
Development at 27 Clifton Road Littlehampton

Flood Risk Assessment

Client:

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REVISION HISTORY

Revision	Date	Details
00	13 th June 2022	First issue
01	5 th September 2022	Environment Agency pre-planning advice added and discussed
02	1 st May 2024	Report updated with flood modelling for new planning application
03	11 th December 2024	Minor amendment to Appendix H

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ABBREVIATIONS

AEP:	Annual exceedance probability
AOD:	Above Ordnance Datum
BGS:	British Geological Survey
CCA:	Climate change allowance
CDA:	Critical drainage area
FRA:	Flood risk assessment
HMO:	House in multiple occupation
LLFA:	Lead Local Flood Authority
LPA:	Local Planning Authority
NGR:	National Grid Reference
OS:	Ordnance Survey
OWC:	Ordinary watercourse
PPG:	Planning Practice Guidance
SFRA:	Strategic Flood Risk Assessment

1.0 INTRODUCTION AND BACKGROUND

- 1.1. JOC Consultants Ltd is instructed by Vitae Investments Ltd, (the Client), to prepare this flood risk assessment report in connection with a planning application to Arun District Council for a development at 27 Clifton Road, Littlehampton.
- 1.2. A previous planning application under reference LU/350/22/PL for the provision of 10 bedrooms, a shared kitchen and dining area, and a self-contained flat at ground floor level was refused on 19th December 2022.
- 1.3. An appeal under reference APP/C3810/W/23/3322319 against the refusal of planning permission was dismissed by the planning inspector on 1st November 2023.
- 1.4. Following the dismissal of the appeal the proposals for the ground floor have been modified and flood modelling has been carried out in order to assess flood risk at the site. In addition, there has been further consultation with the Environment Agency, seeking to address its outstanding concerns which were:
 - the absence of an internal staircase; and
 - the absence of data to allow an assessment of the effect of a breach in the flood defences.
- 1.5. These matters are addressed in this report.
- 1.6. References in this report to “the site” are references to the parts of 27 Clifton Road that are the subject of the planning application. Specific references to sources of information used in the report are shown in square brackets and are listed in section 9 and the appendices follow thereafter.
- 1.7. In the preparation of this FRA report, JOC Consultants Ltd has relied on published information, flood data provided by the Environment Agency and information provided by the Client and JOC Consultants Ltd accepts no liability for the accuracy or adequacy of that information or for the consequences of any changes to or re-assessment of that information in the future.
- 1.8. This report is prepared specifically for the Client and the report may not be used for any purpose other than for the purposes stated in paragraph 1.1 above and it may not be assigned to any third party without our written permission.

2.0 OBJECTIVES

2.1. The objectives of a site-specific flood risk assessment are stated in paragraph 020 of the Planning Practice Guidance for flood risk and coastal change. The guidance states the objectives are to establish:

- *‘whether the development is likely to be affected by current or future flooding from any source;*
- *whether it will increase flood risk elsewhere;*
- *whether the measures proposed to deal with these effects are appropriate;*
- *the evidence for the local planning authority to apply (if necessary) the Sequential Test, and;*
- *whether the development will be safe and pass the Exception Test, if applicable’.*

3.0 PLANNING POLICY AND GUIDANCE ON FLOOD RISK

3.1 National Policy

3.1.1. National Planning Policy in relation to flood risk is set out in the National Planning Policy Framework (NPPF) [2].

3.2 Local Policy

3.2.1. Local policy is defined in the Arun Local Plan 2011 – 2031 adopted on 18th July 2018 [3]. Policy W DM2 defines the criteria that must be satisfied if planning permission is to be granted to applications for development in areas at risk of flooding.

3.2.2. Local policy on development and flood risk is informed by the Level 1 and Level 2 Strategic Flood Risk Assessment (SFRA), [4]. Reference to the SFRA is made in subsequent sections of this report.

3.3 Planning Practice Guidance

3.3.1. In addition to national and local policy, the Planning Practice Guidance for Flood Risk and Coastal Change [1] provides advice to planning authorities to assist them when considering planning applications in areas at risk of flooding. The Environment Agency Standing Advice

[5] also provides guidance to local planning authorities when considering planning applications in areas at risk of flooding.

3.3.2. This report has been prepared with reference to the above guidance.

4.0 LOCATION AND DESCRIPTION OF THE SITE

- 4.1. The site is located in Clifton Road and is shown outlined in red in Figure 1, following page 19. The coordinates at the approximate centre of the site are: 502800, 101930.
- 4.2. The site is located at the ground floor of a house in multiple occupation. Access to the building is from Clifton Road.
- 4.3. The gross site area amounts to approximately 0.04ha.
- 4.4. The site is within the Littlehampton Economic Growth Area, as defined in Figure 12-1 of the SFRA.
- 4.5. The site is in Flood Zone 3 as shown in the Flood Map for Planning in Appendix A. The site is also within the Environment Agency flood warning or alert area: *Littlehampton East Bank*.
- 4.6. Ground levels, determined by topographical survey, are in the range 2.05m to 2.19m AOD across the frontage of the building in Clifton Road (the east elevation). The survey also shows the existing ground floor level to be at least 2.14m AOD. The topographical survey is provided in Appendix B.
- 4.7. The existing first floor level is 3.05m above the ground floor level and is therefore 5.19m AOD.

5.0 THE PROPOSED DEVELOPMENT

- 5.1. It is proposed to modify the ground floor of the building by raising the floor level by 600mm to 2.74m AOD and providing 10 bedrooms, a shared kitchen and dining area, and a self-contained flat at ground floor level. In addition, it is necessary to reduce the size of the first floor office in order to create space for the proposed internal staircase which will provide a safe route to the first floor should flooding occur in the future.
- 5.2. The development plans are provided in Appendix C.

- 5.3. The proposed development is classified as **More Vulnerable** in accordance with paragraph 066 of the Planning Practice Guidance, Table 2.

6.0 FLOOD RISK

6.1 Pre planning consultation with the Environment Agency

- 6.1.1. A pre-planning consultation meeting was held with the Environment Agency on 8th February 2024 at which the revised proposals for the development were discussed.
- 6.1.2. As stated in section 5 above, an internal staircase is now proposed.
- 6.1.3. In order to address uncertainties in the previous version of this FRA report due to lack of data, JBA Consulting was commissioned to update and re-run the Environment Agency's 2017 River Arun model. The JBA report is provided in Appendix D and is the most up to date source of data available for this FRA.

6.2 Design flood level

- 6.2.1. In accordance with paragraph 002 of the Planning Practice Guidance for flood risk and coastal change, the Design Flood Level is the 0.5% AEP tidal flood level at the site, including an allowance for climate change over the lifetime of the development. Events which exceed this are assessed as residual risks in section 7.3 of this report. The 0.5% AEP flood level in 2124 is provided in paragraph 6.5.4 below.

6.3 Existing flood defences

- 6.3.1. The coastal defence consists of a raised shingle beach and a 'hard' promenade behind which is Sea Road, the B2140. The initial line of defence is the shingle beach which absorbs wave energy and provides height, relative to sea level. Although the shingle can be displaced in a severe storm, the promenade and the B2140 provide a second line of defence which is not likely to be breached.
- 6.3.2. The SFRA notes at section 6.4 that the coastal frontage between the River Arun in Littlehampton and Sea Lane in Ferring is maintained by Arun District Council. Paragraph 6.4.1 of the SFRA cites the Rivers Arun to Adur flood and erosion management strategy which describes the coastal frontage between these rivers as '*a raised shingle defence which*

provides coastal protection and a measure of flood protection'. The SFRA at paragraph 6.4 states:

'The coastline is protected by shingle beaches, and the majority of the coastal defences offer a standard of protection from an event with an annual probability of 1 in 200 and are of 'Good' to 'Fair' condition grade.'

- 6.3.3. The crest level of the sea wall at Littlehampton is 5.22m AOD.
- 6.3.4. In addition to the coastal defences, there is a flood defence wall along the left bank of the River Arun. This comprises a steel sheet piled wall with a raised promenade and concrete wall. In order to provide accurate data for the JBA model, the top level of the wall was surveyed between Arun Parade and the footbridge at Wharfe Road. The results of the survey points with their coordinates are provided in Appendix E.
- 6.3.5. The survey shows that the flood defence level is in the range 3.99m to 5.29m AOD.

6.4 History of Flooding

- 6.4.1. Littlehampton has experienced flooding in the past. The SFRA at section 5.1 notes that a tidal surge in February 1983 caused flooding of more than 150 properties and in June 2021 85 properties were flooded in the South Terrace area. The Historic Flooding Records Map in Appendix E of the SFRA shows Clifton Road to have been unaffected by fluvial, tidal, coastal or surface water flooding.

6.5 Risk of tidal or fluvial flooding

- 6.5.1. The JBA flood risk modelling report considered the following scenarios:
 - Defended 0.5% AEP and 0.1% AEP in 2024;
 - Defended 0.5% AEP climate change scenarios in 2124;
 - Undefended 0.5% AEP and 0.1% AEP;
 - Breach of floodwall: 0.5% AEP in 2024; and
 - Breach of floodwall: 0.5% AEP climate change scenario in 2124.
- 6.5.2. The estimated mean sea levels at Littlehampton have been updated in accordance with current climate change guidance, as described in the JBA report. The present day and future sea levels are sated in Table 2-1 of the JBA report.

6.5.3. The report confirms that flood risk at the site is dominated by still water flooding from the River Arun.

6.5.4. The model results are shown in Table 3-1 of the JBA report. The flood levels vary across the site but the levels at model nodes 7, 15 41 and 50 are shown in Table 3-1. The model demonstrates:

Defended scenarios

- 0.5% AEP 2024: No flooding
- 0.1% AEP 2024: maximum flood level: 2.25m AOD
- 0.5% AEP: 2124 maximum flood level: 4.71m AOD

Undefended scenarios

- 0.5% AEP 2024: maximum flood level: 2.38m AOD
- 0.1% AEP 2024: maximum flood level: 2.62m AOD

Breach scenarios

- 0.5% AEP 2024: No flooding
- 0.5% AEP 2124: max flood level: 4.73m AOD.

6.5.5. It is evident from the model results that the site, like the wider area in Littlehampton, relies on the River Arun floodwall for its protection from flooding and unless the flood defence is raised in the future, in response to climate change, there is a risk of flooding to a depth up to 2.65m and a flood level of 4.71m AOD in the Design Flood Event of 0.5% AEP including climate change effects.

6.5.6. In the event that there is a breach in the flood defence wall, the site would be unaffected in the present day, but would be at risk of flooding to a depth of up to 2.67m with a flood level of 4.73m AOD in 2124, taking future sea level rise into account.

6.6 Risk of surface water flooding

6.6.1. The surface water flood maps in Appendix F show no flooding at the site in a high risk event (AEP greater than 3.3%), or in a medium risk event (AEP: 1% to 3.3%), but flooding in Clifton

Road is indicated. In a low risk event (AEP: 0.1% to 1%), surface water flooding is indicated to depths exceeding 300mm at the site and in Clifton Road. The indicated depth range is 300mm to 900mm, but as this flooding is immediately adjacent to an area where the depth is indicated to be less than 300mm, it is reasonable to conclude that the depth in the road is only marginally above 300mm as it could not physically be contained to a significantly greater depth.

6.7 Risk of sewer flooding

- 6.7.1. Sewer flooding can occur when the capacity of the sewerage system is exceeded or when there is a blockage, causing the flow to back-up and the water level to rise upstream. This type of flooding is related to surface water flooding as the runoff from intense rainfall can exceed the flow capacity of the system. Sewers normally have capacity to contain the runoff from rainfall events with an annual probability of 3.3% or more, and any flooding usually occurs at the lowest gullies or manholes on the system. The risk of this type of flooding in Clifton Road is assessed to be low to medium.

6.8 Risk of groundwater flooding

- 6.8.1. Groundwater flooding of land occurs when the water table rises above the ground surface or enters basements and is typically associated with permeable rock such as chalk and low-lying valley areas. The map of areas susceptible to groundwater flooding in Appendix F of the SFRA shows the site to be in an area where there is a greater than 75% chance of groundwater emergence. Given that the urban area around the site is largely impermeable however, groundwater flooding is unlikely be a significant problem to the development in comparison with the risks of fluvial and tidal flooding.

6.9 Risk of flooding from reservoirs and canals

- 6.9.1. The Environment Agency flood map for reservoirs shows the site is not within an area that would be affected due to the uncontrolled release of water from reservoirs (see Appendix G).
- 6.9.2. The site is not at risk of flooding from canals.

6.10 Effect of the development on flood risk

- 6.10.1. The development will result in no loss of floodplain storage and will have no effect on the risks of fluvial or tidal flooding in the wider area.

6.10.2. The development will not increase the existing impermeable area of the site and will not therefore have any effect on surface water run-off rates or volumes. It will not therefore have any effect on the risk of surface water flooding in the wider area.

6.10.3. The development will have no effect on the risks of flooding from sewerage, groundwater, reservoirs or canal sources.

6.11 Effects of climate change

6.11.1. The site is in the Arun and Western Streams management catchment and climate change must be considered over the expected lifetime of the development. Paragraph 006 of the Planning Practice Guidance for flood risk and coastal change recommends a lifetime of 100 years for residential development, so climate change must be considered up to 2124.

6.11.2. The effects of climate change on sea levels and River Arun levels have been considered in the JBA report and the results are also provided in section 6.5 above.

6.11.3. The effect of climate change on rainfall is predicted to increase peak rainfall intensities by up to 45% over the lifetime of the development. This is likely to increase the frequency of surface water flooding in the future.

8.0 FLOOD RISK MANAGEMENT

8.1 Fluvial flood risk

7.1.1. The design flood level is the 0.5% AEP event including the effect of climate change over the lifetime of the development. The model predicts this flood level to be 4.71m AOD at the site with the flood defences at their existing level. As it is not practicable to raise the ground floor level by more than 600mm, the design flood level will therefore be 1.97m above the proposed finished floor level of 2.74m AOD and 0.48m below the first floor level.

7.1.2. It is highly unlikely that the defences will not be raised in response to climate change in the future, but this cannot be guaranteed. The internal staircase however, will provide access to a place of safety at first floor level should the defences remain at their existing level throughout the lifetime of the development. This approach to flood risk management was accepted at a nearby similar development involving ground floor bedrooms at 125 Bayford Road, which is the next street east of Clifton Road and which is at a similar risk of flooding. Planning permission for that development was granted under reference LU/13/21/PL.

- 7.1.3. In view of the future risk of flooding to the ground floor it is recommended that the ground floor is converted using flood resilient construction methods and materials up to at least the predicted breach flood level of 4.73m AOD.
- 7.1.4. Notwithstanding the protection provided by the flood defences, it is recommended that the management of the HMO registers with the free flood warning service provided by the Environment Agency. It is understood that there will be a resident site manager present at all times.
- 7.1.5. A flood emergency action plan was prepared for the previous planning application. This has been updated and is provided in Appendix H. It is recommended that the plan is made available within the HMO.

8.2 Surface water flood risk

- 7.2.1. The recommended finished ground floor level of 2.74m AOD will provide approximately 300mm of freeboard above the estimated surface water flood level.

8.3 Residual flood risks

- 7.3.1. Residual risks are those that remain after the implementation of the flood risk management measures to mitigate the risk from the Design Flood. These include the risk of an event greater than the design flood event; the risk of a breach in the flood defences; and the risk that the flood defences might not be raised in the future in response to climate change.

The 0.1% AEP event

- 7.3.2. The 0.1% AEP flood level at the site is predicted to be 2.25m AOD. This would be 0.49m below the proposed ground floor level.

Breach events

- 7.3.3. In the event of a breach in the River Arun floodwall the 0.5% AEP flood level at the site in 2124 is predicted to be 4.73m AOD, which would be 0.46m below the level of the first floor safe refuge area. This is the worst case scenario, based on the 95th percentile climate change prediction.

Risk of flood defences not being raised in the future

- 7.3.4. This risk is addressed in paragraph 7.12 above.

- 7.3.5. It is not considered necessary to procure flood exclusion barriers at this stage, as these would not be required until the latter part of the lifetime of the development, by which time it will be known if the flood defences have, or have not been raised.

Cross section showing relative levels

- 7.3.6. A schematic cross section showing the proposed FFL, the flood defence levels and the 0.5% AEP predicted flood level in 2124 is provided in Appendix I.

9.0 THE SEQUENTIAL TEST AND EXCEPTION TEST

9.1 The Sequential Test

- 8.1.1. As the proposed development is a change of use of an existing building, the Sequential Test is not required, in accordance with the NPPF.

9.2 The Exception Test

- 8.2.1. The NPPF states at paragraph 160 that, for the Exception Test to be passed, it should be demonstrated that:
- the development would provide wider sustainability benefits to the community that outweigh flood risk; and
 - the development will be safe for its lifetime, taking into account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
- 8.2.2. The development is in a sustainable location with local amenities and transport links within walking distance. It will provide much needed housing accommodation in Littlehampton and it is therefore considered that, given the protection provided by the flood defences and the low risk of flooding in the future, the risks of flooding is outweighed by the benefits that the development will bring to the local area. It therefore is considered that the development passes this part of the test.
- 8.2.3. Although there is a risk of flooding if the flood defences are not raised during the lifetime of the development, the provision of an internal staircase to a place of safety and the implementation of the recommendations in section 7.0 will ensure the development will be safe during its lifetime. As the development will have no effect on flood levels, there will be no increase in

flood risk elsewhere. Accordingly, it is considered that the development passes the second part of the Exception test.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

- 9.1.1. The use of the site for residential accommodation places the site in the 'More Vulnerable' category, in accordance with Annex 3 of the NPPF.
- 9.1.2. The site is in flood zone 3a, but is protected by flood defences which reduce the annual probability of fluvial and tidal flooding to less than 0.5% in the present day. It is highly likely that flood defences will be raised in the future, in response to climate change, but this cannot be guaranteed. If the defences are not raised, there is a risk of flooding to an internal depth of up to 1.99m above the proposed finished ground floor level by 2124 in the worst case breach scenario. The internal staircase however will provide access to a place of safety at the first floor which would not be affected by the flooding.
- 9.1.3. The site is at a medium risk of surface water (pluvial) flooding which indicates an annual probability in the range 1% to 3.3%. The flood depth is indicated to be at around 300mm but could slightly exceed this.
- 9.1.4. The risk of sewer flooding is assessed to be low to medium and groundwater flooding is not considered to be a significant risk, given the extent of impermeable area around the site.
- 9.1.5. The site is not at risk from an uncontrolled release of water from reservoirs or canals.
- 9.1.6. The effects of climate change are predicted to increase flood levels at the site to 4.73m AOD in the worst case scenario.
- 9.1.7. As the development is for a change of use, the Sequential Test does not need to be applied.
- 9.1.8. It is concluded that the proposals for the development and the implementation of the flood risk management recommendations in section 7 of this report will make the development safe for its lifetime. The development is in a sustainable location and will contribute to the need for housing accommodation in Littlehampton. It is therefore considered that the risks of flooding are outweighed by urgent need for the type of accommodation proposed by the development. Accordingly, it is considered that the development passes the Exception Test.

10.2 Recommendations

- 9.2.1. It is recommended that the flood risk management measures stated in section 7 of this report are implemented prior to occupation of the development for residential use.

11.0 REFERENCES

1. Planning Practice Guidance: Flood Risk and Coastal Change. Updated 25th August 2022. Department for Levelling Up, Housing and Communities and Ministry of Housing and Local Government.
2. National Planning Policy Framework. Department for Communities and Local Government. Updated 20th December 2023.
3. Arun Local Plan – 2011 to 2031, adopted on 18th July 2018.
4. Arun and Worthing Level 1 and Level 2 Strategic Flood Risk Assessment, July 2000.
5. Environment Agency Standing Advice to local planning authorities. April 2015, updated 8th February 2022.
6. Arun to Adur Flood Modelling Draft Report, JBA Consulting 2012.
7. Flood risk assessments: climate change allowances. Environment Agency, 19th February 2016, updated 27th May 2022.

27 Clifton Road, Littlehampton, BN17 5TE



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Plotted Scale - 1:4000. Paper Size - A4

Promap
LANDMARK INFORMATION

Figure 1: Location Plan

APPENDIX A

Flood Map for Planning

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
502799/101928

Created
26 Apr 2024 15:16

**Your selected location is in flood zone 3
– an area with a high probability of flooding.**

This means:

- you may need to complete a flood risk assessment for development in this area
- you should ask the Environment Agency about the level of flood protection at your location and request a Flood Defence Breach Hazard Map (You can email the Environment Agency at: enquiries@environment-agency.gov.uk)
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (find out more at www.gov.uk/guidance/flood-risk-assessment-standing-advice)

Notes

The flood map for planning shows river and sea flooding data only. It doesn't include other sources of flooding. It is for use in development planning and flood risk assessments.

This information relates to the selected location and is not specific to any property within it. The map is updated regularly and is correct at the time of printing.

Flood risk data is covered by the Open Government Licence which sets out the terms and conditions for using government data. <https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/>

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Flood map for planning

Your reference

<Unspecified>

Location (easting/northing)

502799/101928

Scale

1:2500

Created

26 Apr 2024 15:16

Selected area

Flood zone 3

Flood zone 2

Flood zone 1

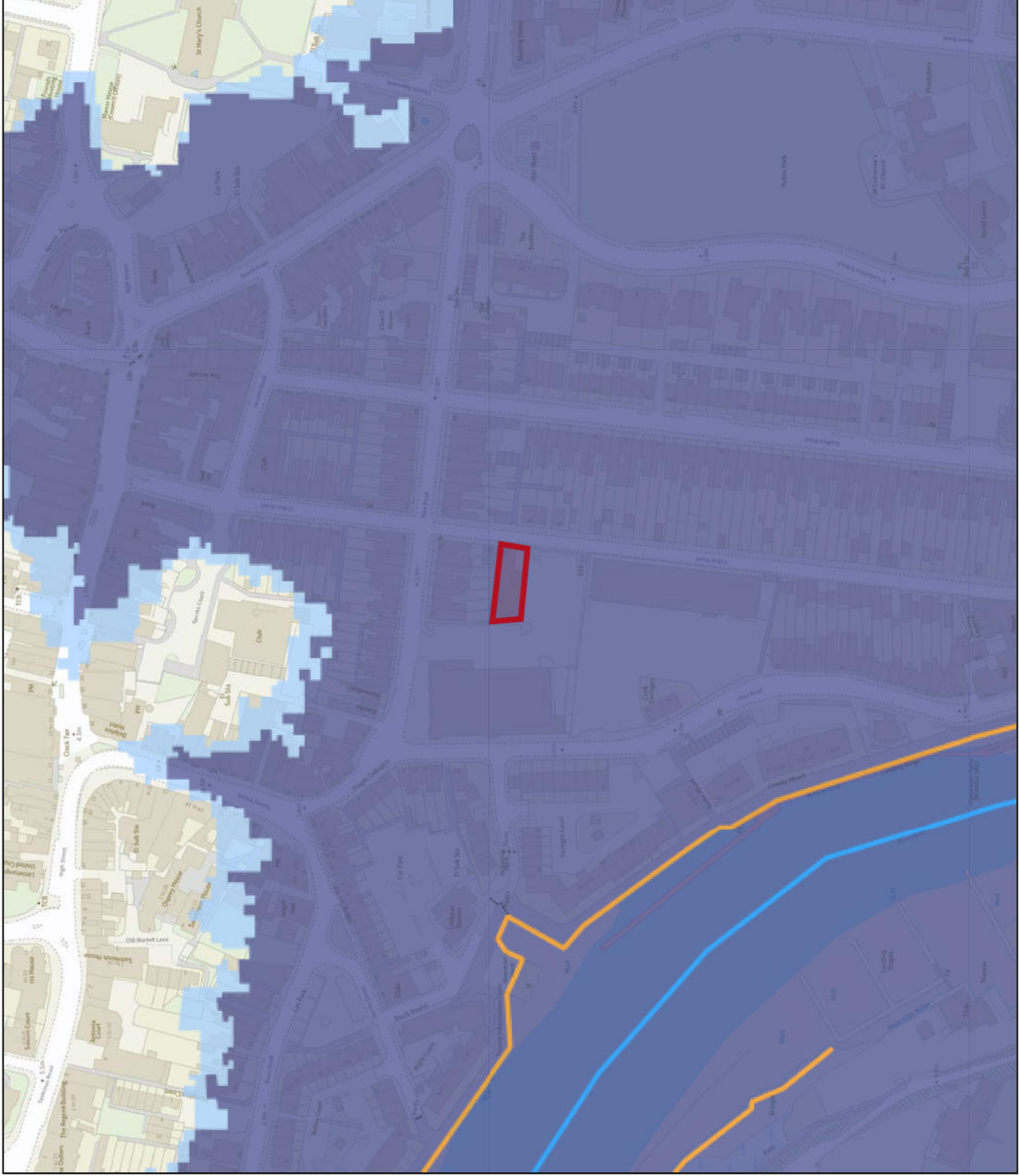
Flood defence

Main river

Water storage area

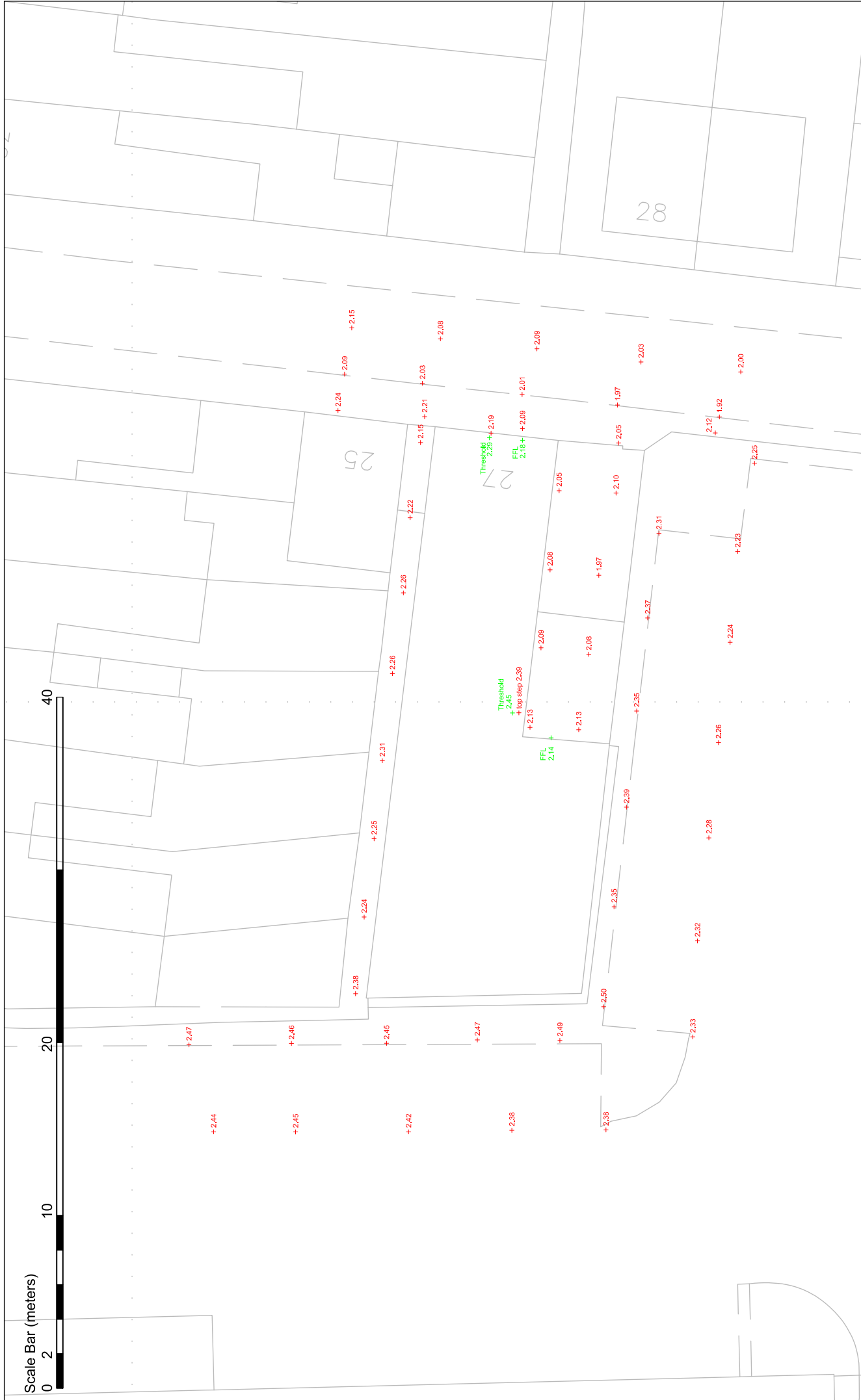


Page 2 of 2



APPENDIX B

Topographical Survey Plan



NOTES SURVEY IS BASED ON OS GRID SYSTEM	<u>Control Stations</u>	<u>Comments</u> 	<u>Client</u>		<u>Job Title</u>		<u>Rev</u>
			Vitae Investments		27 Clifton Road, Littlehampton West Sussex, BN17 5TE		
			<u>Drawing Title</u>		Existing Site Levels		
			<u>Scale</u> 1:200 @ A3	<u>Date</u> 24/05/22	<u>Drawn</u> CH	<u>Drawing No.</u> 001	
			<u>Surveyed by</u> CH	<u>Checked</u> SE	<u>Job No.</u> 018 05 22		<u>-</u>

SeSurveying



APPENDIX C

Development plans

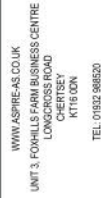
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Project 27 CLIFTON ROAD, LITTLE HAMPTON BN17 5TE

Title
PROPOSED GROUND FLOOR PLAN

Drawn By	Checked
----------	---------

Drawing Number	Revision
----------------	----------

1714-11	A
---------	---

Client	*
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SCALE BAR (METRES) 1:100@A3

Proposed Ground Floor Plan
Scale - 1:100@A3

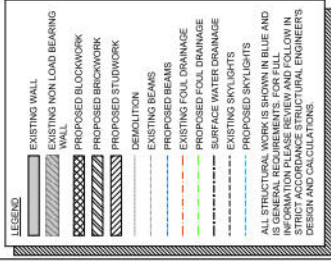
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ALL PROPOSED ROAD AND JUNCTION ALTERATIONS SUBJECT TO HIGHWAYS ENGINEERS DETAILED DESIGN

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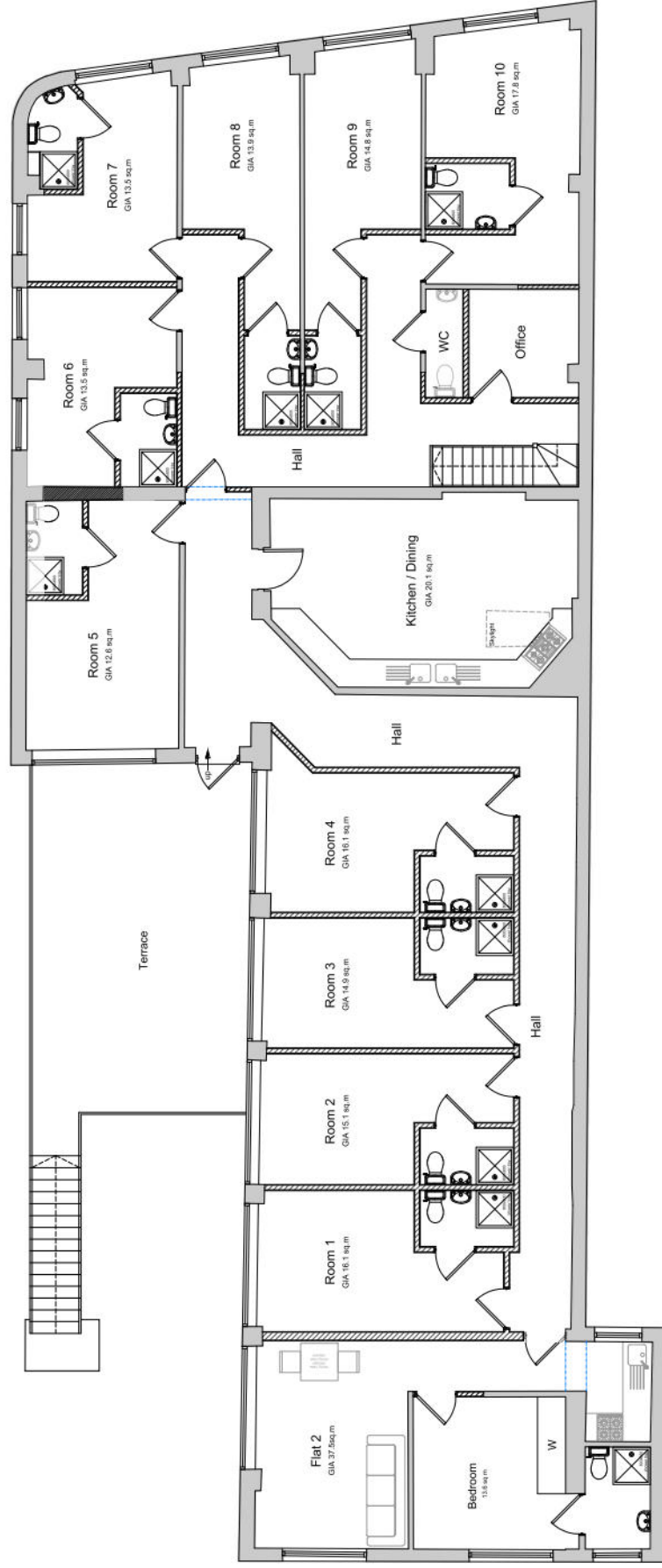


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Proposed First Floor Plan
Scale - 1:100@A3

SCALE BAR (METRES) 1:100@A3



Feasibility

APPENDIX D

JBA Flood risk modelling report

Flood risk modelling for Clifton Road, Littlehampton

Draft report

April 2024

**Prepared for:
Vitae Investments Ltd**

www.jbaconsulting.com

Document Status

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Contract

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JBA Project Code	2024s0305

This report describes work commissioned by JOC Consultants Ltd, on behalf of Vitae Investments Ltd, by an instruction dated 27 February 2024. The Client's representative for the contract was John O'Connor of JOC Consultants Ltd. Matthew Hird of JBA Consulting carried out this work.

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Abbreviations

AEP	Annual Exceedance Probability
CFBD	Coastal Flood Boundary Data
HR	Hazard Rating
mAOD	metres Above Ordnance Datum
RCP	Representative Concentration Pathway
TUFLOW	Two-dimensional Unsteady FLOW (a hydraulic model)
UKCP18	United Kingdom Climate Projections 2018

1 Introduction

JBA Consulting were commissioned by Vitae Investments Limited to update and re-run the Environment Agency's model of the River Arun to assess the flood risk for a proposed development site at 27 Clifton Road in Littlehampton.

The objective was to prepare updated flood mapping predictions for a range of Annual Exceedance Probability (AEP) events, for three scenarios: 1) with the existing defences in place (the defended case, representing the actual risk of flooding), 2) with all raised defences removed (undefended case) and 3) with a breach through the defence close to the site. The scenarios and flood event magnitudes tested are:

- Defended case
 - Present day 0.5% AEP and 0.1% AEP, and
 - Climate change 0.5% AEP (Higher central and Upper end allowances)
- Undefended case
 - Present day 0.5% AEP (Flood Zone 3a) and 0.1% AEP (Flood Zone 2)
- Breach modelling
 - Present day 0.5% AEP, and
 - Climate change 0.5% AEP (Higher central and Upper end allowances)

The following outputs were required from the assessment:

- Maximum flood extents for each of the events/scenarios simulated, provided as GIS Shapefiles and presented in mapping within the report.
- Maximum predicted water levels, tabulated for each event/scenario extracted at locations centred around the site.
- A report (this document) which summarises the technical work completed, and outputs provided and includes maps of the spatial extent of flooding, at and close to 27 Clifton Road, Littlehampton, and also present maps of the maximum depth, velocity and hazard rating of predicted flooding.

2 Model updates

The Environment Agency's TUFLOW flood inundation model of the River Arun¹ was updated to include information on the latest flood defences, new boundary conditions were applied and information regarding the site topography was added. The area covered by the model (model domain) and the location of the Clifton Road site are shown in Figure 2-1.

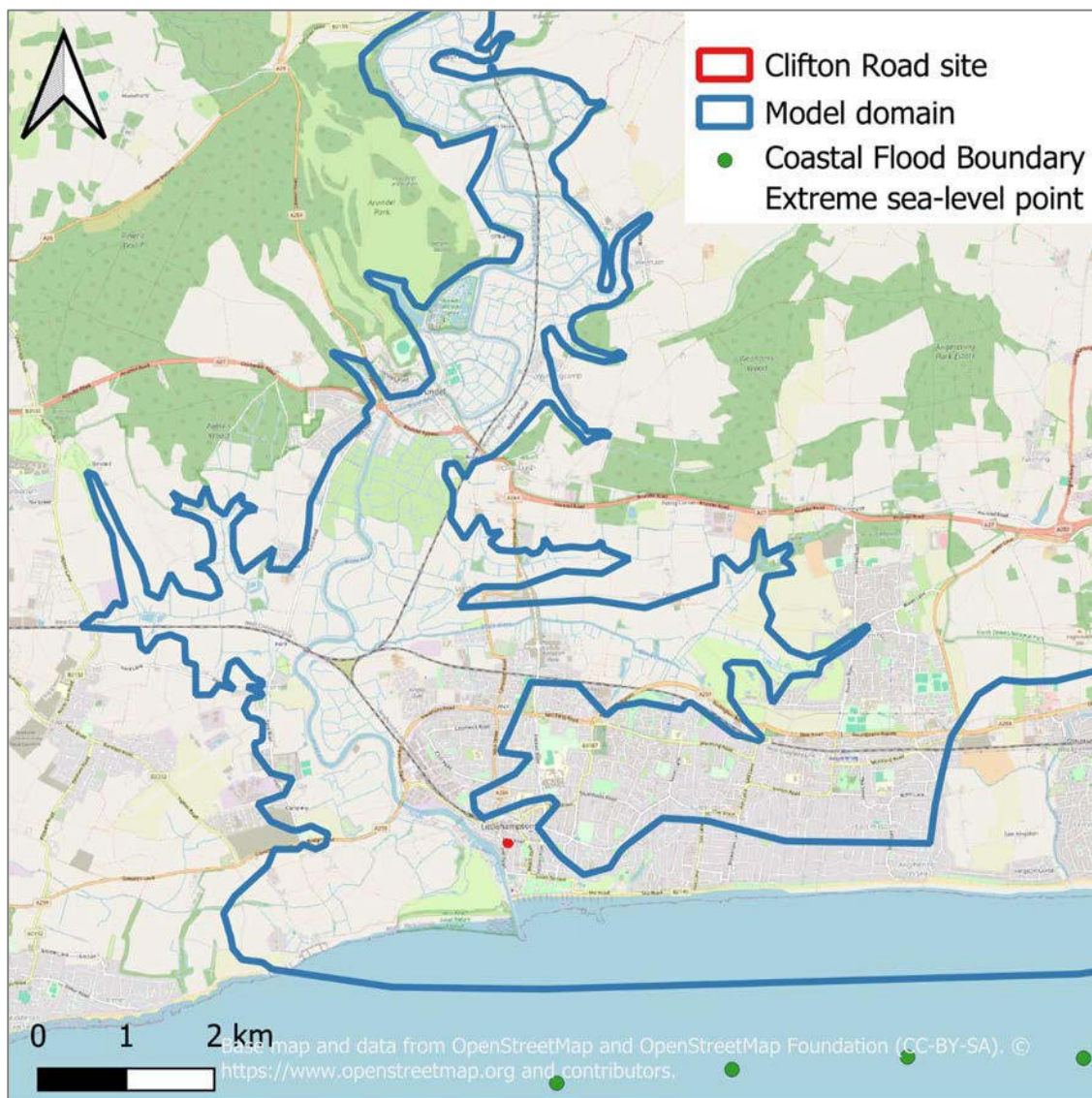


Figure 2-1: Model domain and site location (model domain continues to north and east).

¹ JBA Consulting for the Environment Agency. River Arun Modelling Study, Final Report, January 2017.

2.1.1 Defence updates

The latest flood defence data was downloaded for the River Arun through Littlehampton from the Defra Data Services Platform and added to the model. The spatial defence data was updated on the east and west bank of the River Arun from the mouth of the river upstream to the A259 Bridge Road crossing. For the undefended model the raised defences were turned off in the model and polygons were added to smooth the remaining high ground down the level of the surrounding ground levels.

Following the initial running of the model it was clear that there were low spots in the modelled defences. A topographic survey was commissioned in March 2024 to check and update the defence crest levels.

2.1.2 Boundary condition updates

To update the boundary conditions applied to the model, the latest estimates of the extreme sea-levels were obtained from the Environment Agency's Coastal Flood Boundary Dataset (CFBD)², using the two points at the east and western ends of the model domain (CFBD chainages 4572 and 4554). The CFBD has a base year of 2017 for water levels, so needed to be updated to present day in 2024 to take account of sea-level rise. Sea level rise values were calculated using United Kingdom Climate Projections 2018 (UKCP18) guidance for the Representative Concentration Pathway (RCP) 8.5 Upper end (95%) scenario from 2017 to 2024, giving an uplift of 0.05m. Sea-level rise projections were then calculated from 2024 to 2124 using the UKCP18 RCP 8.5 Higher Central (70%) and Upper End (95%) allowances, as required by the climate change allowance guidance published by the Environment Agency³. The calculated sea-level rise projections were 1.06m for the 70% uplifts and 1.43m for the 95% uplifts from 2024 to 2124. The extreme sea-levels for the 0.5% and 0.1% AEP events are detailed in Table 2-1.

Table 2-1: Extreme sea-levels and climate change uplifts

CFBD chainage	UKCP18 sea-level rise 2017-2024 95% (m)	UKCP18 sea-level rise 2024-2124 70% (m)	UKCP18 sea-level rise 2024-2124 95% (m)	0.5% AEP sea-level in 2024 (mAOD)	0.1% AEP sea-level in 2024 (mAOD)	0.5% AEP sea-level in 2124 70% (mAOD)	0.5% AEP sea-level in 2124 95% (mAOD)
4572	0.047	1.061	1.431	3.98	4.18	5.04	5.41
4554	0.047	1.061	1.431	4.26	4.47	5.32	5.69

² Coastal Design Sea Levels - Coastal Flood Boundary Estuary Boundaries (2018). Data available at: <https://environment.data.gov.uk/dataset/8427e52e-d465-11e4-904a-f0def148f590>

³ Environment Agency - Flood risk assessments: climate change allowances. Last updated 27 May 2022. Available: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>

For the wave overtopping, as the site is located along the River Arun and away from the open coast, the flood risk is dominated by still water flooding from the river, therefore the wave overtopping discharge rates from the existing model were re-used.

2.1.3 Topographic survey updates

A topographic survey of existing ground levels at the site was completed by SeSurveying in 2022. The surveyed levels were converted into a Digital Elevation Model and read into the model to improve the representation of ground levels beyond those available in LIDAR data. A new survey of the defence crest levels was completed in March 2024 to confirm levels on the left bank of the River Arun.

2.1.4 Breach model setup

To model the predicted flood risk from a defence failure, a breach scenario was setup in the model. With the updated defences the 'south breach' configuration in the Environment Agency's 2017 flood model was no longer appropriate as the level needed to trigger the breach using the new breach guidance was too high. After reviewing the ground levels and the defence levels, a new breach was setup close to the existing model breach near the Harbour Masters Office on Pier Road.

The latest Environment Agency guidance from 2017⁴ was followed to setup the breach. The defence in this location is a concrete wall. Therefore, a 20m breach was added through the defence, with a time to closure of 18-hours following the initiation of the breach. The trigger level for the breach is defined by the water level when it reaches three-quarters of the defence height from the toe of the defence to the top of the crest. In this location, the toe of the defence was taken on the landward side of the defence near Pier Road, with an elevation of 3.60mAOD. The crest of the defence in this location is 4.32mAOD. The trigger was calculated at 4.08mAOD. The location of the breach, relative to the Clifton Road site, is shown in Figure 2-2.

⁴ Environment Agency, 2021. Breach of defences guidance, LIT 56413, June 2021.

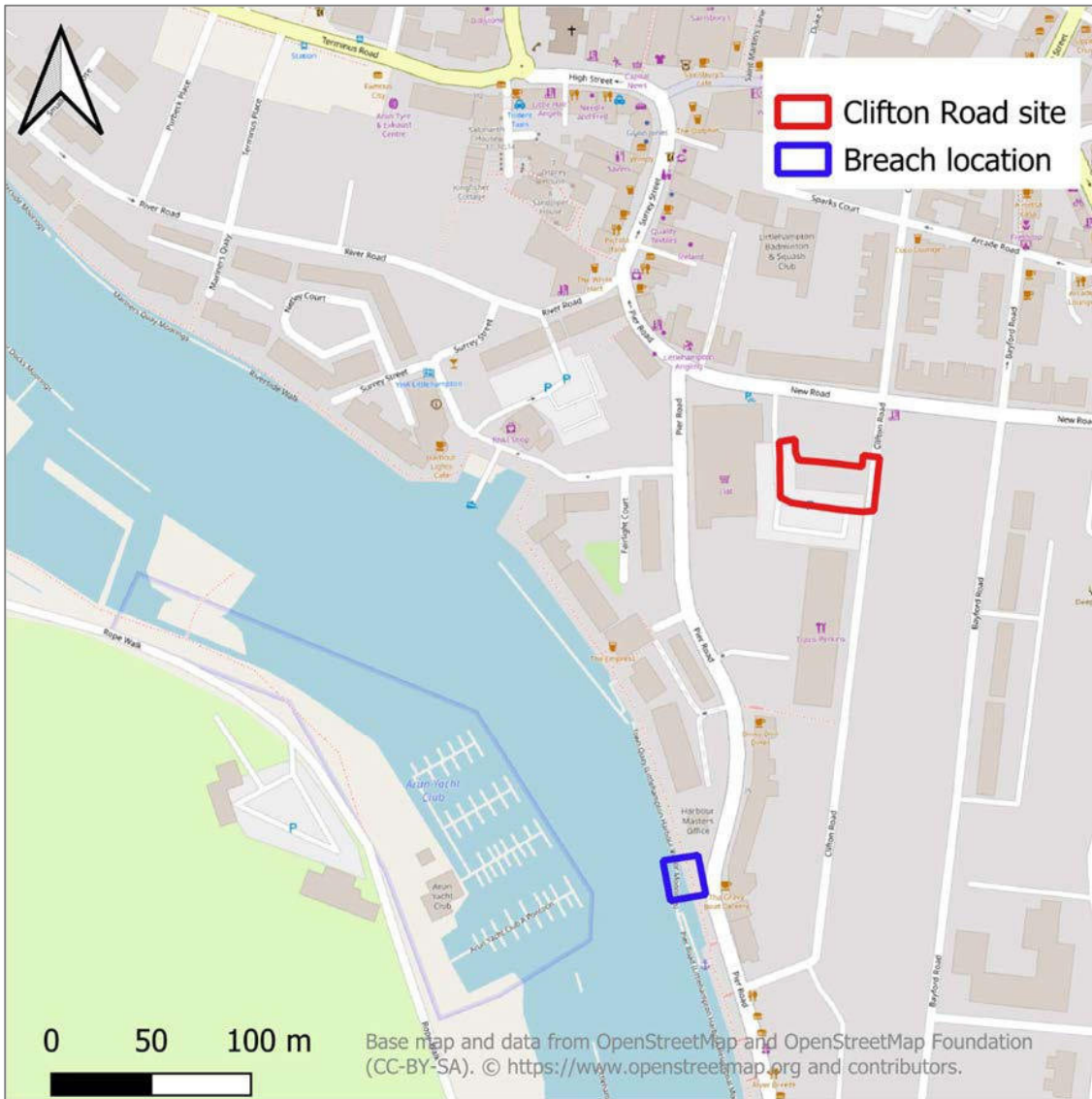


Figure 2-2: Location of defence breach

3 Results

The sections below present flood extent, depth and water level information from defended case (section 3.1), undefended case (section 3.2) and breach scenario (section 3.3) model predictions. To support the interpretation of water levels stated, the topographic survey levels recorded in the Se Surveying May 2022 data is provided in Appendix A. Section 3.4 discussed the flood hazard predicted by the model and section 3.5 presents the tabular flood prediction information provided.

3.1 Defended case model results

The defended model was run with all current defences in place.

For the 0.5% AEP (present day, year 2024) scenario, the following observations are made:

- There is no flood risk to the development site from 0.5% AEP event.
- The modelled defences have a minimum elevation of 3.94mAOD along River Road, whereas the maximum water levels reach 3.92mAOD in this location.

For the 0.1% AEP (present day, year 2024) event, water levels in the River Arun channel near the low point in the defence near Riverside Walk reach 4.04mAOD. The flooding is more extensive and inundates the site with depths reaching approximately 0.15m, as shown in Figure 3-2, and maximum water levels of 2.44mAOD.

When the sea-level rise projections are applied to the 0.5% AEP event to represent climate change conditions in 2124, the sea-levels applied to model coastal boundaries are 1.06m higher in the Higher Central scenario and 1.43m higher in the Upper end scenario, compared to present day levels. The defences are overtopped in many more locations, resulting in significantly more extensive flooding being predicted.

For the 0.5% AEP year 2124 event Higher Central scenario, water levels in the River Arun channel alongside Riverside Walk reach 4.51mAOD. Peak water levels at the Clifton Road site are predicted to be 4.00mAOD, with flood depths up to 2m, as shown in Figure 3-3.

For the 0.5% AEP year 2124 event Upper End scenario, water levels in the River Arun channel alongside Riverside Walk reach 4.71mAOD. Peak water levels at the Clifton Road site are predicted to be 4.71mAOD, with flood depths of around 2.6m, as shown in Figure 3-4.

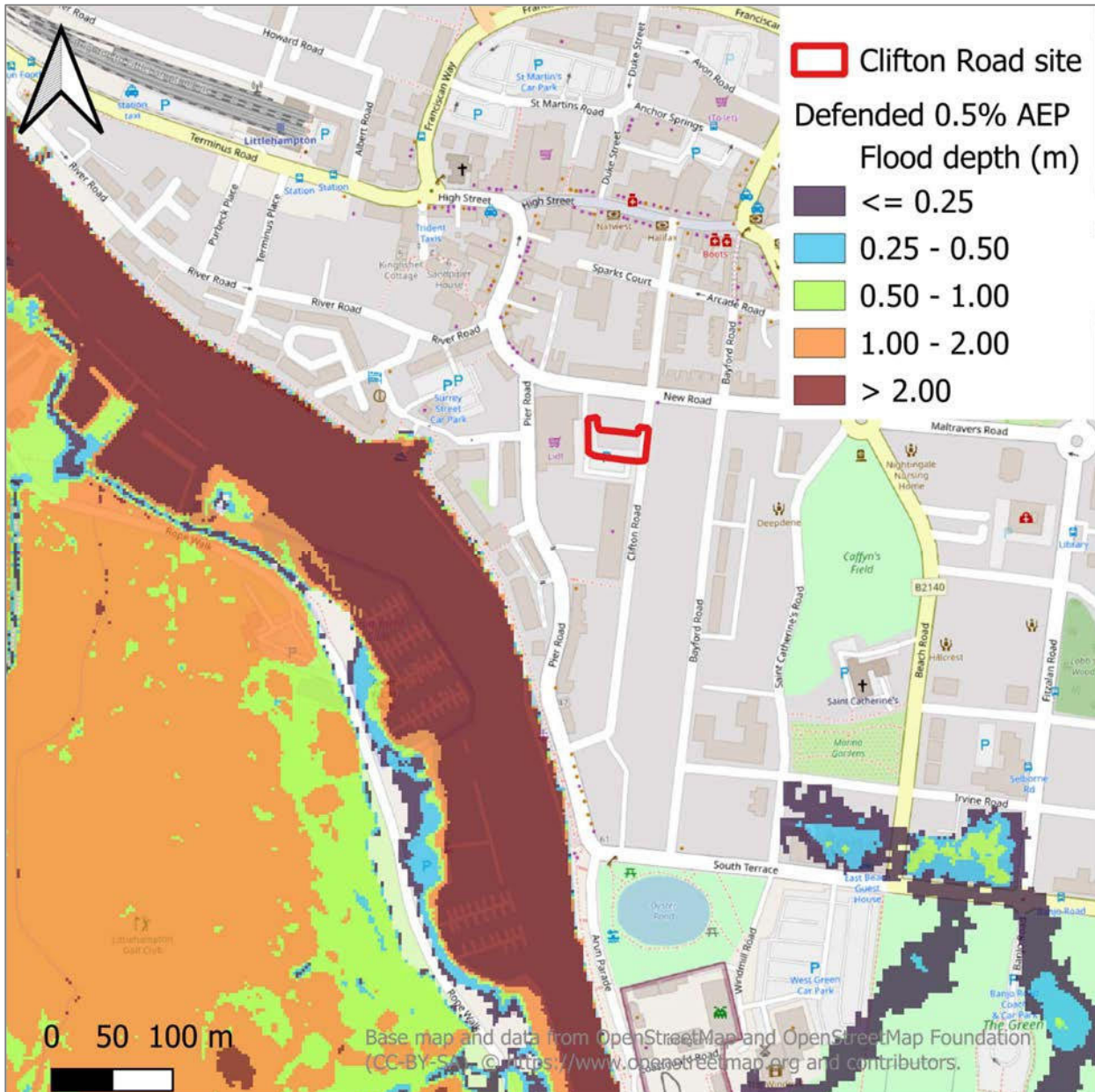


Figure 3-1: Flood depths in the defended scenario - 0.5% AEP (present day, year 2024)

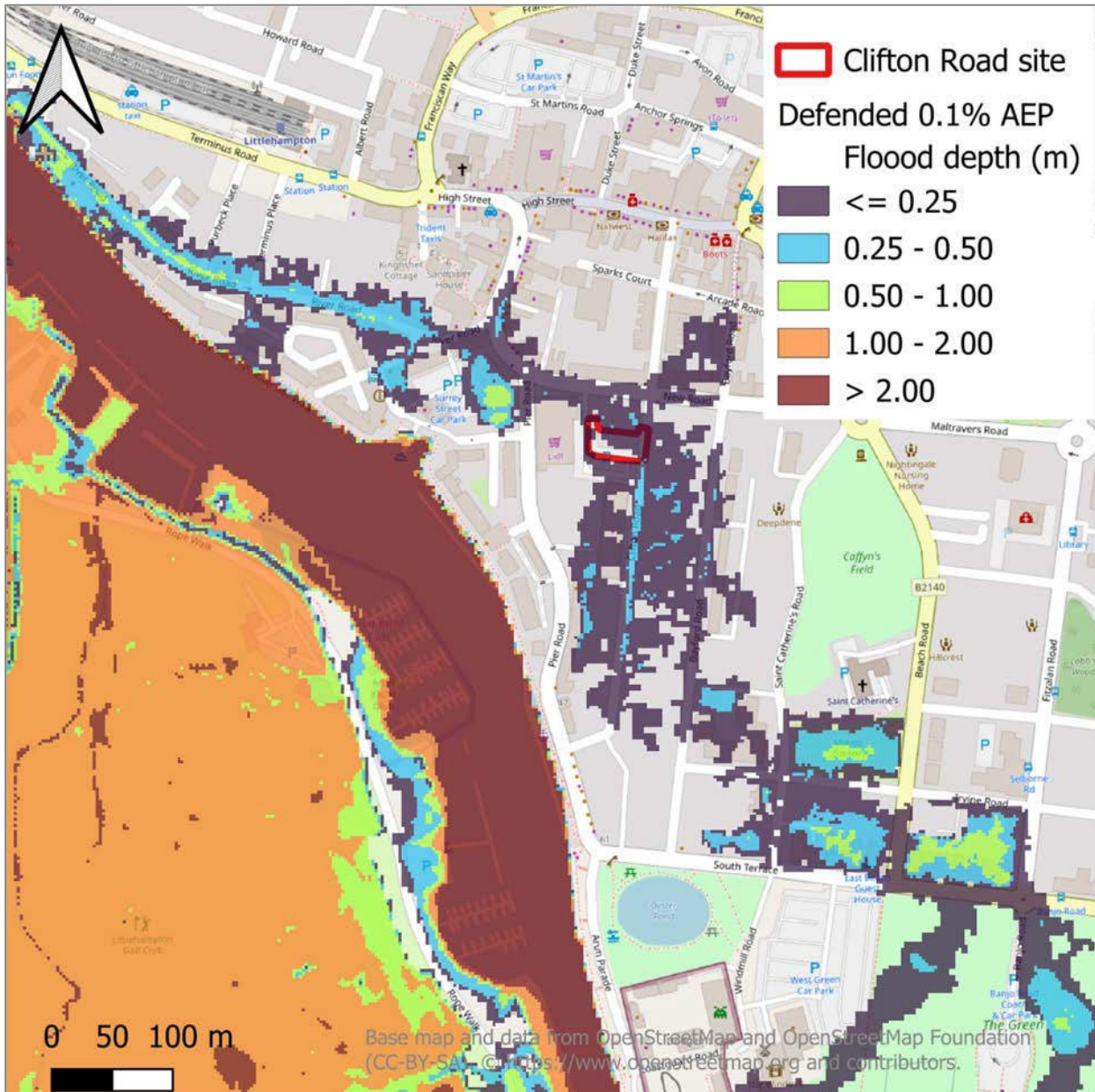


Figure 3-2: Flood depths in the defended scenario - 0.1% AEP (present day, year 2024)

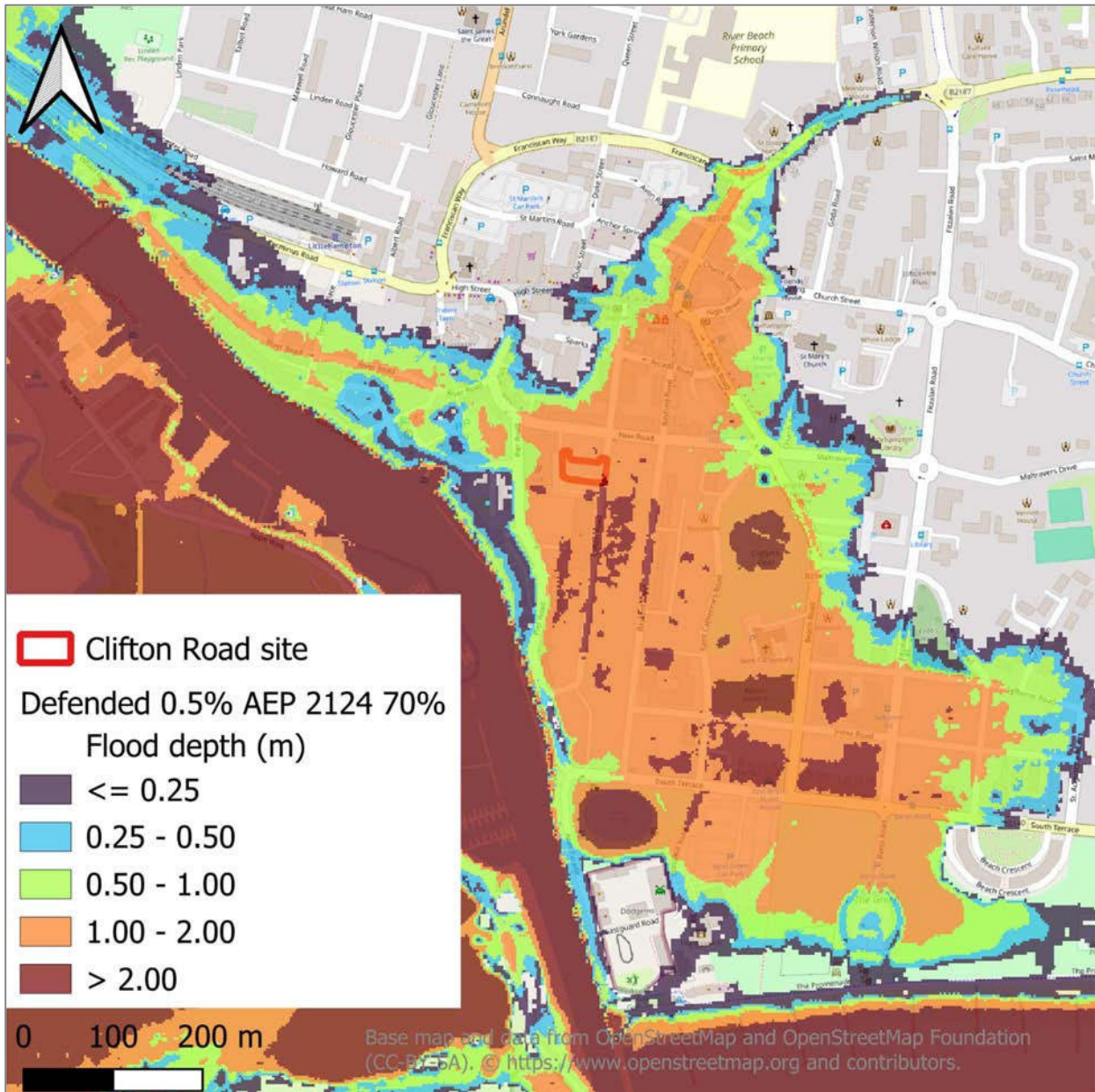


Figure 3-3: Flood depths in the defended scenario - 0.5% AEP event in 2124 using the Higher Central sea level rise allowance

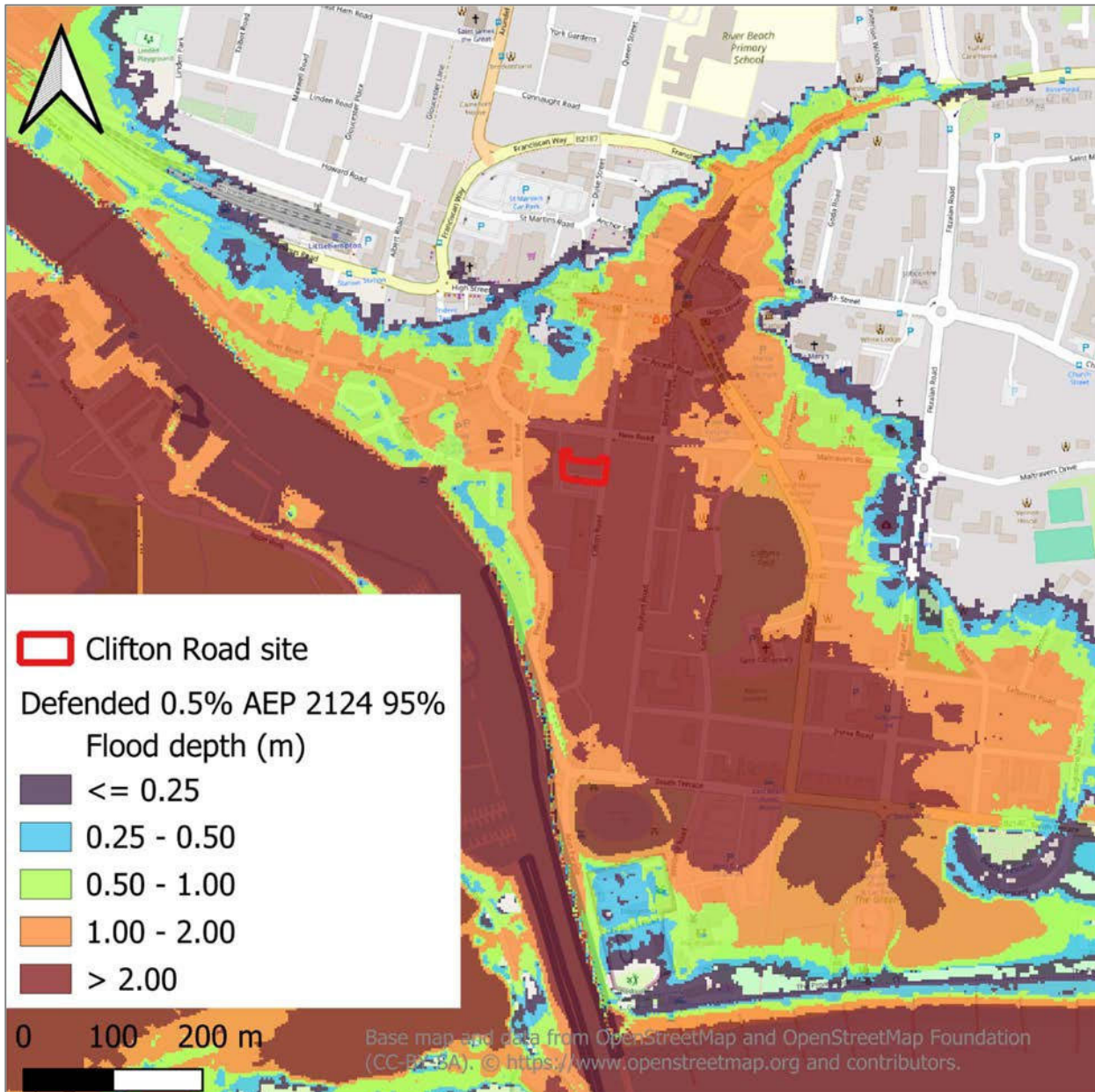


Figure 3-4: Flood depths in the defended scenario - 0.5% AEP event in 2124 using the Upper End sea level rise allowance

3.2 Undefined case model results

In the undefended scenario all raised defences are removed and/or lowered to the elevation of the surrounding ground levels. When the flood defences are removed from the model, flood water spreading onto land distant from the site acts to reduce water levels in the River Arun channel.

For the 0.5% AEP present day event, water levels in the River Arun are 3.39mAOD (3.92mAOD in the defended case). For the 0.1% AEP present day event, water levels in the River Arun are 3.51mAOD (4.04mAOD in the defended case). Lower water levels in the undefended case mean that the flow route originating from Riverside Walk in the defended case is notably smaller, and the main source of the floodwater is from low lying ground on the corner of Pier Road near the Gravy Boat restaurant and from wave overtopping from the open coast. For the 0.5% AEP and 0.1% AEP present day events, water levels at the development site are 2.38mAOD (depths less than 0.3m) and 2.62mAOD (depths up to 0.6m), respectively (0mAOD and 2.44mAOD in the defended case, respectively). Refer Figure 3-5 and Figure 3-6 for images of maximum flood depth predictions.

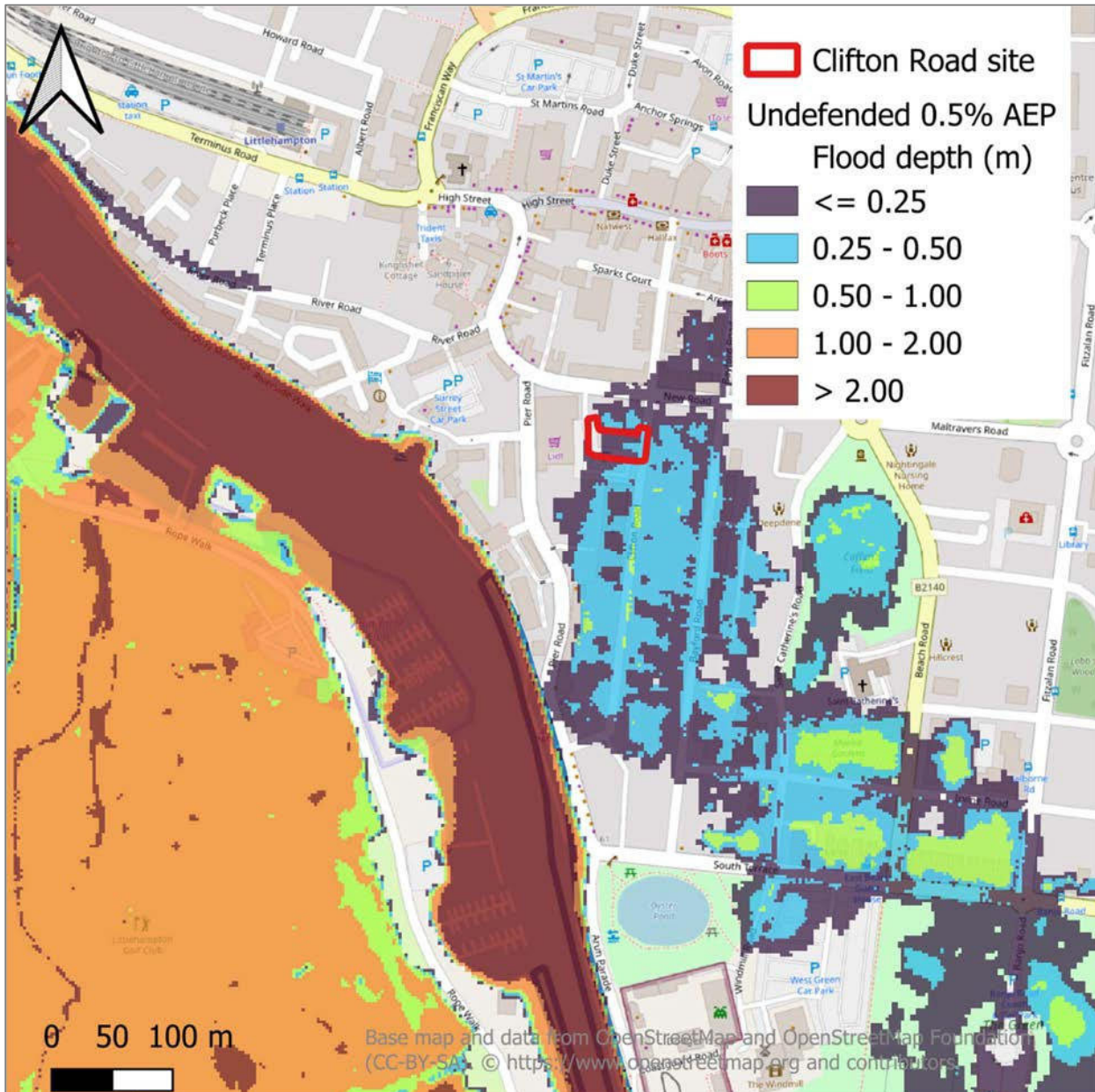


Figure 3-5: Flood depths in the undefended scenario - 0.5% AEP (present day, year 2024)

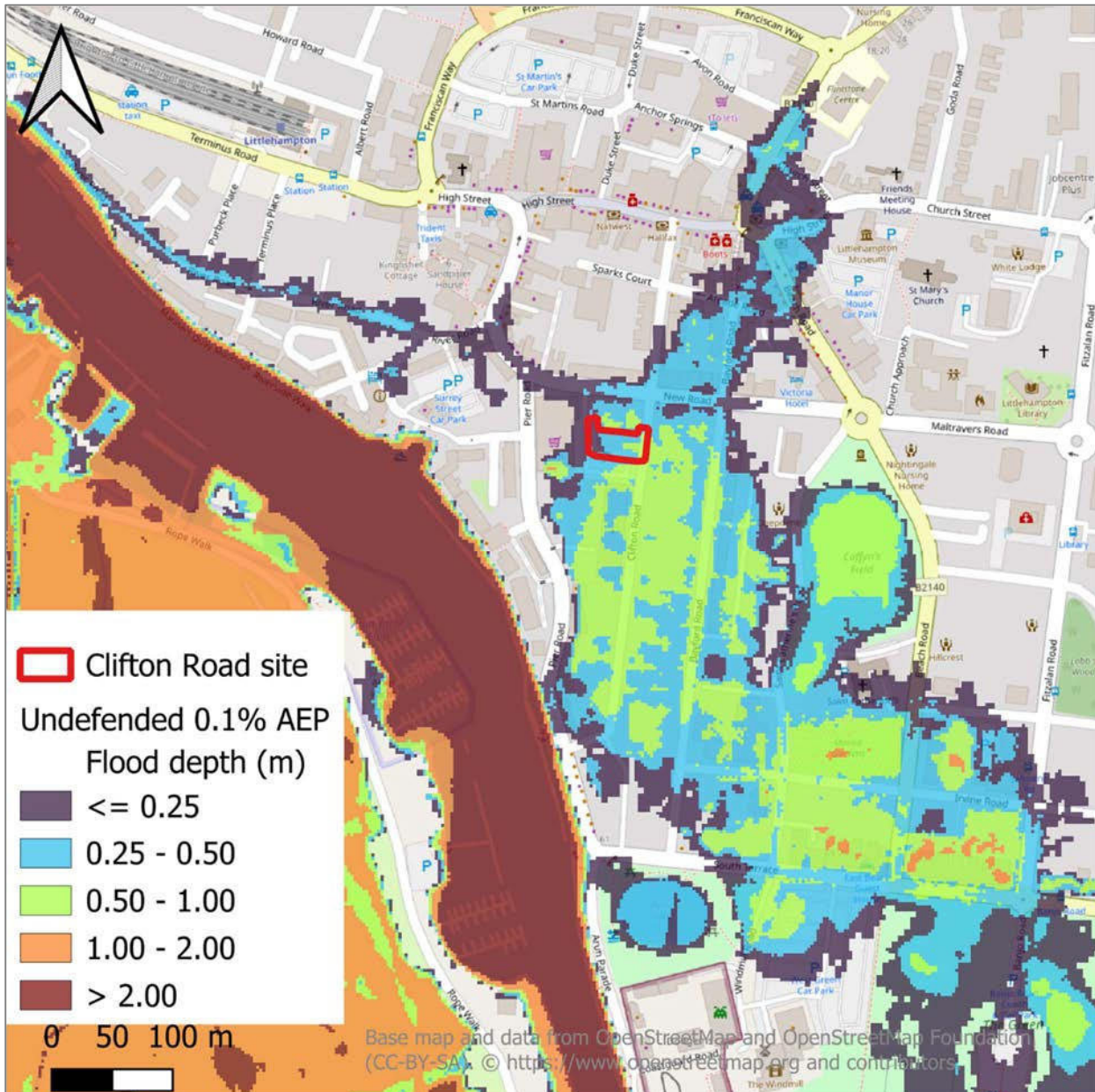


Figure 3-6: Flood depths in the undefended scenario - 0.1% AEP (present day, year 2024)

3.3 Breach model results

The flood extents and depths from the breach model are very similar to the defended model results described in section 3.1. The trigger level of 4.08mAOD for the breach is not reached in the 0.5% AEP event, so there is no flood risk to the development site. In the climate change scenarios, the peak water levels are already above many sections of defence, so the breach results are similar to the defended outputs. Flood depths from the 0.5% AEP breach scenario are shown in Figure 3-7 and flood depths from the 0.5% AEP scenario in 2124 (Upper end allowance) are shown in Figure 3-8.

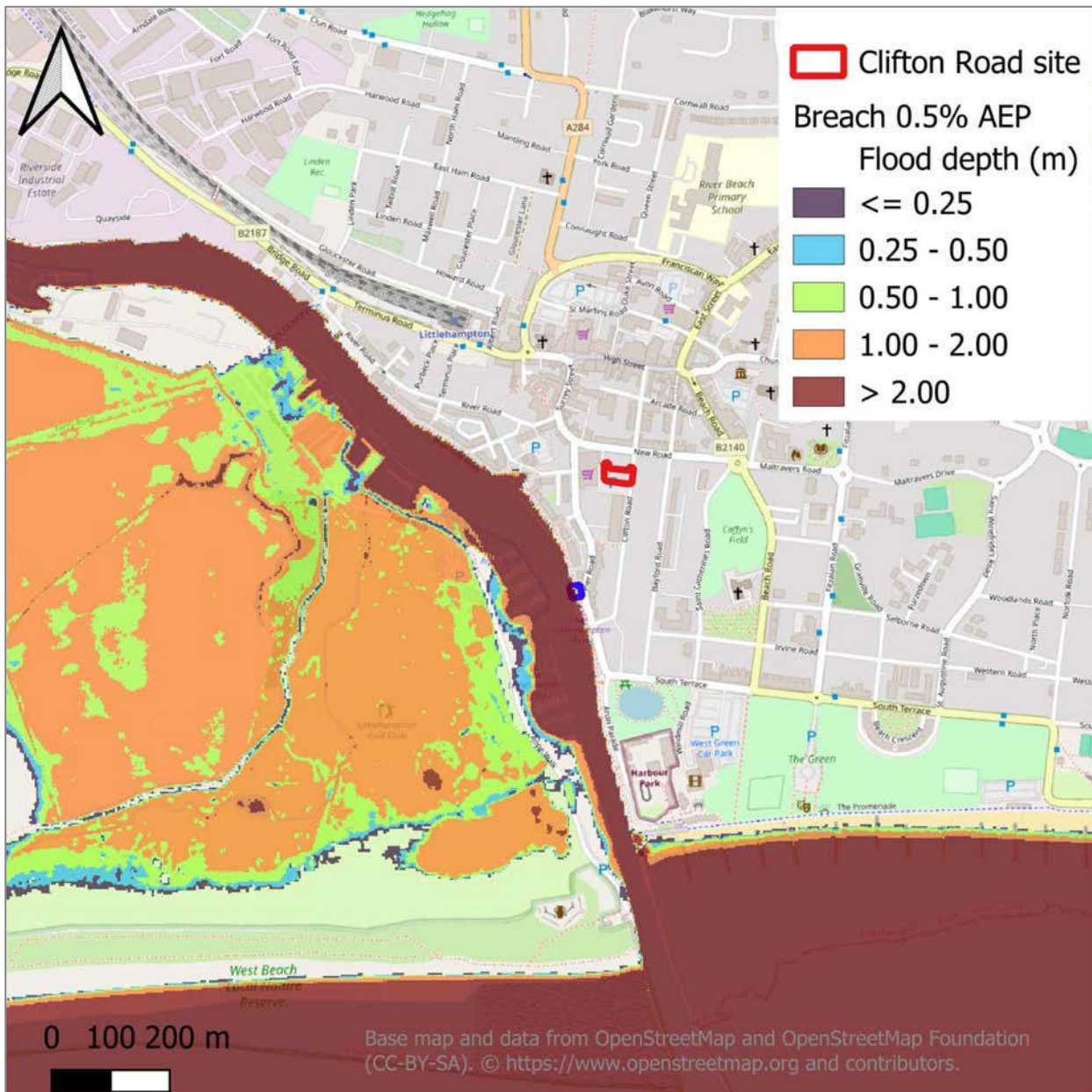


Figure 3-7: Flood depths in the breach scenario - 0.5% AEP (present day, year 2024)

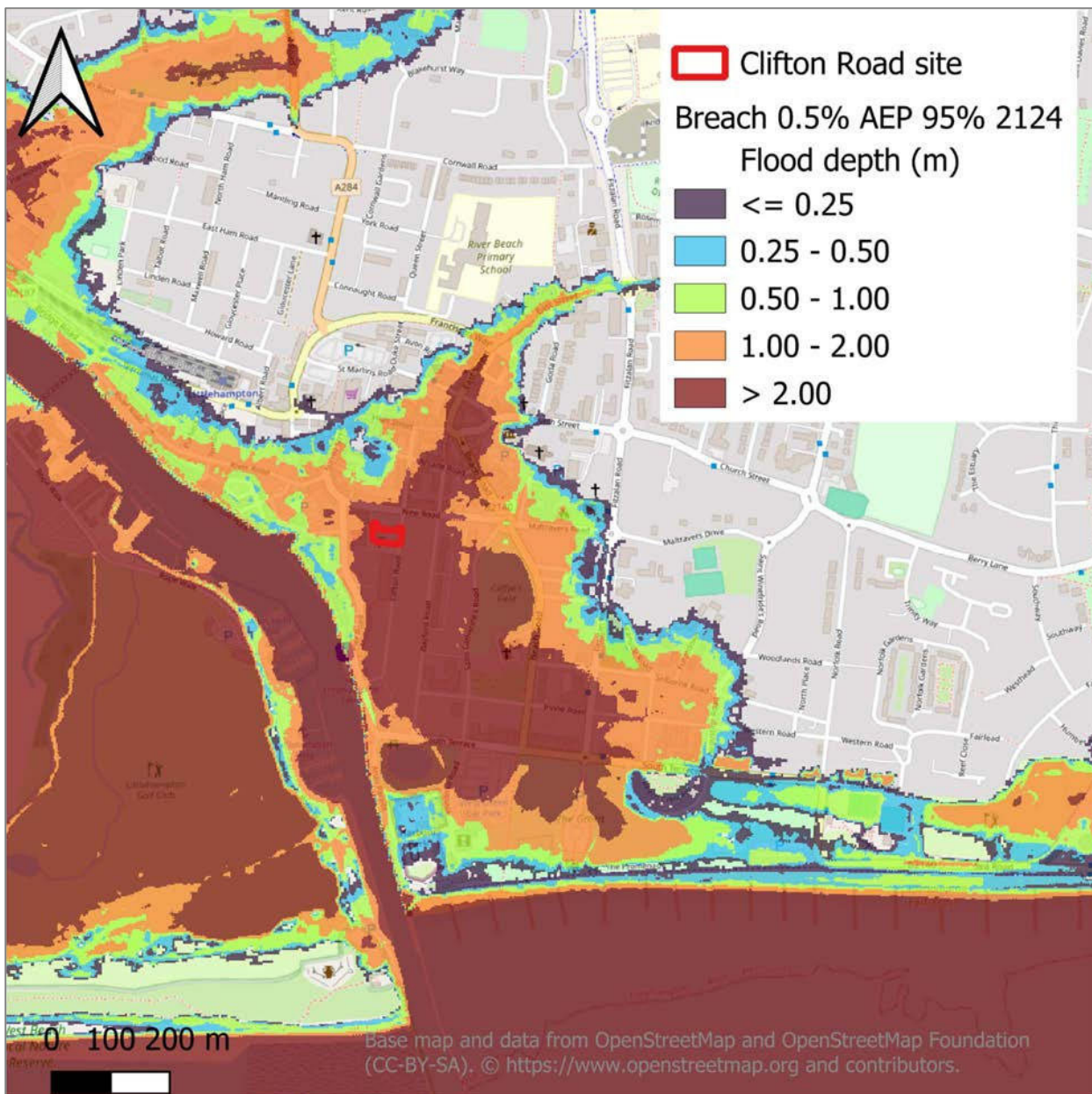


Figure 3-8: Flood depths in the breach scenario - 0.5% AEP event in 2124 (Upper End sea level rise allowance)

3.4 Flood hazards

Flood Hazard Rating is a function of risk associated with flood depth and velocity, and model predictions were produced as grids for each simulation. The grids required for these maps were generated based on the following equation:

$$\text{Hazard Rating (HR)} = \text{Depth} \times (\text{Velocity} + 0.5) + (\text{Debris Factor})$$

This equation is in line with the Department for the Environment, Food and Rural Affairs' (Defra's) "Supplementary Note on Flood Hazard Ratings and Thresholds" that was issued in May 2008⁵. A debris factor of 0.5 was used for depths < 0.25m and a debris factor of 1.0 was used for depths > 0.25m. These Debris Factors correspond to those recommended for urban floodplains in Defra's Supplementary Note. This Note also provides guidance on classifying Flood Hazard Ratings, as detailed below. These were adopted for the study.

- HR < 0.75: Very low hazard.
- 0.75 < HR < 1.25: Danger for some.
- 1.25 < HR < 2.0: Danger for most.
- HR > 2.0: Danger for all.

There is no hazard risk to the site for the 0.5% AEP defended and breach scenarios. Flood hazard at the site is mainly very low for the present day (year 2024) 0.5% AEP event for the undefended scenario (Figure 3-9).

⁵ Defra (2008). Defra Flood and Coastal Defence Appraisal Guidance Social Appraisal, supplementary note to operating authorities: Assessing and Valuing Risk to Life from Flooding for use in Appraisal of Risk Management Measures, May 2008.

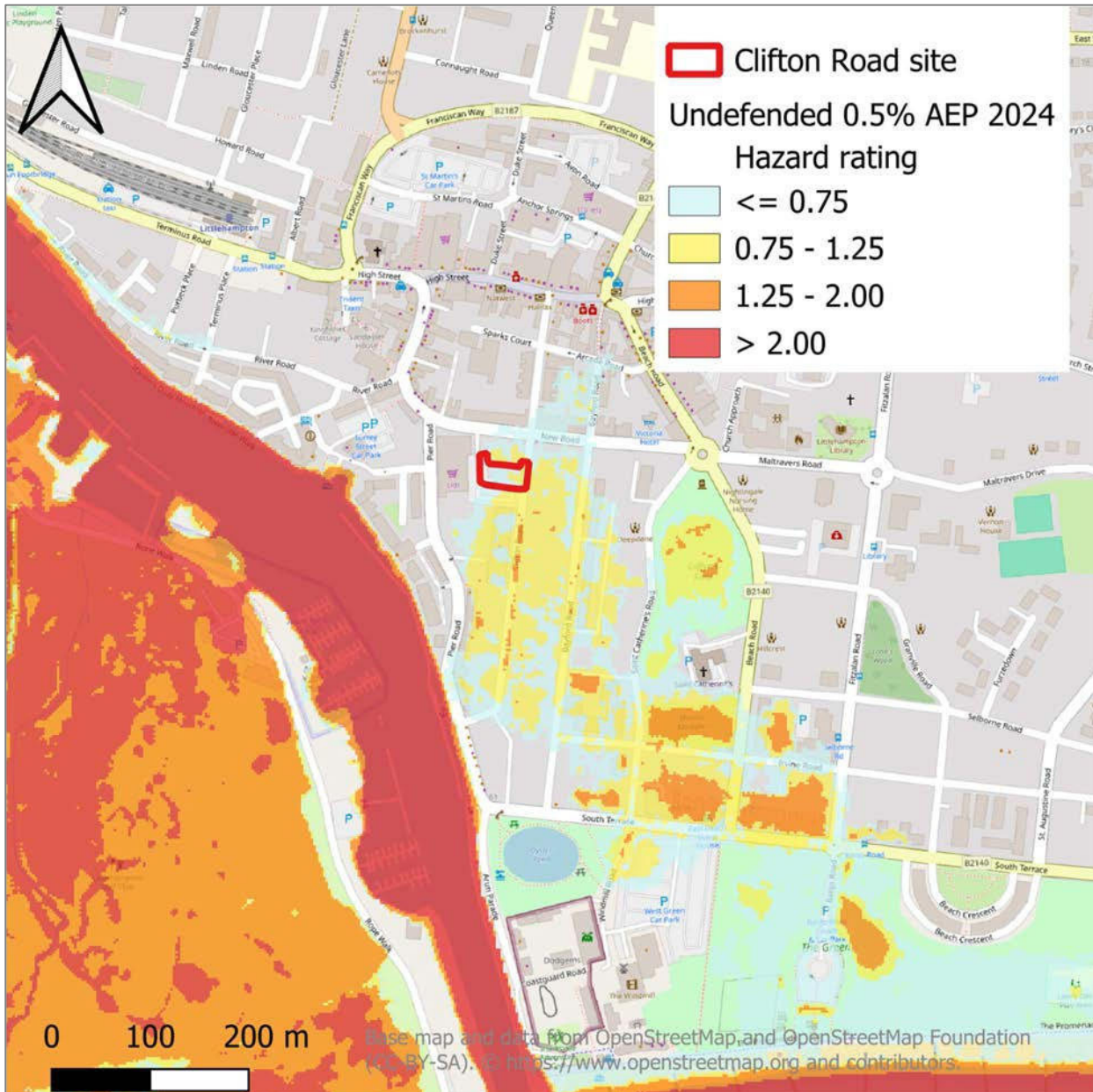


Figure 3-9: Flood hazard map for the undefended 0.5% AEP event in 2024

For the present day (year 2024) defended 0.1% AEP event, the risk increases to have greater areas of the site with danger for some people and danger for most people. In the climate change scenarios, all of the site falls into the danger for all category, as shown in Figure 3-10.

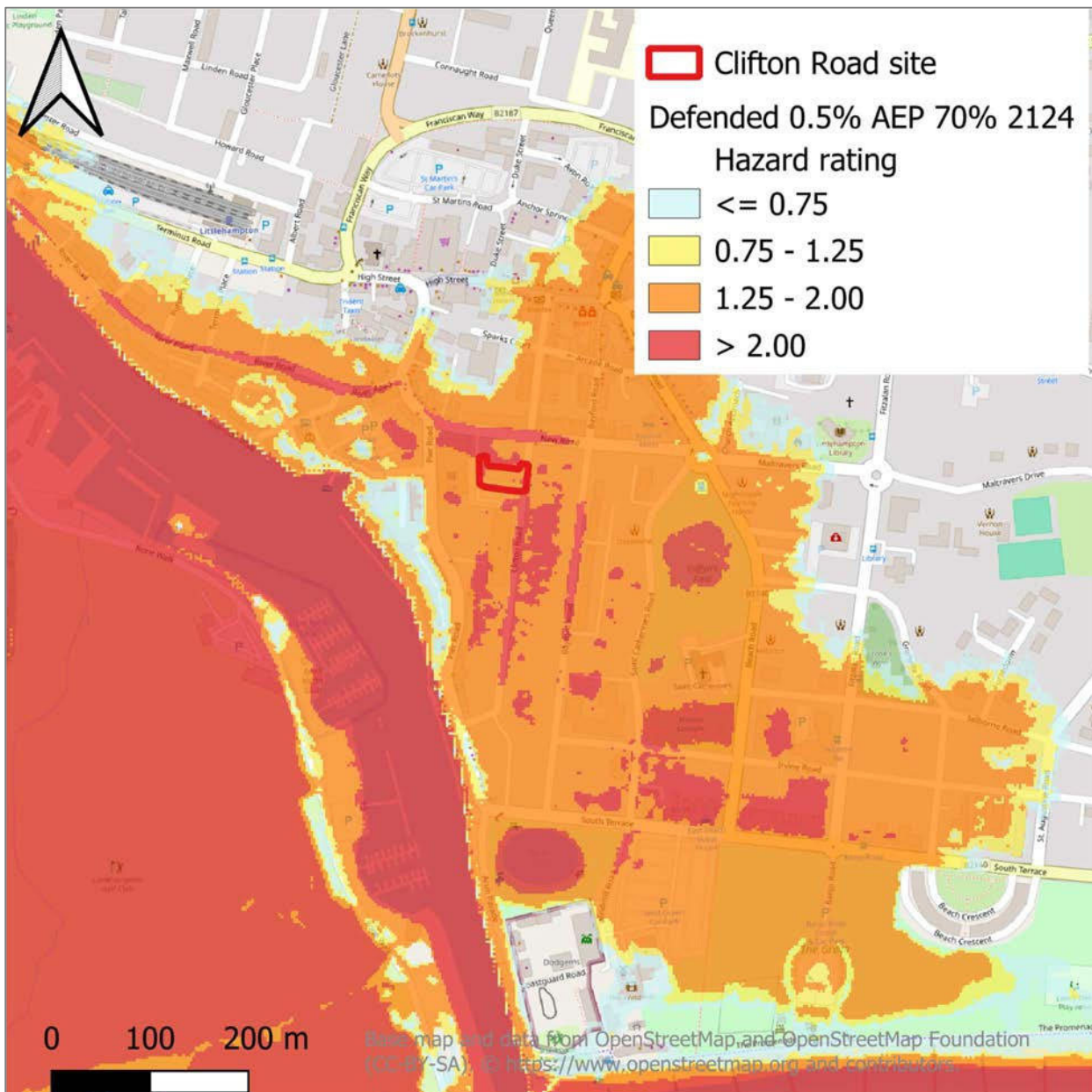


Figure 3-10: Flood hazard map for the 0.5% AEP event in 2124 (Higher central sea level rise allowance)

3.5 Tabulated model results

Model results were extracted at 60 output points within the site boundary (see Figure 3-11). The output points were placed at the location of the surveyed ground level points from the topographic survey. The model results of water levels, flood depths, flow velocity and hazard rating at each point are included in Appendix A. Results for a selected number of points are summarised in Table 3-1 to Table 3-4. Outputs are provided in these tables at point numbers 7, 15, 19, 41 and 50, circled in Figure 3-11.

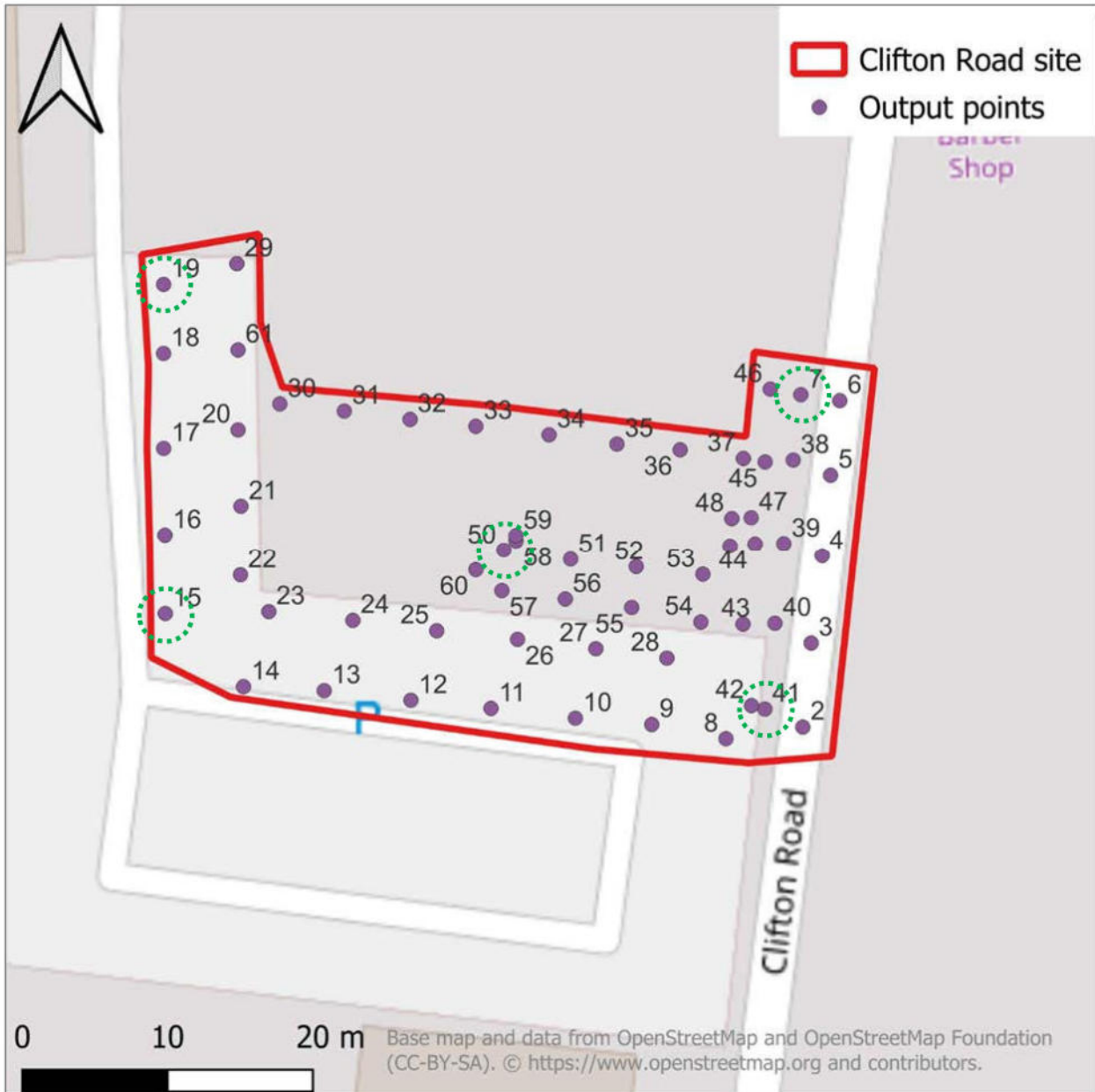


Figure 3-11: Site output locations for monitoring flood levels and depths

Table 3-1: Summary of model results from selected points for the 0.5% AEP event in 2024

Point number	Water level Def/ Undef/ Breach (mAOD)	Flood depth Def/ Undef/ Breach (m)	Flow velocity Def/ Undef/ Breach (m/s)	Hazard Def/ Undef/ Breach
7	0.00 / 2.38 / 0.00	0.00 / 0.27 / 0.00	0.00 / 0.15 / 0.00	0.00 / 1.13 / 0.00
15	0.00 / 0.00 / 0.00	0.00 / 0.00 / 0.00	0.00 / 0.00 / 0.00	0.00 / 0.00 / 0.00
19	0.00 / 0.00 / 0.00	0.00 / 0.00 / 0.00	0.00 / 0.00 / 0.00	0.00 / 0.00 / 0.00
41	0.00 / 2.38 / 0.00	0.00 / 0.32 / 0.00	0.00 / 0.09 / 0.00	0.00 / 1.16 / 0.00
50	0.00 / 2.38 / 0.00	0.00 / 0.15 / 0.00	0.00 / 0.01 / 0.00	0.00 / 0.58 / 0.00

Table 3-2: Summary of model results from selected points for the 0.1% AEP event in 2024

Point number	Water level Def/ Undef (mAOD)	Flood depth Def/ Undef (m)	Flow velocity Def/ Undef (m/s)	Hazard Def/ Undef
7	2.25 / 2.62	0.13 / 0.51	0.48 / 0.13	0.63 / 1.27
15	0.00 / 2.62	0.00 / 0.26	0.00 / 0.04	0.00 / 0.96
19	2.44 / 2.62	0.06 / 0.24	0.38 / 0.07	0.56 / 0.93
41	2.17 / 2.62	0.12 / 0.57	0.19 / 0.08	0.57 / 1.29
50	2.20 / 2.62	0.01 / 0.40	0.18 / 0.03	0.51 / 1.20

Table 3-3: Summary of model results from selected points for the 0.5% AEP in 2124 (Higher central allowance)

Point number	Water level Def/ Breach (mAOD)	Flood depth Def/ Breach (m)	Flow velocity Def/ Breach (m/s)	Hazard Def/ Breach
7	4.00 / 4.51	1.89 / 2.40	0.64 / 0.56	1.99 / 2.29
15	4.00 / 4.51	1.63 / 2.14	0.66 / 0.19	2.04 / 2.11
19	4.00 / 4.51	1.62 / 2.13	0.84 / 0.32	2.32 / 2.28
41	4.00 / 4.51	1.95 / 2.45	0.78 / 0.51	1.99 / 2.29
50	4.00 / 4.51	1.77 / 2.28	0.35 / 0.15	1.92 / 2.21

Table 3-4: Summary of model results from selected points for the 0.5% AEP in 2124 (Upper end allowance).

Point number	Water level Def/ Breach (mAOD)	Flood depth Def/ Breach (m)	Flow velocity Def/ Breach (m/s)	Hazard Def/ Breach
7	4.71 / 4.73	2.60 / 2.61	0.65 / 0.57	2.51 / 2.39
15	4.71 / 4.73	2.34 / 2.36	0.72 / 0.19	2.34 / 2.22
19	4.71 / 4.73	2.33 / 2.35	0.84 / 0.34	2.81 / 2.42
41	4.71 / 4.73	2.65 / 2.67	0.79 / 0.52	2.47 / 2.38
50	4.71 / 4.73	2.48 / 2.50	0.36 / 0.16	2.41 / 2.30

A Extract of Se Surveying May 2022 site topographic survey drawing



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ISO 45001:2018

APPENDIX E

Floodwall survey data points

021 03 24 Adur Flood Wall Level Survey
28/03/2023

Number	Easting	Northing	Level	Notes
1	502275.5	102216.2	5.08	
2	502277.1	102214.3	5.06	Plinth
3	502279.8	102211.2	5.05	
4	502281.3	102209.5	5.05	
5	502282.7	102210	5.06	
6	502282.7	102210.1	4.81	
7	502290	102211.2	4.79	
8	502292.2	102205.1	4.80	
9	502307.3	102189.3	4.80	
10	502307	102189.1	4.12	
11	502300.1	102181.7	4.13	
12	502316	102163.8	4.06	
13	502325.4	102172.4	4.07	
14	502325.5	102172.4	4.84	
15	502326.6	102173.4	4.83	
16	502375.6	102090.1	3.99	
17	502408.7	102052.5	4.80	
18	502411.3	102049.6	4.80	
19	502412.4	102049.5	4.81	
20	502412.3	102049.9	4.41	
21	502425.4	102037	4.43	
22	502438	102026.3	4.42	
23	502452.5	102014.6	4.40	
24	502466.7	102007	4.42	
25	502477.1	102002.4	4.38	
26	502495.9	101992	4.38	
27	502513	101982.7	4.39	
28	502513.2	101982.5	4.41	Plinth
29	502513.4	101982.2	4.32	
30	502516.4	101979.2	4.30	
31	502541.6	101961	4.31	
32	502567.6	101942.5	4.32	
33	502588.1	101928.1	4.31	
34	502611.9	101928.6	4.34	
35	502617.9	101941.7	4.31	
36	502638	101932.7	4.34	
37	502647	101928.4	4.35	
38	502632.9	101903.1	4.35	
39	502643.8	101893.6	4.36	
40	502660.3	101871	4.36	
41	502680.9	101842.4	4.39	
42	502689	101831	4.37	
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44	502701	101807	4.34	
45	502707.7	101785.2	4.33	

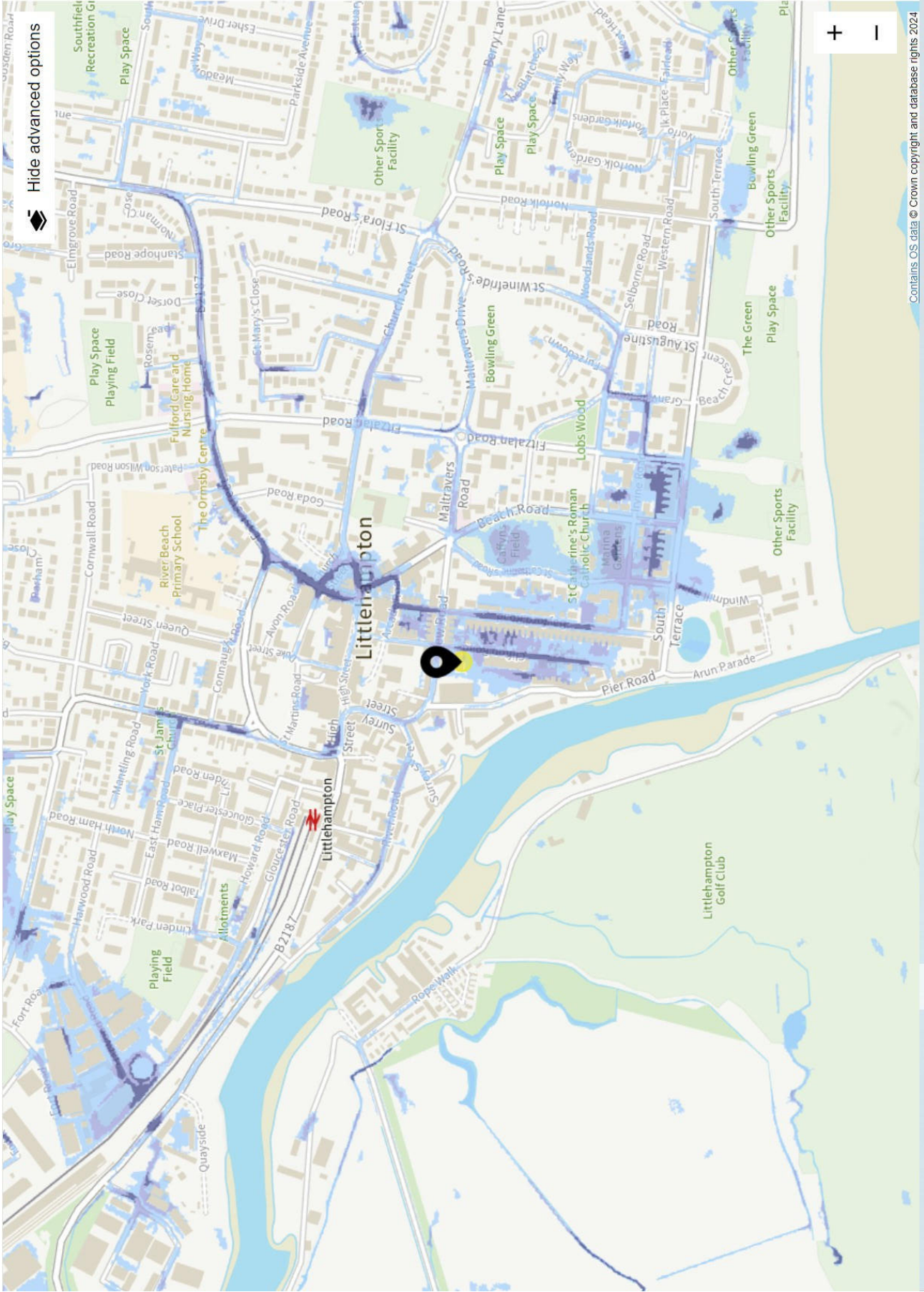
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48	502728.4	101719.8	4.32
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50	502729.3	101716.3	4.81
51	502731.3	101709.4	4.84
52	502731.4	101709.4	4.92
53	502733.4	101702.4	4.88
54	502733.5	101702.4	5.02
55	502735.7	101694.9	5.00
56	502733.4	101691.9	5.01
57	502735.6	101685.9	5.02
58	502736.2	101684.3	5.01
59	502742.3	101667.8	4.99
60	502748.7	101646.9	4.97
61	502754.1	101623.8	4.99
62	502758.1	101600.1	4.97
63	502760.1	101575.8	4.98
64	502760.2	101575.7	5.29
65	502761.6	101557.5	5.27
66	502763	101538.4	5.26
67	502764.3	101521.7	5.28

Survey undertaken using Network RTK GPS. 5 points stored at each location for accuracy.

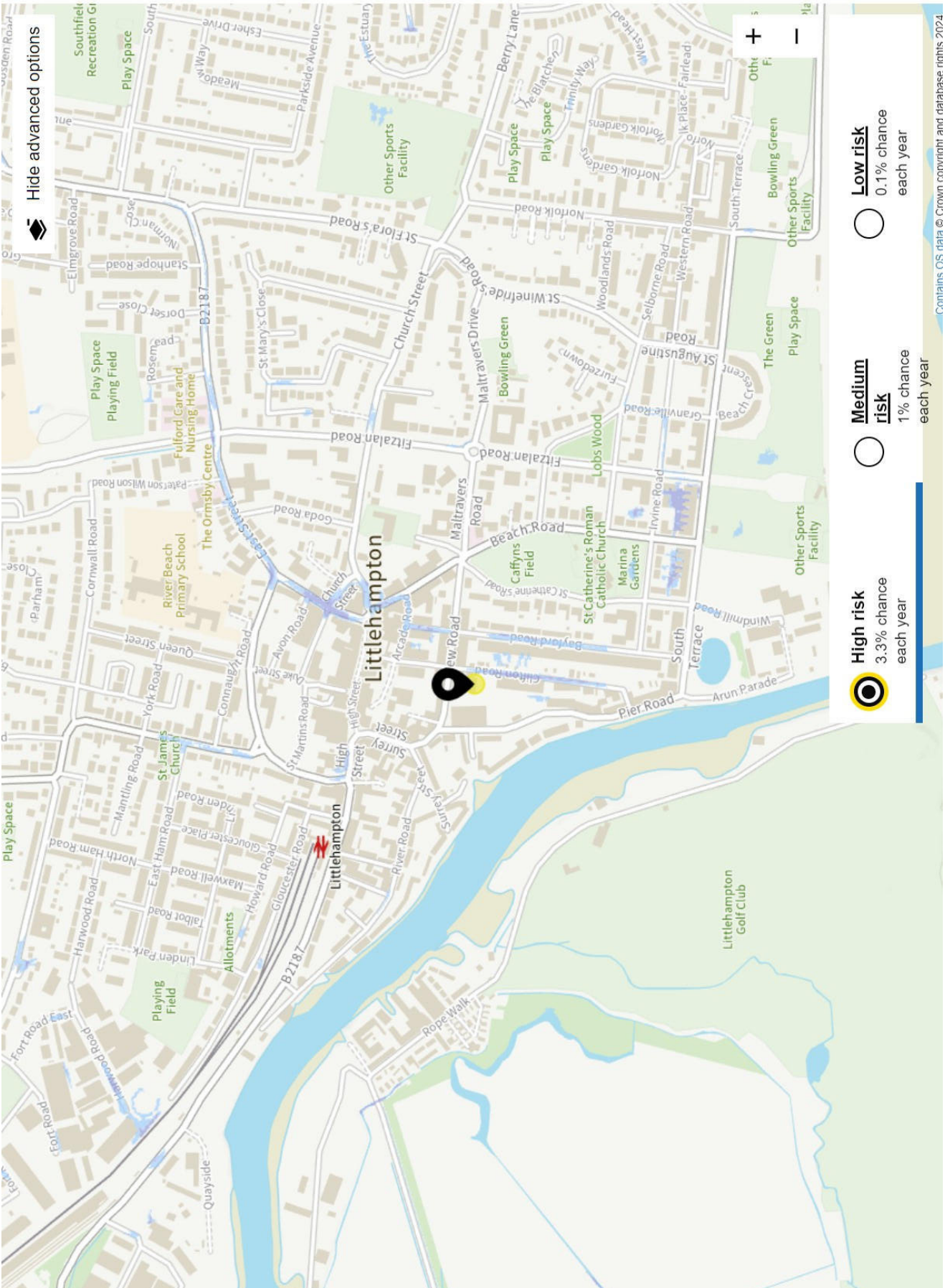
Maximum	5.29
Minimum	3.99

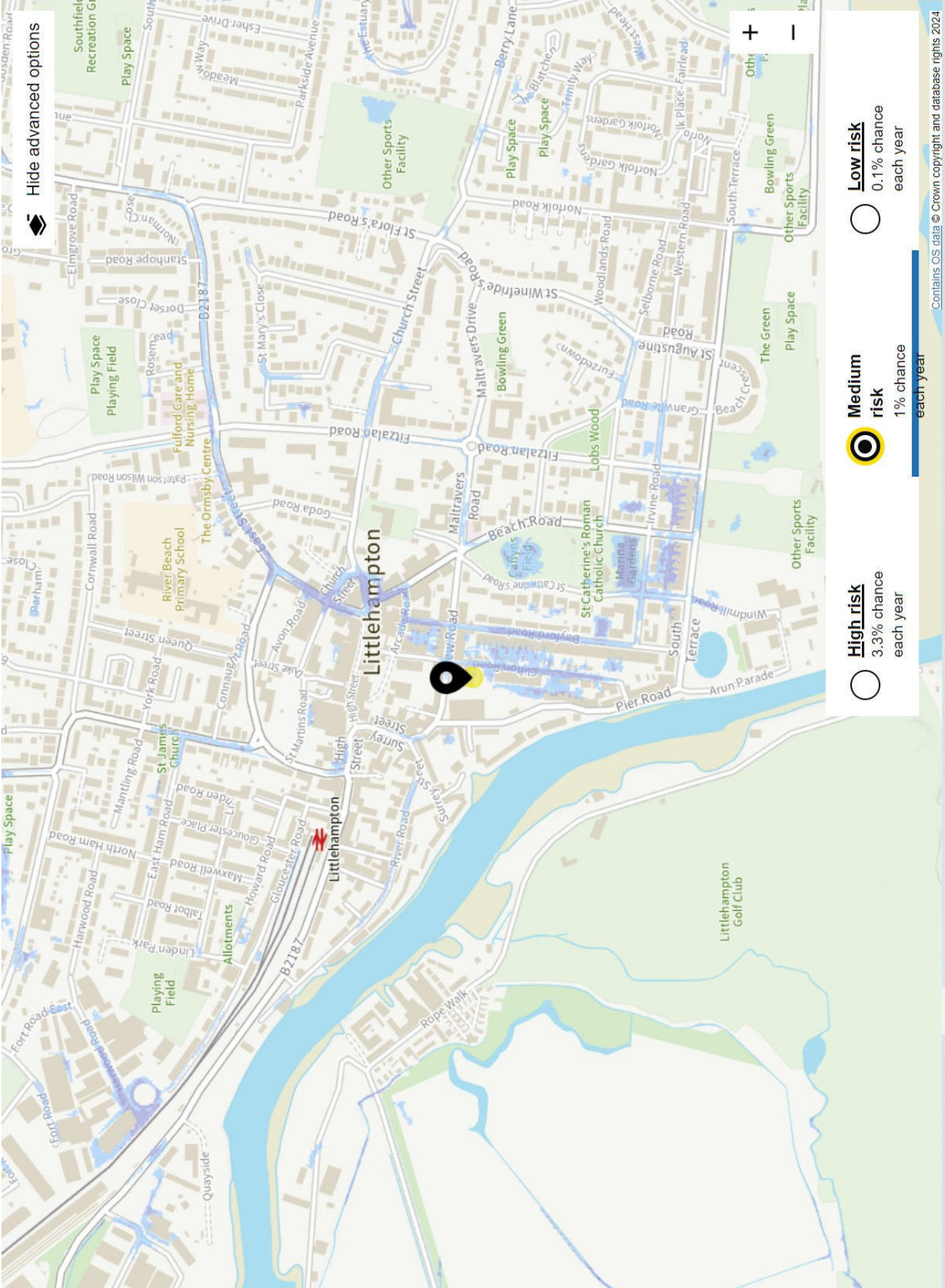
APPENDIX F

Surface water flood maps



Pause to updates of flood risk data
We have paused updates to





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Key

Surface water

- ☐ Extent
- ☒ Depth

- ☒ Above 90cm
- ☐ 30cm to 90cm
- ☐ Below 30cm

- ☐ Velocity

Rivers and the sea

- ☐ Extent

Reservoirs

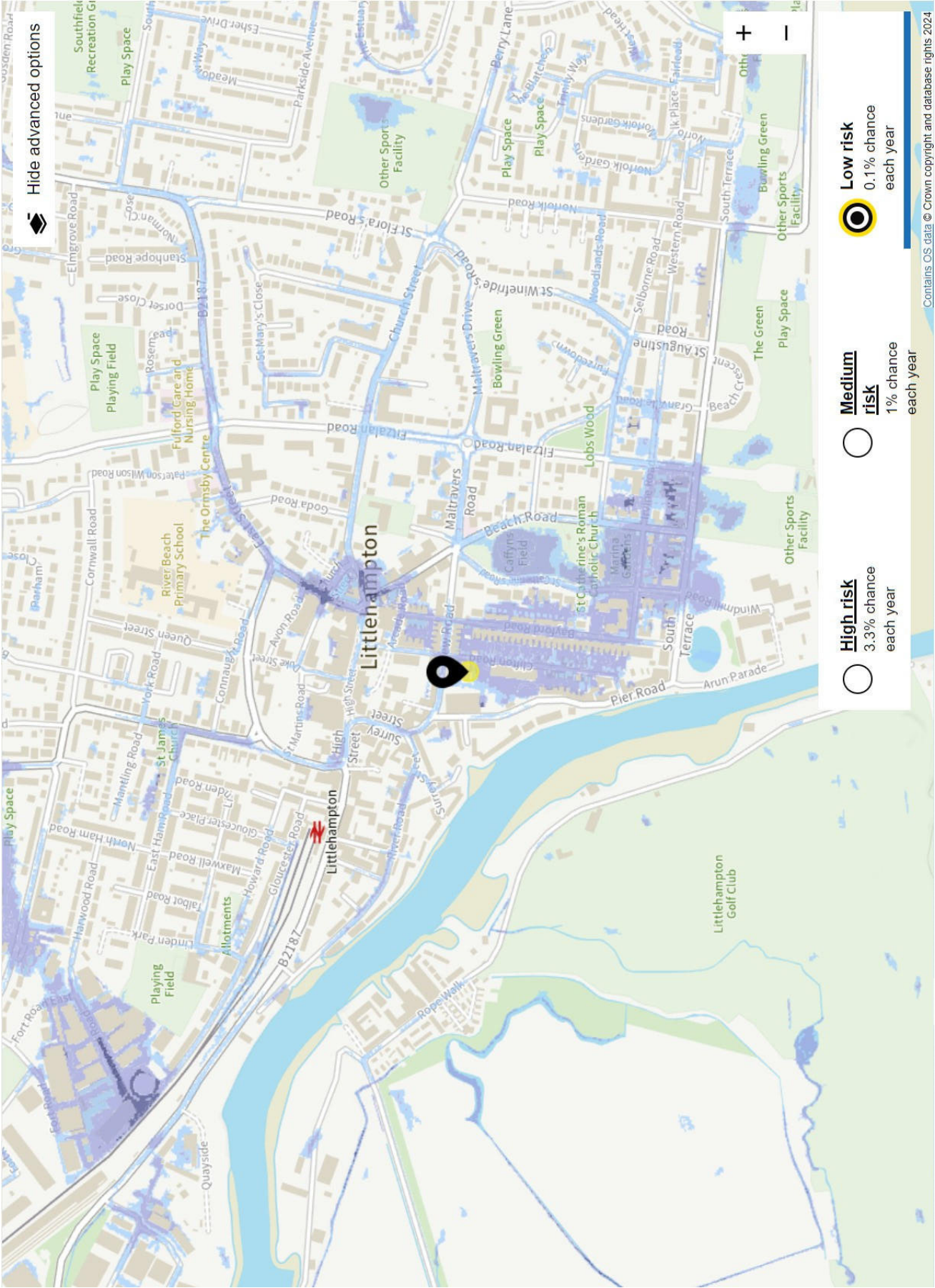
- ☐ Extent

Map details

- ☒ Show flooding
- ☒ Selected address

Pause to updates of flood risk data

We have paused updates to information about flood risk from rivers and the sea and surface water while we get ready for new data.



Key

Surface water



Extent



Depth



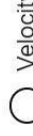
Above 90cm



30cm to 90cm



Below 30cm



Velocity

Rivers and the sea



Extent

Reservoirs



Extent

Map details



Show flooding



Selected address

Pause to updates of flood risk data

We have paused updates to information about flood risk from rivers and the sea and surface water while we get ready for new data.

APPENDIX G

Reservoirs flood map

APPENDIX H

Flood emergency action plan

Development at 27 Clifton Road Littlehampton

Flood Emergency Action Plan

Client:

Vitae Investments Ltd
6 Windsor Road
Worthing
BN11 2LX

Prepared by:

joc consultants ltd

Park Farm House
Leathley Lane
Leathley
Otley
LS21 2JU

REVISION HISTORY

Revision	Date	Details
00	13 th December 2022	First Issue
01	1 st May 2024	Updated
02	11 th December 2024	Minor amendment to section 4

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APPENDIX C: Categories of flood warning

1.0 INTRODUCTION

- 1.1. JOC Consultants Ltd is instructed by Vitae Investments Ltd to prepare this flood emergency plan in connection with a planning application to Adur District Council for a change of use development at 27 Clifton Road, Littlehampton.
- 1.2. The location of the development is shown in Figure 1 in Appendix A.
- 1.3. A flood risk assessment (FRA) report has been prepared for the above applications¹ and this flood emergency plan should be read in conjunction with that report.
- 1.4. The flood emergency action plan is a 'living document' and should be reviewed and updated as new information becomes available. In particular, the plan should be updated following consultations with the Arun District Council concerning safe refuge venues for evacuated residents. It is expected that these details will be clarified following a grant of planning permission.

¹ JOC Consultants report No 22/021.01 revision 02 dated 1st May 2024

2.0 CURRENT GUIDANCE

2.1 National Guidance

- 2.1.1. This flood emergency plan is based on the guidance in 'Flood risk Emergency Plans for New Development' [1] hereafter called the 'ADEPT guidance'.
- 2.1.2. Further guidance can be found in Table 9.2 in section 9.

3.0 SUMMARY OF THE FLOOD RISK

- 3.1. The FRA report was prepared with reference to the flood risk modelling report prepared by JBA Consulting and flood modelling data provided by the Environment Agency². The risk of flooding is tidally dominated but there is also a risk of surface water flooding in the Clifton Road area. There are fluvial and tidal flood defences on the east bank of the River Arun which officially provide a standard of protection against a tidal flood event occurring of at least 1 in 200 years. The modelling data however, demonstrates that currently, no flooding at the site is predicted in tidal events having annual probabilities of 0.5% or more. In the 1 in 1,000 years event flood depths of up to 130mm are predicted in the present day but this is mitigated by having a raised ground floor level.
- 3.2. Climate change effects on sea levels were considered up to 2124. The 1 in 200 years flood level at the site in 2124 is in the range 4.00m to 4.73m, assuming flood defence levels remain unchanged during the lifetime of the development. This would be approximately 2.0m above the proposed ground floor level of 2.74m AOD. This is a future risk of flooding that would affect a large area of Littlehampton, resulting in major economic loss and it is reasonable to expect that the flood defences will be raised in the future by the competent authority in response to the effects of climate change on tidal flood levels.
- 3.3. In order to mitigate the risks of flooding the FRA report recommended that the ground floor in the premises is raised by 600mm to 2.74m AOD. This will mitigate the risk of surface water flooding in Clifton Road. Flood resilient construction is also recommended for the ground floor in order to mitigate the risk that flood defences are not raised in the future.
- 3.4. In the event that a breach occurs in the flood defences during a 1 in 200 years event, the site would be unaffected in the present day, but flood levels of up to 4.73m AOD are predicted by 2124. In a 1 in 1,000 years event, a flood depth of 510mm is predicted in the present day. This would not exceed the proposed ground floor level, Clifton Road would be flooded.

² In Appendix D of the FRA report rev. 02 – see footnote 1

4.0 FLOOD HAZARD

- 4.1. Major flooding is damaging to property and potentially dangerous to life. Even shallow floodwater, when flowing at high speed, can cause a person to fall over and floodwater that is around 600mm deep can cause vehicles to float.
- 4.2. Floodwater is usually dark and murky and it is not always possible to see the flooded ground surface. It is especially dangerous to wade through flood water when the depth obscures the view of the ground because of hidden hazards. Flooding can lift manhole covers and some manhole chambers can be several metres deep, so anyone wading through floodwater is at risk of falling into a manhole.
- 4.3. Floodwater that is more than 600mm deep can cause structural damage to buildings and it is sometimes better to allow floodwater to enter a building in order to equalise pressure, than to risk structural collapse.
- 4.4. When floodwater enters buildings it may typically be contaminated with sewage which poses an obvious health hazard and a thorough clean-up operation is required afterwards.
- 4.5. The evidence from the FRA report suggests that during the lifetime of the development, a flood level of 4.73m AOD could potentially occur by 2124 in the event of a breach in the flood defences if the defences are not raised in response to climate change. This would be very hazardous and evacuation of the ground floor would be necessary in response to a flood warning. Should evacuation not be feasible however, the internal staircase will provide a safe route to a place of safety on the first floor.
- 4.6. The construction of the coastal and river flood defences suggests that the likelihood of a breach would be very low.

5.0 ROLES AND RESPONSIBILITIES

- 5.1. The Flood Risk Regulations 2009 places a duty on the Environment Agency and Lead Local Flood Authorities to prepare Flood Risk Management Plans which must identify the areas at risk and the measures proposed to manage the flood risks.
- 5.2. The Civil Contingencies Act 2004 places a duty on local authorities, the emergency services, the National Health Service and the Environment Agency to plan for emergencies which would include serious flooding.
- 5.3. The roles and responsibilities of the various organizations that would be involved in a major flooding incident are summarized in Appendix 3 of the publication *Flooding – minimising the risk - Flood plan guidance for communities and groups*, published by the Environment Agency. An extract from this publication is reproduced in Appendix B.
- 5.4. Roles and responsibilities are also discussed in the ADEPT guidance, but this is limited to public authorities.
- 5.5. The premises will have a full time management presence on site at all hours. The management staff will be responsible for taking the appropriate actions in the event of a flood warning. There is also a monitored CCTV system in the existing premises which will be retained.

6.0 FLOOD WARNINGS

- 6.1. The development is in a Flood Warning Area operated by the Environment Agency. It is recommended that the HMO registers with the Environment Agency to receive targeted automatic flood warnings.
- 6.2. The various categories of flood warning issued by the Environment Agency are summarized in Table 6.1 and further information is provided in Appendix C. Flood warnings provided by the Environment Agency do not cover flash flooding caused by intensive rainfall.

Table 6.1: Categories of Flood Warning		
Type	Reason for issue	Action
Online flood risk forecast	Possibility of flooding	Monitor weather conditions. Monitor flooding information on Environment Agency website.
Flood Alert	Possibility of flooding to specific areas	Standby to implement flood response plan. Monitor conditions. Prepare emergency kit.
Flood Warning	Flooding is expected in a specific area.	Move people and items to a safe place. Turn off electricity, gas, and water supplies if it is safe to do so. Install flood protection equipment such as flood barriers.
Severe Flood Warning	Severe flooding has occurred or is imminent.	Do not enter flooded areas.

- 6.3. The 24-hour Floodline telephone number 

- 6.4. The points of contact for receipt of flood warnings will be the on-site HMO Manager. An out-of-hours number should be provided when registering for the flood warnings.

7.0 SITE PREPARATIONS THE EVENT OF A FLOOD WARNING

- 7.1. A summary of preparatory actions in the event of the various categories of flood warnings is provided in Table 1 above.
- 7.2. Responsibilities for implementing the preparatory actions will rest with the HMO manager and the management team.

8.0 EVACUATION ROUTE AND SAFE HAVENS

8.1. In the event that evacuation of the HMO is necessary, occupants will leave the premises from the exit into Clifton Road and proceed north to Terminus Road. Consultation with Arun District Council will be necessary in order to identify a suitable refuge, such as a school or a church hall for evacuated residents in the area and this information should be added to the Flood Emergency Action Plan in due course.

8.2. The evacuation route is described below:

- Leave the HMO, turning left into Clifton Road and proceed north to New Road;
- Turn left at New Road and proceed west and then north towards the High Street and Terminus Road.

9.0 USEFUL INFORMATION

9.1. Table 2 provides a list of contact numbers and website addresses for relevant organizations.

Table 9.2: Details of organizations involved in a flood emergency		
Organization	Telephone Number	Website
ArunDistrict Council		www.arun.gov.uk
Environment Agency		www.gov.uk/government/organisations/environment-agency
Sussex Police		www.sussex.police.uk
East Sussex Fire and Rescue Service		www.esfrs.org/

9.2. Table 3 provides a list of useful web-based publications which provide further guidance.

Table 9.2: Useful Environment Agency publications	
Publication	Website
What to do before, during and after a flood	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/403213/LIT_5216.pdf
Prepare your property for flooding	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/451622/LIT_4284.pdf
Flooding – minimising the risk. Flood plan guidance for communities and groups	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/292939/LIT_5286_b9ff43.pdf
Flooding: Advice for the public	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/401980/flood_leaflet_2015_final.pdf

APPENDIX A

Figure 1: Location Plan

27 Clifton Road, Littlehampton, BN17 5TE



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Licence number 100023432
Plotted Scale - 1:4000. Paper Size - A4

Promap
LANDMARK INFORMATION

Figure 1: Location Plan

APPENDIX B

Extract from:

‘flood plan guidance for communities and groups’ – Appendix 3

Who does what during a flood?

This lists the principle actions of each organisation. It may not always be possible for all actions to be carried out during a flood event.

Responding organisations have limited resources so may not be able to provide assistance in all circumstances. In such cases the owners and occupiers need to be aware that they should make their own arrangements to protect their property from flooding. This should be clearly stated in the plan.

Environment Agency

- issues flood warnings for flooding from rivers, the sea and groundwater;
- receives and records details of flooding incidents;
- monitors the situation and advises other organisations;
- deals with emergency repairs and blockages on main rivers and own structures;
- responds to pollution incidents;
- advises on waste disposal issues.

County Council and Unitary Authority

- co-ordinates emergency arrangements;
- maintains safe conditions on the roads;
- puts flood warning signs on the highway;
- organises road closures and traffic diversions;
- clears blockages on highway drainage systems;
- may take action to protect property from flooding by water from the highway where there is a failure of the highway drainage system.

Lead Local Flood Authorities (LLFA)

- leads the co-ordination of flood risk management in their areas;
- develops local flood risk management strategies for local sources of flooding;
- manages surface water and groundwater flooding;
- maintains a register of structures or features which have a significant effect on flood risk in their area;
- investigates flooding incidents in its area.

District Council

- co-ordinates emergency response for its own area;
- issues flood warnings (by local agreement with Environment Agency);
- provides emergency assistance including providing sandbags;
- clears blocked watercourses (Land Drainage Act powers);
- deals with environmental health issues ,including pollution;
- clears blocked road channels and gully gratings and street cleaning;
- runs emergency planning support groups.

Town and Parish Council

- issues flood warnings (by local agreement with Environment Agency);
- some distribute sandbags.

Police

- takes an overall co-ordination role during an incident.

Fire and Rescue Service

- responds to all emergency incidents as required;
- assists the public where a need is identified and the use of Fire Service personnel and equipment is required.

Water companies

- clears blockages in public sewers;
- may take action to protect property from flooding by water from the public water mains or discharges from the public sewerage systems.

Electricity, gas and telecommunication companies

- attends to emergencies relating to their service at properties where life is at risk as a result of flooding;
- attends to flooding emergencies at their own serviced installations.

Large industrial companies

- protects own premises and installations;
- provides resources which could be hired.

Property owners

- moves to a safe area if life at risk;
- prevents water from entering property if possible;
- switches off electricity and gas supplies at mains;
- moves valuable possessions above areas liable to be flooded.

Flood plan co-ordinator

- is aware of the current situation;
- contacts flood wardens or volunteers and advises on actions to prepare for flooding;
- liaises with the local authority, Environment Agency and other organisations;
- updates the flood wardens if the situation changes;
- maintains emergency contacts.

Flood wardens/volunteers

- acts on the advice received from the flood plan co-ordinator or their assistant;
- puts flood protection measures in place;
- helps and advises vulnerable people and helps move them to safety early if required;
- informs the community of the situation and advises them to prepare by moving cars, putting sandbags or floodboards in place etc.

APPENDIX C

Categories of Flood Warning

Flood warning codes

**ONLINE FLOOD
RISK FORECAST****Meaning**

Be aware.
Keep an eye on the
weather situation.

General advice

- Check weather conditions.
- Check for updated flood forecasts on the Environment Agency website.

**FLOOD ALERT****Meaning**

Flooding is possible
Be prepared.

General advice

- Be prepared to act on your flood plan.
- Prepare a flood kit of essential items.
- Monitor local water levels and the flood forecast on our website.

**FLOOD WARNING****Meaning**

Flooding is expected.
Immediate action required.

General advice

- Move family, pets and valuables to a safe place.
- Turn off gas, electricity and water supplies if safe to do so.
- Put flood protection equipment in place.

**SEVERE FLOOD
WARNING****Meaning**

Severe flooding.
Danger to life.

General advice

- Stay in a safe place with a means of escape.
- Be ready should you need to evacuate.
- Co-operate with the emergency services.
- Call 999 if you are in immediate danger.

**WARNING
NO LONGER
IN FORCE****Meaning**

No further flooding
is currently expected
in your area.

General advice

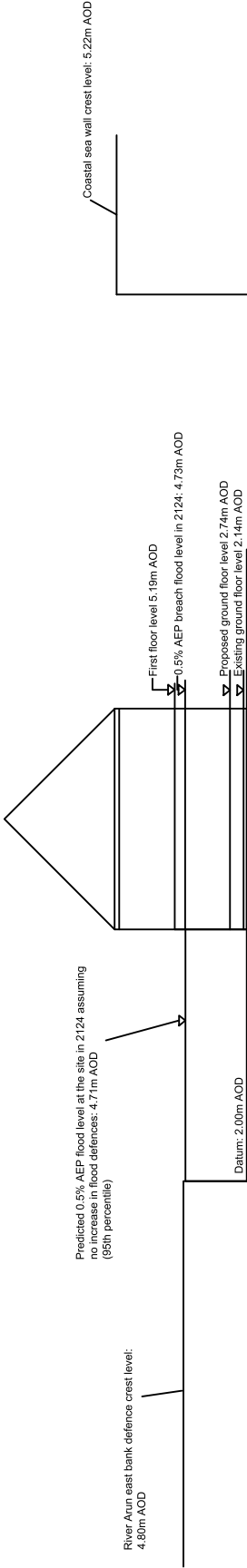
- Be careful. Flood water may still be around for several days.
- If you've been flooded, ring your insurance company as soon as possible.

End of Report

APPENDIX I

Schematic cross section showing relative levels

27 CLIFTON ROAD, LITTLEHAMPTON



Schematic cross section showing relative levels

End of Report