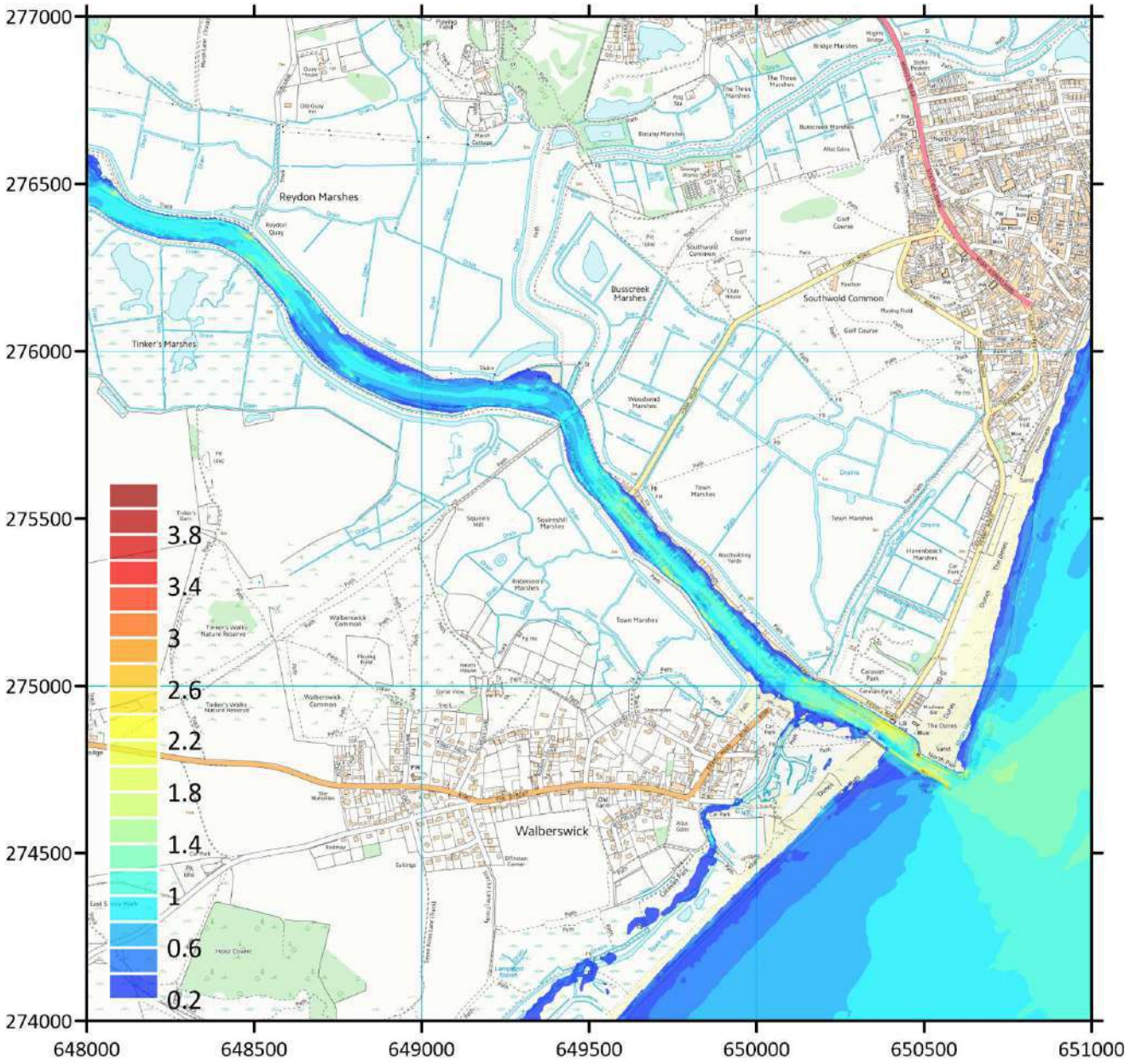
2070 RCP2.6 (50%):
H0 - Present day estuary defences, reduced S Pier

2070 RCP2.6 (50%):
F0 - Present day estuary defences, Solid S Pier



2070 RCP2.6 (50%):
F0 - Present day estuary defences, Solid S Pier

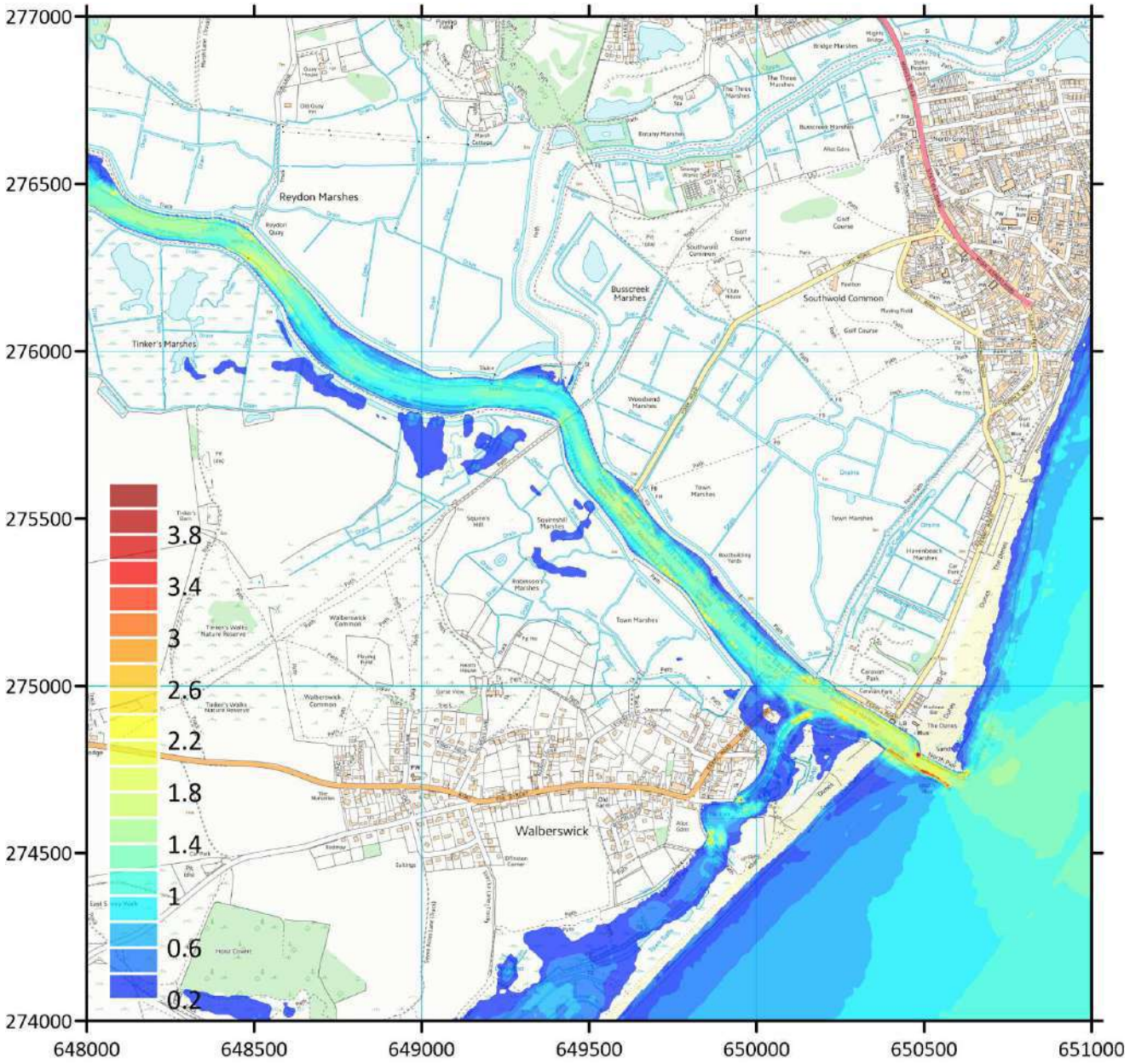
2070 RCP2.6 (50%): G0 - Present day estuary defences, Narrow channel



2070 RCP2.6 (50%): G0 - Present day estuary defences, Narrow Channel

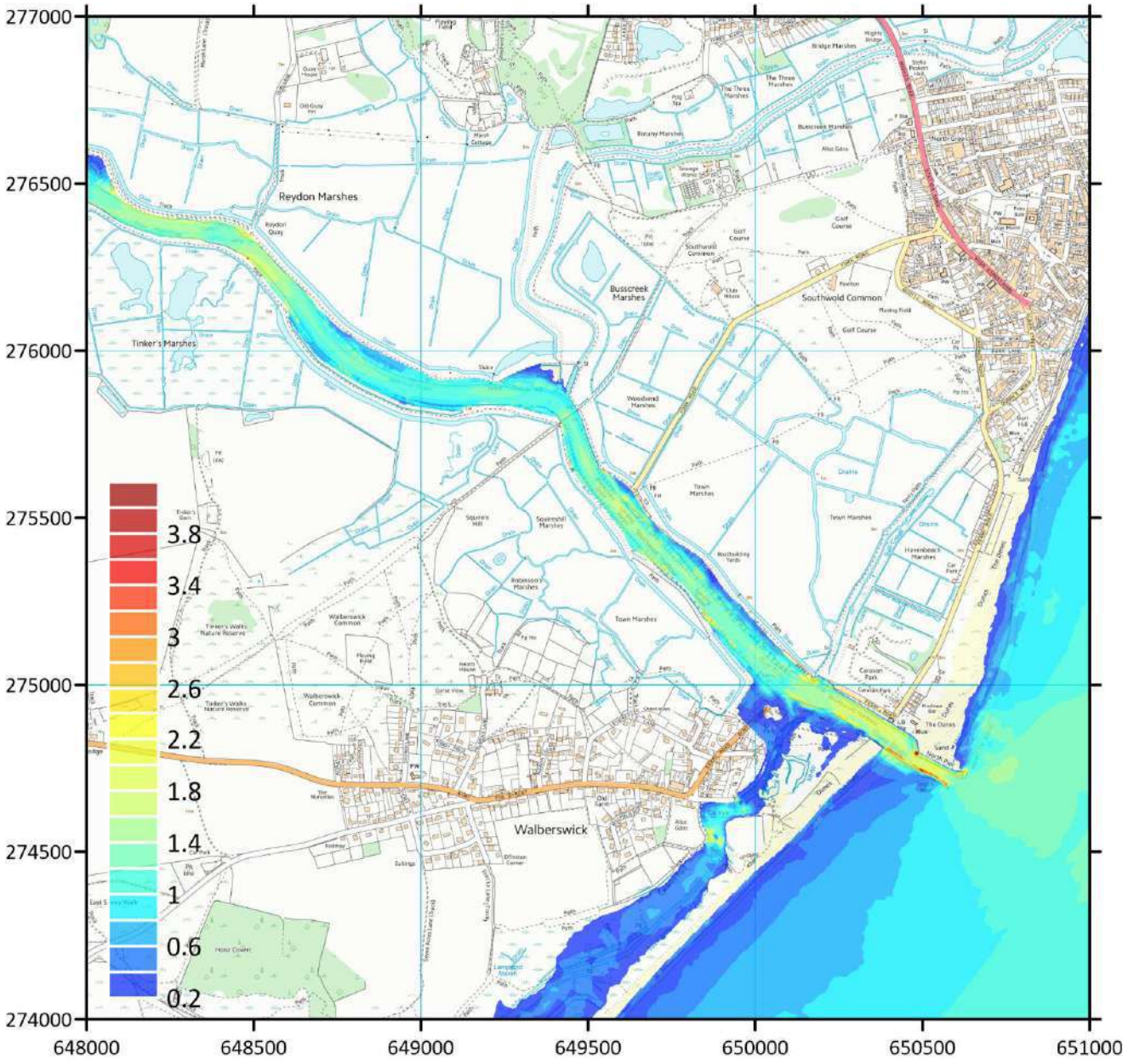
2.7m Sea Level
(2013 event conditions -0.4m)

2013 event -0.4m:
E0 - Present-day estuary defences



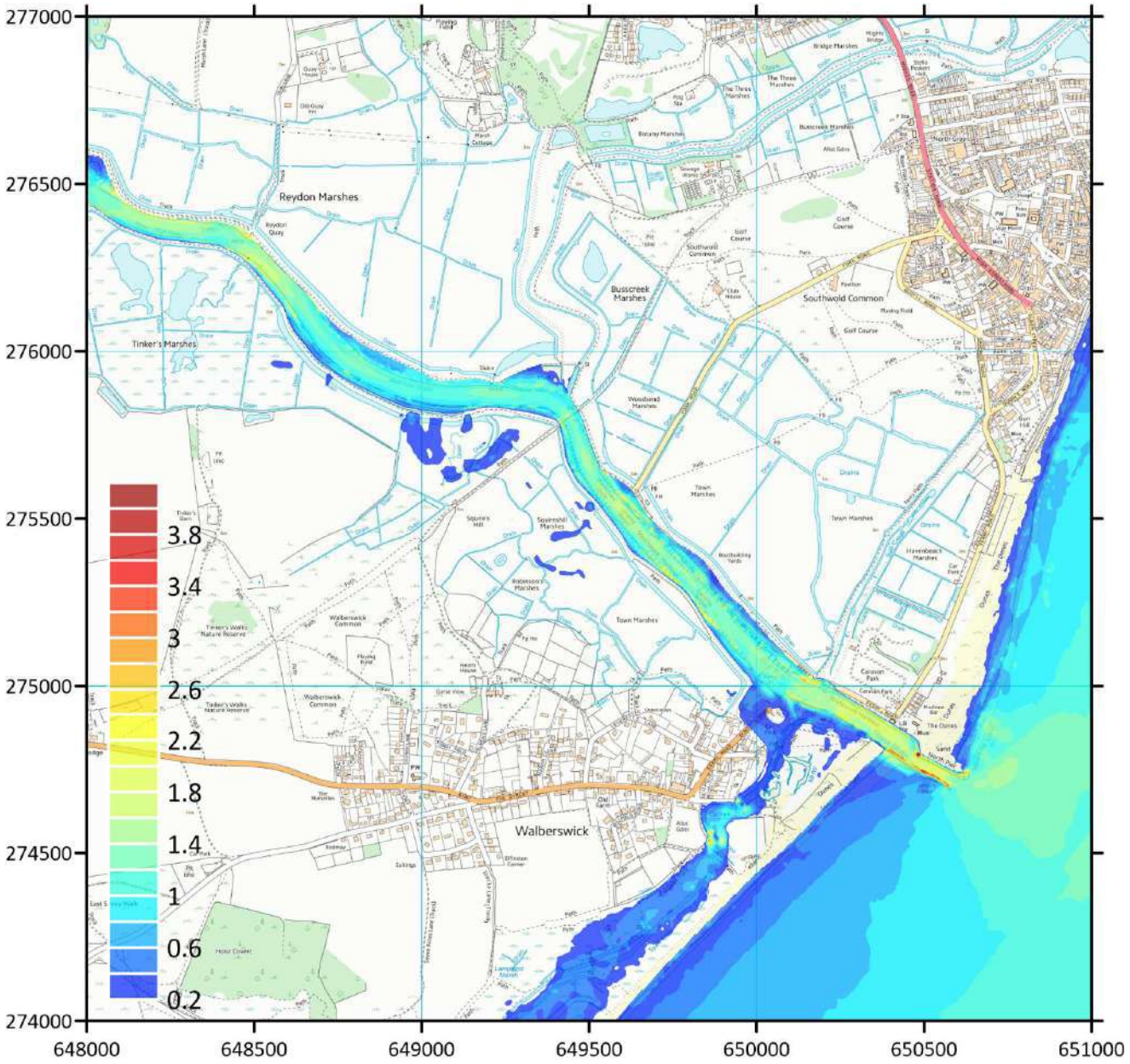
2013 event -0.4m:
E0 - Present-day estuary defences

2013 event -0.4m:
E2 - Raise estuary defences



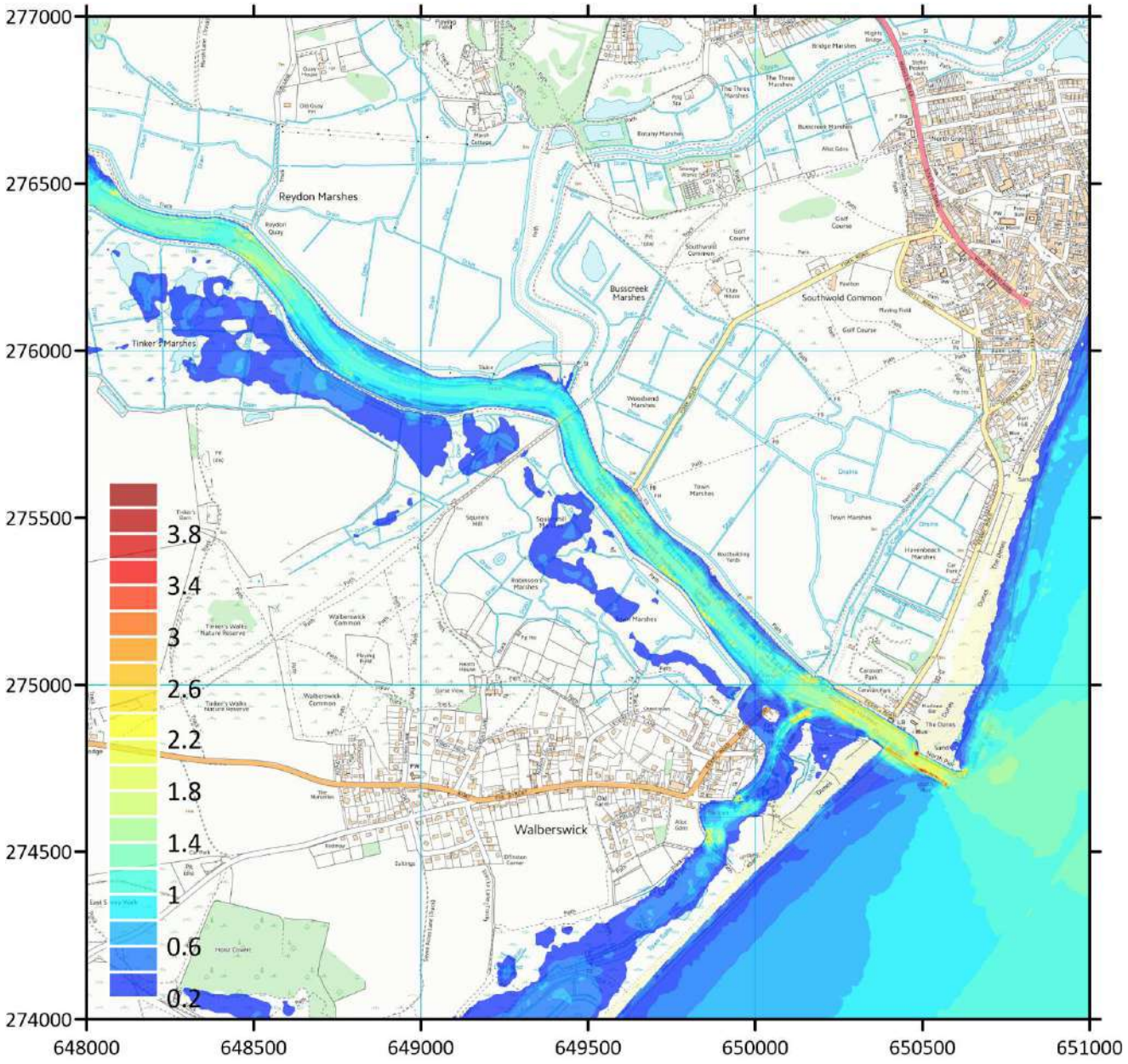
2013 event -0.4m:
E2 - Raise estuary defences

2013 event -0.4m:
E3 – SMP Policy
(Raise N banks,
S banks overtopped)



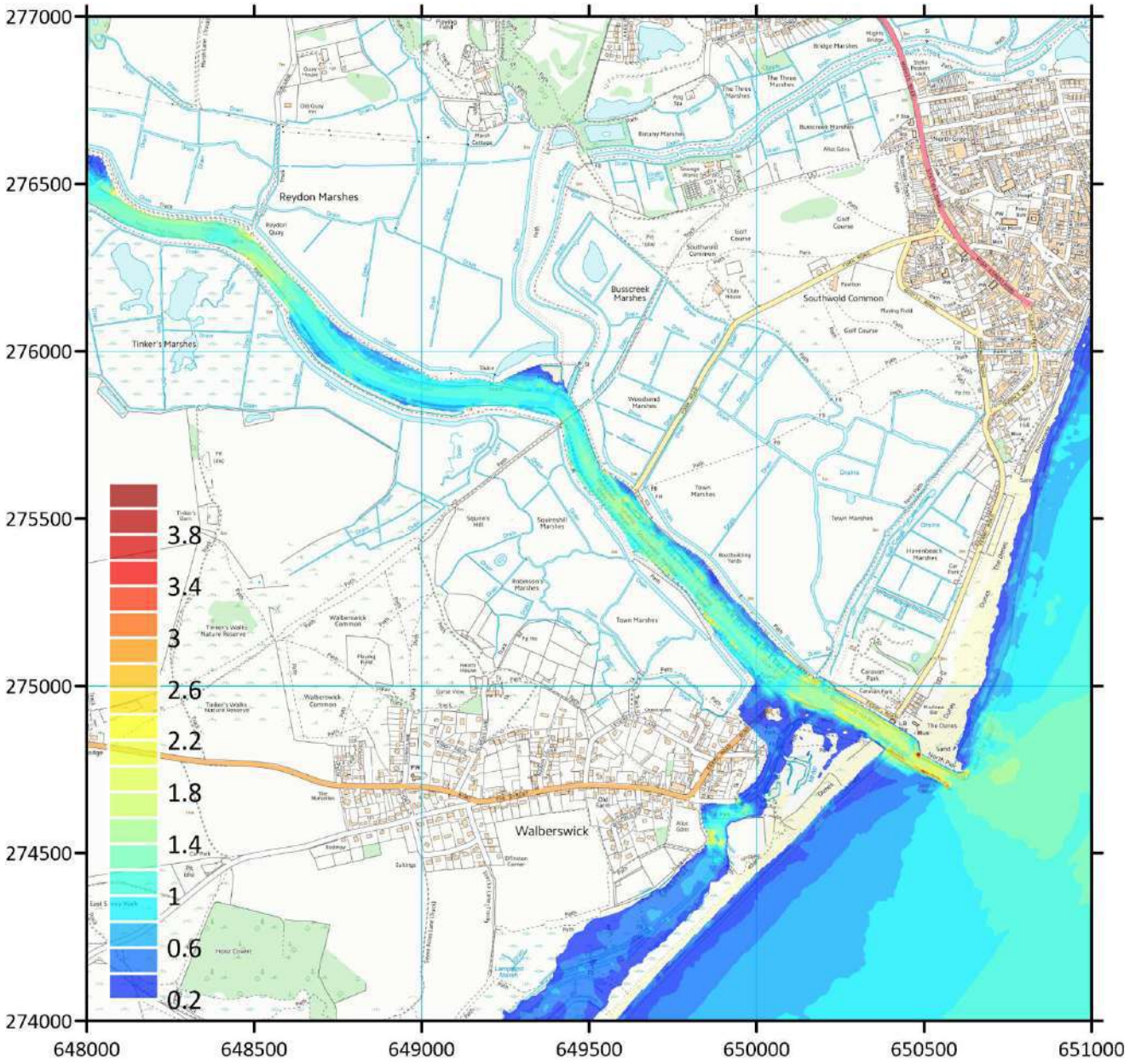
2013 event -0.4m:
E3 – SMP Policy
(Raise N banks,
S banks overtopped)

2013 event -0.4m:
E0 - Present-day estuary defences, marshes raised 300mm



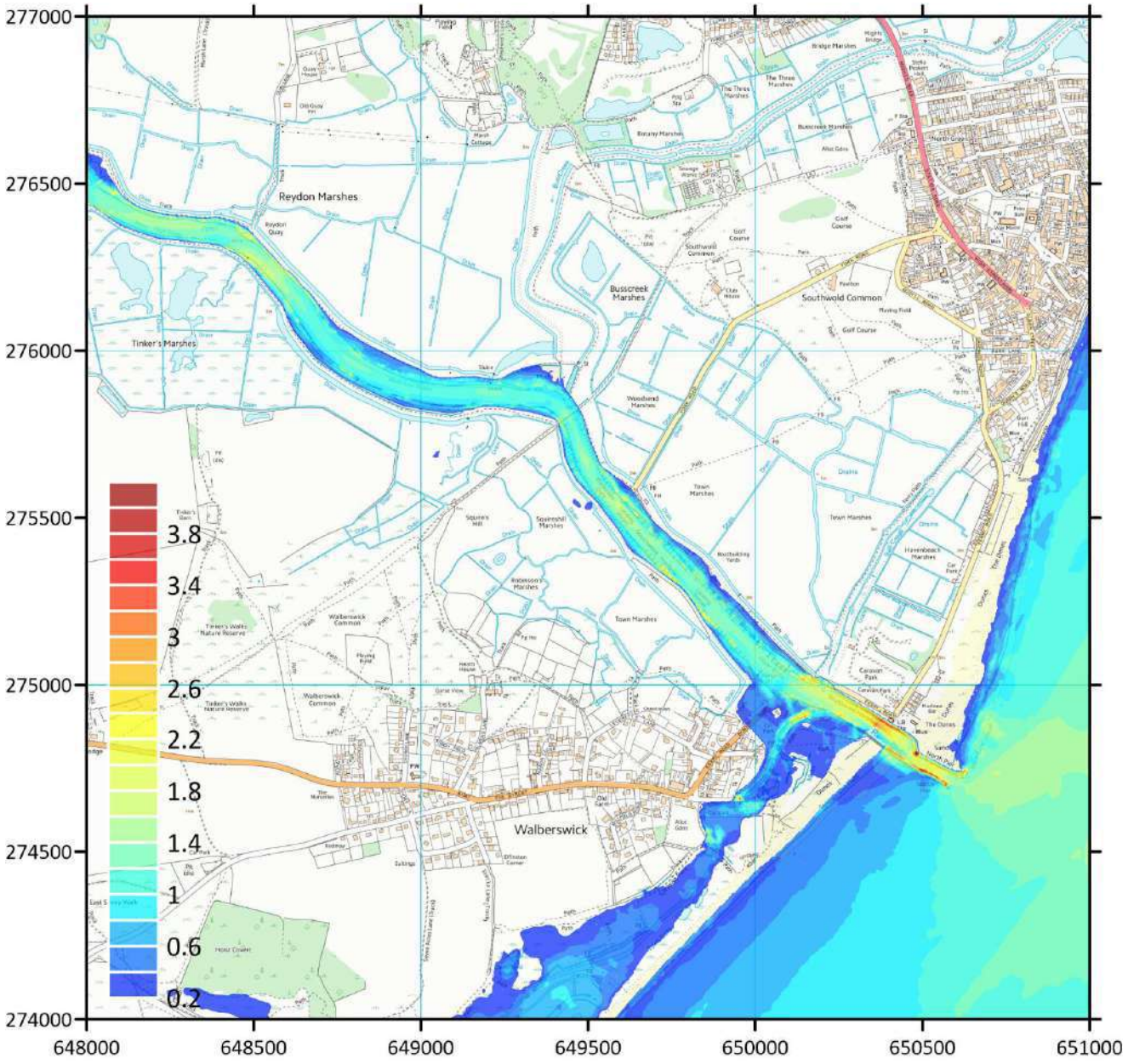
2013 event -0.4m:
E0 - Present-day estuary defences, marshes raised 300mm

2013 event -0.4m:
E2 – Raise estuary defences,
marshes raised 300mm



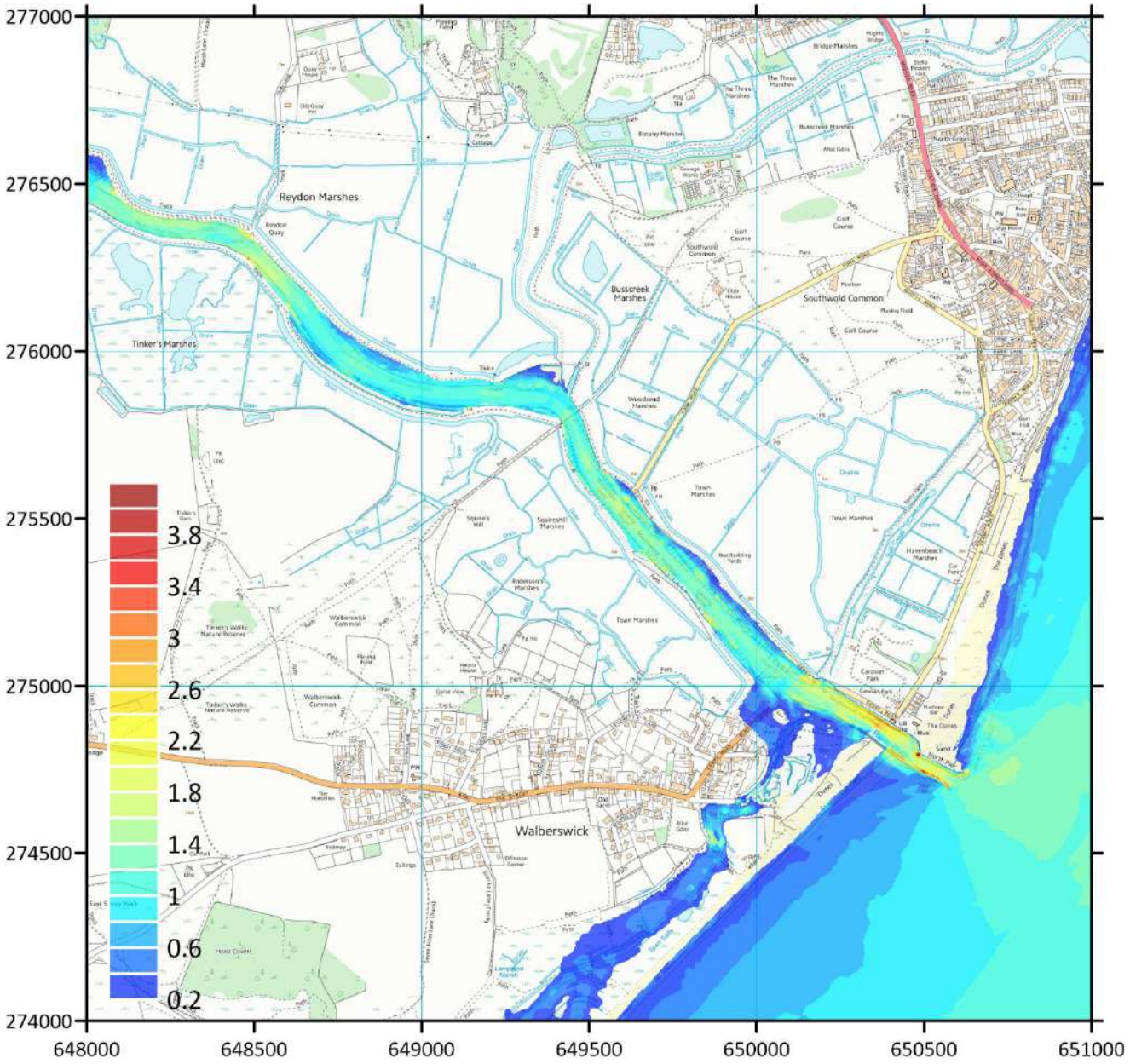
2013 event -0.4m:
E2 – Raise estuary defences,
marshes raised 300mm

2013 event -0.4m:
G0 - Present day estuary defences, Narrow channel



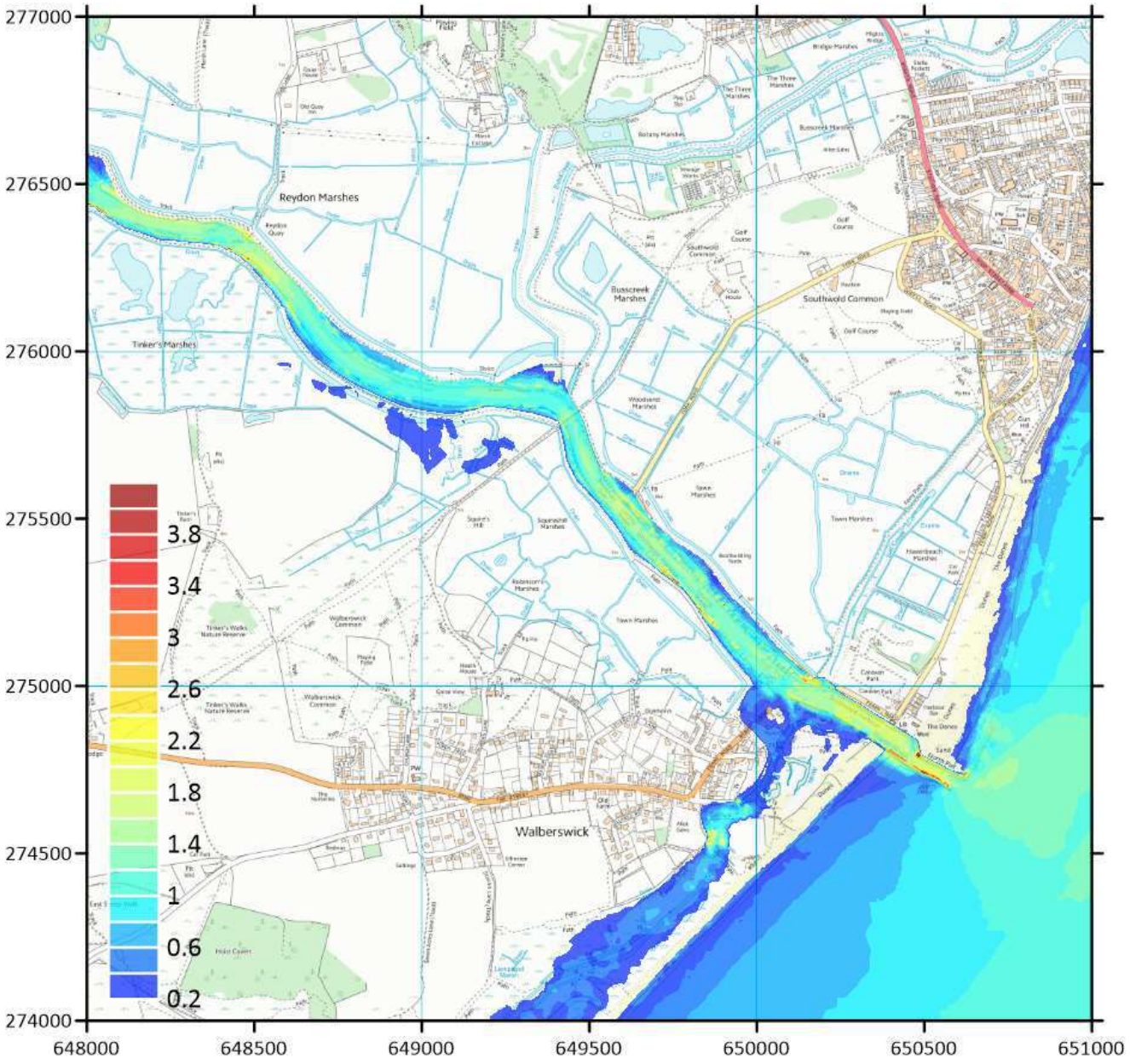
2013 event -0.4m:
G0 - Present day estuary defences, Narrow Channel

2013 event -0.4m:
G2 - Raise estuary defences, Narrow channel



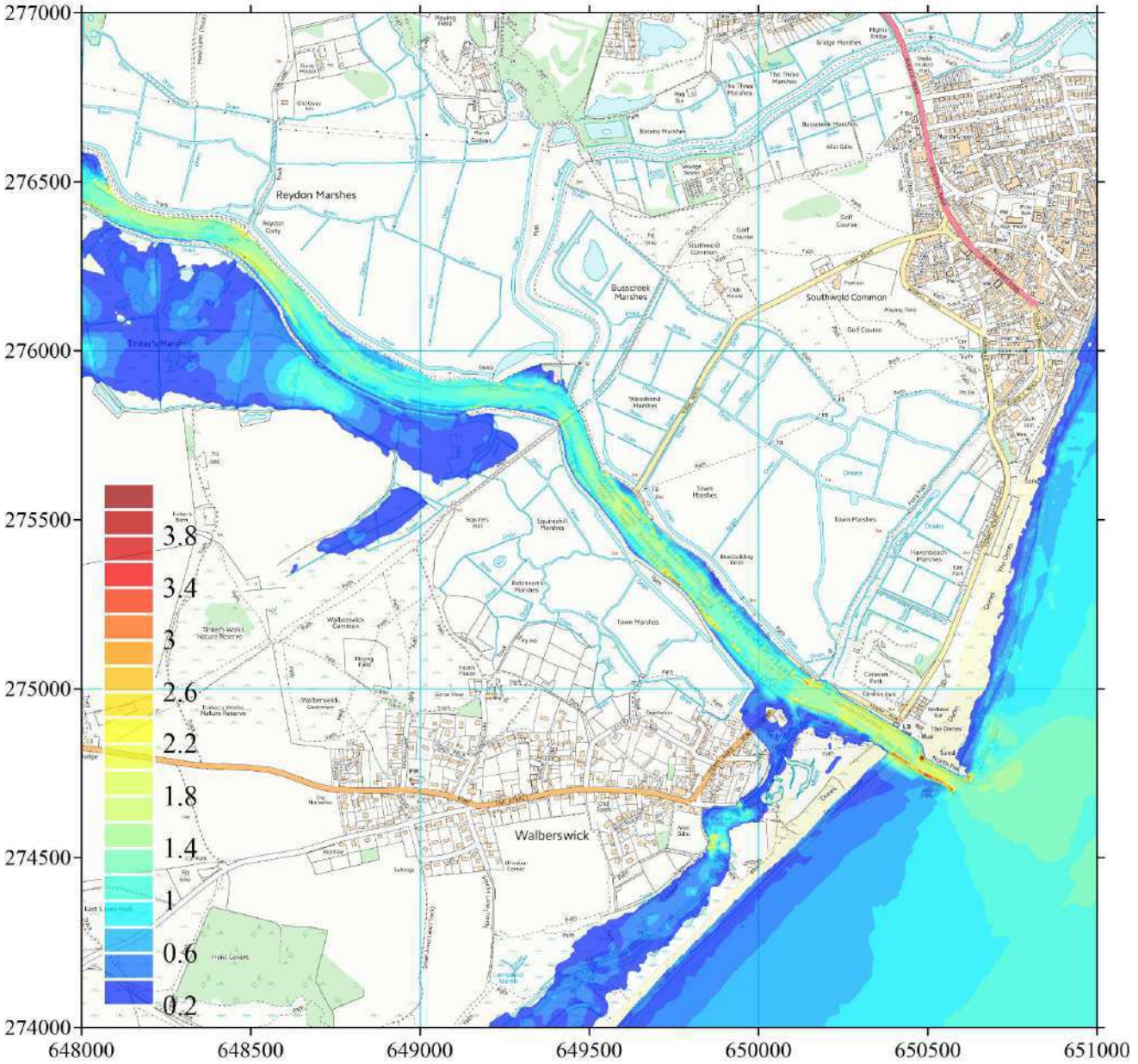
2013 event -0.4m: G2 - Raise estuary defences, Narrow Channel

2013 event -0.4m:
S6 – Passive Spillway at 2.20m



2013 event -0.4m:
S6 – Passive Spillway at 2.20m

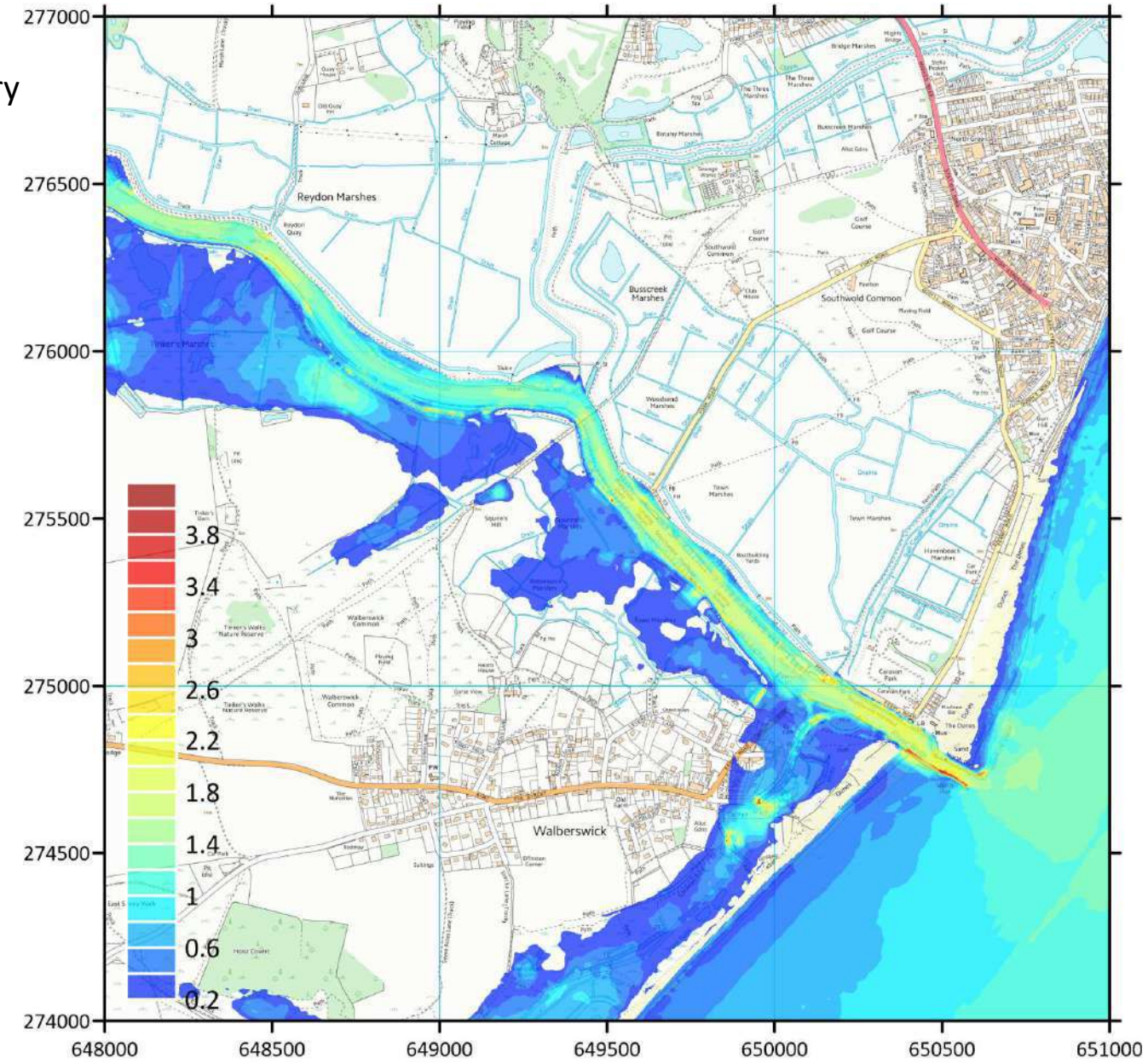
2013 event -0.4m:
S7 – Passive Spillway at 2.00m



2013 event -0.4m:
S7 – Passive Spillway at 2.00m

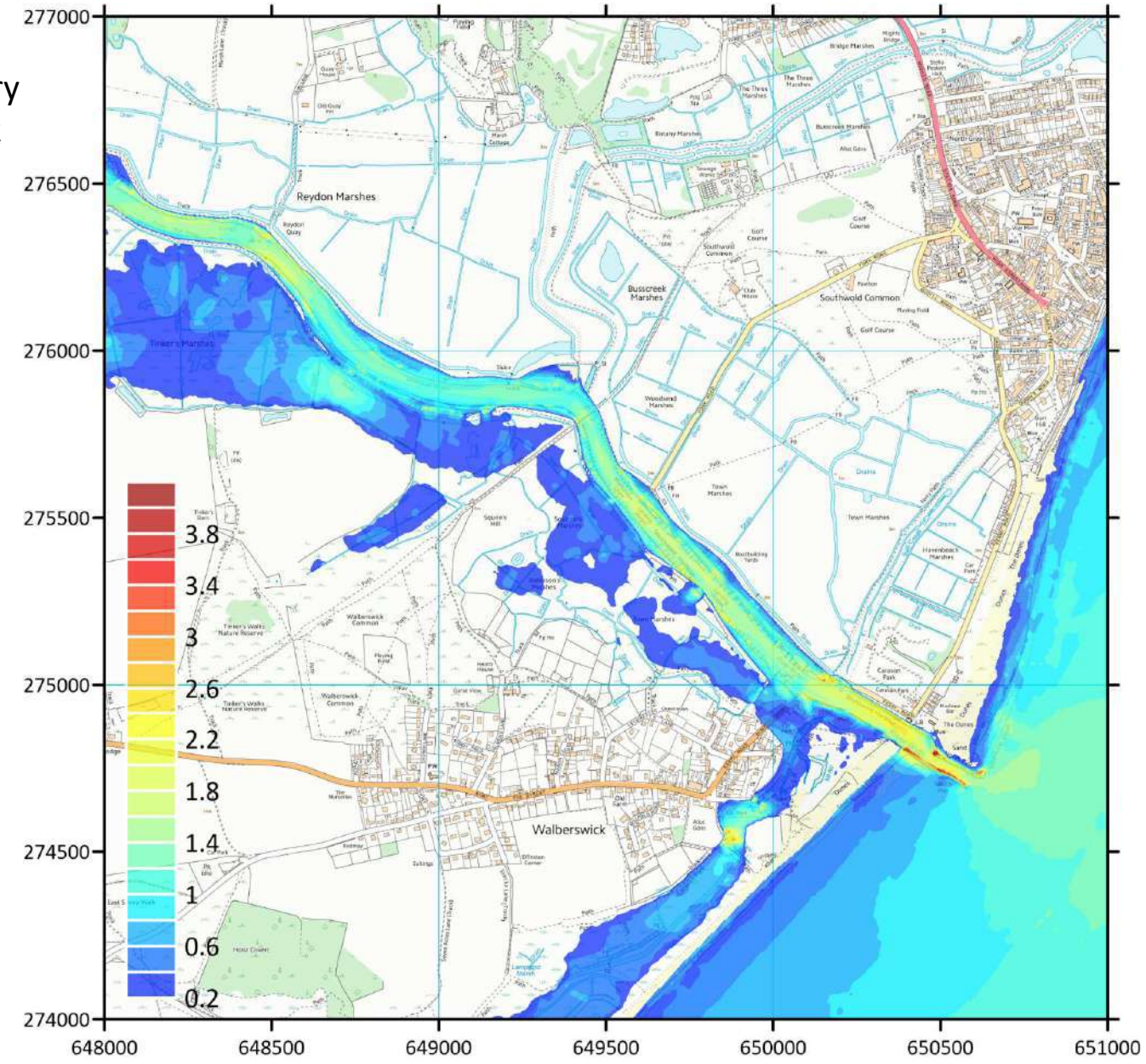
2013

2013 event:
E0 - Present-day estuary defences



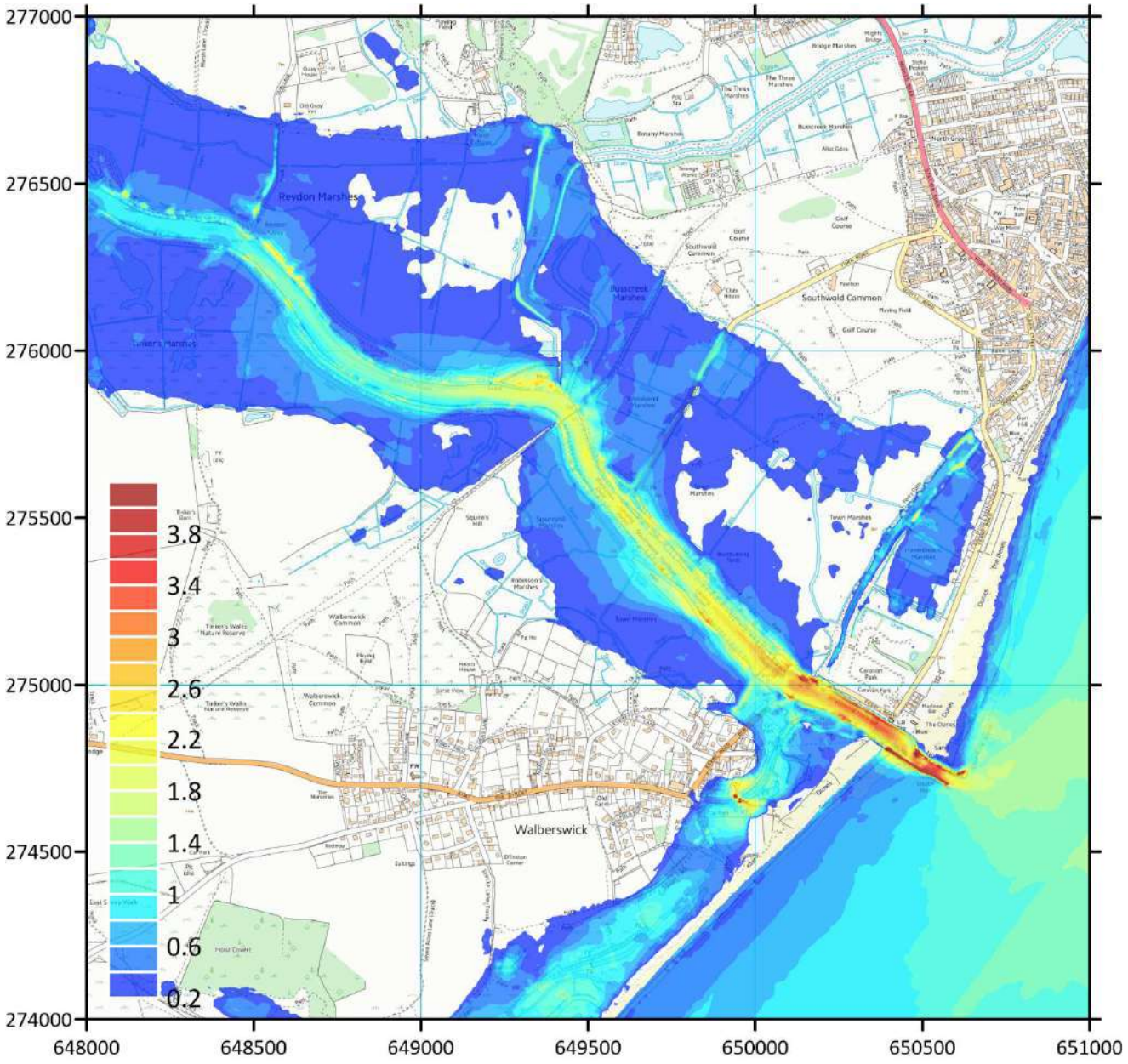
2013 event:
E0 - Present-day estuary defences

2013 event:
E0 - Present-day estuary Defences, Walberswick dunes defended



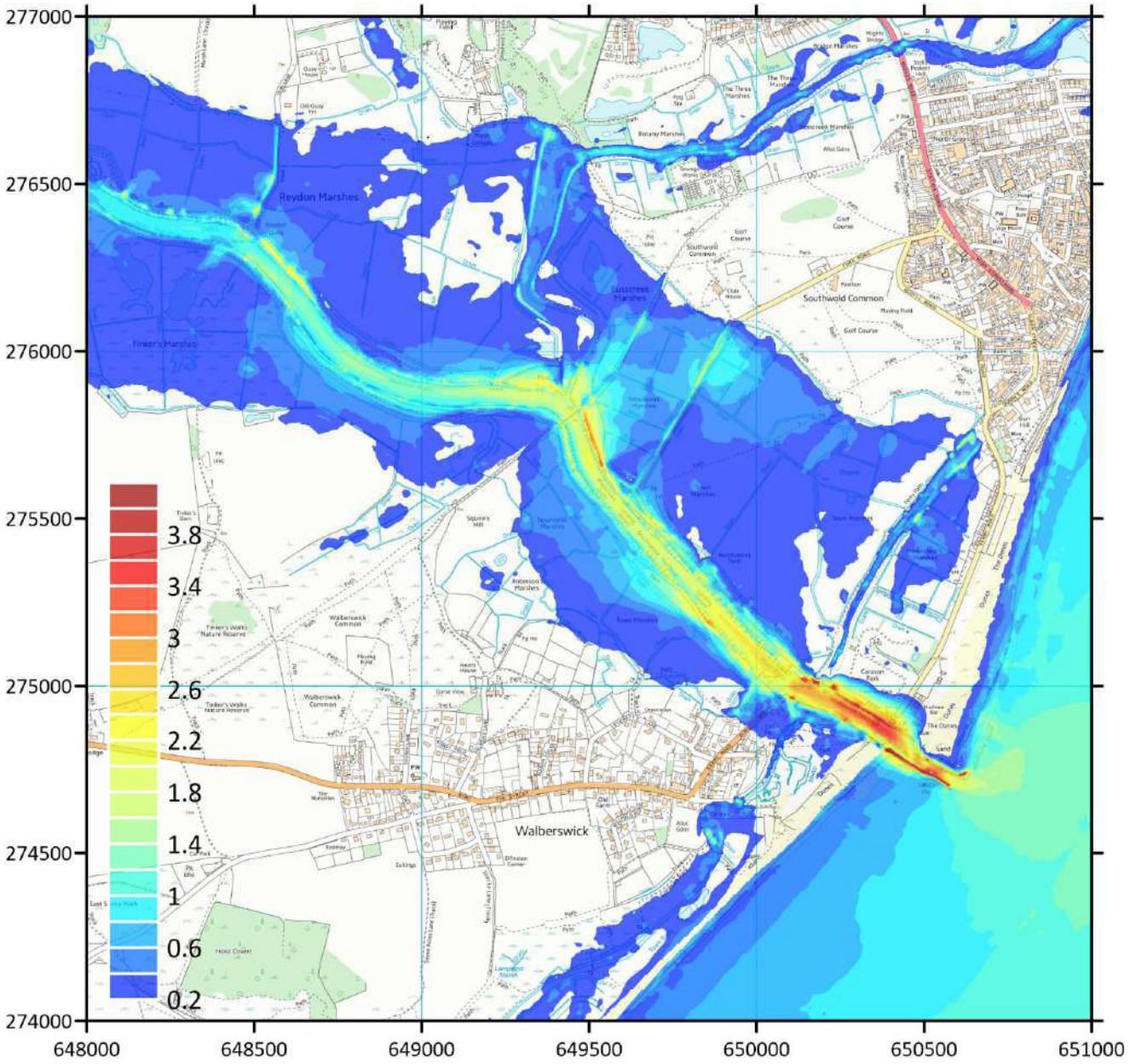
2013 event:
E0 - Present-day estuary Defences, Walberswick dunes defended

2013 event:
E1 – Do Nothing
All embankments failed (undefended)



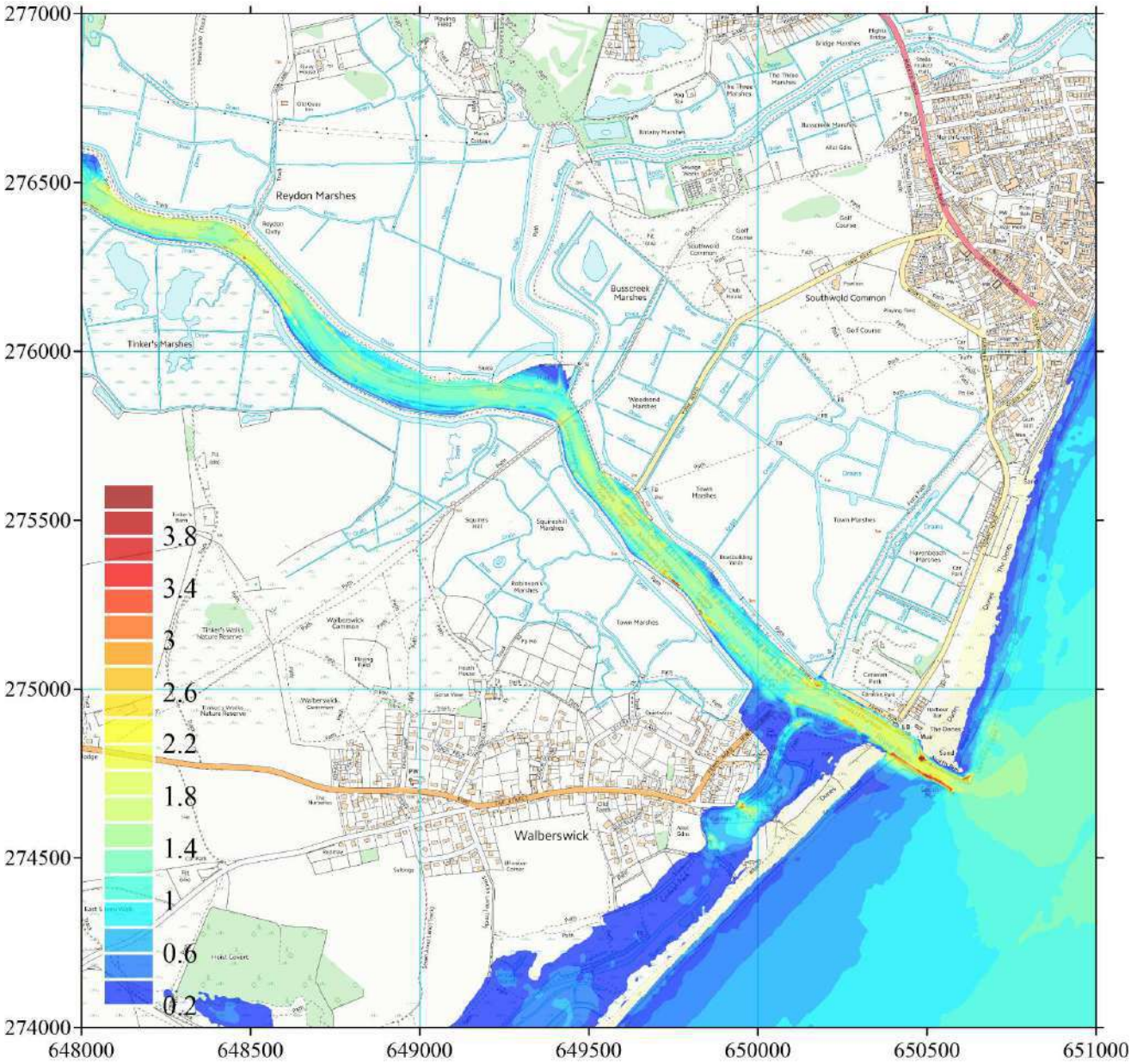
2013 event:
E1 – Do Nothing
All embankments failed (undefended)

2013 event:
E1 – Do Nothing,
all embankments
failed (undefended),
Walberswick dunes
defended



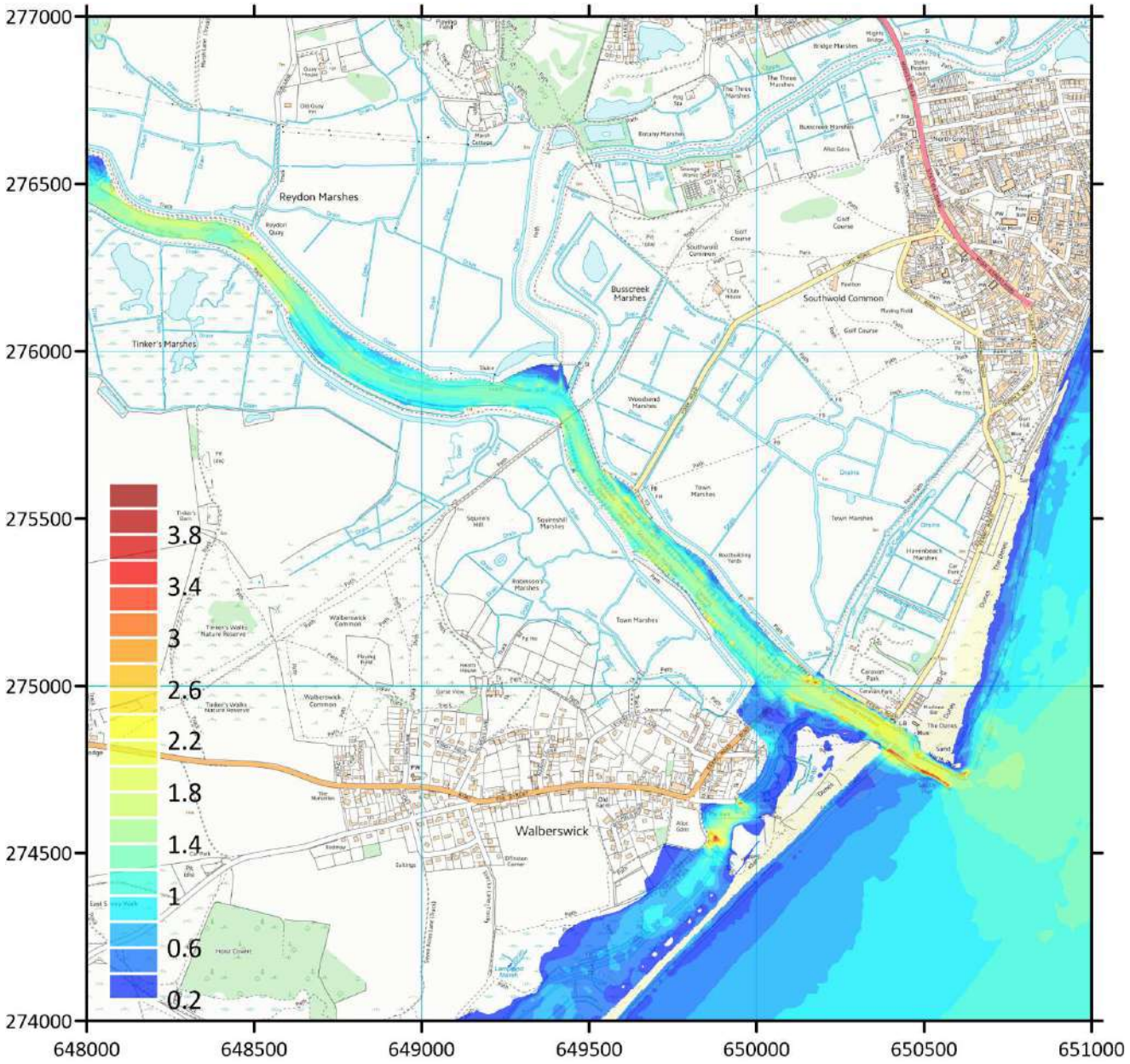
2013 event:
E1 – Do Nothing,
all embankments
failed (undefended),
Walberswick dunes
defended

2013 event: E2 - Raise estuary defences



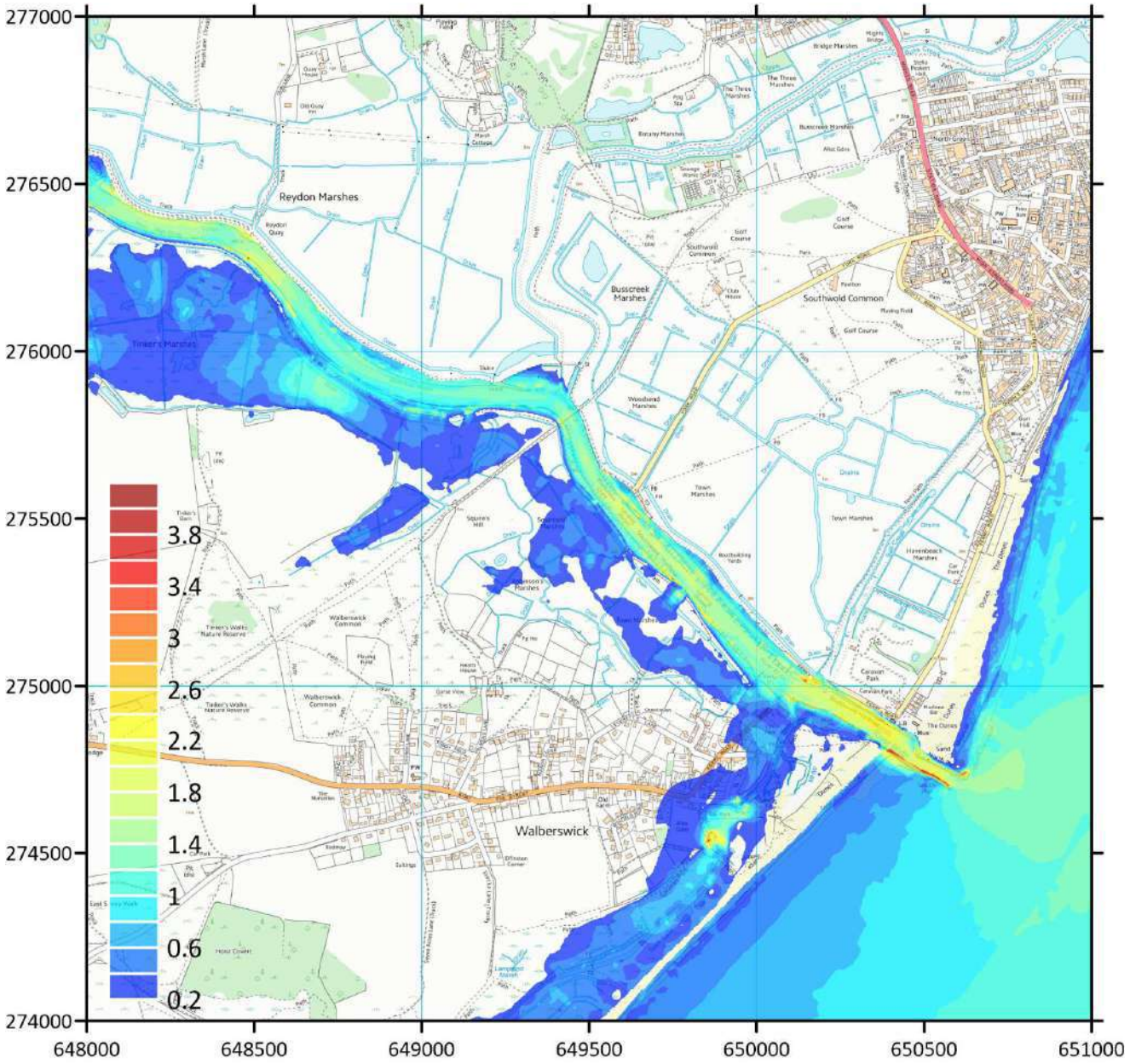
2013 event: E2 - Raise estuary defences

2013 event: E2 - Raise estuary defences, Walberswick dunes defended



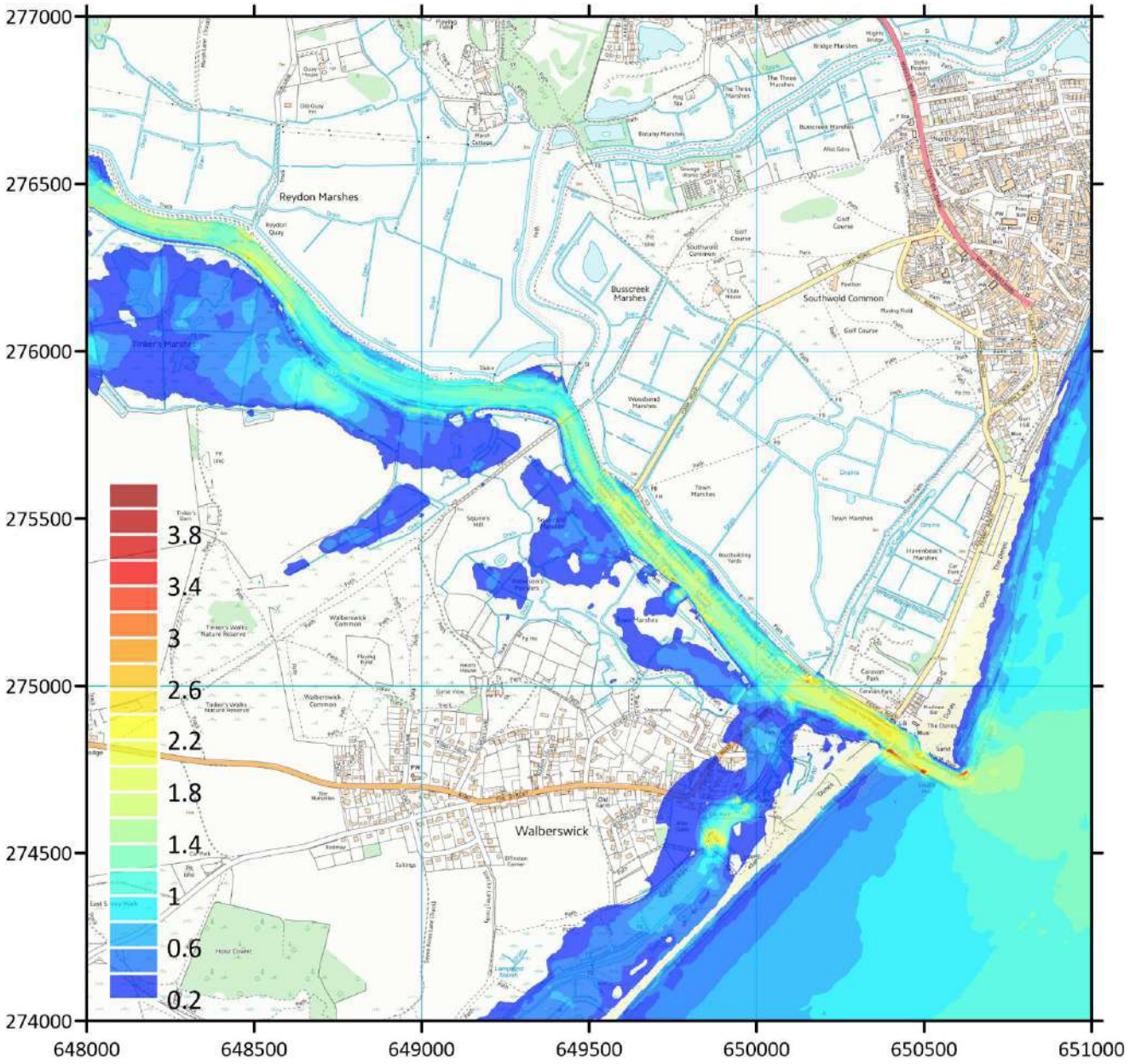
2013 event: E2 - Raise estuary defences, Walberswick dunes defended

2013 event:
E3 – SMP Policy
Raise N banks, S banks overtopped



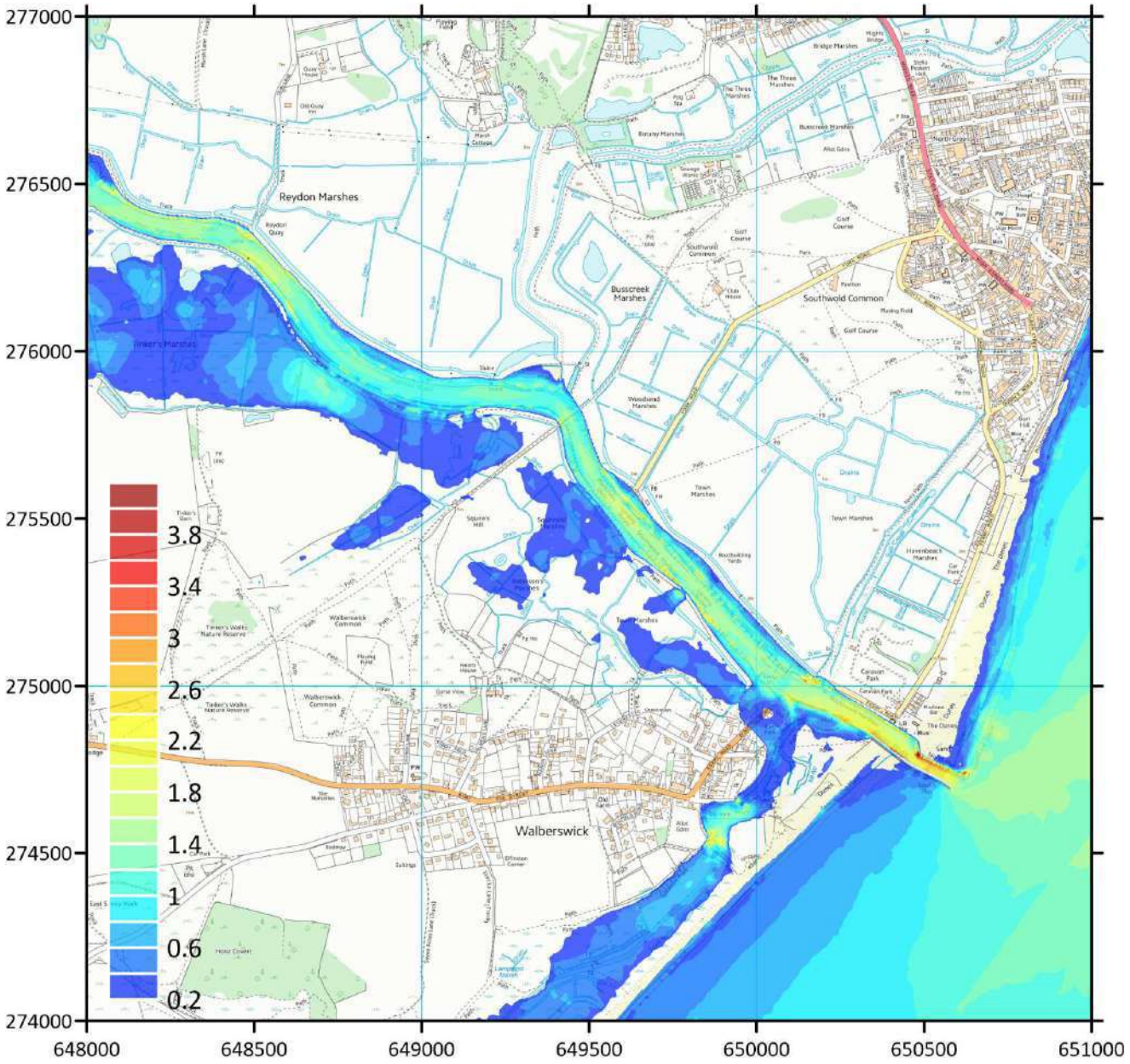
2013 event:
E3 – SMP Policy
Raise N banks, S banks overtopped

2013 event:
H0 - Present day estuary defences, reduced S Pier



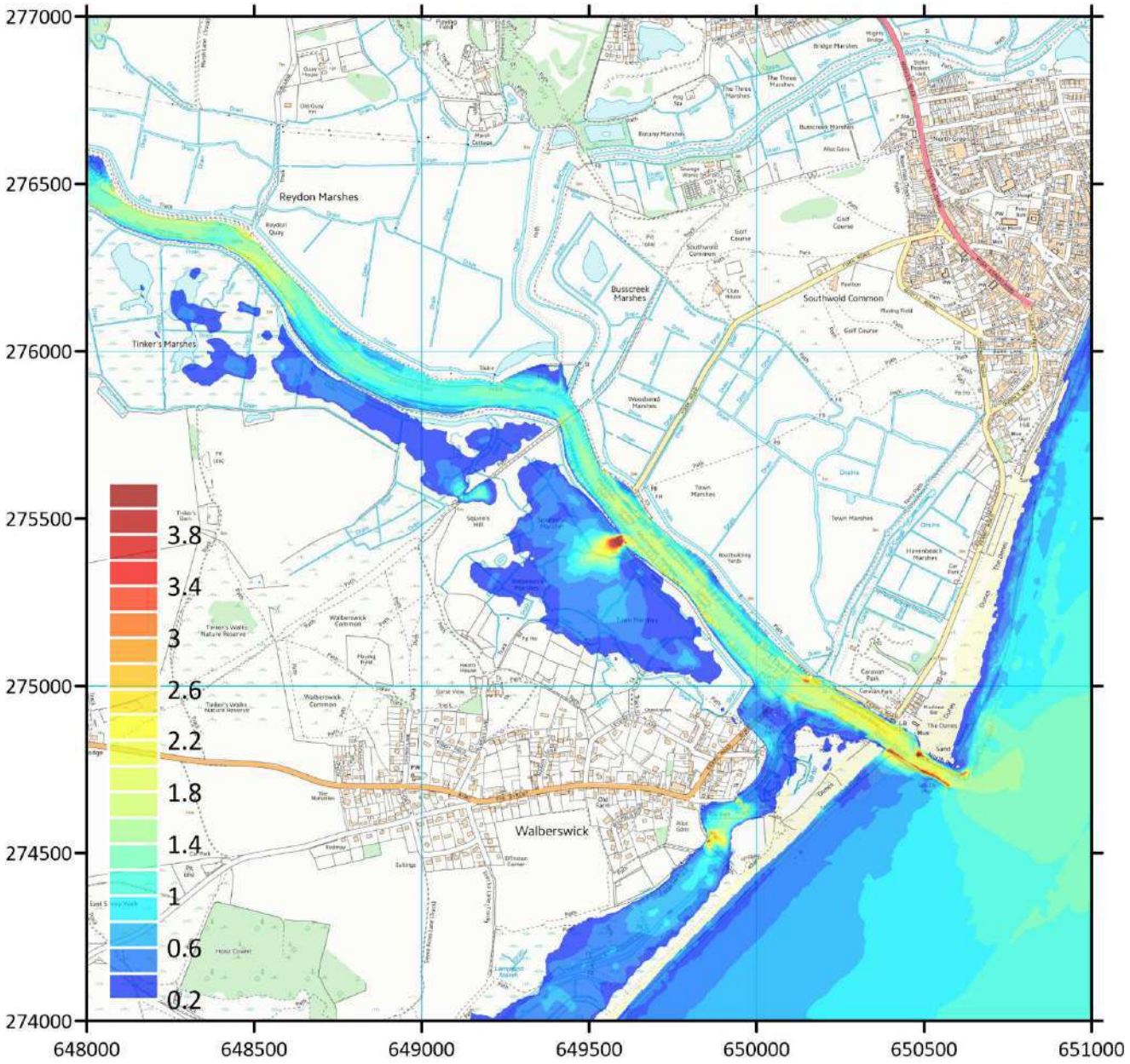
2013 event:
H0 - Present day estuary defences, reduced S Pier

2013 event:
F0 - Present day estuary defences, Solid S Pier



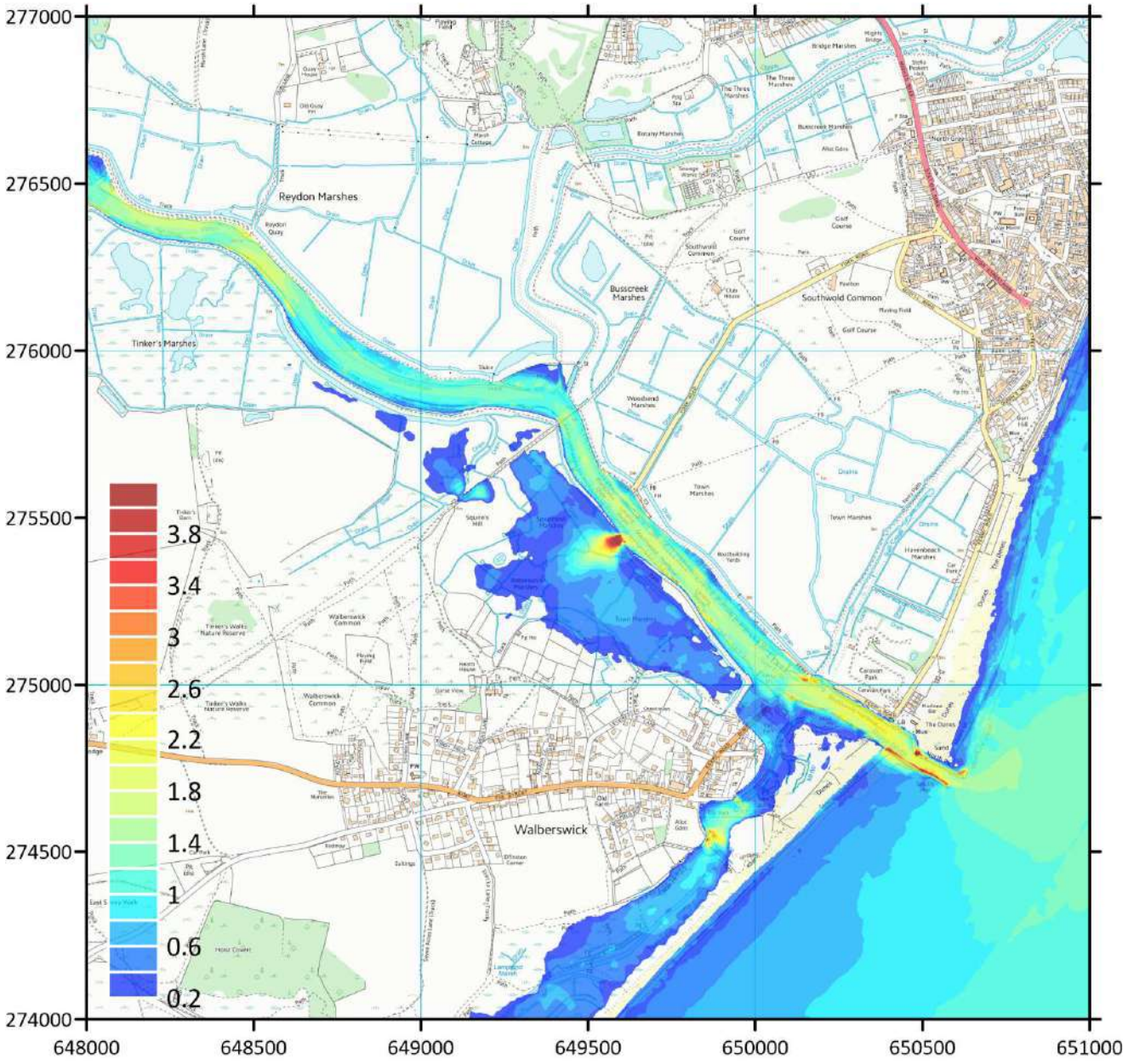
2013 event:
F0 - Present day estuary defences, Solid S Pier

2013 event:
S1a - Raise defences + sluice gate (open at 2.3m water level)



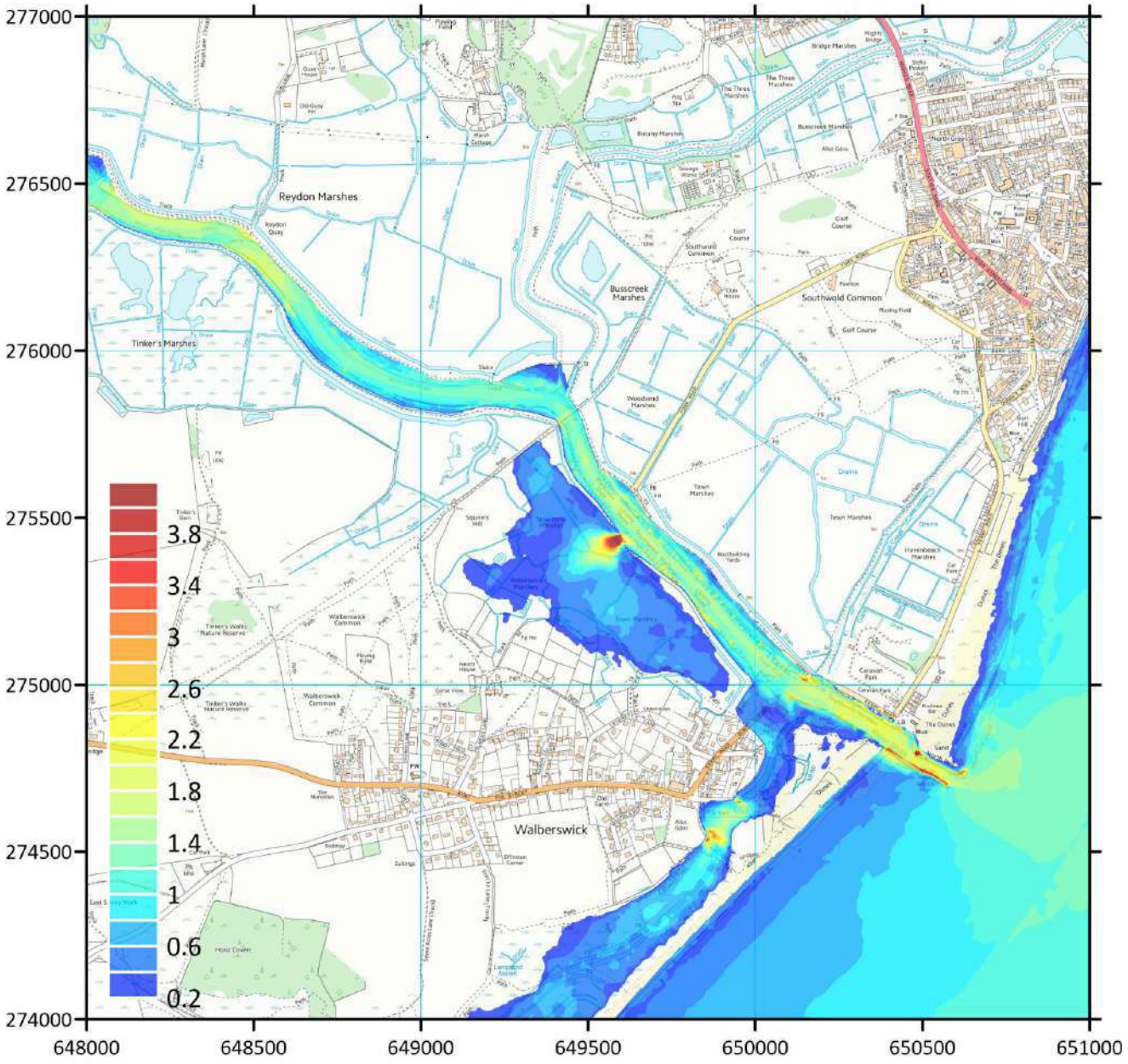
2013 event:
S1a - Raise defences + sluice gate (open at 2.3m water level)

2013 event:
S1b - Raise defences + sluice gate (open at 2.5m water level)



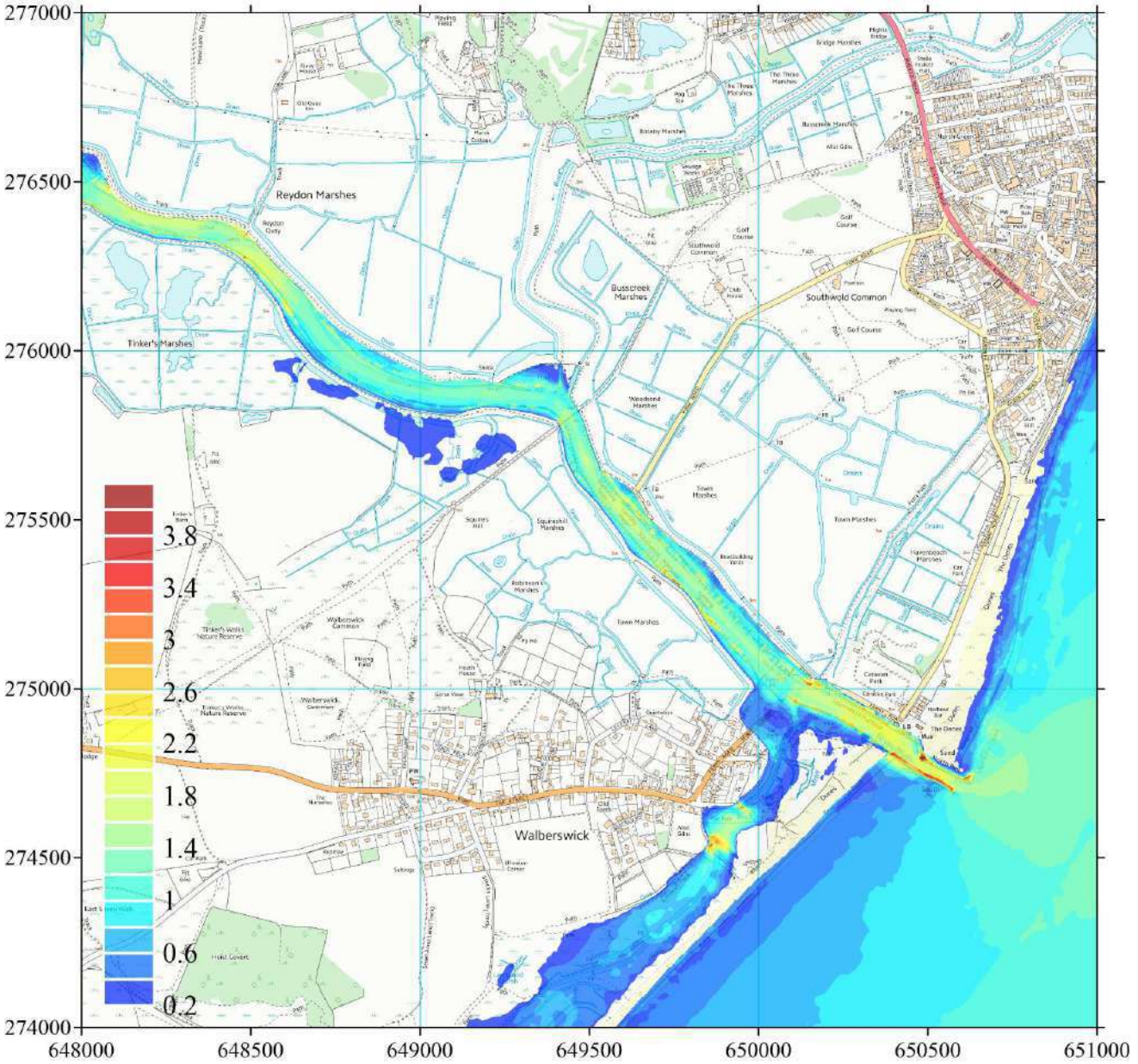
2013 event:
S1b - Raise defences + sluice gate (open at 2.5m water level)

2013 event:
S1c - Raise defences + sluice gate (open at 2.7m water level)



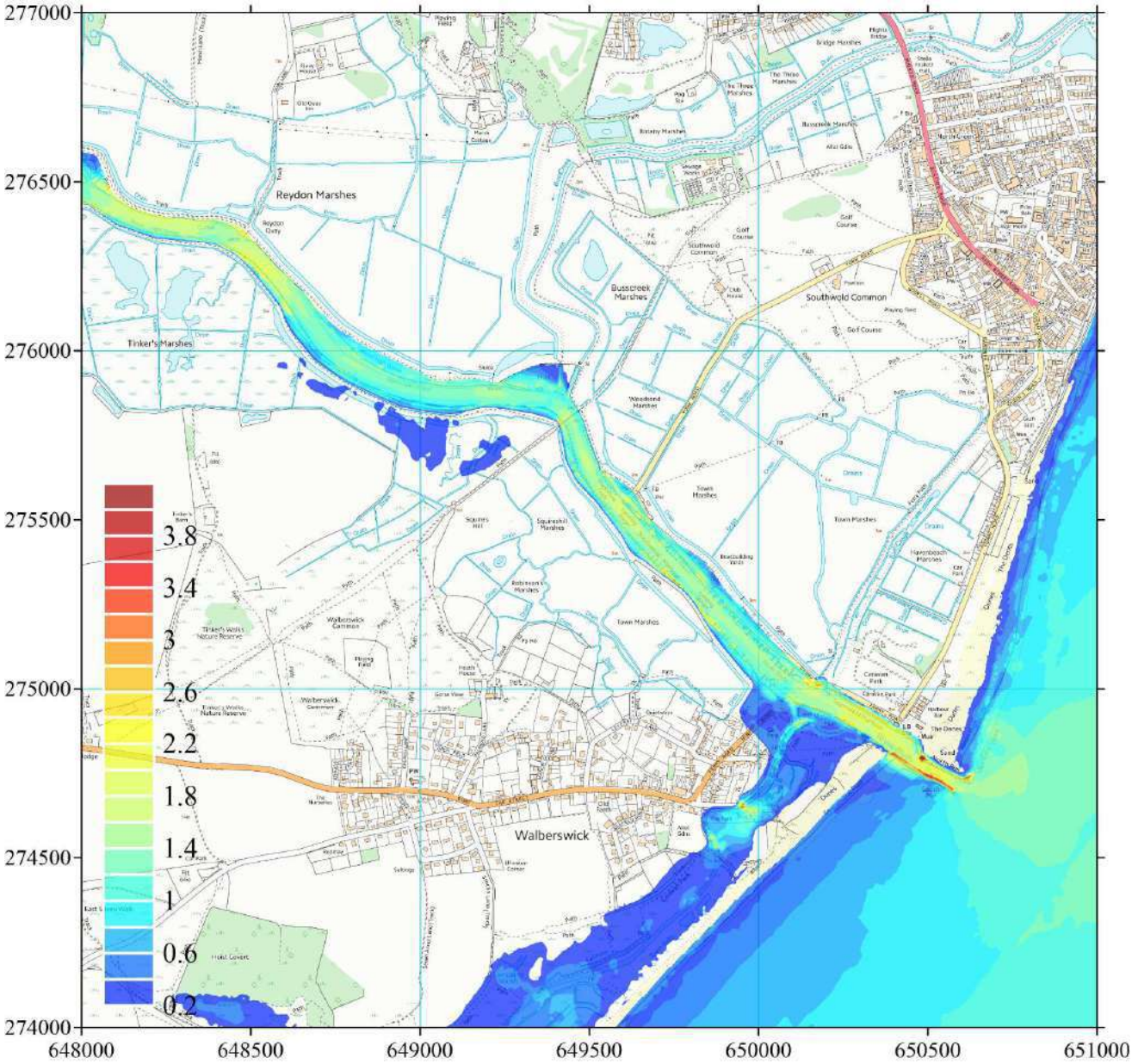
2013 event:
S1c - Raise defences + sluice gate (open at 2.7m water level)

2013 event:
S2 - Raise defences + 500m passive spillway at 2.55mOD, Walberswick dunes defended



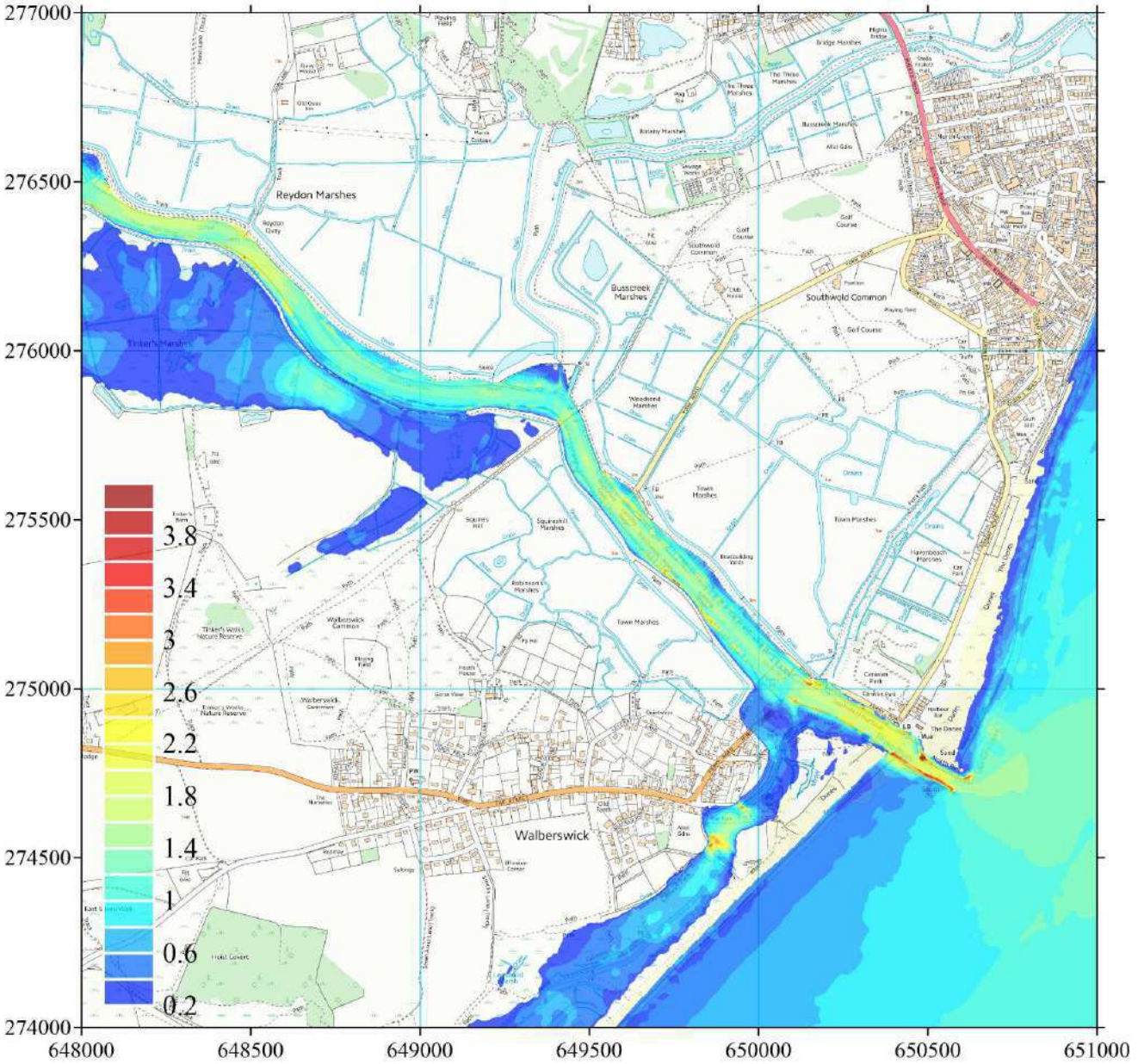
2013 event:
S2 - Raise defences + 500m passive spillway at 2.55mOD, Walberswick dunes defended

2013 event:
S3 - Raise defences + 500m passive spillway at 2.55mOD, Walberswick dunes undefended



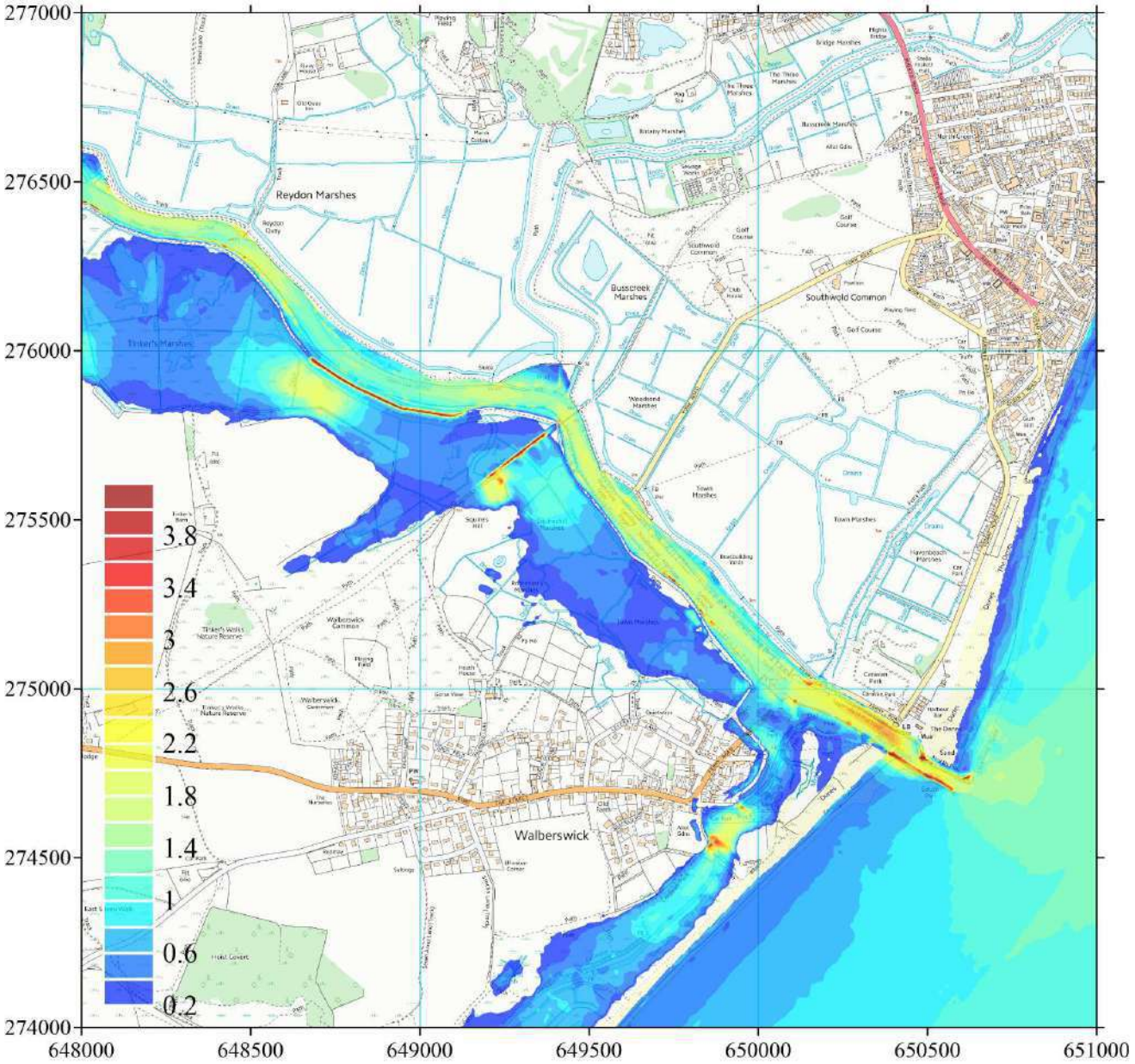
2013 event:
S3 - Raise defences + 500m passive spillway at 2.55mOD, Walberswick dunes undefended

2013 event:
S4 - Raise defences + 500m passive spillway at 2.35mOD, Walberswick dunes defended



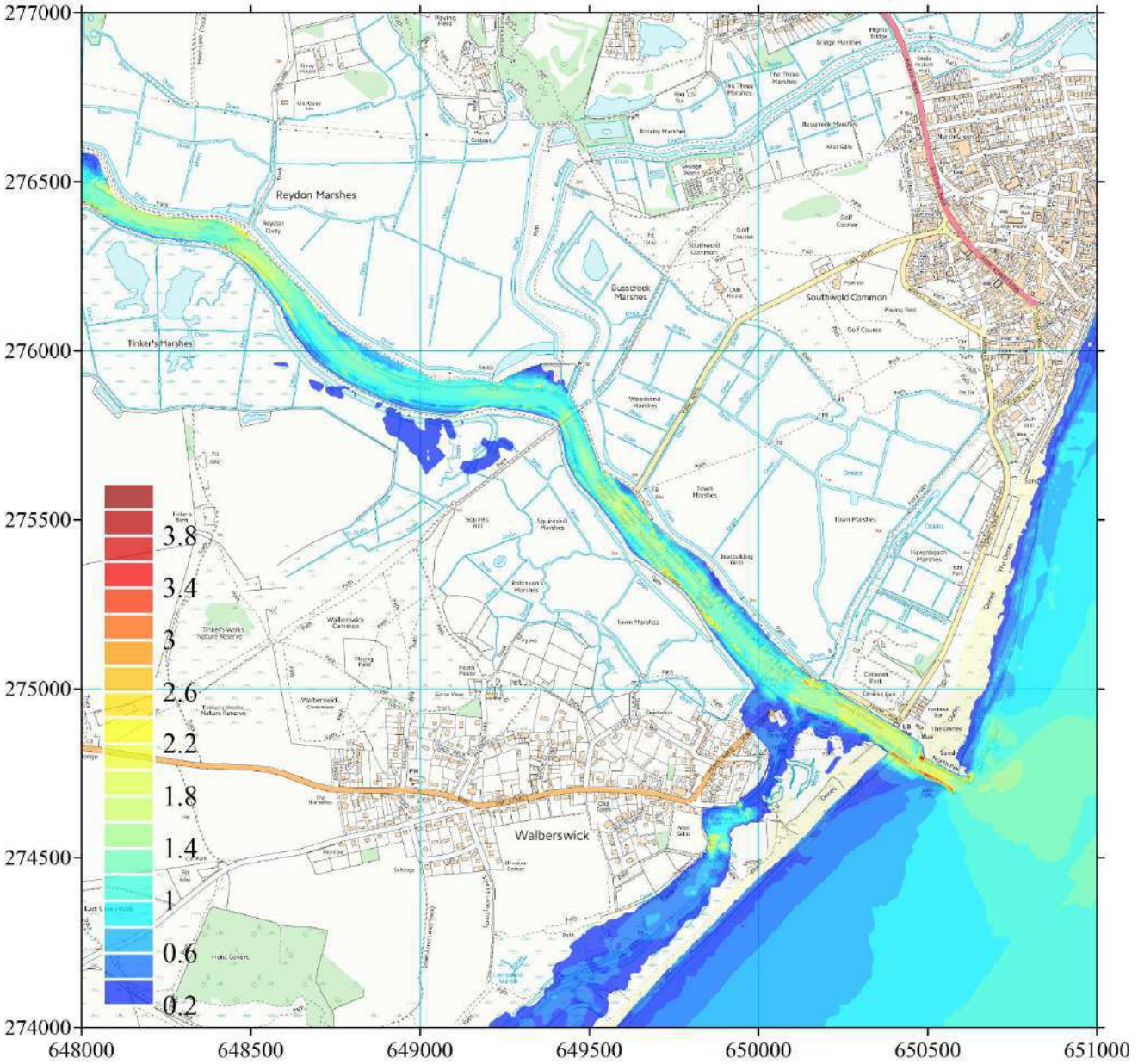
2013 event:
S4 - Raise defences + 500m passive spillway at 2.35mOD, Walberswick dunes defended

2013 event:
S8 - Raise defences + 500m passive spillway at 2.00mOD, Walberswick dunes defended



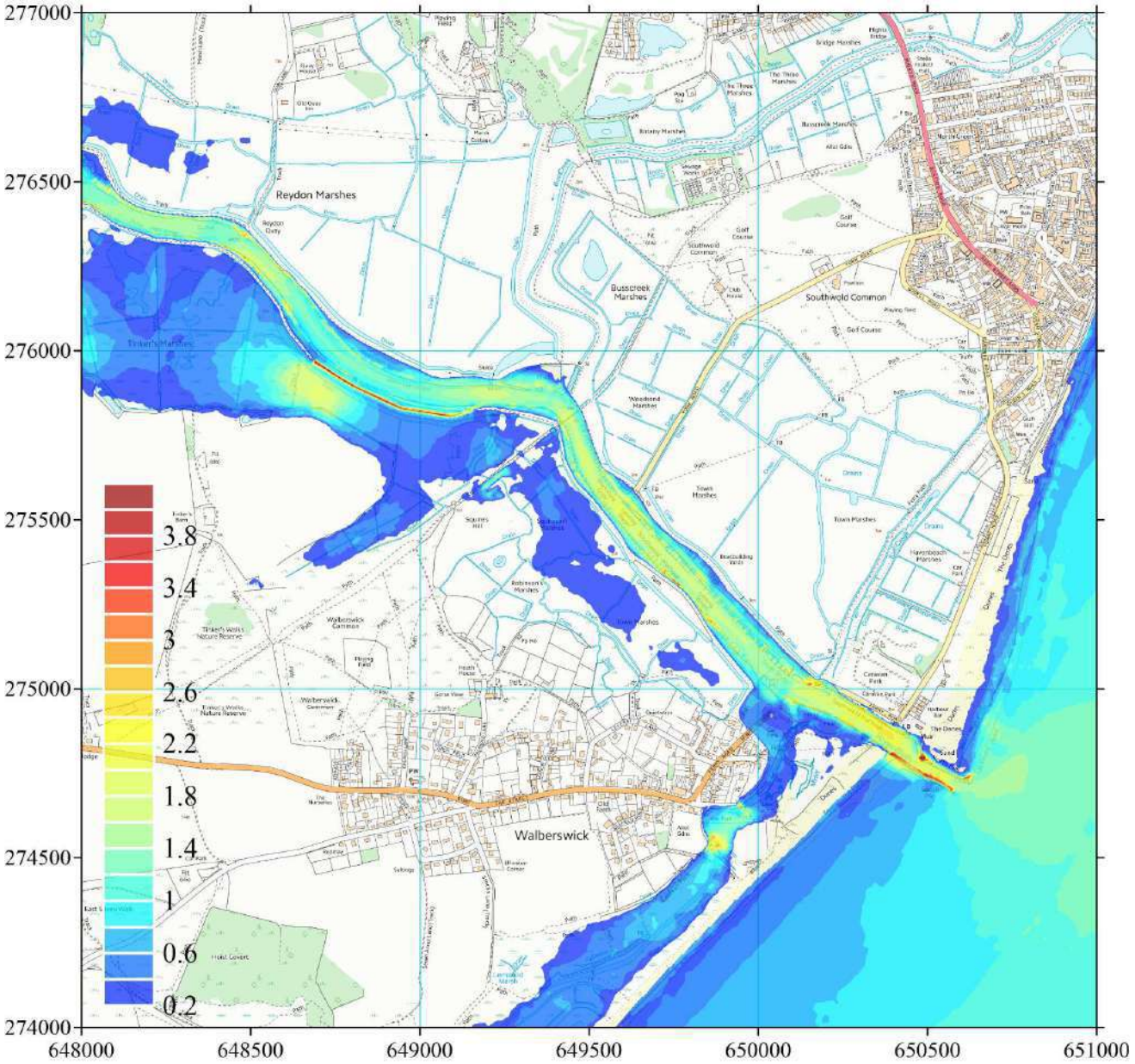
2013 event:
S8 - Raise defences + 500m passive spillway at 2.00mOD, Walberswick dunes defended

2013 event:
S9 - Raise downstream defences only + 500m passive spillway at 2.00mOD, Walberswick dunes defended



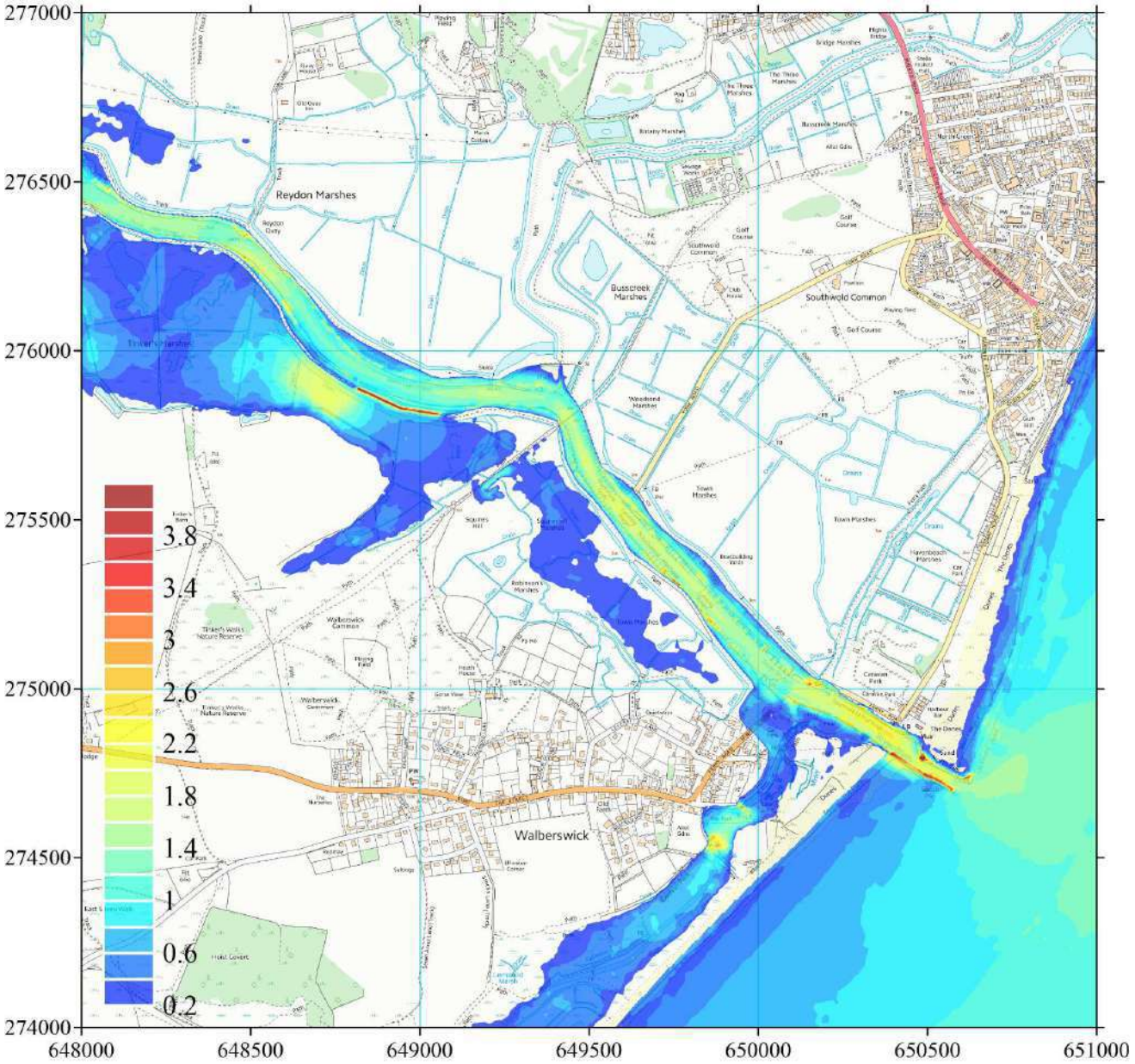
2013 event:
S9 - Raise downstream defences only + 500m passive spillway at 2.00mOD, Walberswick dunes defended

2013 event:
S11 - Raise downstream defences only + 500m passive spillway at 2.00mOD, culverts open into Robinson's Marsh, Walberswick dunes defended



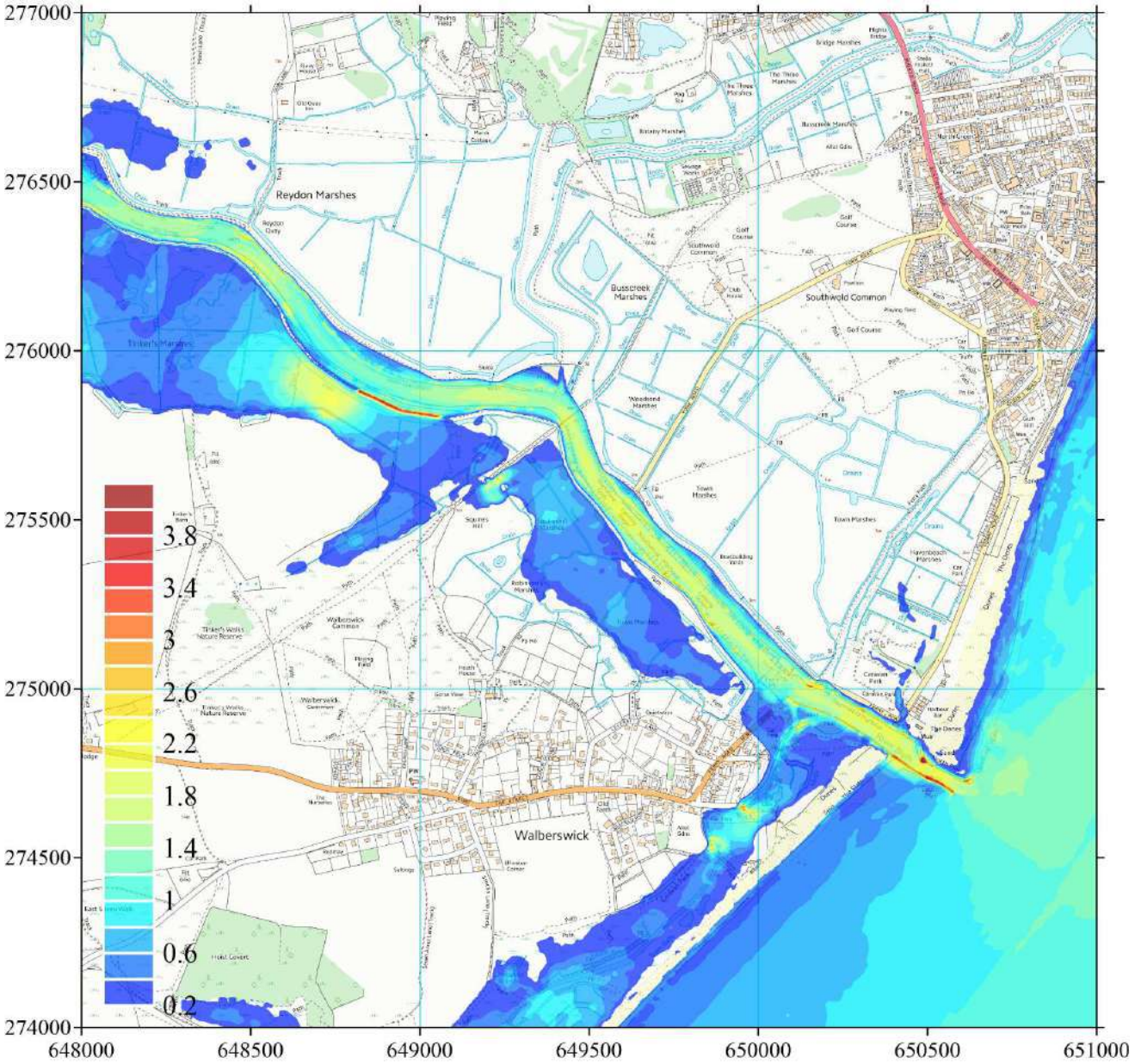
2013 event:
S11 - Raise downstream defences only + 500m passive spillway at 2.00mOD, culverts open into Robinson's Marsh, Walberswick dunes defended

2013 event:
S10 - Raise downstream defences only + 250m passive spillway at 2.00mOD, Walberswick dunes defended



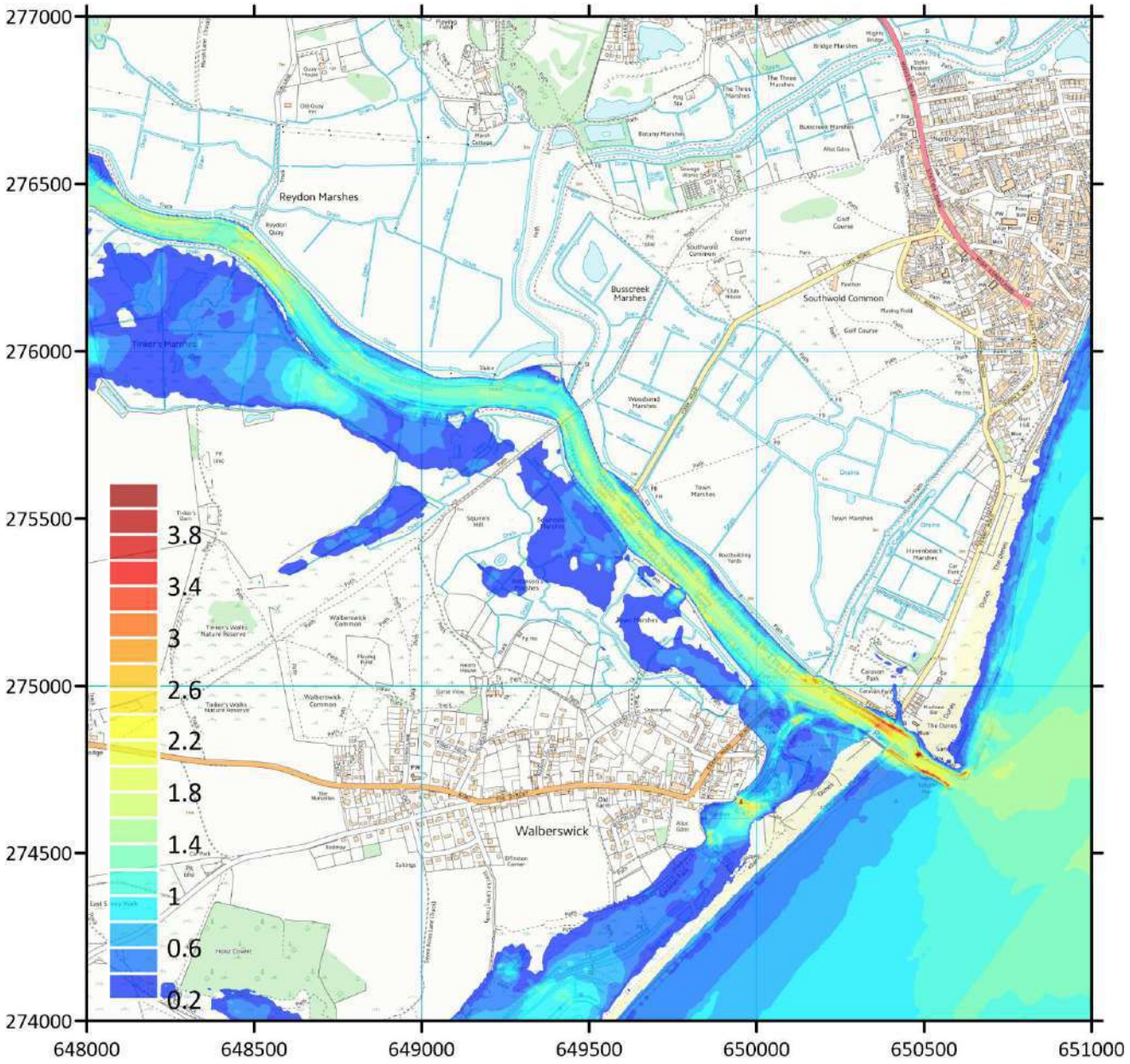
2013 event:
S10 – Raise downstream defences only + 250m passive spillway at 2.00mOD, Walberswick dunes defended

2013 event:
S13 - Raise downstream defences only + 250m passive spillway at 2.00mOD, Walberswick dunes undefended



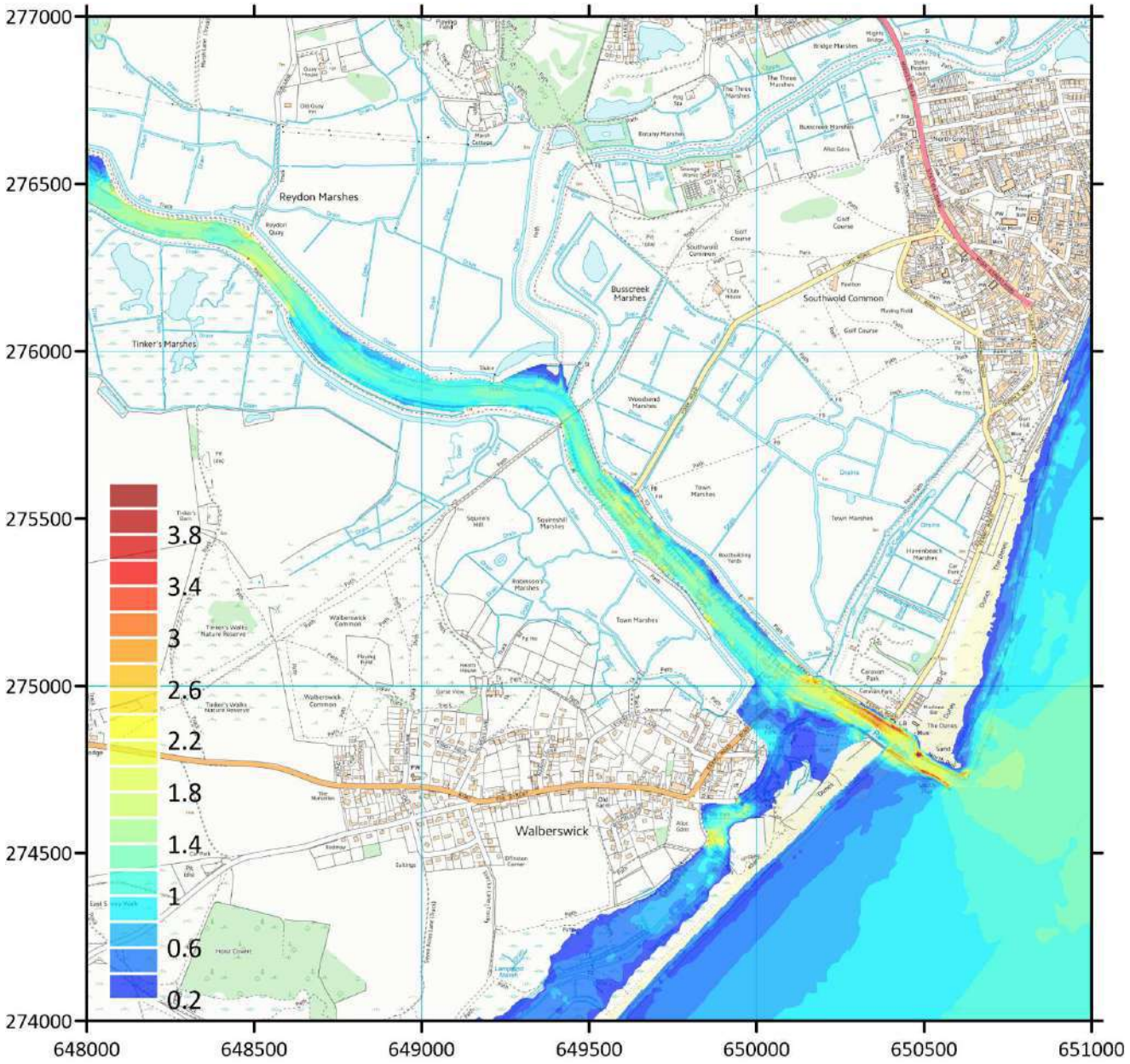
2013 event:
S13 – Raise downstream defences only + 250m passive spillway at 2.00mOD, Walberswick dunes undefended

2013 event:
G0 - Present day estuary defences, Narrow channel



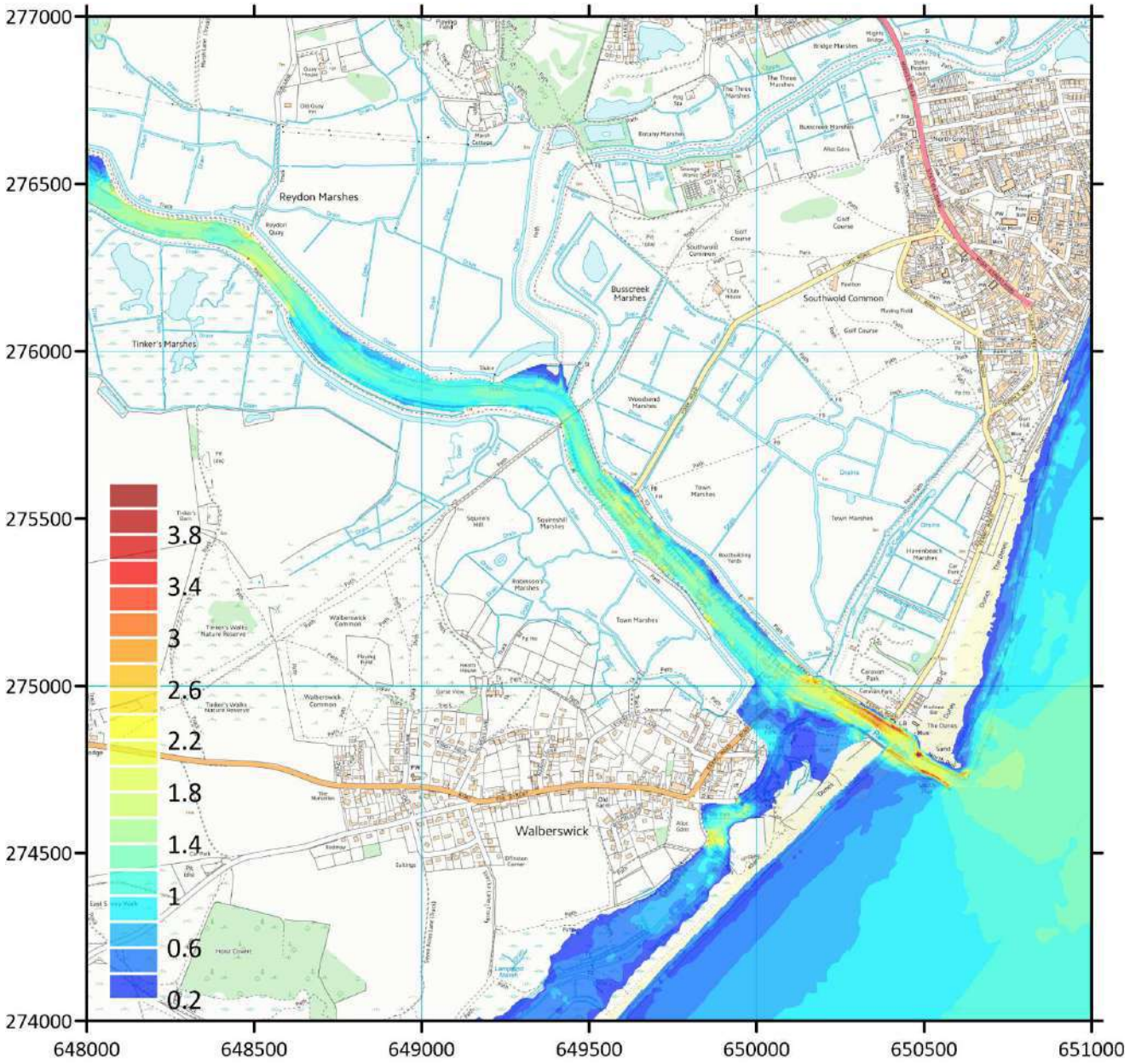
2013 event:
G0 - Present day estuary defences, Narrow channel

2013 event:
G2a - Raise estuary defences, Narrow channel



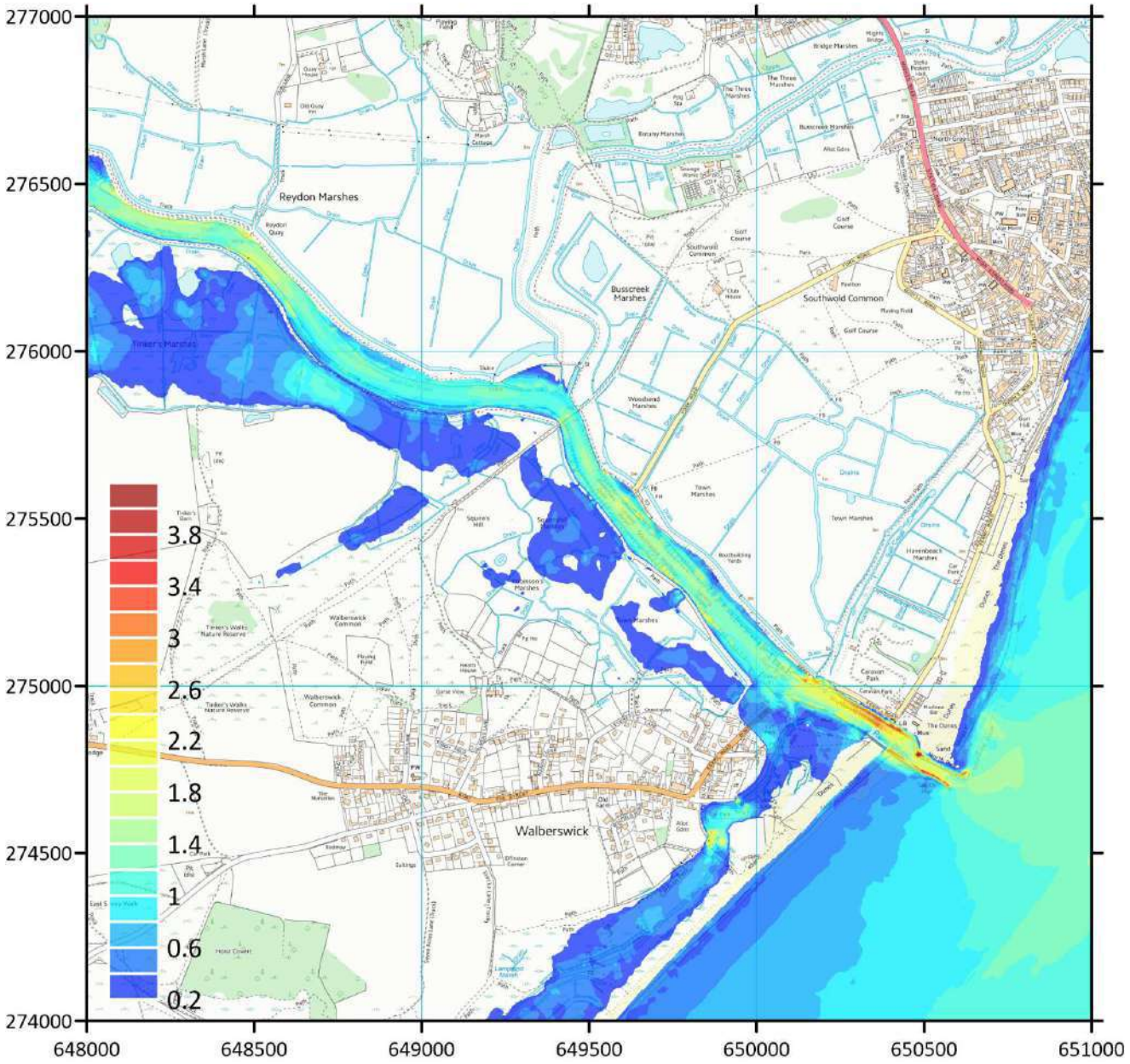
2013 event:
G2a - Raise estuary defences, Narrow channel

2013 event:
G2b - Raise estuary defences, Narrow channel with culverts



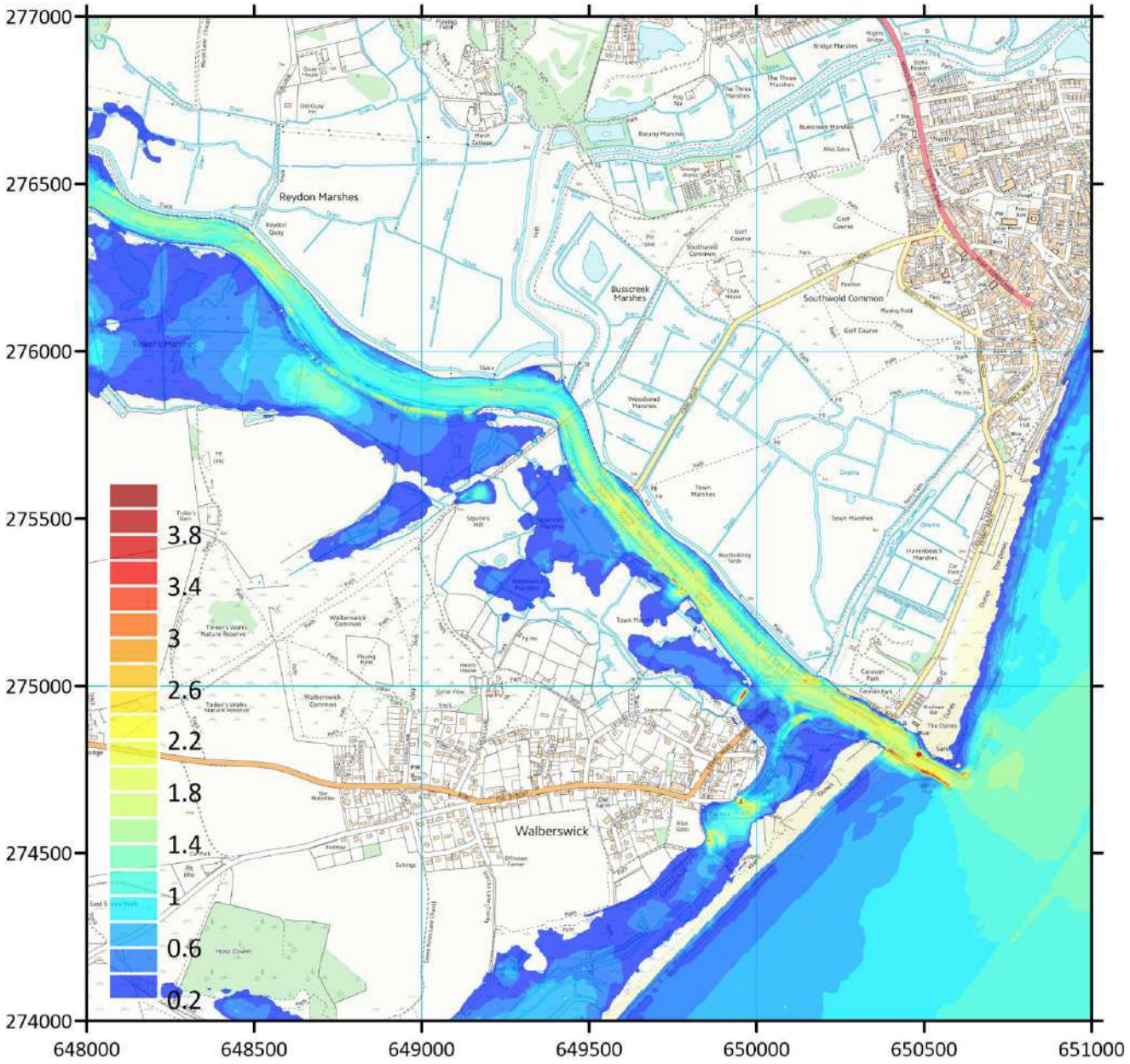
2013 event:
G2b - Raise estuary defences, Narrow channel with culverts

2013 event:
G3 – SMP Policy,
Narrow channel



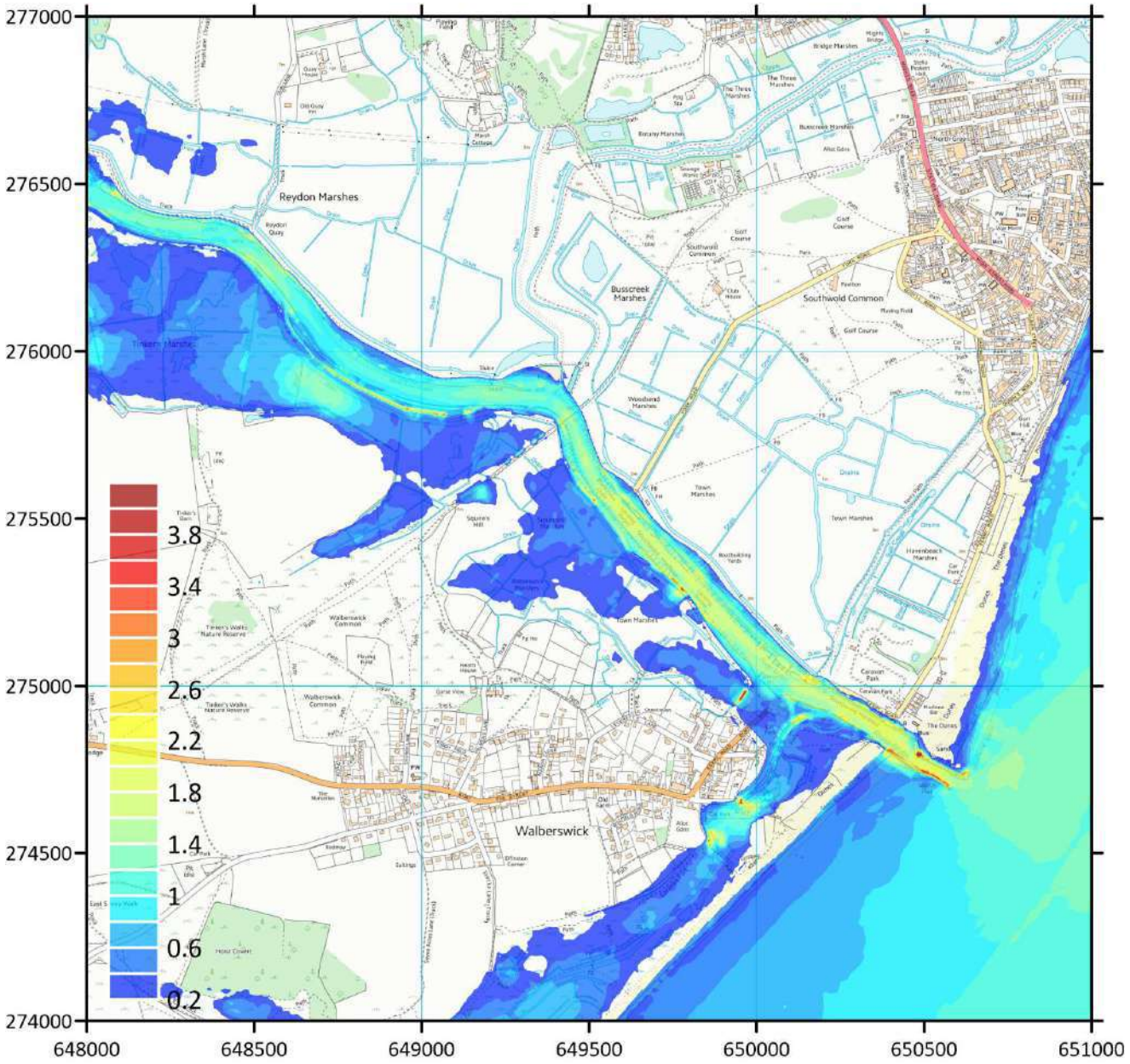
2013 event:
G3 – SMP Policy,
Narrow channel

2013 event:
E0 - Present-day estuary defences, marshes raised 300mm



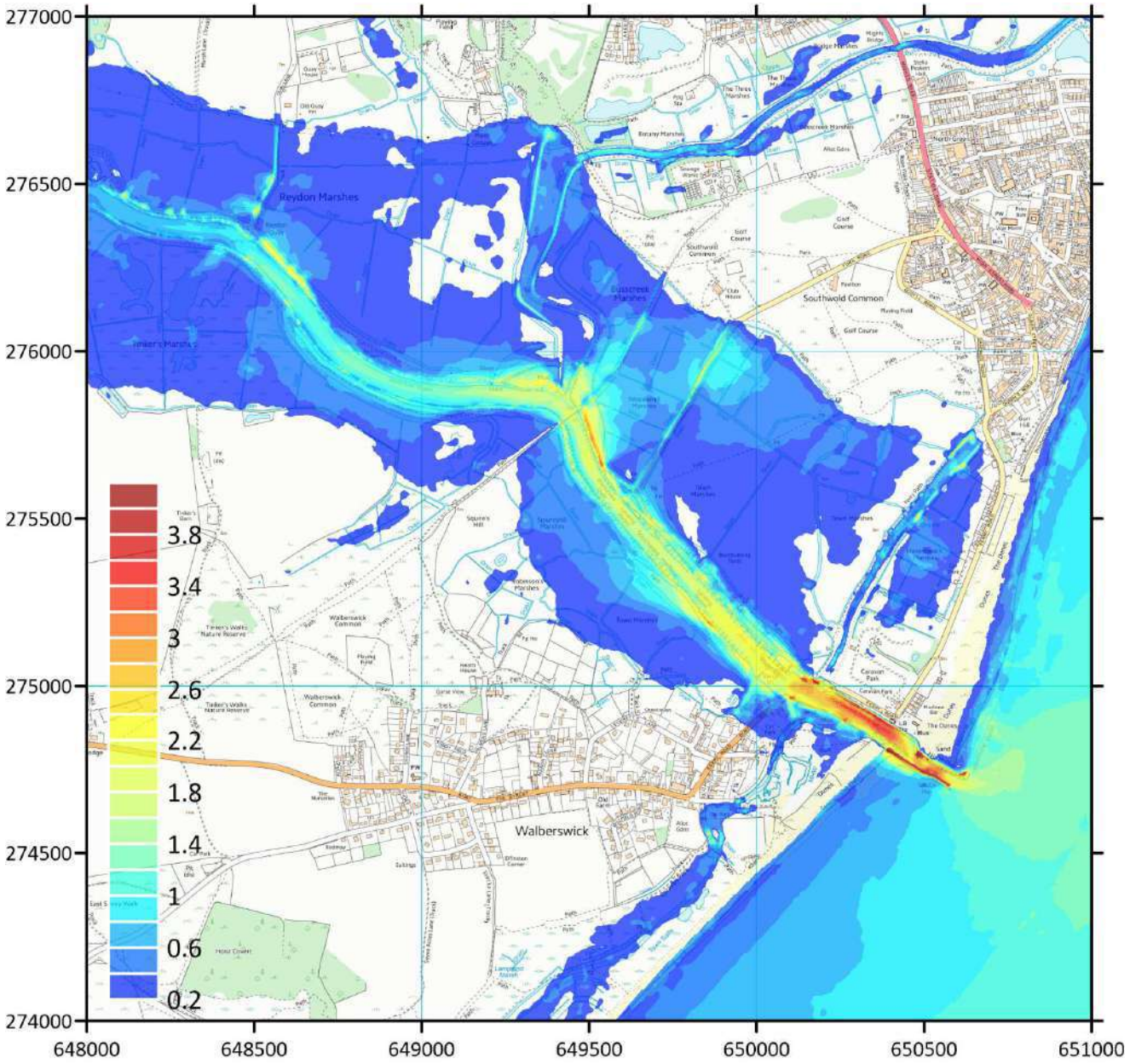
2013 event:
E0 - Present-day estuary defences, marshes raised 300mm

2013 event:
E0 - Present-day estuary defences, marshes raised 600mm



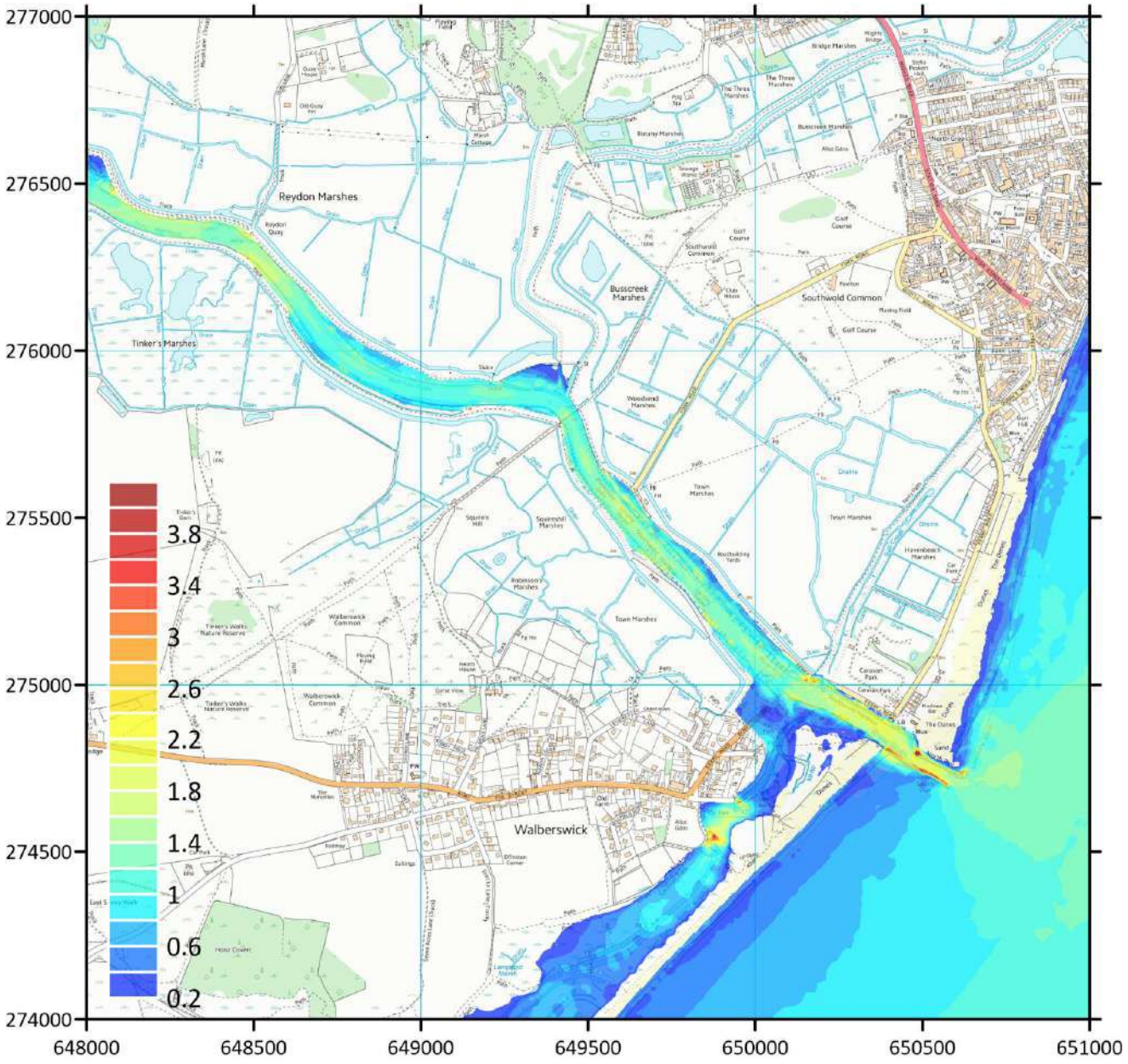
2013 event:
E0 - Present-day estuary defences, marshes raised 600mm

2013 event:
E1 – Do nothing,
marshes raised 300mm



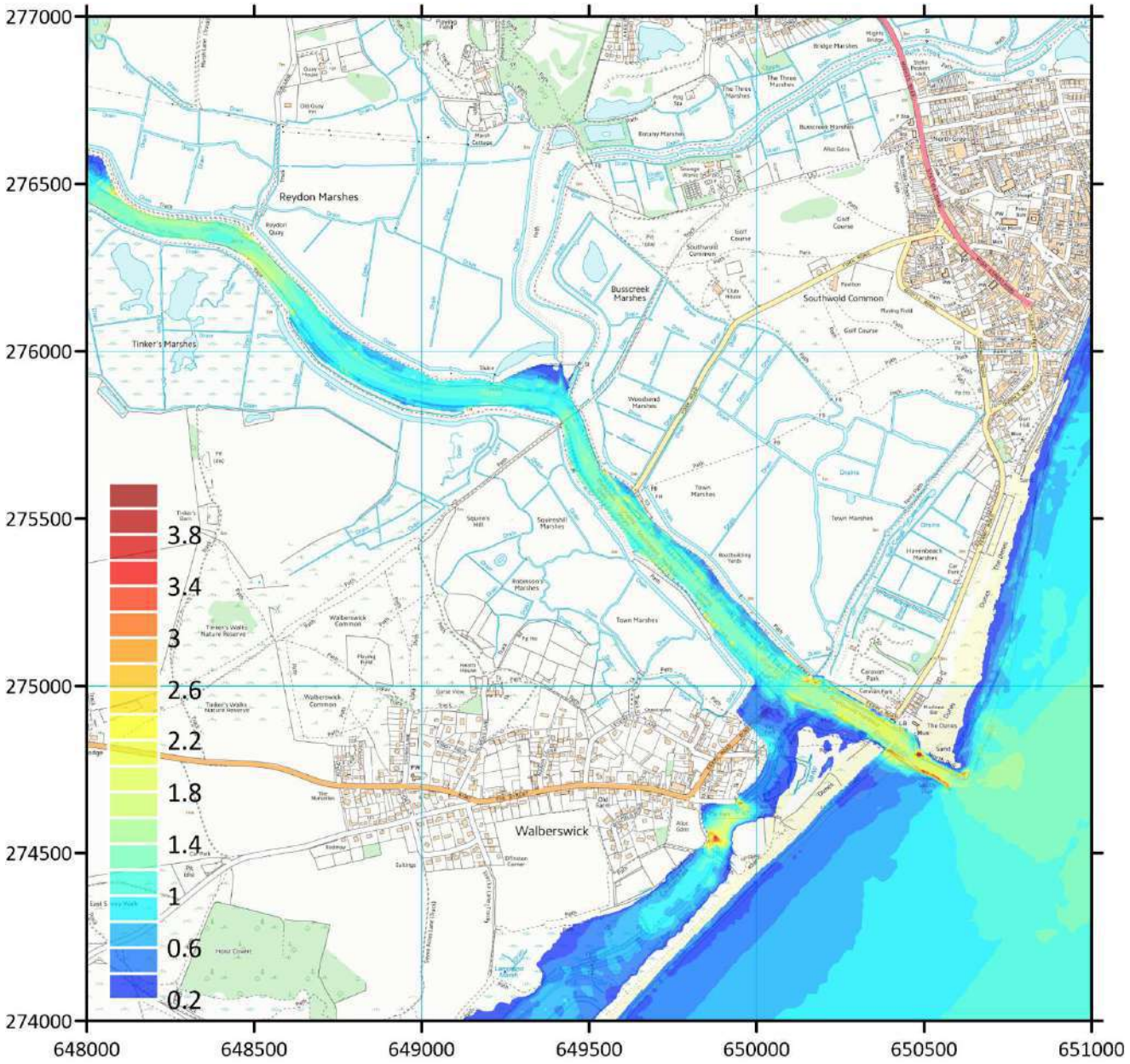
2013 event:
E1 – Do nothing,
marshes raised 300mm

2013 event:
E2 – Raise estuary defences,
marshes raised 300mm



2013 event:
E2 – Raise estuary defences,
marshes raised 300mm

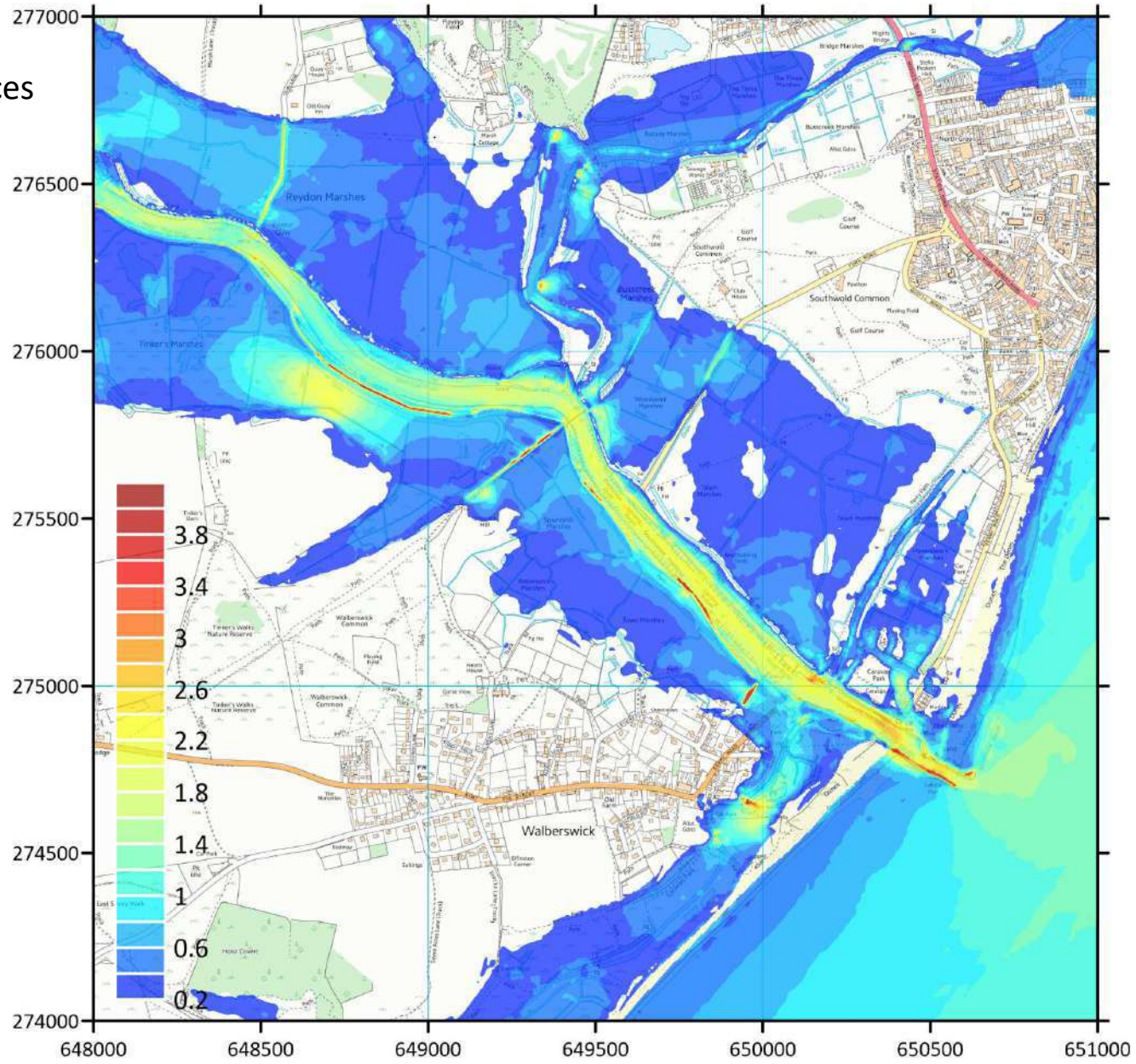
2013 event:
E2 – Raise estuary defences,
marshes raised 600mm



2013 event:
E2 – Raise estuary defences,
marshes raised 600mm

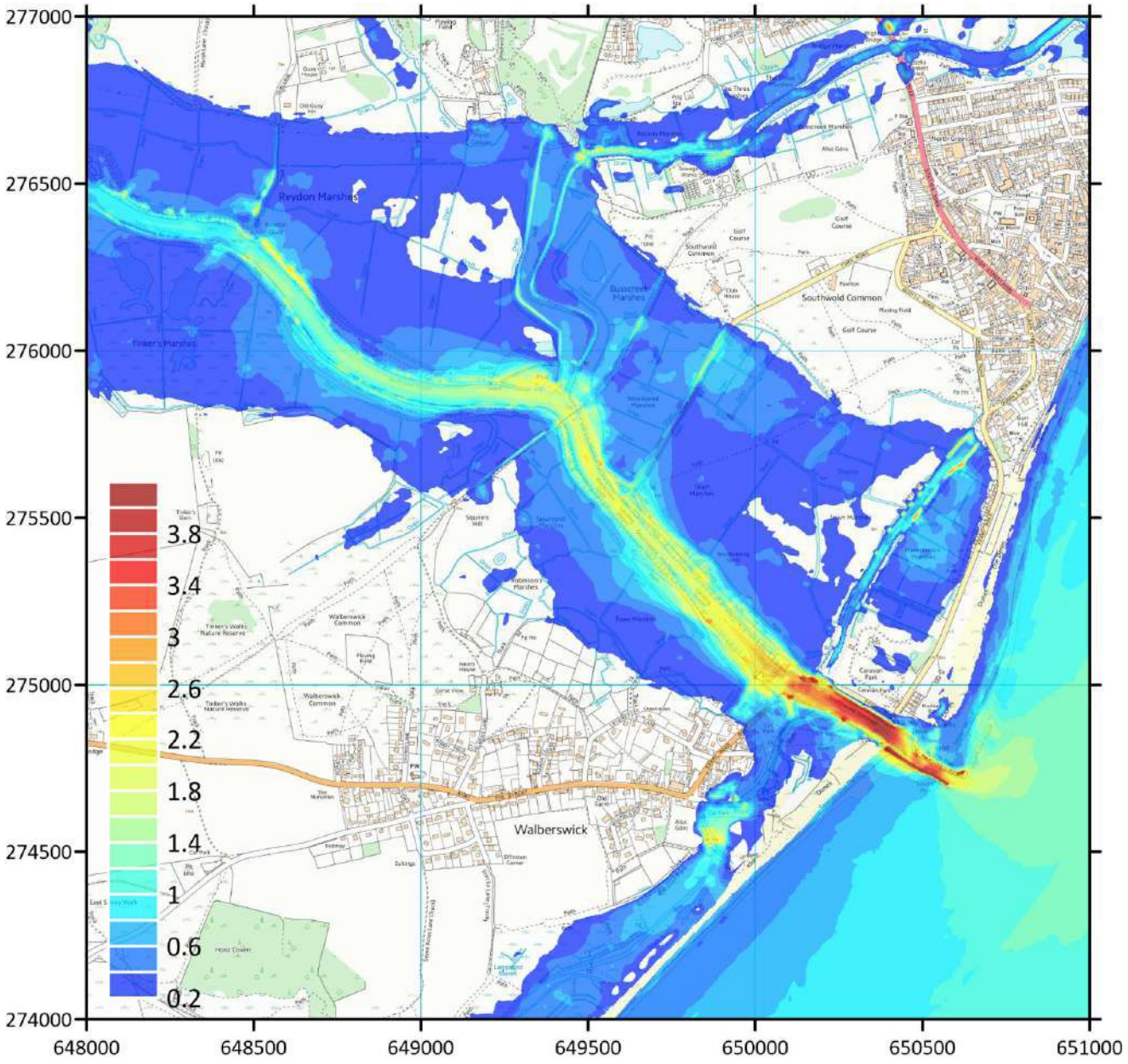
2013 event conditions in 2070
RCP8.5, 95%

2070 RCP8.5 (95%):
E0 – Present day defences



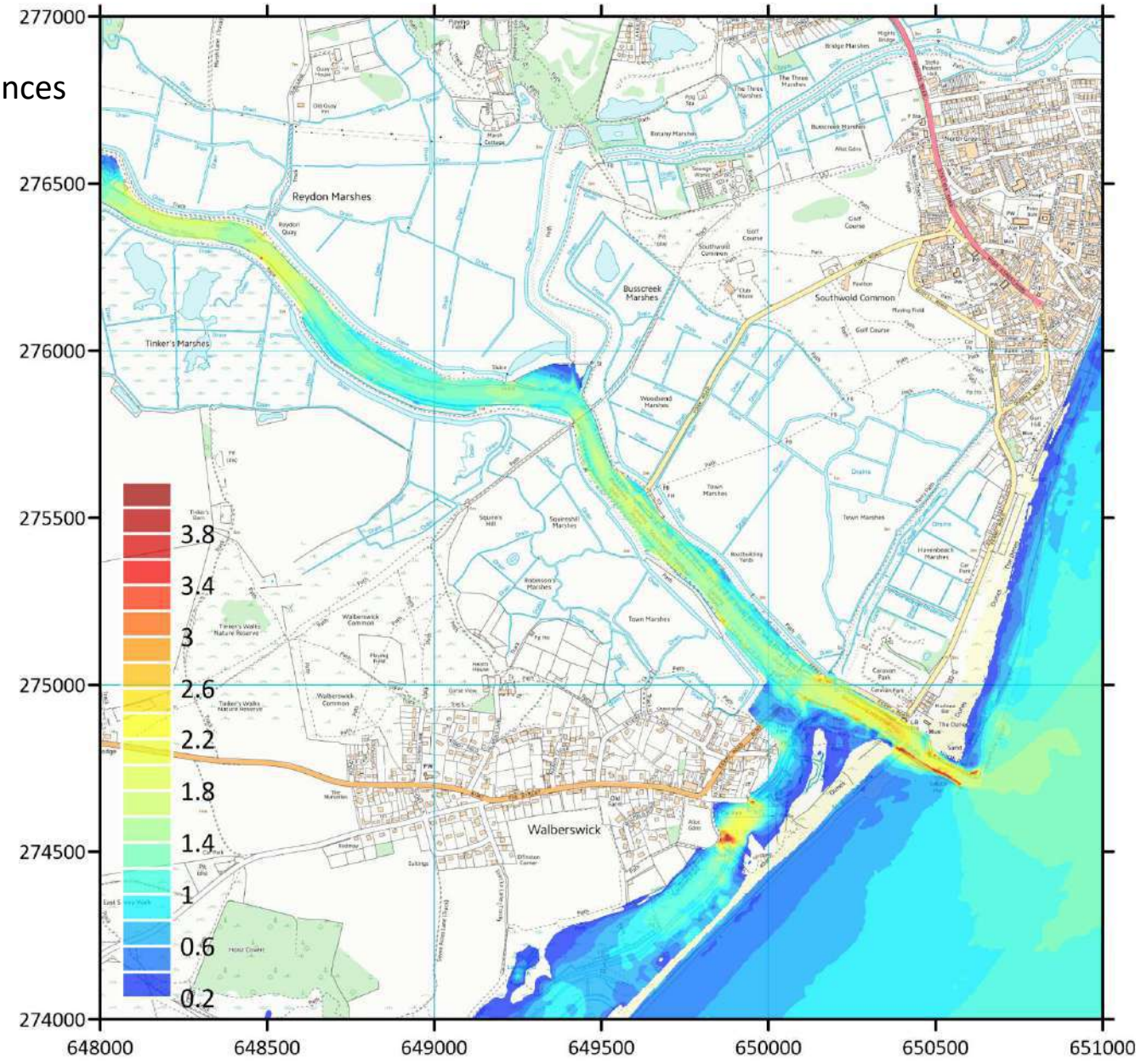
2070 RCP8.5 (95%):
E0 – Present day defences

2070 RCP8.5 (95%):
E1 – Do Nothing



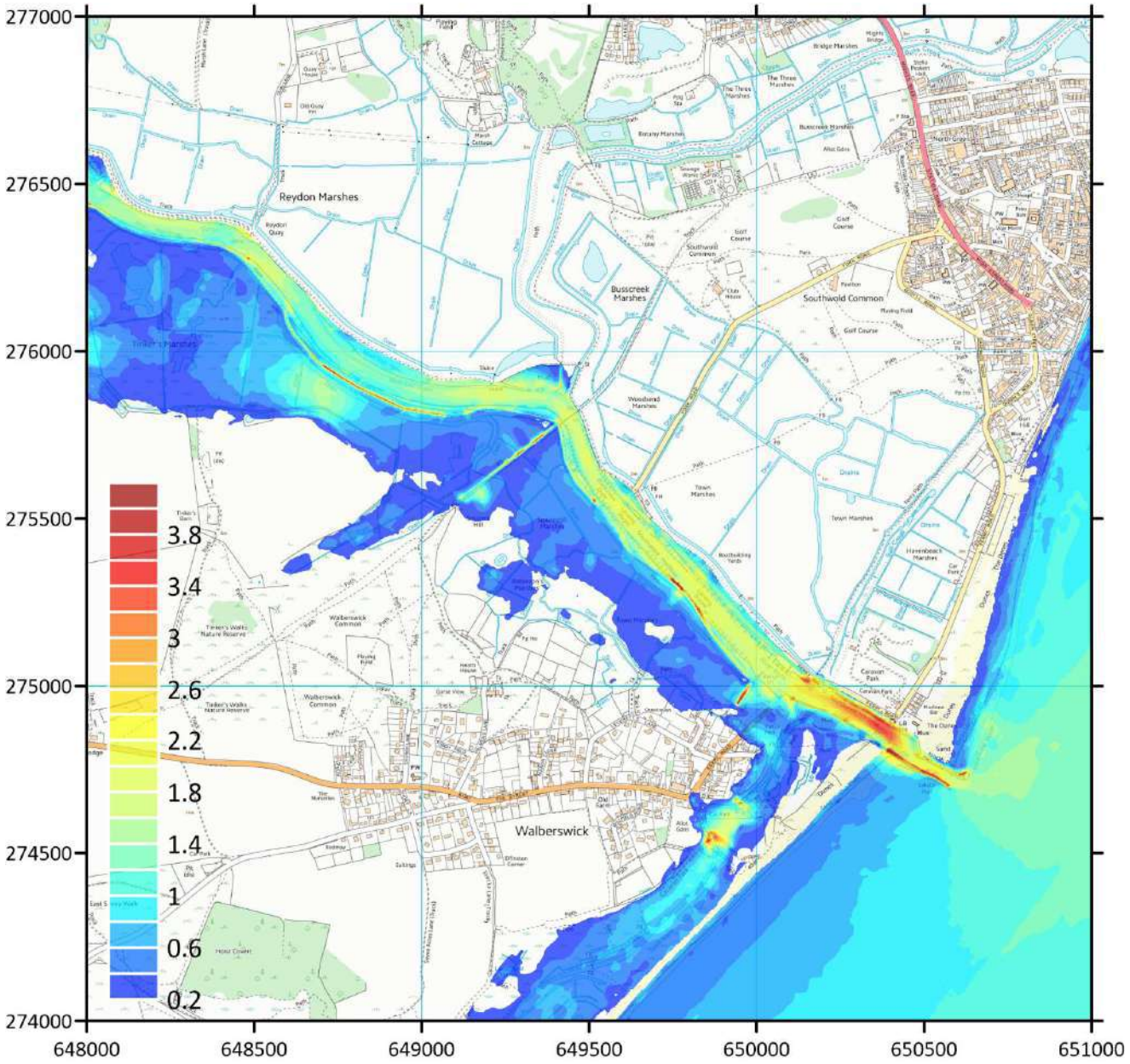
2070 RCP8.5 (95%):
E1 – Do Nothing

2070 RCP8.5 (95%):
E2 – Raise Estuary Defences



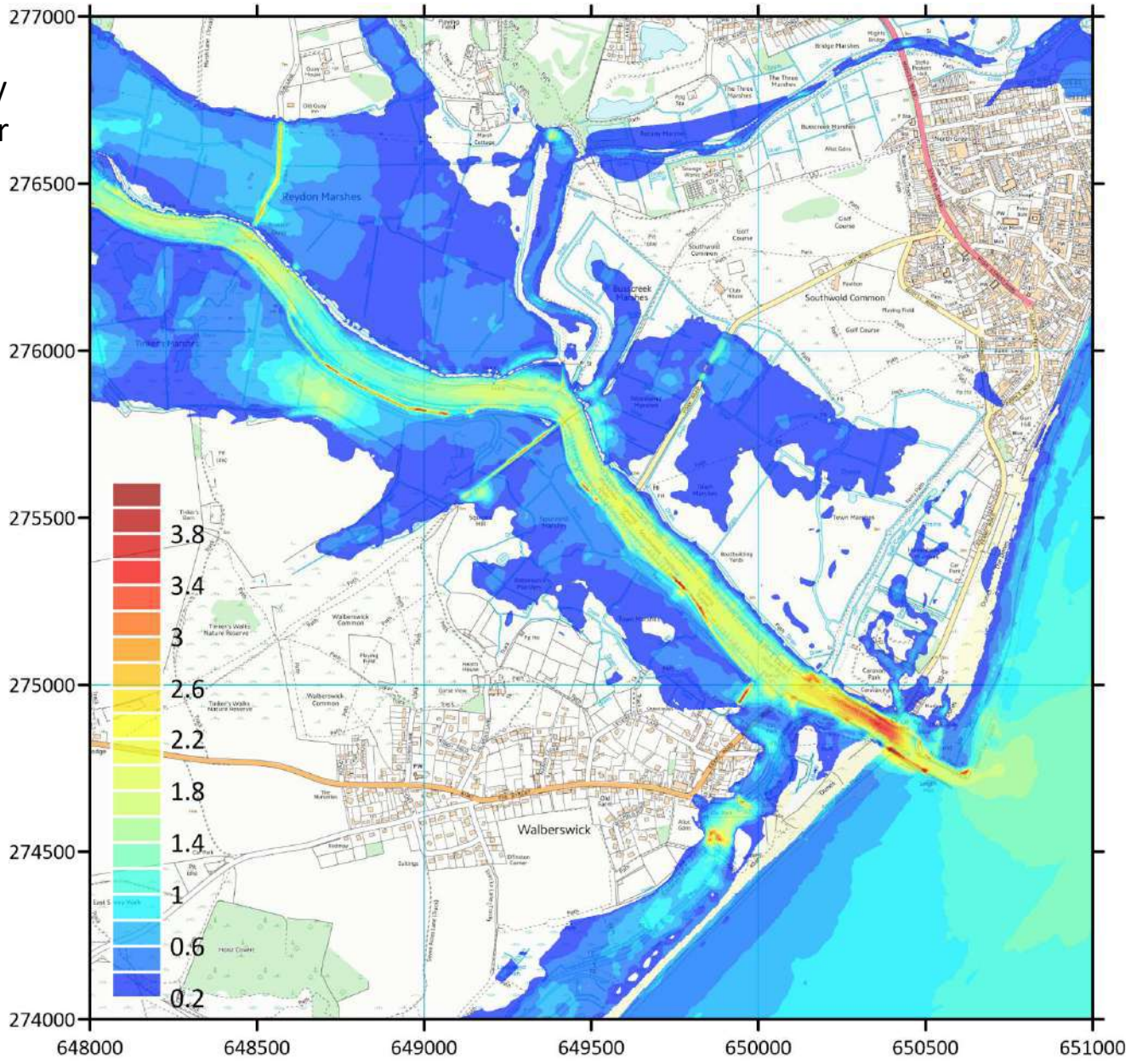
2070 RCP8.5 (95%):
E2 – Raise Estuary Defences

2070 RCP8.5 (95%):
E3 – SMP Policy
Raise N banks,
S banks overtopped



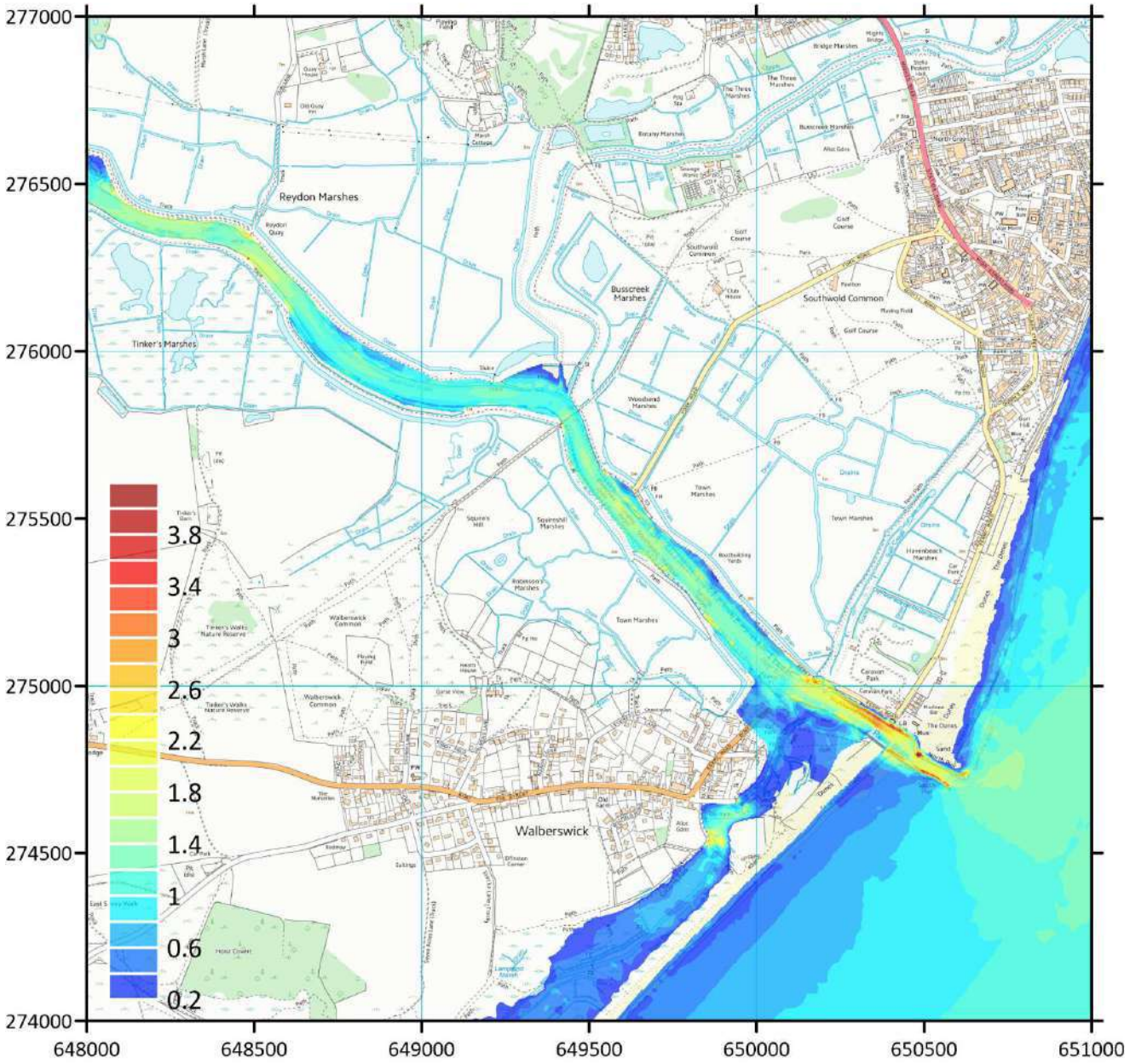
2070 RCP8.5 (95%):
E3 – SMP Policy
Raise N banks,
S banks overtopped

2070 RCP8.5 (95%):
H0 - Present day estuary defences, reduced S Pier



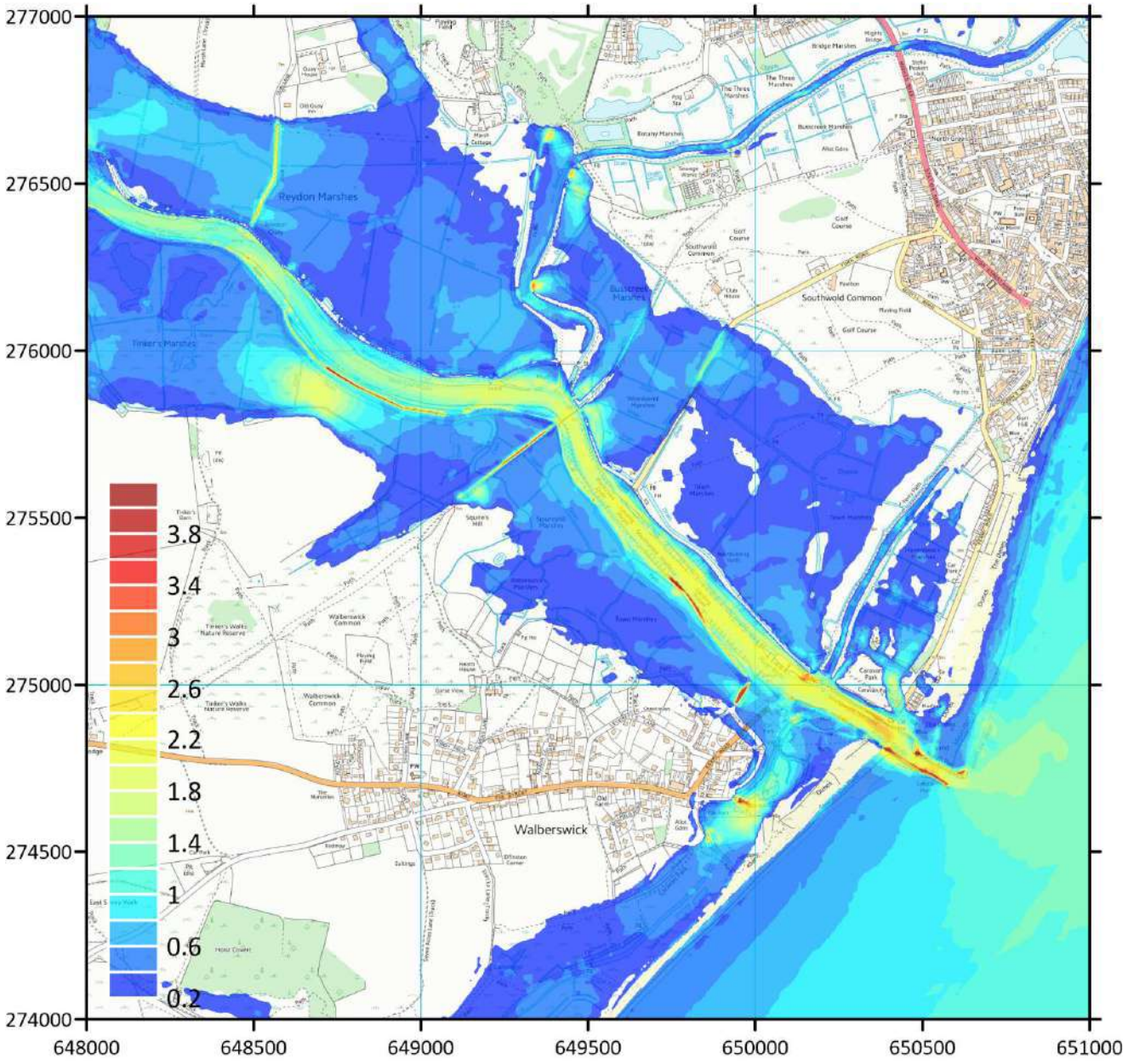
2070 RCP8.5 (95%):
H0 - Present day estuary defences, reduced S Pier

2070 RCP8.5 (95%): G2 – Raise estuary defences, narrow channel



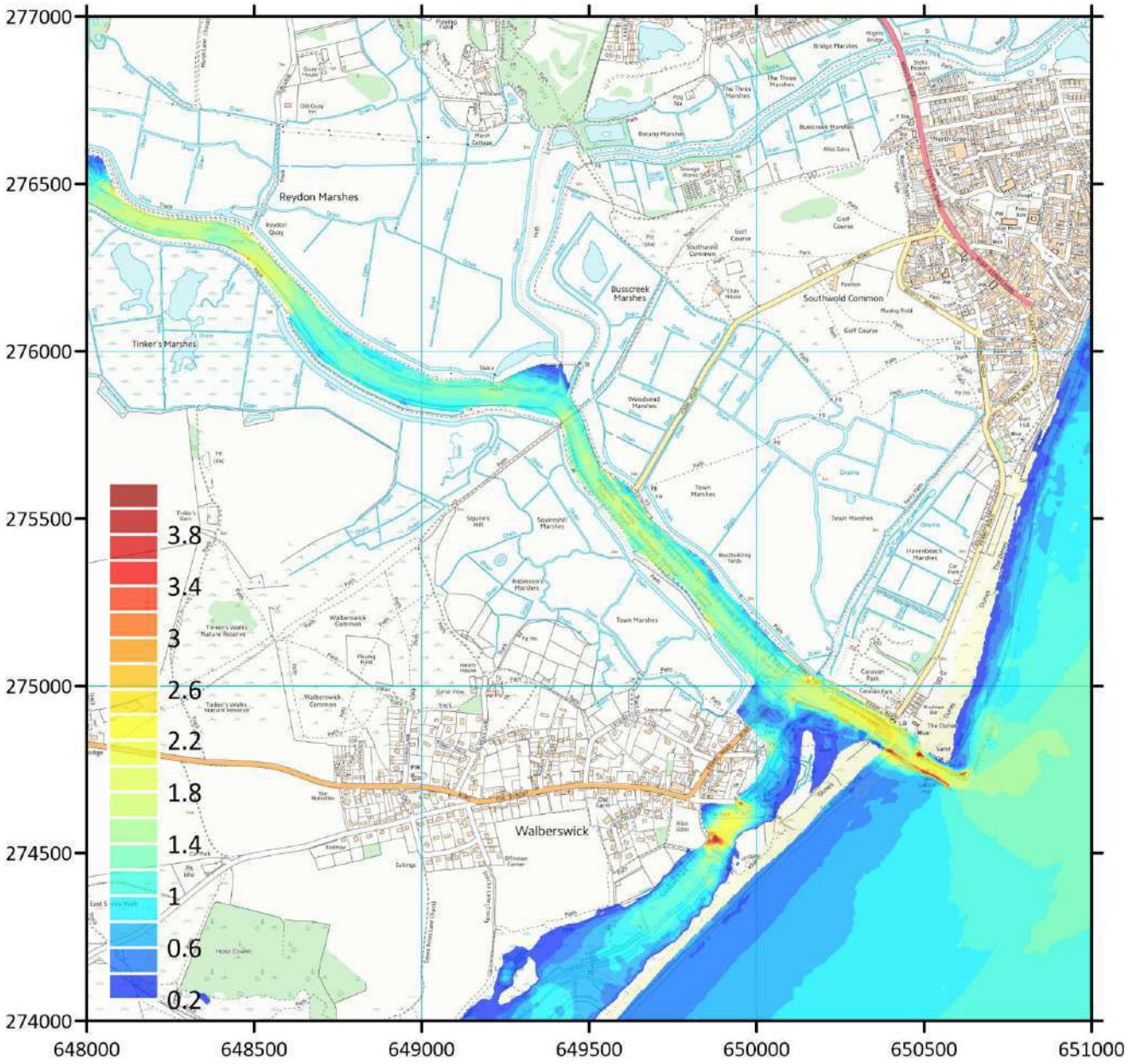
2070 RCP8.5 (95%): G2 – Raise estuary defences, narrow channel

2070 RCP8.5 (95%):
E0 – Present-day estuary defences, marshes raised 300mm



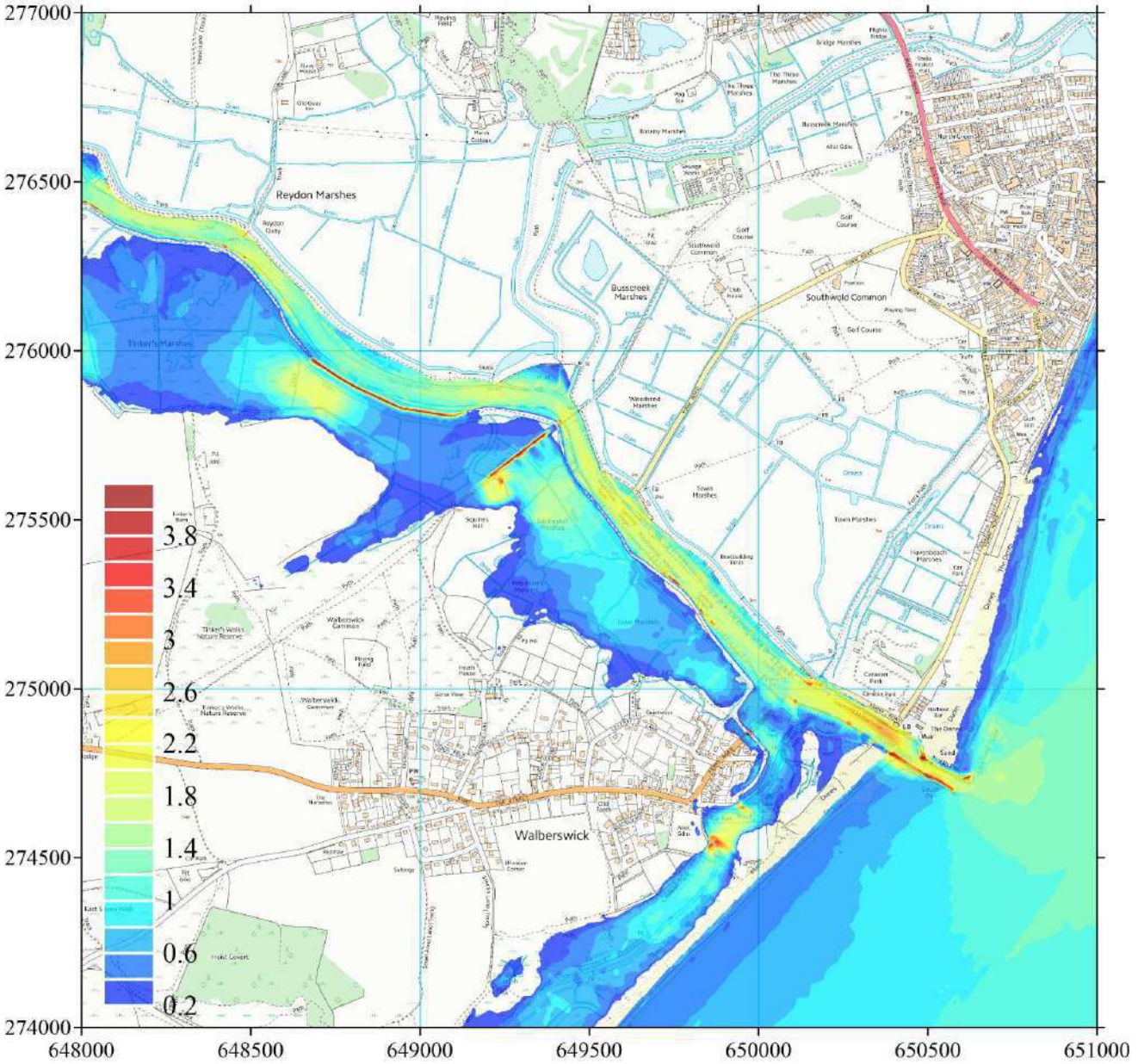
2070 RCP8.5 (95%):
E0 – Present-day estuary defences, marshes raised 300mm

2070 RCP8.5 (95%):
E2 – Raise estuary defences,
marshes raised 300mm



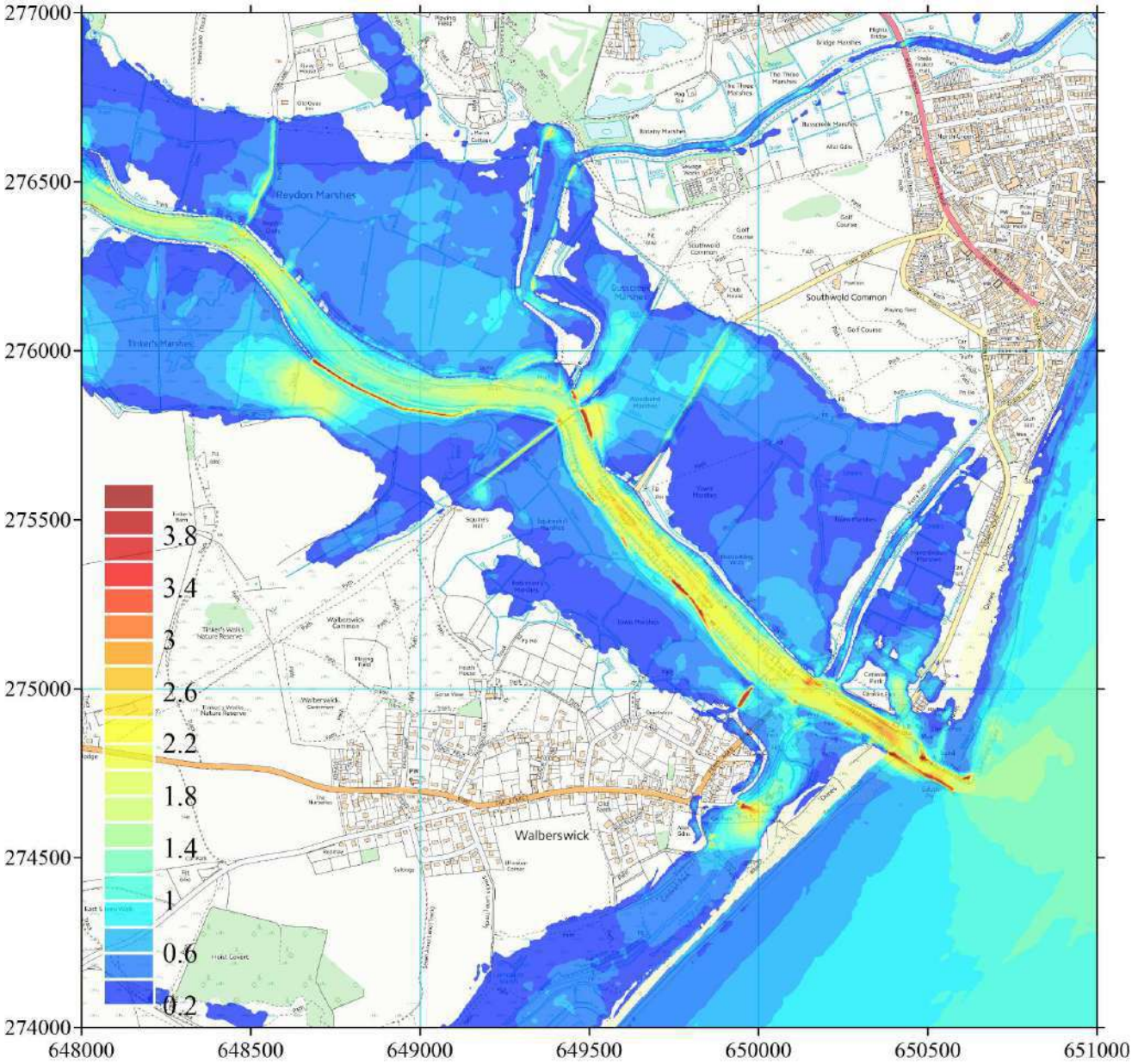
2070 RCP8.5 (95%):
E2 – Raise estuary defences,
marshes raised 300mm

2070 RCP8.5 (95%):
S5 - Raise defences + 500m passive spillway at 2.35mOD, Walberswick dunes defended



2070 RCP8.5 (95%):
S5 - Raise defences + 500m passive spillway at 2.35mOD, Walberswick dunes defended

2070 RCP8.5 (95%): S12U - Raise defences + 500m passive spillway at 2.00mOD, Walberswick dunes undefended



2070 RCP8.5 (95%): S12U - Raise defences + 500m passive spillway at 2.00mOD, Walberswick dunes undefended