

23/10/25

Flood Risk Assessment



Waterside Hotel

Prepared for:

The Waterside Hotel and Galleon Leisure Club Limited
Waterside Hotel
Didsbury
Greater Manchester



Edenvale Young Associates Ltd.
30, Queen Charlotte Street,
Bristol
BS1 4HJ
United Kingdom

Report Title Flood Risk Assessment

Project Name Waterside Hotel

Project Number EVY1238

Report Revision B

Client The Waterside Hotel and Galleon Leisure Club Limited

Written by	SJ.png	Sam Jones/23/10/2025
Checked by	JY.jpg	John Young/23/10/2025
Approved by	JY.jpg	John Young/23/10/2025

Revision	Issued to	Date
B	The Waterside Hotel and Galleon Leisure Club Limited	October 28, 2025

Contents

1	Introduction	1
1.1	Background	1
2	Site Context	5
2.1	Existing Sheet Piled Wall	5
3	Design Proposals	7
3.1	Existing Sheet Piled Wall	7
3.2	Proposed Configuration	7
4	Published Information	9
4.1	Environment Agency Flood Risk Mapping	9
5	National Planning Policy	12
5.1	The Sequential Test (Clause 172)	12
5.2	Vulnerability	12
5.3	The Exception Test (Clauses 178 to 180)	12
6	Flood Risk	13
6.1	Topographic Survey	13
6.2	Climate Change	13
6.3	Hydraulic Modelling Overview	14
6.4	Baseline Hydraulic Modelling	14
6.5	Pre-Development Hydraulic Modelling	16
6.6	Post-Development Hydraulic Modelling	16
7	Conclusions and Recommendations	26
7.1	Conclusions	26
7.2	Recommendations	27
A	Photographs	28
B	Topographic Survey	43
C	Drawings	48

List of Figures

1.1	Sheet Piled Wall	1
1.2	Sheet Piled Wall	1
1.3	Sheet Piled Wall	1
1.4	Location of site shown in Blue (Grid Reference 385489, 389660: Post Code M20 5WZ)	2
1.5	Land Under the Control of the Applicant in Blue	2
1.6	Extent of the Works in Red	3
1.7	Alignment of Proposed Wall (Red Dashed) and Embankment (Blue Dashed)	4
2.1	Sheet pile 2025	5
2.2	Sheet pile 2025	5
2.3	Sheet pile 2025	5
2.4	Sheet pile 2025	6
3.1	Typical Configuration of the Flood Wall	8

4.1	Historical Flood Outline – Environment Agency.	10
4.2	Flood Zone 2 (light blue) & 3 (dark blue).	11
4.3	Surface water flood risk to development site.	11
6.2	Upper Mersey Climate Change Allowances	13
6.1	Extent of Topographic Survey	14
6.3	Baseline Hydraulic Modelling Results – 1 in 100 year flood levels	15
6.4	Baseline Hydraulic Modelling Results – 1 in 100 year + 30% climate change allowance flood levels	15
6.5	Pre-development bank points alongside Waterside Hotel. . .	17
6.6	Post-Development bank points alongside Waterside Hotel. .	18
6.7	Maximum modelled levels, Pre-Development scenario, 1 in 100 year event + 22% CC allowance.	19
6.8	Maximum modelled depths, Post-Development scenario, 1 in 100 year event + 22% CC allowance.	20
6.9	Water level difference mapping, Post-Development minus Pre-Development scenarios, 1 in 100 year event + 22% CC allowance.	21
6.10	In-channel velocity time-series of both the pre-development (red) and post-development (blue) scenarios.	22
6.11	Maximum modelled velocities, Pre-Development scenario, 1 in 100 year event + 22% CC allowance.	23
6.12	Maximum modelled velocities, Post-Development scenario, 1 in 100 year event + 22% CC allowance.	24
6.13	Post Development minus Pre Development Velocities for a 1 in 100 year event + 22% CC allowance.	25

Glossary of Terms

- 1 in 100 year return period: A flow event with a 1% chance of occurring in any one year.
- 1 in 200 year return period: A flow event with a 0.5% chance of occurring in any one year.
- Flood Hazard: A measure of the danger of flooding to pedestrians which takes into account the: the depth flooding; velocity of flood water and presence of debris. There are four categories of flood hazard including:
 - Very low hazard – Low depth and velocity.
 - Dangerous to some (i.e. children, the elderly and the infirm).
 - Dangerous to most (i.e. the general public).
 - Dangerous to all (including the emergency services).
- Flood Zone 1 (Low Probability) A planning boundary defined on the Environment Agency's (EA) flood risk maps (rivers and seas) which is not subject to flooding in a 1 in 1000 year flood event.
- Flood Zone 2 (Medium Probability) A planning boundary on the EA's flood risk maps (rivers and seas) which shows an area which will flood in a 1 in 1000 year flood event (undefended and unblocked).
- Flood Zone 3 (High Probability) A planning boundary on the EA's flood risk maps (rivers and seas) which shows an area which will flood in a 1 in 100 year flood event (undefended and unblocked).
- Hydraulic Model The representation of a river and its floodplains.
- Hydrology The calculation of catchment based flow rates over time (i.e. 1 in 100 and 1 in 1000 year return period events).

1. Introduction



Figure 1.1: Sheet Piled Wall



Figure 1.2: Sheet Piled Wall

1.1 Background

Edenvale Young Associates was commissioned by The Waterside Hotel and Galleon Leisure Club Limited to prepare a Flood Risk Assessment (FRA) for the Waterside Hotel. The Waterside Hotel is on the banks of the River Mersey in Didsbury and is shown in Figures 1.4 and 1.5. The site is within Flood Zone 3. On the 31 December 2024 and 1 January 2025, high water levels in the River Mersey lead to overtopping of the existing sheet piled wall to the rear of the hotel. It is understood that peak water levels reached the underside of the balcony as shown in Figure 1.1. The hotel including swimming pool, gyms and much of the ground floor inundated with damages estimated to be approximately £2.5 million.

The aim of the works comprise the construction of a new reinforced concrete flood defence, behind the hotel and an embankment in the car park to the south in order to mitigate the risks of flooding to the hotel. The location and area of the works is illustrated in Figures 1.4 to 1.7 with detailed drawing given in Appendix C.

- A review of historical flood risk to the site.
- A review of published data and mapping on flood risk.
- A summary of the design proposals.
- An assessment of safe access and egress.
- A discussion about third party impacts.



Figure 1.3: Sheet Piled Wall

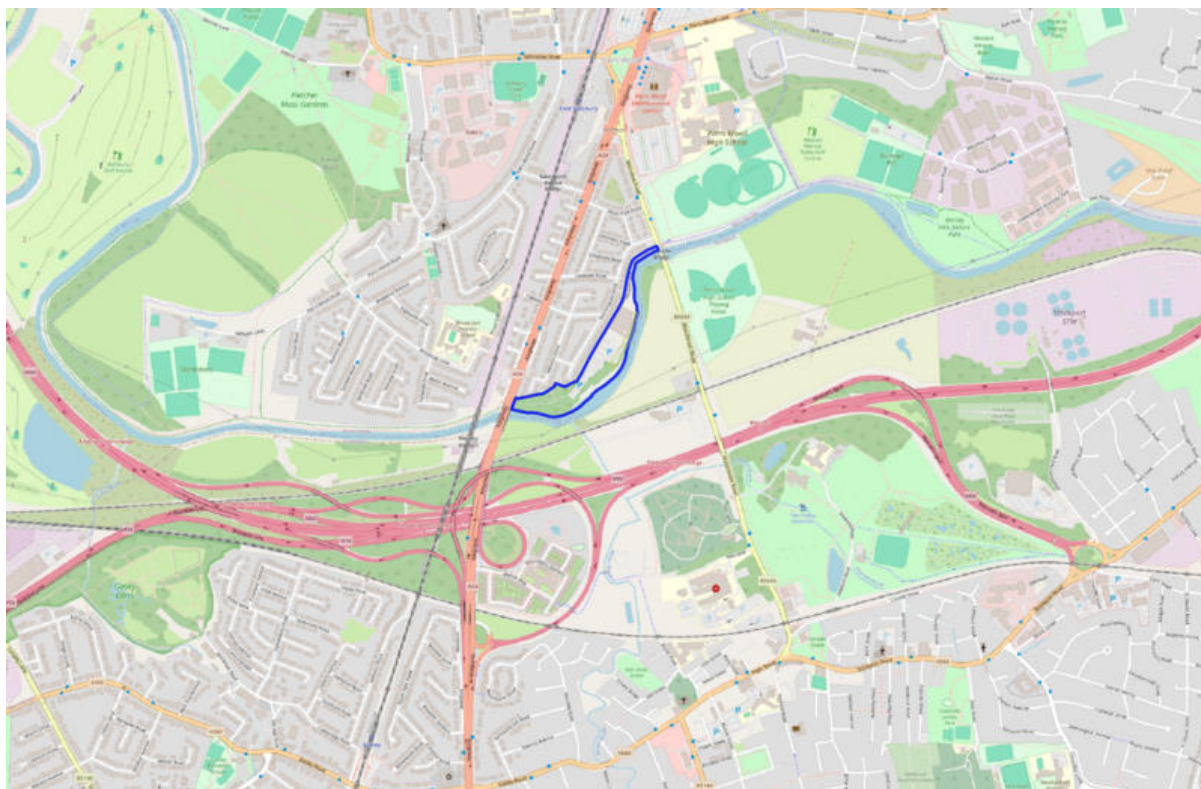


Figure 1.4: Location of site shown in Blue (Grid Reference 385489, 389660: Post Code M20 5WZ)



Figure 1.5: Land Under the Control of the Applicant in Blue



Figure 1.6: *Extent of the Works in Red*

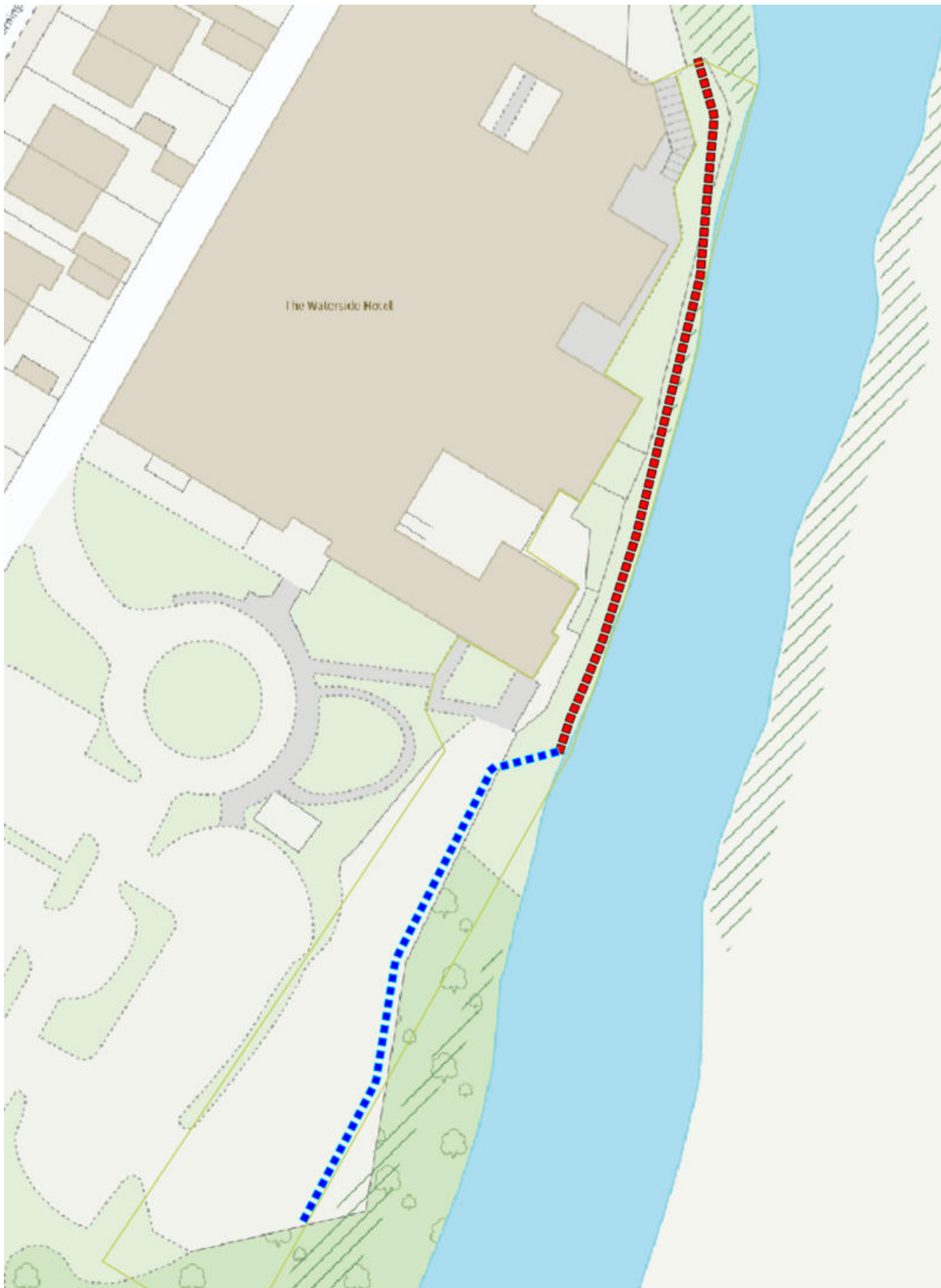


Figure 1.7: Alignment of Proposed Wall (Red Dashed) and Embankment (Blue Dashed)

2. Site Context



Figure 2.1: Sheet pile 2025



Figure 2.2: Sheet pile 2025

2.1 Existing Sheet Piled Wall

An existing sheet piled wall currently mitigates the risk of flooding to the hotel but it was not sufficiently high enough to prevent flooding on the night of the 31 December 2024 and 1 January 2025. Indeed a topographic survey of the wall indicates that there are low points along the crest of the wall. Moreover, a visual condition assessment of the piled wall carried out by Edenvale Young in April 2025 confirmed that there were a number of serious issues relating to the stability and condition of the sheet piles wall. This included:

- Deflection of the wall outwards associated with lateral earth pressures acting towards the river (see Figure 2.1)
- Distortion of the pile clutches along the length of the wall (see Figure 2.2).
- Failure of the waling.

In places, the top of the piled wall is supported by a steel beam spanning from existing columns supporting the canopy to the building. This suggests that the original designer was unable to prove the geotechnical or structural stability of the piles without transferring loading to the building structure.

Trial pits (2m and 3m deep) were excavated adjacent to the wall which revealed the presence of sandstone at shallow depth to the north of the site and sand to the south. However, it was not possible to establish the embedment depth of the piles into the river bank in order to back calculate the structural integrity of the piles.

Accordingly, there are concerns relating to the structural integrity of the piles.



Figure 2.3: Sheet pile 2025

A structural / geotechnical assessment of the options for improving the standard of protection indicated that a less substantial solution (i.e welding a plate to the top of the wall to increase its height) would result in structural failure of the sheet piled wall under hydrostatic loading in flood conditions. Indeed, it is highly likely that the piled wall only survived the 2024 / 2025 event because water levels and therefore pressures equalised on both sides of the wall. Due to the uncertainty associated with the length of embedment and deformation of the piles, it is considered that the piles cannot be relied on to provide geotechnical or structural stability and a separate stand alone solution should be required.



Figure 2.4: Sheet pile 2025

3. Design Proposals

Design Constraints:

- Access for construction.
- The presence of pinch points and limitations of space for the wall.
- The presence of foundations for the building and canopy.
- Bearing capacity of the soils and slope stability.
- Flooding during construction.

Design Drawings for the retaining wall are given in Appendix C

3.1 Existing Sheet Piled Wall

It is considered that the existing sheet piled wall must remain in place for the duration of the construction of the retaining wall. Cutting down or removing the piles to facilitate the construction of the wall would expose the site to the risk of flooding during the works period. The high level financial damages to the hotel which could occur due to flooding is considered to be an unacceptable risk. It should also be noted that the sheet piled wall will isolate the works from the River Mersey mitigating the risks of environmental impacts to the watercourse.

Accordingly, the design is based on minimising the impact on the existing sheet piles by leaving them in place to provide protection to the hotel from flooding and mitigate the environmental risks to the River Mersey. However, it should also be recognised that there remains a risk of flooding during construction if water levels in the Mersey exceed the current level of the defences (e.g. a greater than 1 in 30 years event).

3.2 Proposed Configuration

The proposed wall is an reinforced concrete, gravity retaining wall. The base level for the majority of the wall is based on the existing ground level which is approximately 32.00m AOD. This gives a maximum wall height of approximately 2.6m. The wall includes a shear key below the foundation to resist a sliding failure. The geotechnical assessment indicates that adequate factors of safety for floatation, sliding, overturning and bearing capacity can be achieved with the dimensions shown on the design drawings.

The retaining wall has been set-back from the sheet piled wall by a distance of 0.75m (on average) to give 'man-access' between the sheet piles and wall to facilitate the erection and dismantling of formwork. The void between the new retaining wall and existing piled wall will be filled with a light aggregate and capped with mass concrete to deflect water.

The design also incorporates under-slab drainage through a porous concrete pipe which drains to the four existing pumping chambers to remove water seeping under the sheet piled wall. A flap valve (non return valve) will allow water accumulating behind the wall to drain rapidly into the river should the wall be overtopped by an exceedance event (e.g. a 1 in 1000 year event).

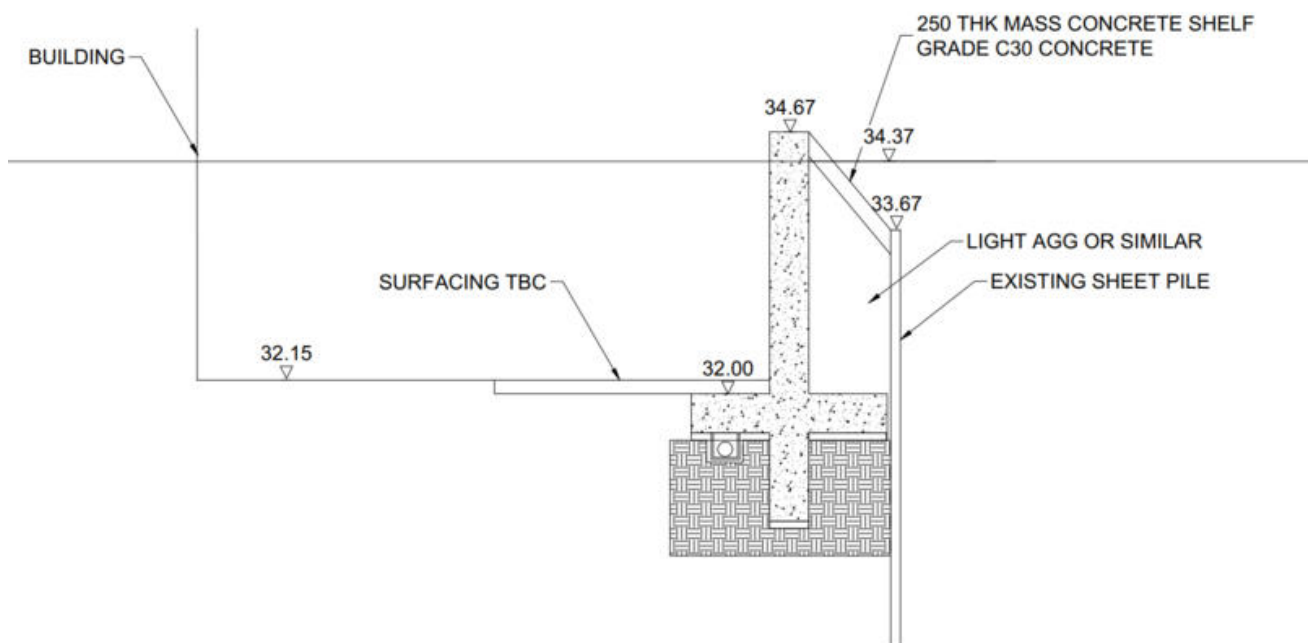


Figure 3.1: Typical Configuration of the Flood Wall

WATERSIDE HOTEL

4. Published Information

Flood Zone

- Flood Zone 3.

4.1 Environment Agency Flood Risk Mapping

Recorded Flooding

Figure 4.1 gives extents of recorded flooding to the area, which shows that the hotel experienced flooding in the past (namely 2002, 2019 and 2021 according to the EA dataset), although as previously mentioned there was severe flooding to the site in January 2025.)

Flood Zone Classification

Figure 4.2 show the flood zone classification, which confirms that the development is within Flood Zone 3.

Surface Water Flood Risk

Surface water flooding occurs following intense rainfall events, when water is unable to infiltrate the ground or cannot discharge to a watercourse. Figure 4.3 shows the surface water flood risk to the site, with the chances of surface water flooding impacting the site considered very low.

Groundwater Flooding

The risk of groundwater flooding in this area is considered to be low/unlikely.

Reservoirs

There is a risk of flooding from reservoirs at the development site. However, it is considered that the risks are appropriately managed and are acceptably low.

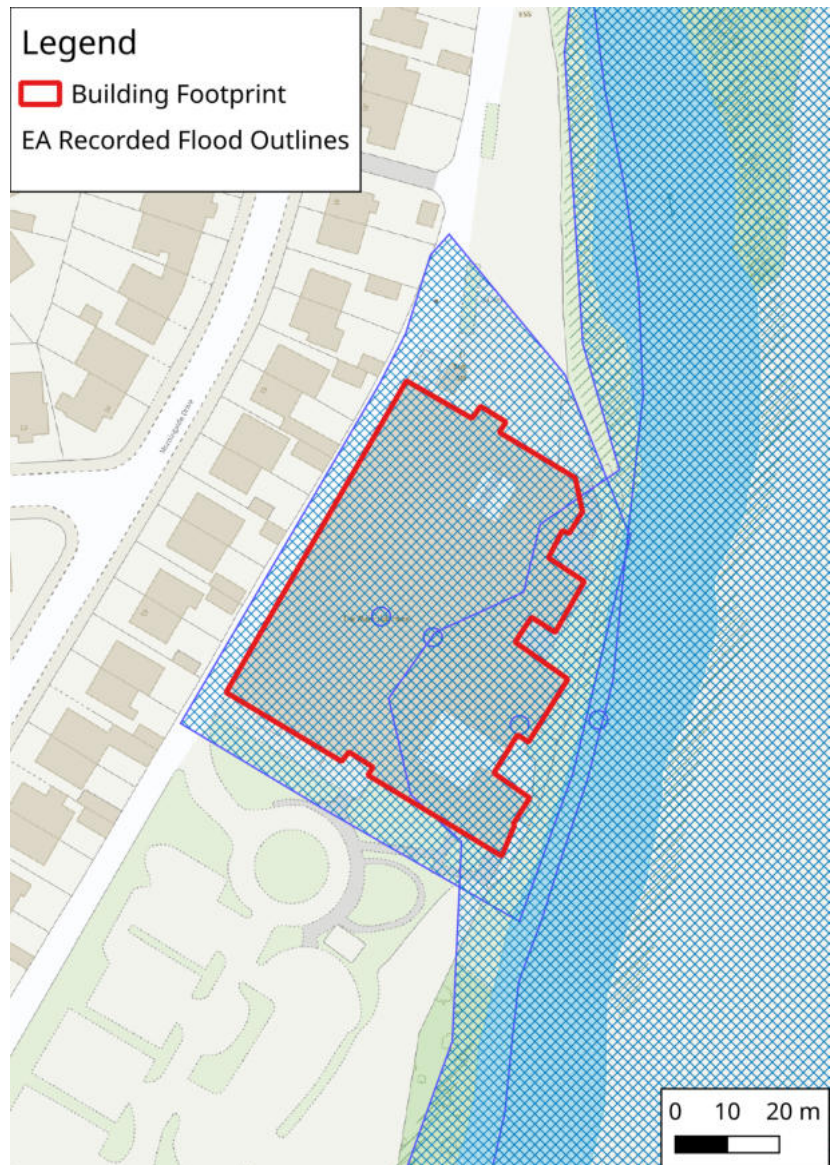


Figure 4.1: Historical Flood Outline – Environment Agency.

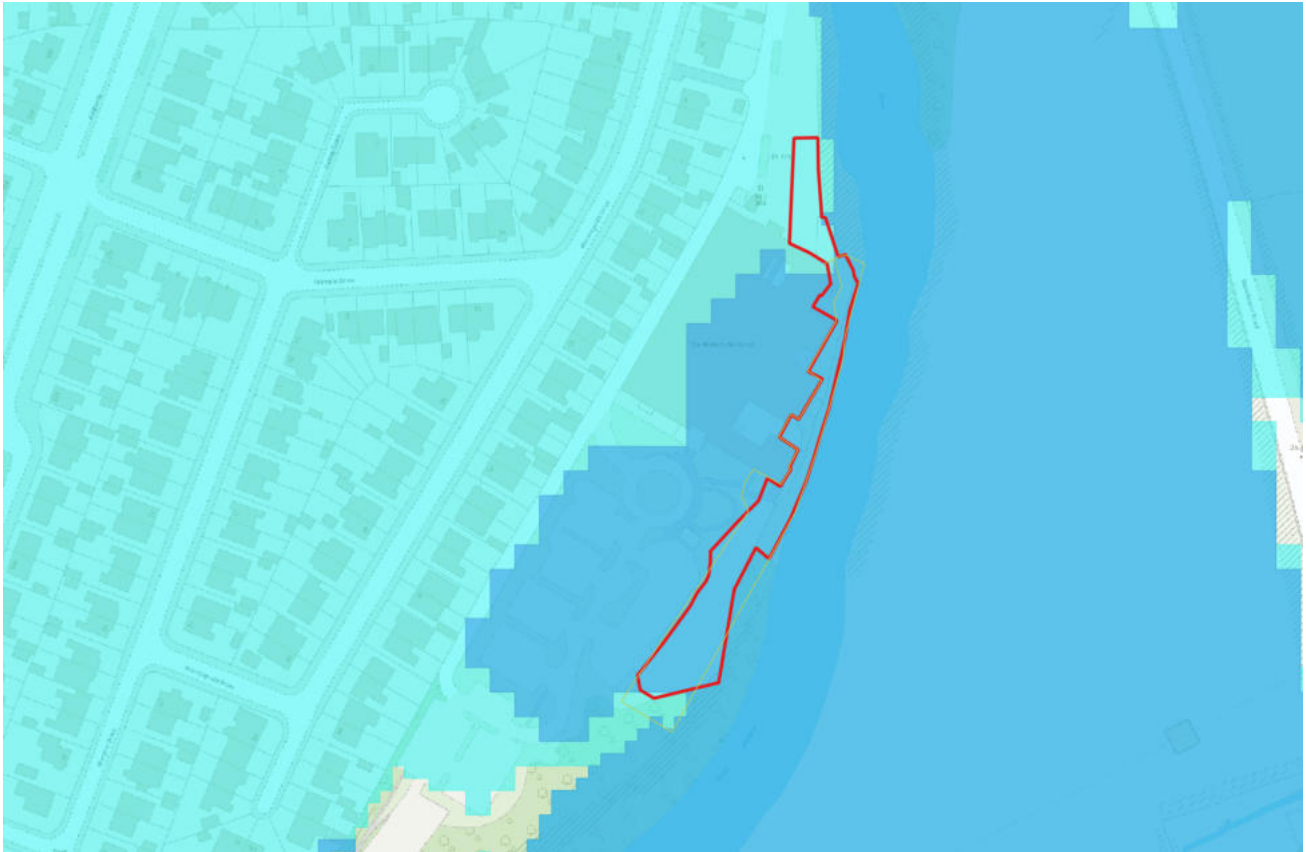
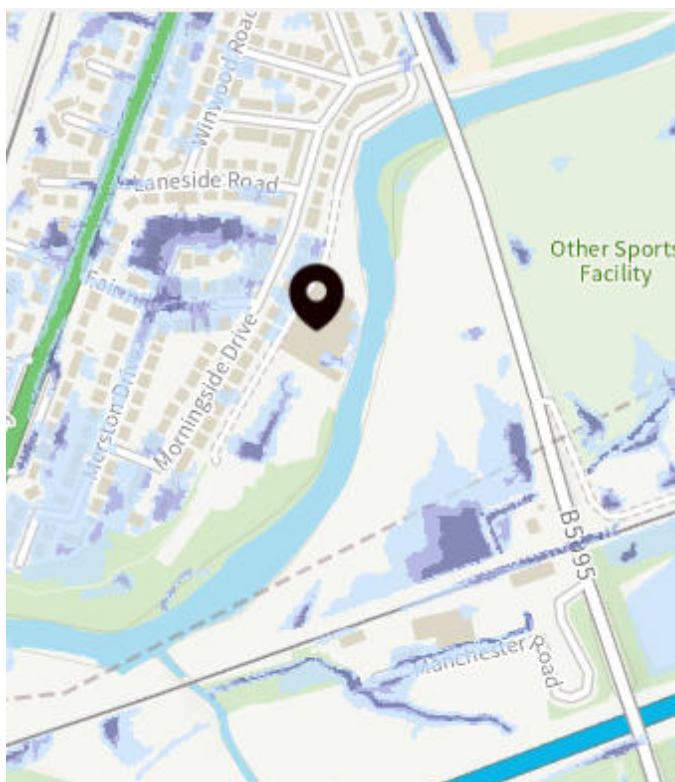


Figure 4.2: Flood Zone 2 (light blue) & 3 (dark blue).



Surface water map

Yearly chance of flooding

○ Flood area (extent)

Yearly chance of flooding between 2040 and 2060

● Flood area (extent)

■ High chance

■ Medium chance

■ Low chance

Figure 4.3: Surface water flood risk to development site.

5. National Planning Policy

NPPF Summary: The Development is:

- in Flood Zone 3;
- classified as Water Compatible

5.1 The Sequential Test (Clause 172)

A Sequential Test is not required as the proposed works are a flood defence to mitigate the risk of flooding to the existing hotel development.

5.2 Vulnerability

Based on the assumption that the scheme is for a flood defence structure then it is considered to be **Water Compatible**.

5.3 The Exception Test (Clauses 178 to 180)

Table 3 of the Flood Risk and Coastal Change Guidance (reproduced as Figure 5.1). The Flood Defence is located in Flood Zone 3 and considered to be 'Water Compatible'.

Table 3 confirms that an Exception Test is not required for Water Compatible development in Flood Zone 3 and that the tests set out in the notes to the table should apply namely that:

**In Flood Zone 3b (functional floodplain) essential infrastructure that has to be there and has passed the Exception Test, and water-compatible uses, should be designed and constructed to:*

- *remain operational and safe for users in times of flood*
- *result in no net loss of floodplain storage*
- *not impede water flows and not increase flood risk elsewhere*

Flood Risk	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Compatible
Zone 1	Yes	Yes	Yes	Yes	Yes
Zone 2	Yes	Exception Test	Yes	Yes	Yes
Zone 3a	Exception Test	No	Exception Test	Yes	Yes
Zone 3b	Exception Test*	No	No	No	Yes*

Table 5.1: Flood Zone and Vulnerability Compatibility

6. Flood Risk

Top of Pile Level	Standard
33.99 m AOD	> 1 in 100
33.97 m AOD	1 in 75 to 100
33.92 m AOD	1 in 75 to 100
33.77 m AOD	1 in 50
33.67 m AOD	1 in 30 to 50
33.86 m AOD	1 in 50 to 75
33.82 m AOD	1 in 50 to 75
33.85 m AOD	1 in 50 to 75
34.10 m AOD	> 1 in 100
34.06 m AOD	> 1 in 100
34.00 m AOD	> 1 in 100

Table 6.1: Top of Pile from Topographic Survey.

6.1 Topographic Survey

A topographic survey of the site was undertaken by Site Surveying Services of Clitheroe. The extent of the survey is shown in Figure 6.1 and is given in Appendix B. Table 6.1 shows the surveyed top of the sheet piled wall along its length with the crest of the wall varying in level from 33.67 to 34.10m AOD, with an average crest level of 33.91m AOD.

6.2 Climate Change

The Environment Agency's Guidance on climate change indicates that the Central Climate change allowance is appropriate for non-residential development such as the hotel. The appropriate climate change allowance for the 2050s (2040-2069), based on the Environment Agency's guidance, is 22% as shown in Figure 6.2.

This assumes that the residual lifespan of the hotel is in the order of 30 to 40 years falling and within the 2040 to 2069 epoch.

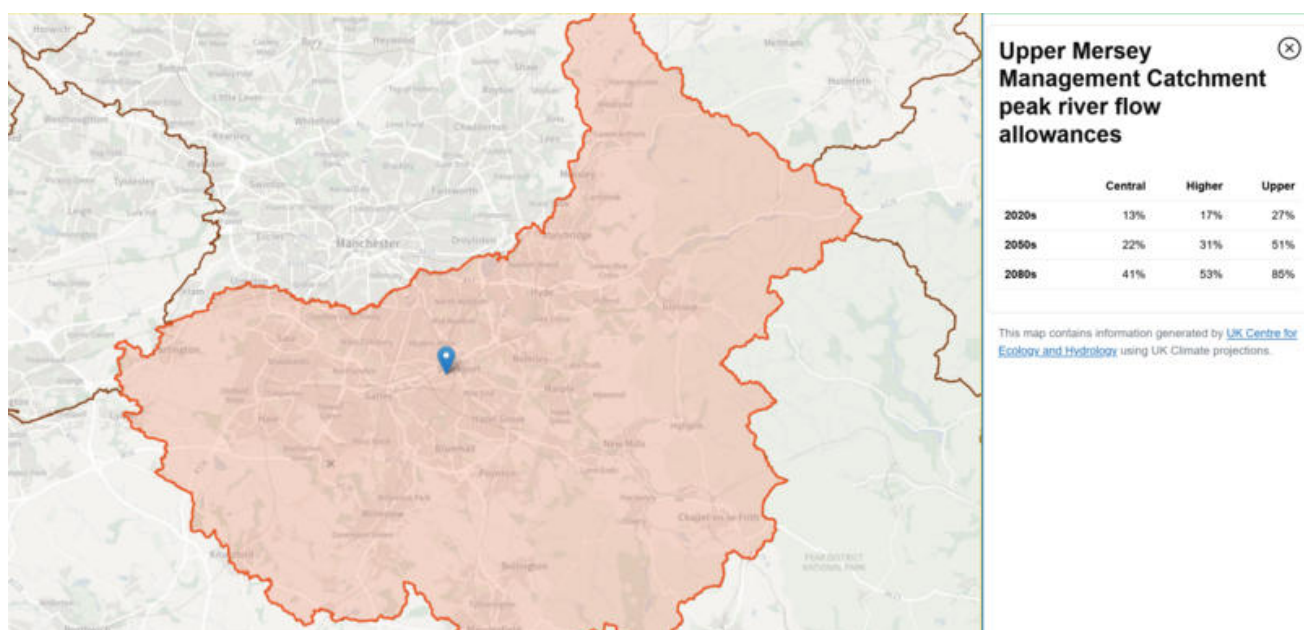


Figure 6.2: Upper Mersey Climate Change Allowances



Figure 6.1: Extent of Topographic Survey

6.3 Hydraulic Modelling Overview

Edenvale Young has obtained the FMP-TUFLOW model hydraulic model of the River Mersey from the Environment Agency to evaluate the flood risk to the site and establish the design level for the works. No changes have been made to the baseline model or inflows, including running the model using identical software versions to the supplied model runs.

With respect to the modelling undertaken for the FRA, there are three hydraulic modelling conditions which are of relevance to this FRA. These are:

- Baseline.
- Pre-development.
- Post-development.

The **Baseline Model** is typically defined as the hydraulic model of a river, city or catchment held by a regulator and supplied to a consultant for the purposes of undertaking an FRA.

The **Pre-Development Model** incorporates topographic survey data of the site to ensure that the model is representative of local conditions, including ground levels, buildings / walls etc. The topographic survey of the existing sheet piled wall into the Baseline Model. This forms the Pre-Development model for this purpose of this FRA.

The **Post-Development Model** incorporates the proposed flood wall.

6.4 Baseline Hydraulic Modelling

Figures 6.3 and 6.4 shows extent of flooding for a 1 in 100 year event as well as a 1 in 100 year event plus 30% climate change allowances. The Baseline modelling does not take account of the protection afforded by the sheet piles but does show inundation of the hotel and car park to the south of the hotel.

The 100 climate change with an allowance of 30% for climate change show extensive flooding to the site and the housing estate behind the hotel (see Figure 6.4). Mitigating this risk would require a much wider scheme than that proposed herein. This could include a dwarf wall along the entrance to the site and a flood gate across the road. However, these elements are not included within this proposal but may be implemented at a later date in consultation with residents, the Environment Agency and the Lead Local Flood Authority.



Figure 6.3: Baseline Hydraulic Modelling Results – 1 in 100 year flood levels

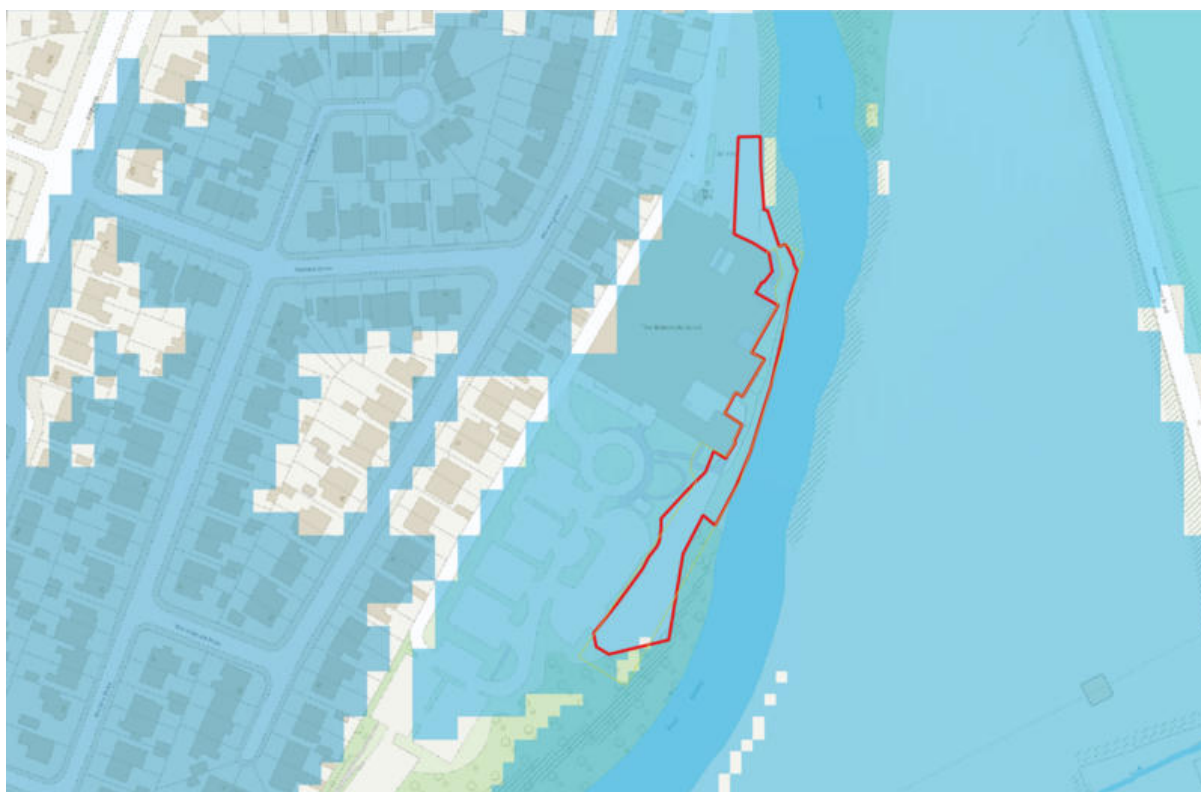


Figure 6.4: Baseline Hydraulic Modelling Results – 1 in 100 year + 30% climate change allowance flood levels

6.5 Pre-Development Hydraulic Modelling

Return Period	Max Water Level
1 in 30	33.61 m AOD
1 in 50	33.77 m AOD
1 in 75	33.89 m AOD
1 in 100	33.98 m AOD
1 in 100 cc 22%	34.37 m AOD
1 in 100 cc 30%	34.63 m AOD

Table 6.2: *Pre-development Hydraulic Model Results – River Mersey at the Waterside Hotel.*

The pre-development scenario incorporates the existing sheet piled wall using adjusted bank points. The topographic survey points of the sheet piled wall crest were utilised to inform these bank points, although some finer detail may have been lost due to the model cell size of 8m. The bank points used in the pre-development scenario are displayed in Figure 6.5.

Table 6.2 shows the results of the Baseline modelling at the site for a range of return period events. The maximum modelled extent of flooding for the pre-development scenario is shown in Figure 6.7 for the design scenario, which is the 1 in 100 year event + 22% CC. The existing sheet piled wall would be overtopped by up to 0.69m, leading to inundation of the development site to a maximum depth of 2.49m. The standard of protection provided by the existing sheet piled wall indicates that overtopping would occur in a 1 in 30 year to a 1 in 50 event (present day). The December / January event of 2024 / 2025 has been assessed as approximately a 1 in 50 year event.

6.6 Post-Development Hydraulic Modelling

Return Period	Max Water Level
1 in 100 cc 22%	34.37 m AOD

Table 6.3: *Post development Hydraulic Model Results – River Mersey at the Waterside Hotel.*

The proposed design crest level for the defence is based on the central climate change allowance (22%) with a 0.3m freeboard giving a design crest level of 34.67 m AOD (34.37 m AOD + 0.3m freeboard.)

The post-development scenario was modelled using the same methodology as the pre-development, but incorporates the design level of the proposed wall interpolated along the length of the bank adjacent to the hotel. The bank points used in the post-development scenario are displayed in Figure 6.5, it should be noted that only 2 were required to set the entire wall elevation at the design level of 34.67mAOD.

The maximum modelled depths in the pre-development scenario are shown in Figure 6.8 for the design scenario, which is the 1 in 100 year event + 22% CC. Table 6.3 confirms that there is no change in peak water level in the River Mersey as a result of the construction of the flood defence. The hotel, including the entire building footprint of the Waterside hotel, is not inundated in this scenario.

Water Level Difference Mapping

Water level difference mapping has been produced which is generated by subtracting the maximum water level of the pre-development scenario from that of the post-development scenario, to gauge the change in flood risk as a result of the proposed works. Figure 6.9 gives the water level difference mapping for the design event, demonstrating the flooding removed from the development site as a result of the proposed flood defence. There are no adverse flood risk impacts to third parties as a result of the proposed scheme. This is because the loss of flood storage is negligible by comparison to the volume of flood storage provided by the floodplains upstream and adjacent to the site.

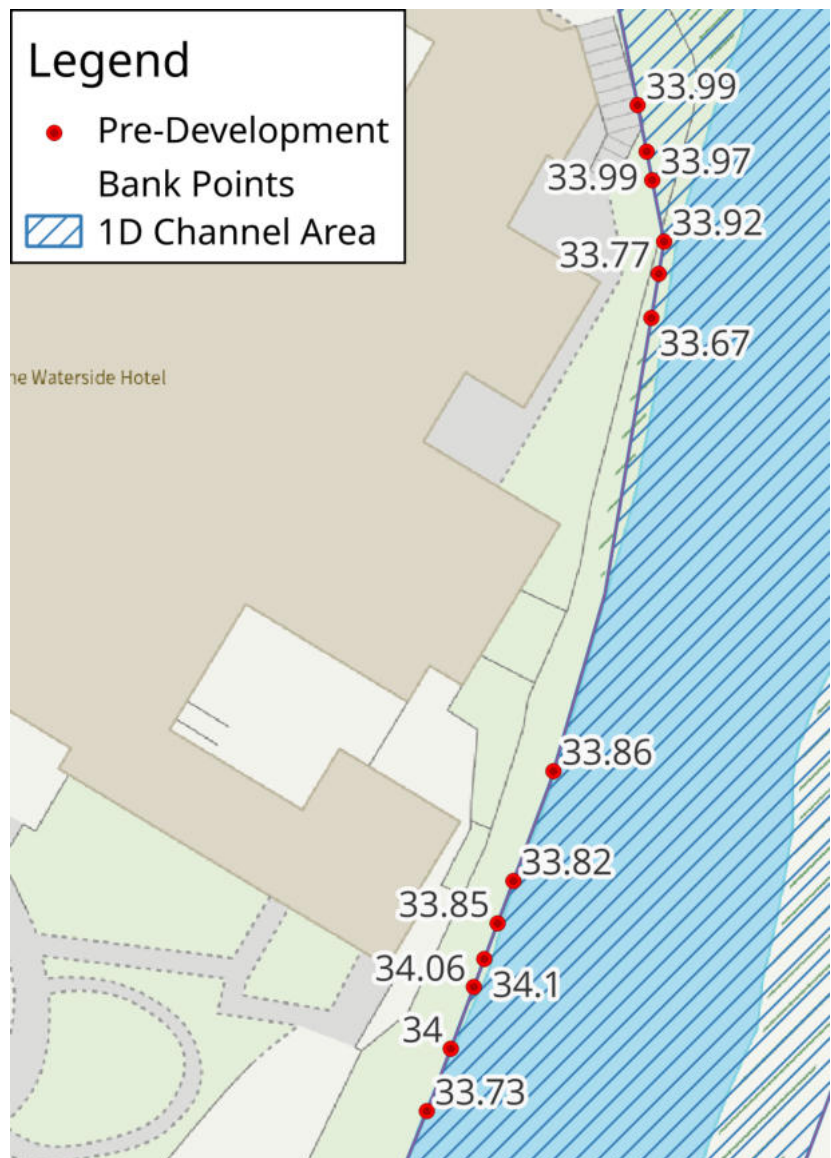


Figure 6.5: Pre-development bank points alongside Waterside Hotel.



Figure 6.6: Post-Development bank points alongside Waterside Hotel.

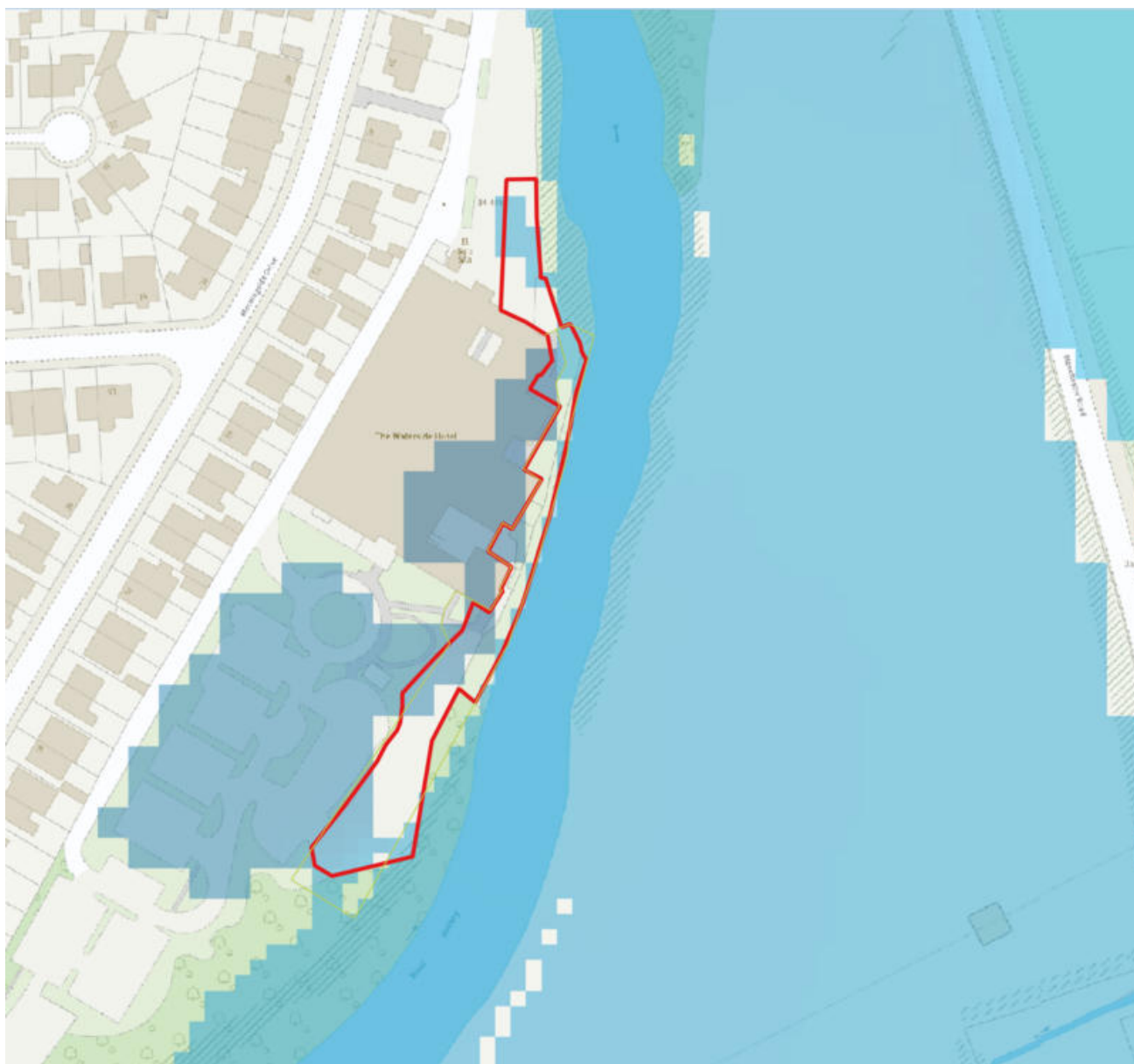


Figure 6.7: Maximum modelled levels, Pre-Development scenario, 1 in 100 year event + 22% CC allowance.



Figure 6.8: Maximum modelled depths, Post-Development scenario, 1 in 100 year event + 22% CC allowance.

- Grey indicates a negligible change in flood levels (with a tolerance of $\pm 10\text{mm}$)
- Yellow/orange indicates an increase in flood water levels.
- Green/cyan a reduction in flood water levels.
- Blue indicate a reduction in the extent of flooding.
- Red indicates areas of new flooding.

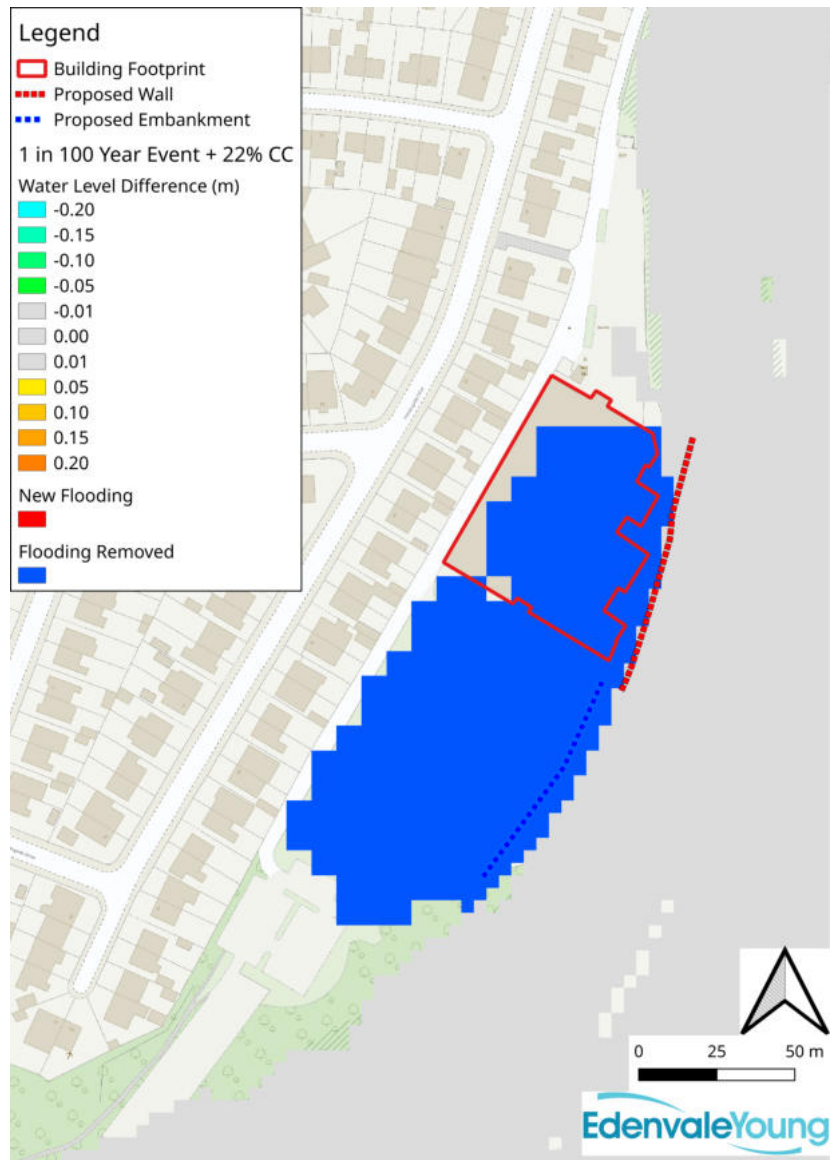


Figure 6.9: Water level difference mapping, Post-Development minus Pre-Development scenarios, 1 in 100 year event + 22% CC allowance.

Velocities & Erosion Risk

In addition to the water level difference mapping, hydraulic modelling results have been utilised to produce velocity mapping of channel and floodplain in the vicinity of the Waterside Hotel. Both pre- and post-development scenarios have been simulated in order to gauge any potential impacts of the development on downstream velocities, in order to investigate scour/erosion potential.

Figures 6.11 and 6.12 show the maximum modelled velocities in the design event for the pre- and post-development scenarios respectively. Figure 6.13 shows the difference in velocity between the pre and post development scenarios for the same event demonstrating that there is no measurable change in the velocity field associated with the construction of the flood defence.

In addition, Figure 6.10 presents the in-channel velocity time-series of both the pre-development (red) and post-development (blue) scenarios, which shows that any changes in the depth-averaged velocity within the Mersey as a result of the scheme are negligible. This reinforces the conclusion that the flood defence will not increase scour or bank erosion downstream of the hotel.

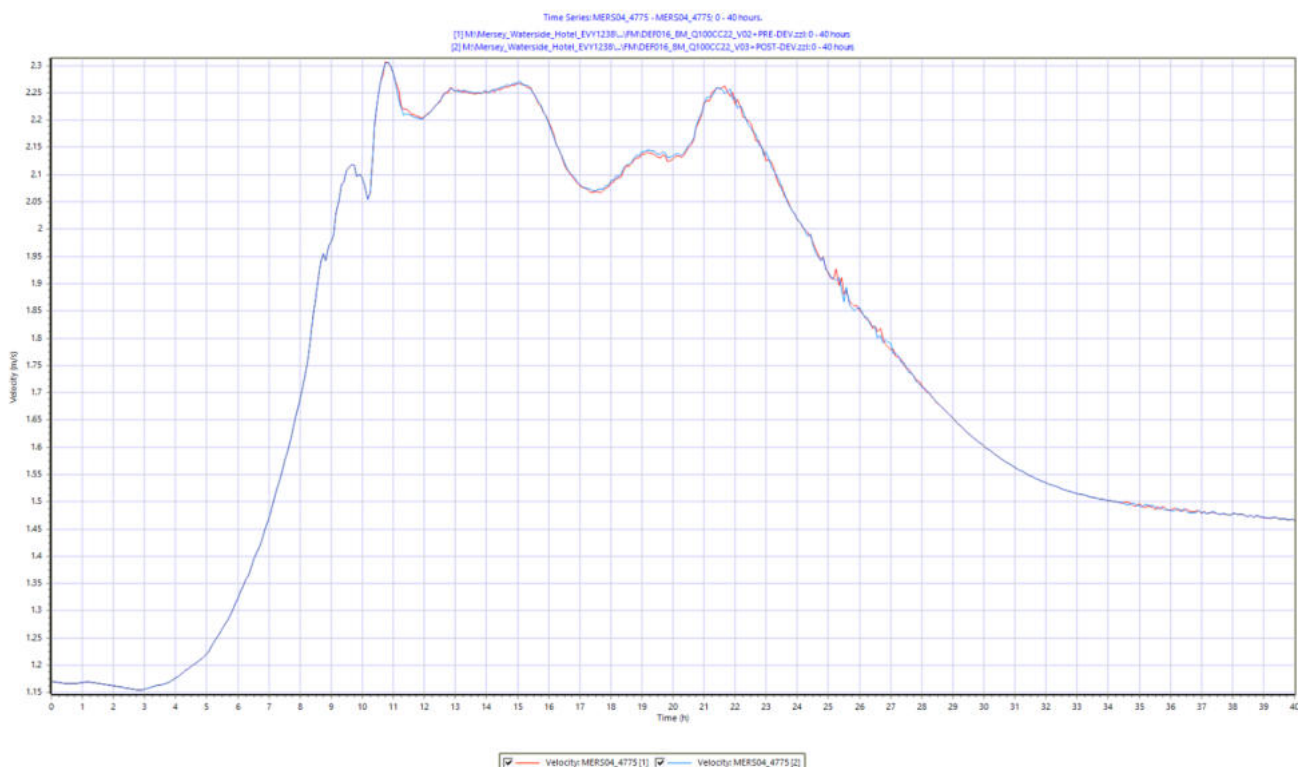


Figure 6.10: In-channel velocity time-series of both the pre-development (red) and post-development (blue) scenarios.

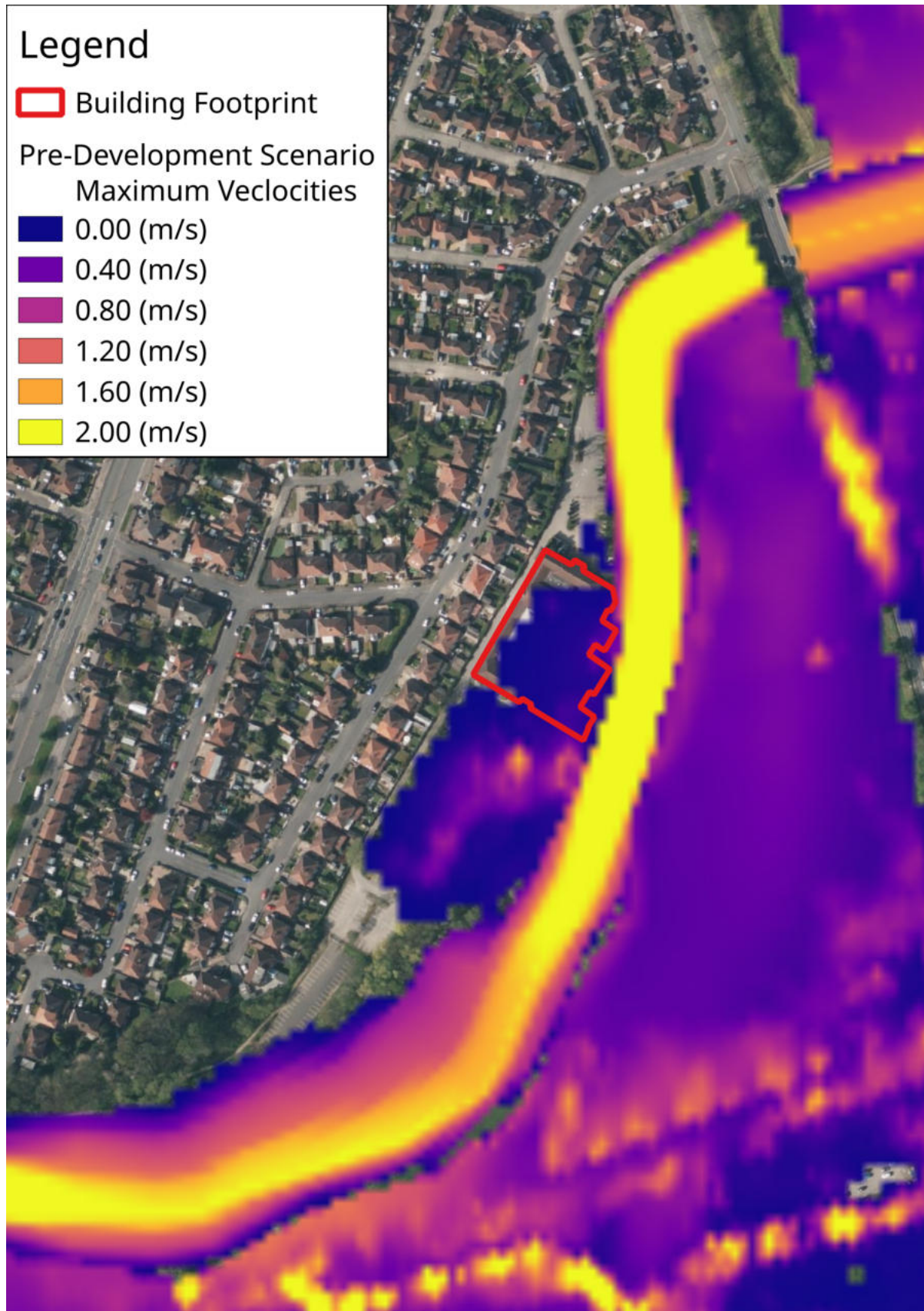


Figure 6.11: Maximum modelled velocities, Pre-Development scenario, 1 in 100 year event + 22% CC allowance.

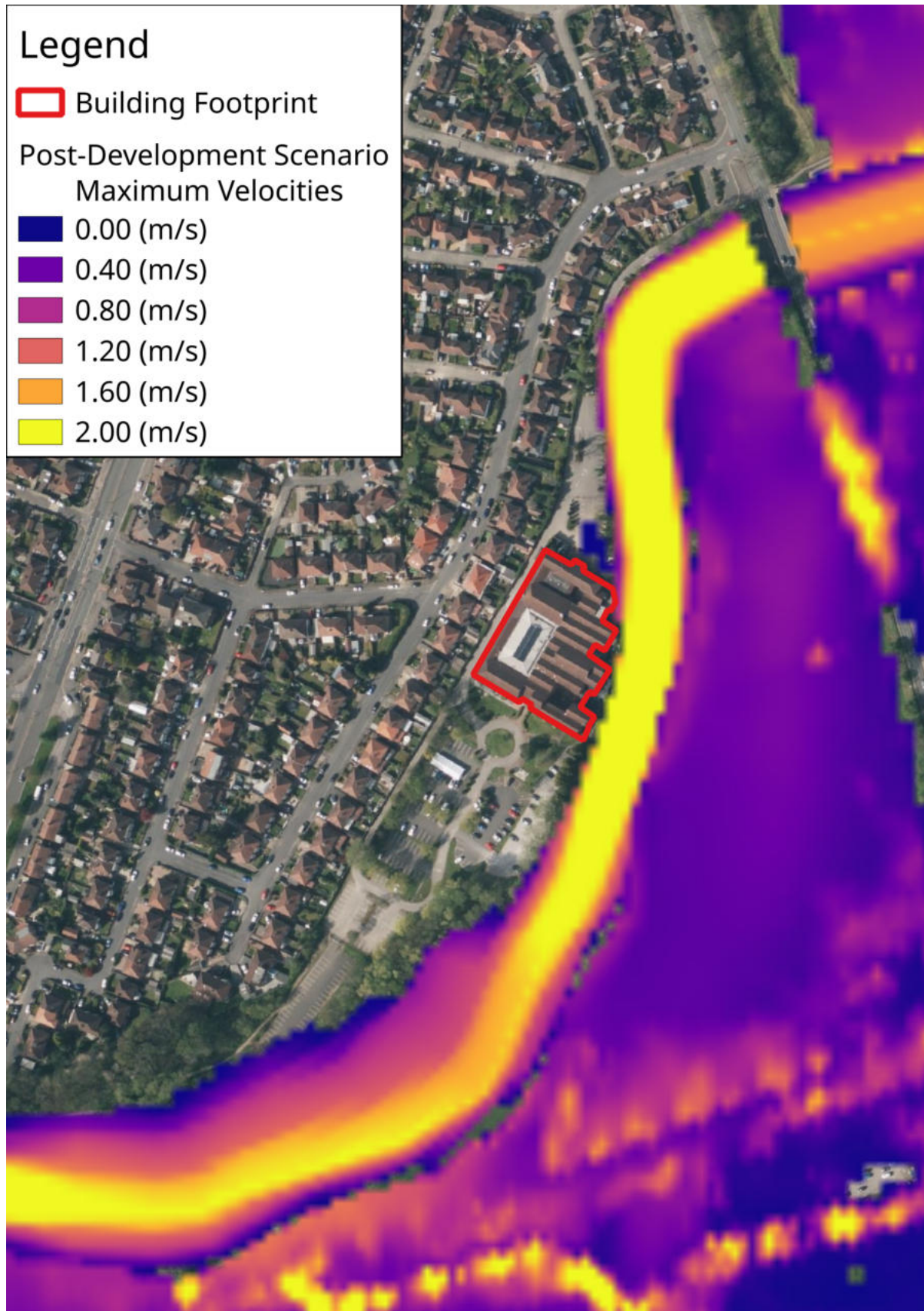


Figure 6.12: Maximum modelled velocities, Post-Development scenario, 1 in 100 year event + 22% CC allowance.

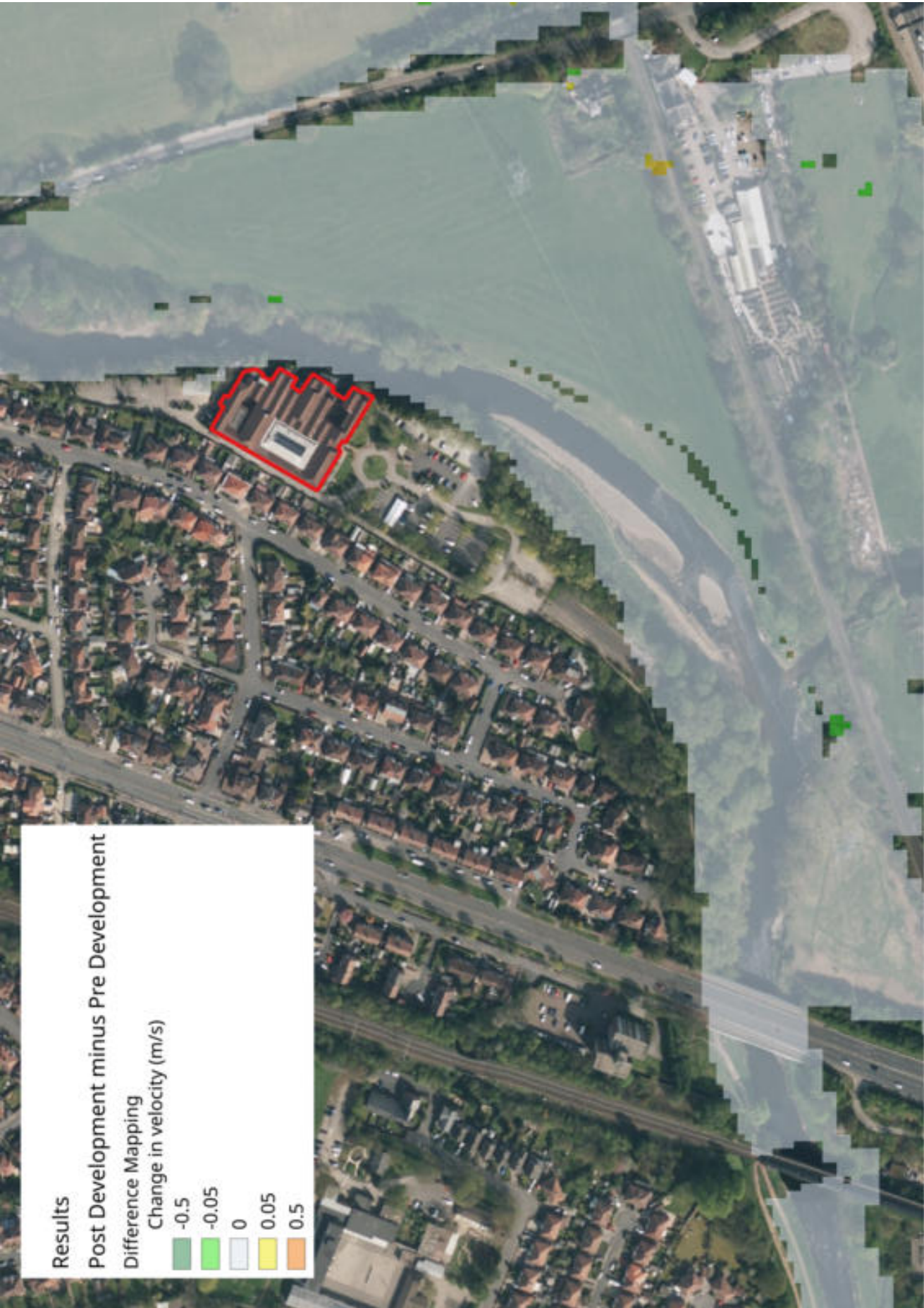


Figure 6.13: Post Development minus Pre Development Velocities for a 1 in 100 year event + 22% CC allowance.

7. Conclusions and Recommendations

7.1 Conclusions

Edenvale Young Associates were commissioned by prepare a Flood Risk Assessment, alongside a detailed design, for proposed flood defence on the eastern perimeter of the Waterside Hotel site on the banks of the River Mersey in Didsbury. The scope of works has included an evaluation of published information, desktop analysis, a summary of the design proposals and a consideration of pre- and post-development hydraulic modelling using the Environment Agency model of the Mersey and tributaries.

The proposed design is comprised of a gravity retaining wall with a design crest level of 34.69m AOD, which will sit on the landward side of an existing sheet pile wall which does not provide the hotel with the desired level of protection. The design crest level was set at the design flood level, which is based on the 1 in 100 year event + 22% allowance for climate change, plus 300mm freeboard.

An evaluation of published information including Environment Agency flood mapping yields the following:

- The restoration site is located in Flood Zone 3.
- Flood risk from surface water has been evaluated and is not considered significant.
- The site is not considered to be at risk of groundwater flooding.
- The site is at risk of inundation from reservoir flooding but it is considered that reservoir management means that the the risk is appropriately managed.

Edenvale Young obtained the Environment Agency's model of the Mersey and it's tributaries for the purpose of assessing flood risk. No changes were made to the model or the hydrological inflows for the Baseline model. The baseline model results indicated that the building footprint of the Waterside hotel, would be inundated in the pre-development scenario to a maximum depth on site of 2.49m. Subsequently two new model scenarios were created, representing the pre-development (existing sheet pile wall) and post-development (proposed flood wall) structure crest levels which form the boundary between the development site and the River Mersey.

The site does not flood in the post-development scenario due to the defence provided by the proposed flood wall and embankment to the south of the hotel. In terms of water level difference mapping, the post-development scenario indicates that the change in flood levels as a result of the scheme is negligible. In addition, the impact of the flood defence on both in-channel and floodplain velocities is negligible in the design event.

In summary the scheme does not:

- Result in a significant loss of floodplain storage.
- Impede water flows and increase flood risk elsewhere.

7.2 Recommendations

The existing Flood Warning and Evacuation Plan for the hotel should be updated as a condition of planning.

WATERSIDE HOTEL

A. Photographs



Waterside Hotel Didsbury

8 April 2025 2023

Location

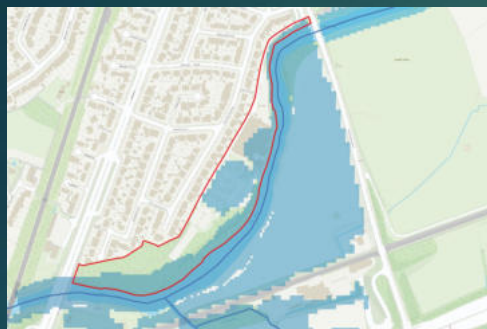


The Environment Agency has records of flooding to the site in 1997, 2004 and 2008.

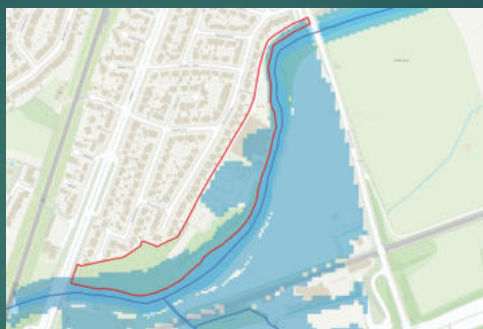
The December 2024 Event was the highest on record

A review of the EA flow gauge for the Mersey suggests that it was the equivalent of a 1 in 75 year event.

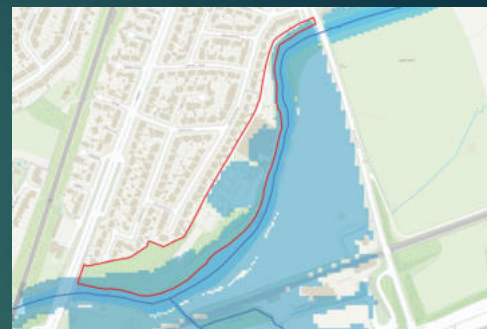
Hydraulic Modelling Results



1 in 50 year return period
Peak Level = 33.76m AOD



1 in 75 year return period
Peak Level = 33.88m AOD

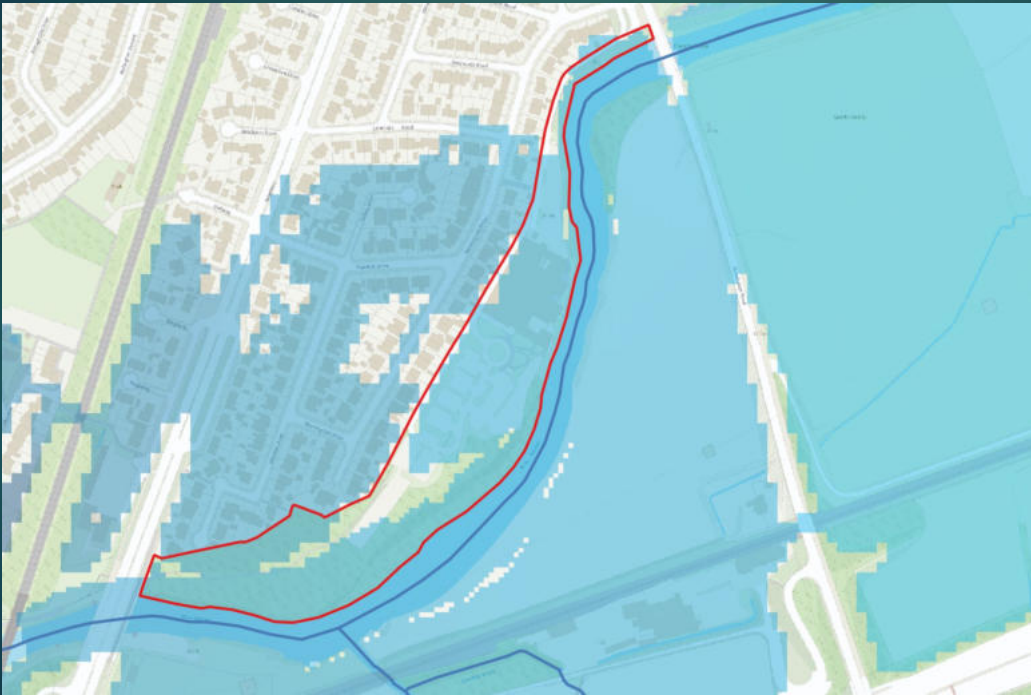


1 in 100 year return period
Peak Level = 33.97m AOD

There is comparatively little difference in flood level between a 1 in 75 year event and a 1 in 100 year event at the site. This is due to the fact that there is a relatively wide floodplain.

N.B The modelling results do not take into account the beneficial impact of the piled wall.

Hydraulic Modelling Results



1 in 100 year return period with an allowance of 30% increase in flow for climate change.

This is the expected flood outline in 2125.

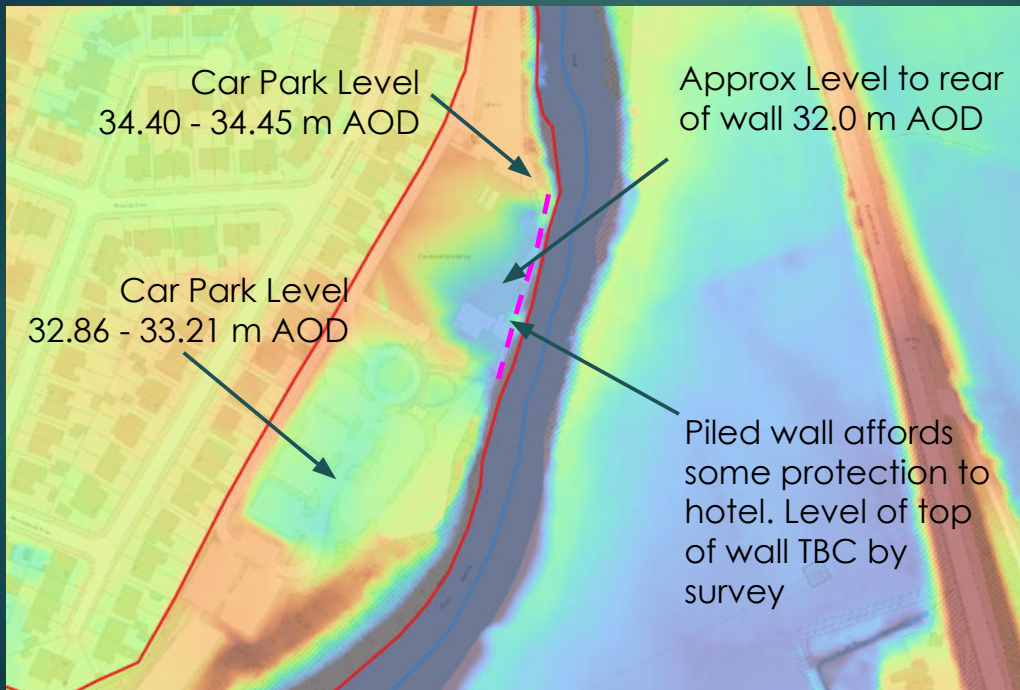
The peak Level at the site is predicted to be 34.61m AOD

Site Photography



Anecdotal
reported level of
flooding in
December 2024.

LiDAR



The car park and areas to the north are flood free in a 1 in 100 year event.

The depth of flooding behind the wall experienced in December / January 2024 / 25 was approximately 2m.

Site photography



Bund in southern car park should be raised to give an adequate freeboard to the design event.

Raised Embankment



Possible extent of raised embankment to mitigate risk of flooding to the car park and hotel

Site Photography



Constraint on Construction

Narrow width for access for construction plant

Narrow width to accommodate an independent retaining wall setback from the existing piled wall

Site Photography



Site Photography



Constraint on
Construction

Narrow width for
access for
construction plant

Narrow width to
accommodate
an independent
retaining wall
setback from the
existing piled wall

Site Photography



Wall has deflected outwards which is a sign of progressive failure.

Site Photo



Pile clutches in the wall have deflected outwards which is a sign of progressive failure.

Site Photography



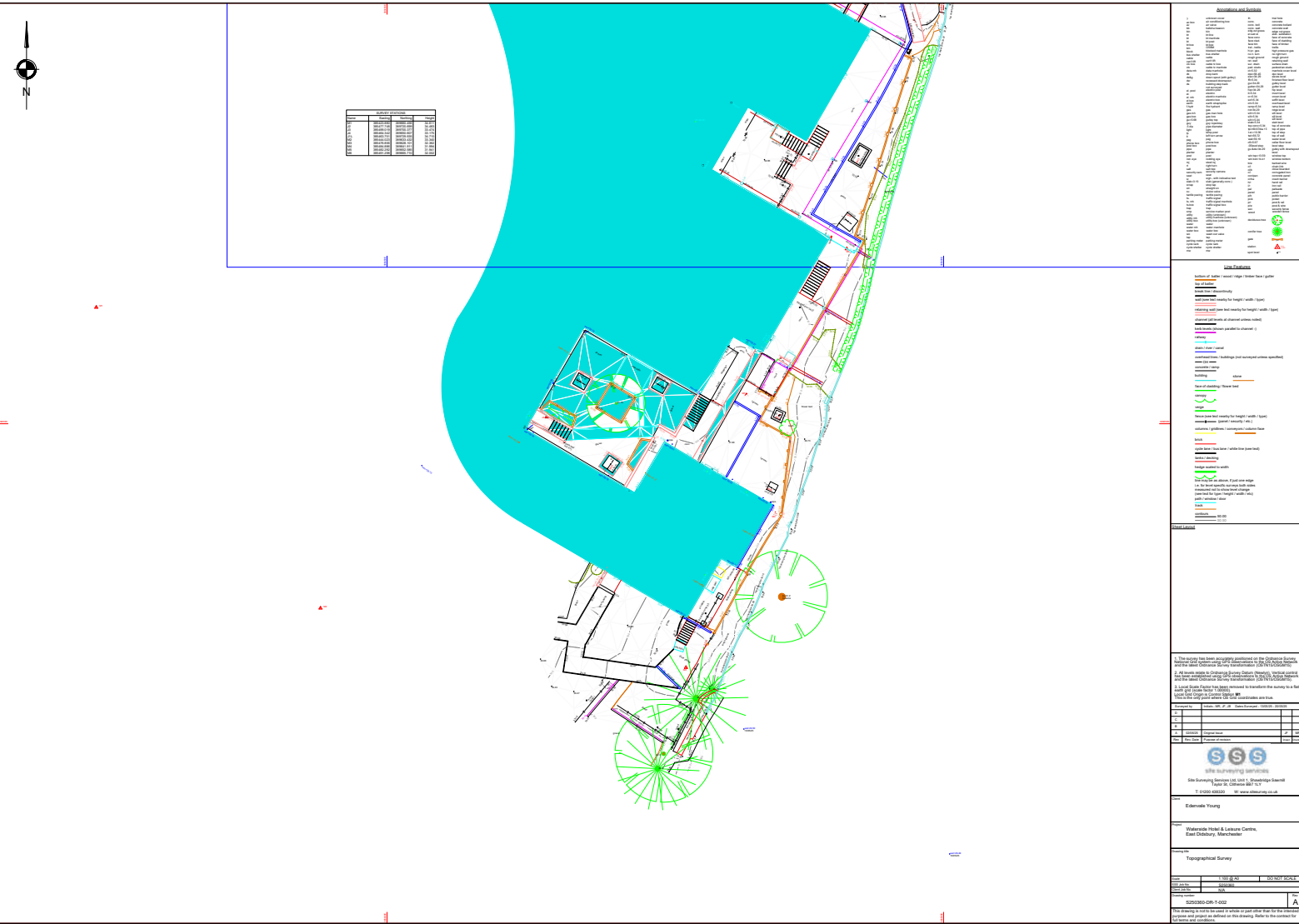
Internal areas of the development are currently being refurbished.

Flood resilient construction would reduce the cost and time taken to recover from future flooding.

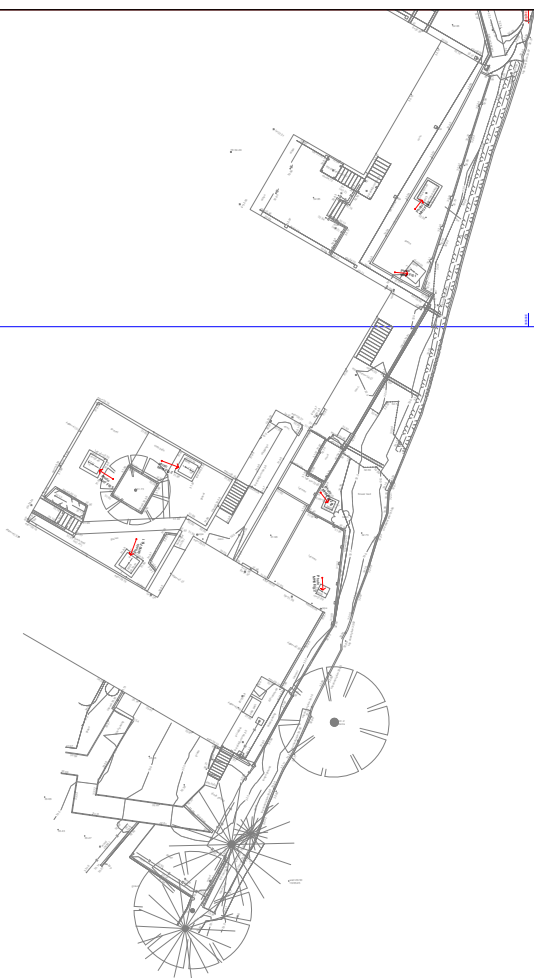
WATERSIDE HOTEL

B. Topographic Survey





[illegible]



Geography and Symbols	
1. Country	USA
2. State	California
3. City	San Francisco
4. County	San Francisco
5. ZIP Code	94102
6. Latitude	37.7749
7. Longitude	-122.4210
8. Time Zone	Pacific Standard Time (PST)
9. Daylight Saving Time	Yes
10. Area (sq. miles)	46.9
11. Population	473,954
12. Major Industries	Technology, Finance, Healthcare, Education, Retail, Manufacturing
13. Major Universities	University of California, Berkeley; Stanford University; San Francisco State University
14. Major Sports Teams	San Francisco 49ers; San Francisco Giants; San Francisco Warriors; San Francisco Seals
15. Major Landmarks	Golden Gate Bridge; Alcatraz Island; San Francisco Presidio; Fisherman's Wharf
16. Major Parks	Golden Gate Park; Sausalito; Tiburon
17. Major Waterways	San Francisco Bay; San Francisco River
18. Major Airports	San Francisco International Airport (SFO)
19. Major Seaports	San Francisco Bay
20. Major Highways	Interstate 580; Interstate 805; Interstate 680
21. Major Public Transportation	San Francisco Municipal Transportation Agency (Muni)
22. Major Cultural Institutions	San Francisco Symphony; San Francisco Opera; San Francisco Ballet
23. Major Museums	San Francisco Museum of Modern Art (SFMOMA); de Young Museum
24. Major Libraries	San Francisco Public Library
25. Major Hospitals	San Francisco General Hospital; UCSF Medical Center
26. Major Police Departments	San Francisco Police Department
27. Major Fire Departments	San Francisco Fire Department
28. Major Social Services	San Francisco Department of Social Services
29. Major Environmental Organizations	San Francisco Estuary Institute; San Francisco Bay Area Council on the Environment
30. Major Historical Sites	San Francisco Presidio; Alcatraz Island; San Francisco Mission Dolores
31. Major Cultural Festivals	San Francisco Jazz Festival; San Francisco Film Festival
32. Major Sports Events	San Francisco 49ers; San Francisco Giants; San Francisco Warriors
33. Major Landmarks (continued)	Golden Gate Bridge; Alcatraz Island; San Francisco Presidio; Fisherman's Wharf
34. Major Parks (continued)	Golden Gate Park; Sausalito; Tiburon
35. Major Waterways (continued)	San Francisco Bay; San Francisco River
36. Major Airports (continued)	San Francisco International Airport (SFO)
37. Major Seaports (continued)	San Francisco Bay
38. Major Highways (continued)	Interstate 580; Interstate 805; Interstate 680
39. Major Public Transportation (continued)	San Francisco Municipal Transportation Agency (Muni)
40. Major Cultural Institutions (continued)	San Francisco Symphony; San Francisco Opera; San Francisco Ballet
41. Major Museums (continued)	San Francisco Museum of Modern Art (SFMOMA); de Young Museum
42. Major Libraries (continued)	San Francisco Public Library
43. Major Hospitals (continued)	San Francisco General Hospital; UCSF Medical Center
44. Major Police Departments (continued)	San Francisco Police Department
45. Major Fire Departments (continued)	San Francisco Fire Department
46. Major Social Services (continued)	San Francisco Department of Social Services
47. Major Environmental Organizations (continued)	San Francisco Estuary Institute; San Francisco Bay Area Council on the Environment
48. Major Historical Sites (continued)	San Francisco Presidio; Alcatraz Island; San Francisco Mission Dolores
49. Major Cultural Festivals (continued)	San Francisco Jazz Festival; San Francisco Film Festival
50. Major Sports Events (continued)	San Francisco 49ers; San Francisco Giants; San Francisco Warriors

[illegible]

The survey has been successfully positioned on the Ordnance Survey grid system using GPS observations to the OS Active Network and the latest Ordnance Survey transformation (OSNET1.ORDNANCE.SURVEY).

All data were input to Ordnance Survey's National Geographic Information System (Ordnance Survey's National Geographic Information System) and the data were then transformed to the OS Active Network.

Local State Factor has been removed to transform the survey to a flat with grid (scale factor 1.000000).

Local State Factor has been removed to transform the survey to a flat with grid (scale factor 1.000000).

Accepted by	Index: MR, JP, JR	Status: Accepted	12/03/20	20/10/21
020620	Original issue		JP	MR
in: Rev Date	Previous revision		Issue	Production



site surveying services

Site Surveying Services Ltd Unit 1, Shorebridge Summit
Taylor St, Offshore B27 1LY

Edenrose Young

Waterside Hotel & Leisure Centre,
East Chisbury, Manchester

Menthol Chamber Photos Plan

1:100 @ A4
1:500 @ A3
1:1000 @ A2

500 NORTH SCALE

See A

This drawing is not to be used in whole or part other than for the intended purpose and project as defined on this drawing. Refer to the contract for terms and conditions.

S20360-OR-PH-032

WATERSIDE HOTEL

C. Drawings



Copyright © Edenvale Young Associates 2025

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose. We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties. This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

The consultant will follow accepted procedure in providing the services but given the residual risk associated with any prediction and the variability which can be experienced in flood conditions, the consultant takes no liability for and gives no warranty against actual flooding of any property (client's or third party) or the consequences of flooding in relation to the performance of the service.