Flood Risk Assessment for Planning

Prepared for:
Jake Moss

August 2024

Location:
Land to rear of 35 – 37 High Street
Shoreham
BN43 5DD

Our reference:
94626-BPM-HighStreet



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Document Issue Record

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Contents

1. Key Facts 4
1.1 Flood Risk Posed: 4
1.2 Flood Risk Mitigation: 4
2. Introduction 5
3. Existing Situation 6
3.1 Site Usage: 6
3.2 Topography: 8
3.3 Geology and Soil: 9
3.4 Riparian Ownership: 11
3.5 Environmental Permit for Flood Risk Activity: 11
4. Development Proposal 12
5. Assessment of Flood Risk 13
5.1 Flood Zones: 13
5.2 Tidal (River Adur): 14
5.2.1 Modelled Flood Levels and Extents: 14
5.2.2 Flood Storage Areas: 15
5.2.3 Flood Defences: 16
5.2.4 Residual Risk (breach or overtopping of flood defences): 17
5.2.5 Historical Flood Events: 17
5.3 Pluvial (Surface Water): 18
5.4 Groundwater: 19
5.5 Sewer Surcharge: 21
5.6 Other Sources: 22
6. Flood Risk Management 23
6.1 Vulnerability to Flooding: 23
6.2 EA Standing Advice: 23
6.3 Physical Design Measures: 23
6.4 Safe Escape and Flood Action Plan: 24
6.5 Flood Warning: 24
6.6 Flood Plan: 25
6.7 Off-Site Impacts: 26
6.7.1 Fluvial Floodplain Storage: 26
6.7.2 Surface Water Drainage: 27
7. Sequential and Exception Test 28
8. Discussion and Conclusions 29
Appendix 32

1. Key Facts

1.1 Flood Risk Posed:

- The site is located within Flood Zones 1 (Low Risk), 2 (Medium Risk) and 3 (High Risk).
- The risk would appear to be predominantly tidal and originate from the River Adur which borders the site to the south.
- Modelled flood levels and extents have been requested from the EA for use within this report.
- The design flood levels for planning are the 1:200 year with Higher Central, and Upper End climate change. The 1:200 year flood levels are 5.36mAOD and 5.74mAOD respectively.
- Comparison of these flood levels with topographic site levels (4.04mAOD to 4.66mAOD) shows the site is entirely below the flood levels, with a potential maximum flood depth of 1.32m for the 1:200yr plus Higher Central and 1.70m for the Upper End climate change allowances.
- The Environment Agency have completed construction of the Shoreham Adur Tidal Walls defence scheme which provides protection of extreme events with 0.33% probability (1 in 300 year), allowing for 50 years of sea level rise.
- The EA Risk of Flooding from Surface Water Map suggests that the site lies in an area of "Very Low" risk of flooding from surface water.
- According to the Adur and Worthing Councils Level 1 Strategic Flood Risk Assessment 2024 the JBA groundwater Mapping shows the site to not be ask of flooding.
- The sewer incident report form database indicates that in the BN43 5 postcode there have been 8 recorded sewer flood incidents.
- The site lies outside the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely.

1.2 Flood Risk Mitigation:

- The proposed application is for the construction of a one bed flat and a house.
- The finished floor level for all residential uses will be at 6.10mAOD.
- A route of safe refuge in line with the requirements of the NPPF can be provided.
- Flood proofing of the development will be incorporated as appropriate.
- A flood warning and evacuation plan will be implemented post development.
- The applicant will register with the free Environment Agency Floodline Alert Direct service.
- Due to the small scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

2. Introduction

Unda Consulting Limited have been appointed by Jake Moss (hereinafter referred to as "the applicant") to undertake a Flood Risk Assessment for the proposed development at Land to the rear of 35 – 37 High Street, Shoreham, BN43 5DD (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the associated technical guidance.

The purpose of the study is to support a planning application for the proposed development.

The site appears to be located within Flood Zones 1, 2 and 3 as defined by the Environment Agency (EA) on their Flood Map for Planning. Under the National Planning Policy Framework (NPPF), a FRA is required if a proposed development:

- includes building or engineering works in Flood Zone 2 or 3;
- includes building or engineering works on land classified by the Environment Agency as having critical drainage problem;
- changes the use of land or buildings in a location at risk of flooding from rivers or the sea, or with critical drainage problems;
- changes the use of land or buildings in a way that increases the flood vulnerability of the development where it may be subject to other sources of flooding;
- is larger than 1 hectare.

The assessment should demonstrate to the Local Planning Authority (LPA) and EA how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its potential users.

- whether the proposed 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 and risks are appropriate.

3. Existing Situation

3.1 Site Usage:

The site is currently occupied by a car park which backs onto the River Arun.

Existing site plans are provided in the report Appendix.

The site has current valid planning permission for "Proposed 2no. one bedroom and 2no. two bedroom apartments set over three storeys with South facing balconies" (Adur and Worthing Planning Reference: AWDM/1863/22).



Figure 1: Aerial photograph of site and surrounding area (Source: Google Earth)

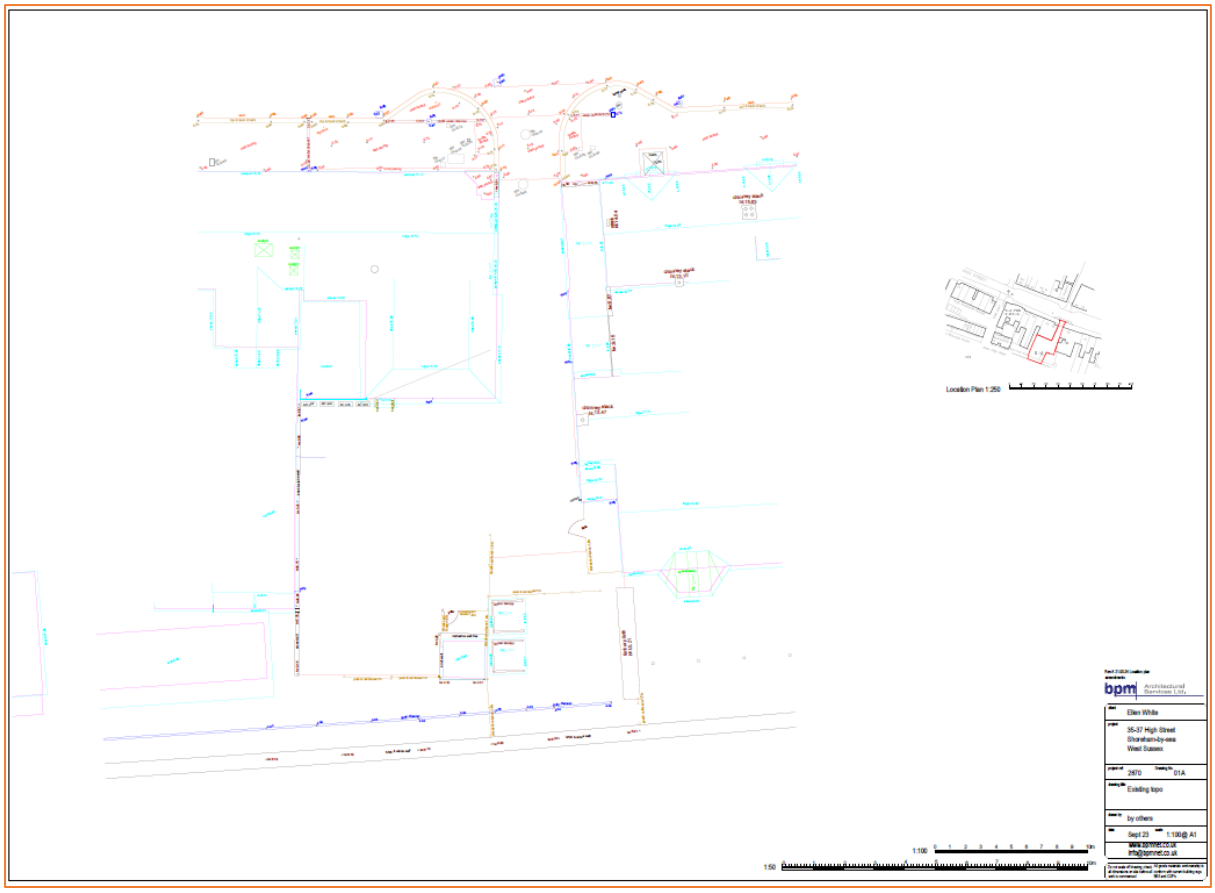


Figure 2: Existing Site Plan and Location Plan (Source: BPM Architectural Services Ltd)

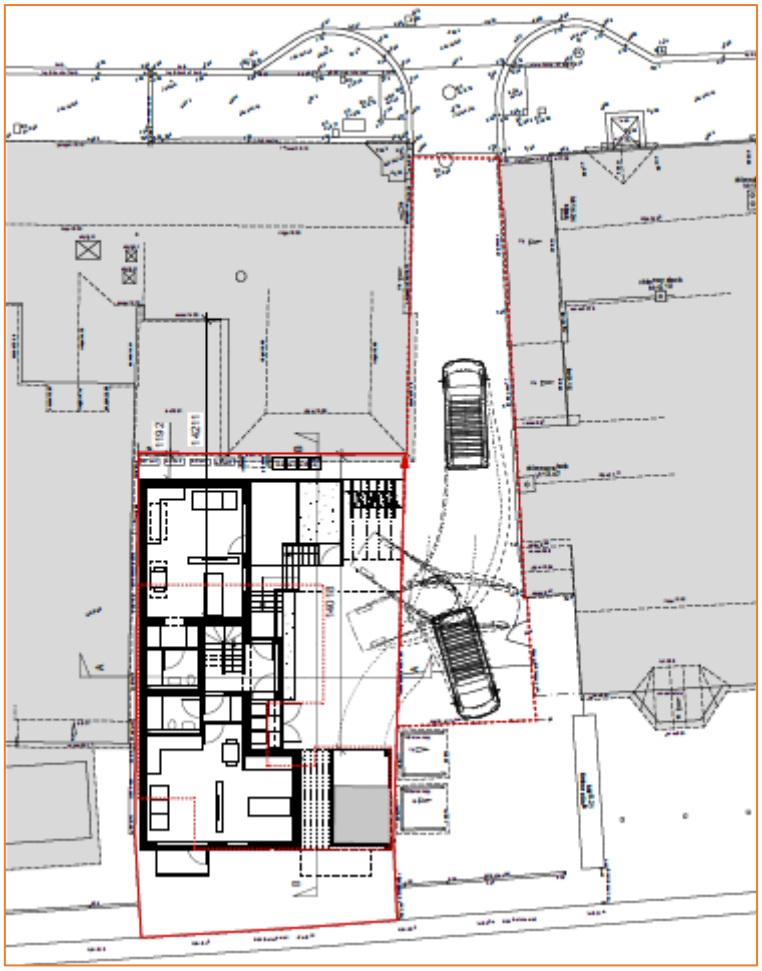


Figure 3: Existing Approved Site Plan (Source: AWDM/1863/22)

3.2 Topography:

Environment Agency LiDAR has been used to assess the topography across the site and wider area. Light Detection and Ranging (LIDAR) is an airborne mapping technique, which uses a laser to measure the distance between the aircraft and the ground surface. Up to 100,000 measurements per second are made of the ground, allowing highly detailed terrain models to be generated at high spatial resolutions. The EA's LIDAR data archive contains digital elevation data derived from surveys carried out by the EA's specialist remote sensing team. Accurate elevation data is available for over 70% of England. The LiDAR technique records an elevation accurate to +0.3m every 2m. This dataset is derived from a combination of the full dataset which has been merged and re-sampled to give the best possible coverage. The dataset can be supplied as a Digital Surface Model (DSM) produced from the signal returned to the LIDAR (which includes heights of objects, such as vehicles, buildings and vegetation, as well as the terrain surface) or as a Digital Terrain Model (DTM) produced by removing objects from the Digital Surface Model. 1.0m horizontal resolution DTM LiDAR data has been used for the purposes of this study.

LiDAR remotely sensed digital elevation data suggests that the ground topography on the site ranges between approximately 4.04mAOD and 5.73mAOD.

Topographic levels in the area of the proposed development ranges between approximately 4.04mAOD and 4.66mAOD.

3.3 Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Lambeth Group – Clay, Silt and Sand, with superficial deposits of Alluvium – Clay, Silt, Sand and Peat.

The British Geological Survey (BGS) Map indicated that the superficial deposits underlying the site are Beach and Tidal Flat Deposits (Undifferentiated) – Clay, Silt, Sand and Gravel and Head – Clay, Silt, Sand and Gravel.

The soil type taken from the UK Soil Observatory website are relatively deep soils from Colluvium soil parent material with a Clayey Loam to Sandy Loam soil texture and Quaternary Marine/Estuarine Sand to Silt soil parent material with a Clay to Sandy Loam soil texture.

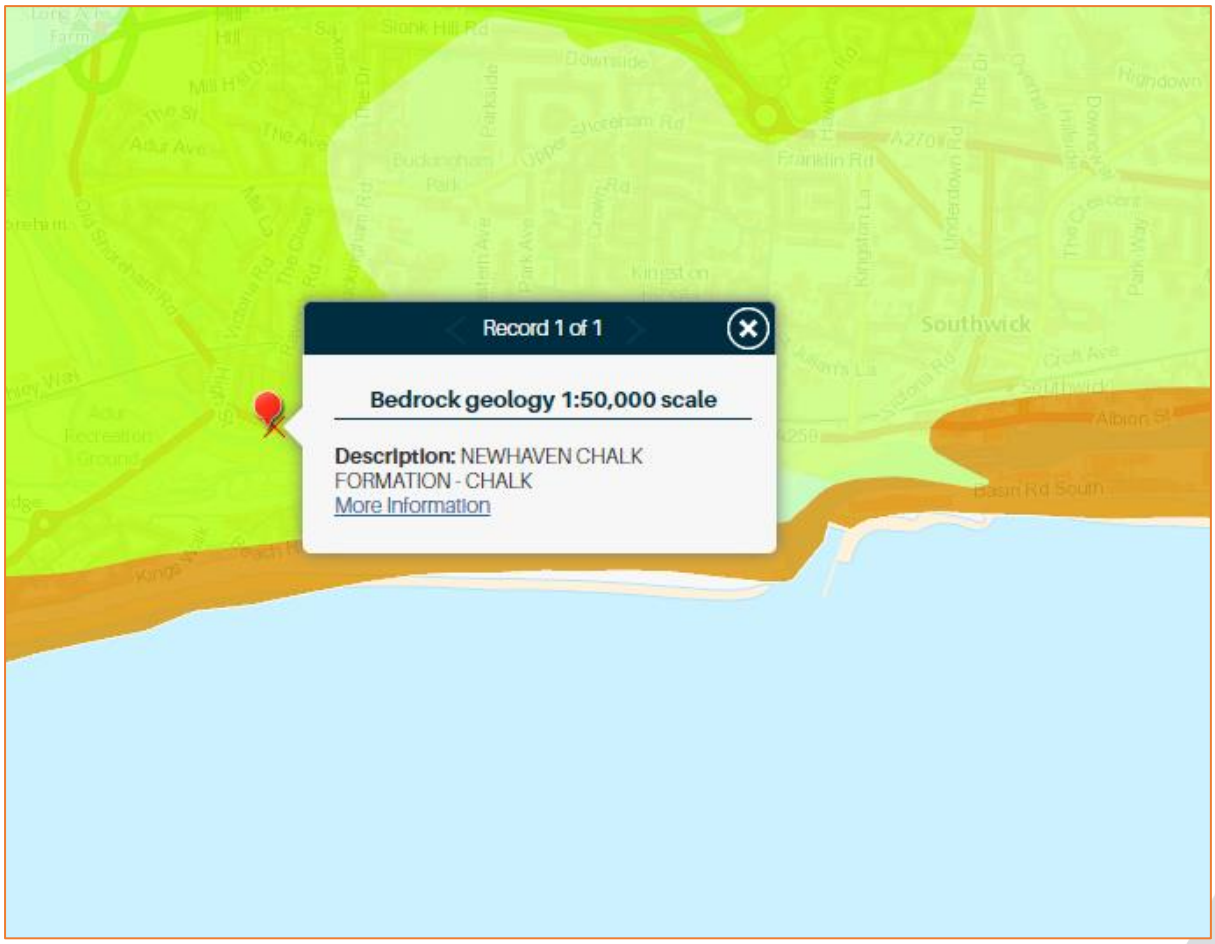


Figure 4: Local bedrock geology (Source: BGS)

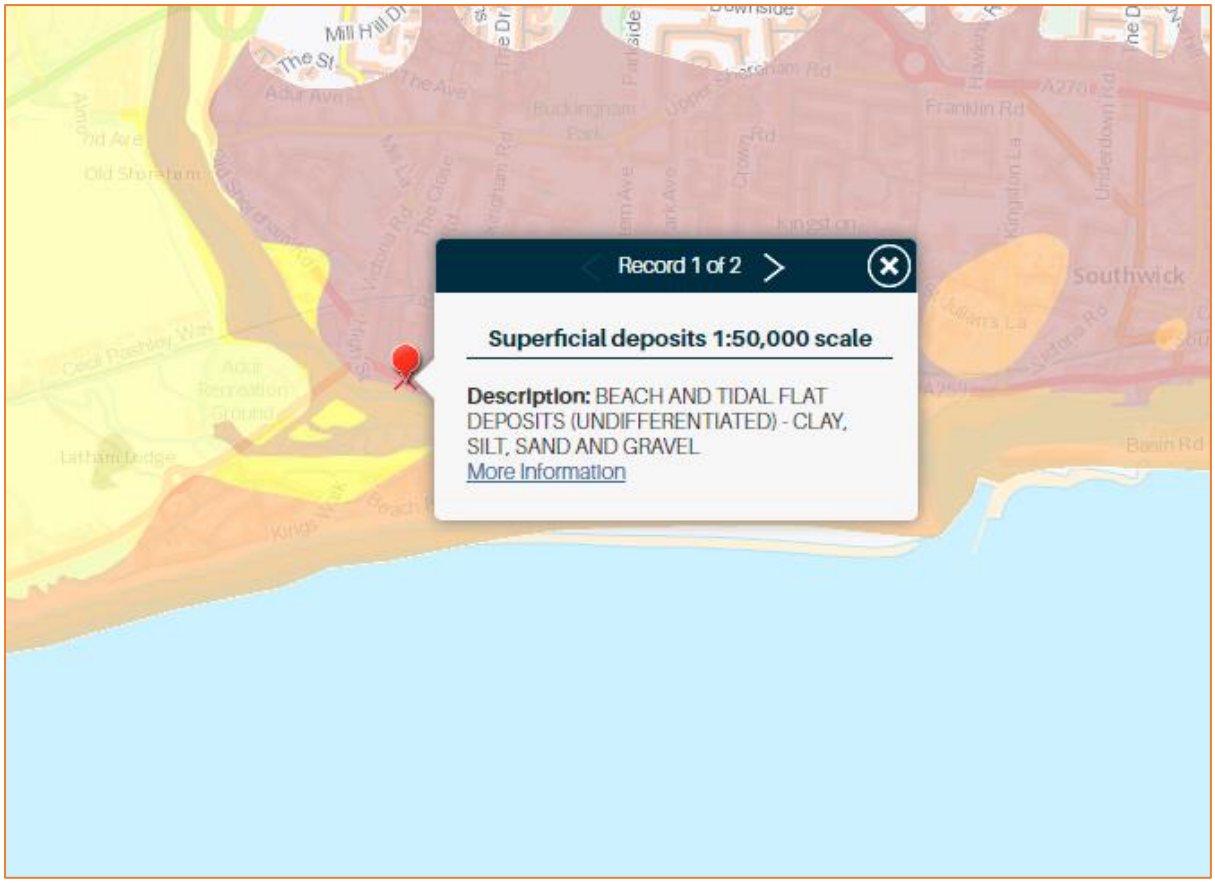


Figure 5: Superficial deposits geology (Source: BGS)

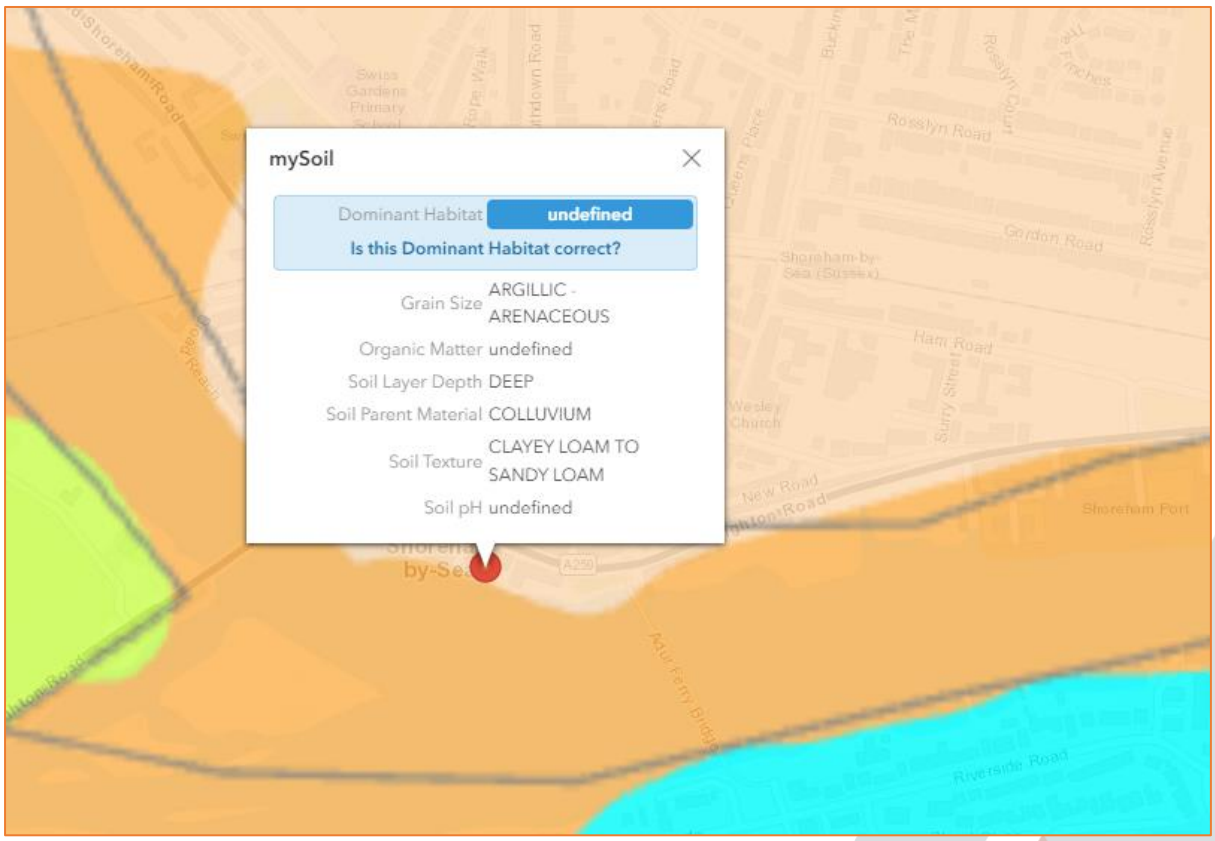


Figure 6: Local soil types (Source: UKSO)

3.4 Riparian Ownership:

A riparian owner is someone who owns land or property alongside a river or other watercourses. A watercourse is any natural or artificial channel through which water flows including flow through a culvert, ditch, drain, cut, dyke, sluice or private sewer.

Riparian owners have statutory responsibilities, including:

- Maintaining river beds and banks;
- Allowing the flow of water to pass without obstruction;
- Controlling invasive alien species

Further guidance for riverside property owners can be found in the Environment Agency's helpful booklet 'Living on the Edge, 5th Edition' published in June 2014.

3.5 Environmental Permit for Flood Risk Activity:

Under the Environmental Permitting (England and Wales) Regulations 2010 any activity within 8m of the bank of a main river, or 16m if it is a tidal main river, or any activity within 8m of any flood defence structure or culvert on a main river, or 16m on a tidal river or any activity within 16m of a sea defence structure may require a permit. Some activities may be excluded or exempt. Further details and guidance are available on the GOV.UK website:

https://www.gov.uk/guidance/flood-risk-activities-environmental-permits.

For more information and to apply please contact the Partnerships and Strategic Overview team at:

- National Customer Contact Centre on 03708 506 506 or
- enquiries@environment-agency.gov.uk

Please be aware that Environment Agency permits, consents and licences are separate from the planning process and are not guaranteed.

The applicant has confirmed that proposed development will take place within 16m of a tidal main river.

4. Development Proposal

The proposed planning application is for the construction of a one bed flat and a house.

Proposed plans can be found in the report Appendix.

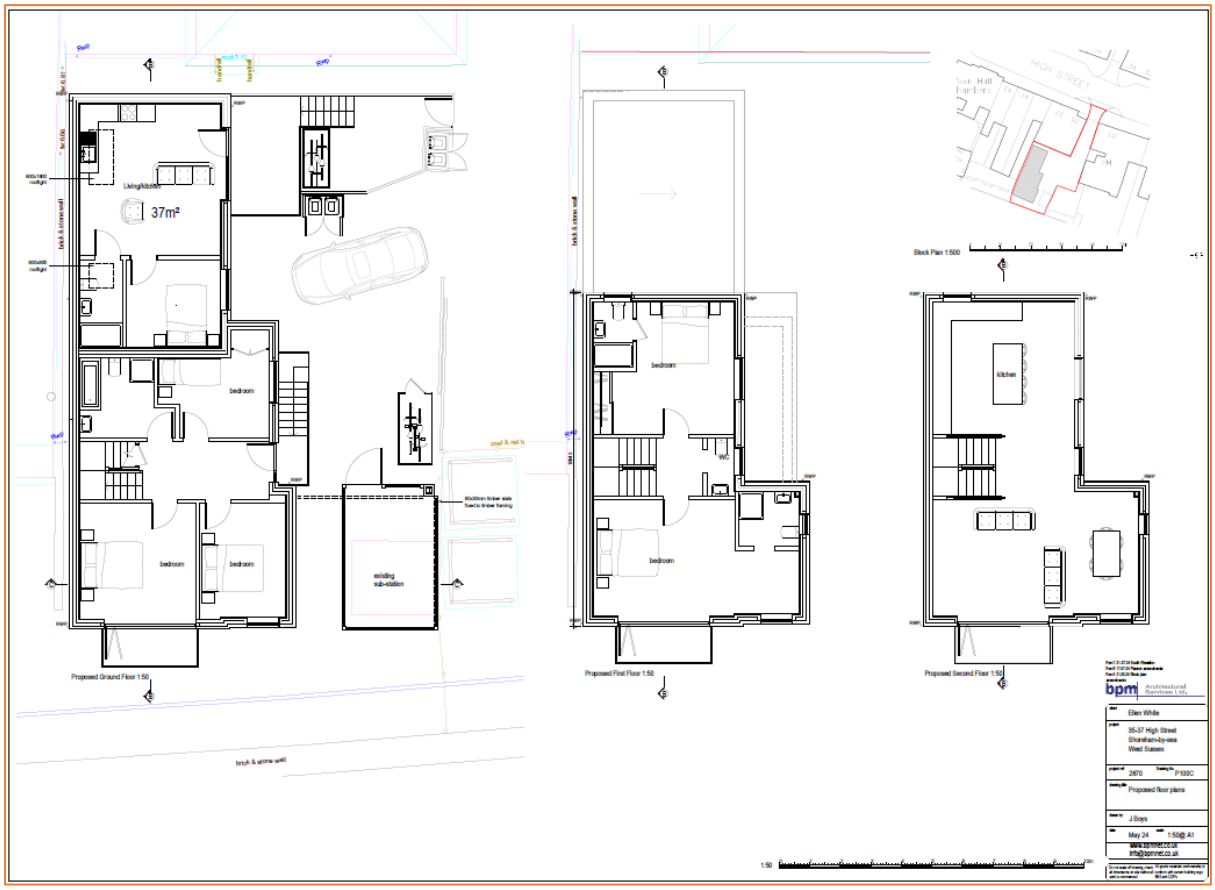


Figure 7: Proposed Floor Plans (Source: BPM Architectural Services Ltd)

5. Assessment of Flood Risk

5.1 Flood Zones:

Within planning, Flood Zones refer to the probability of river and sea flooding, ignoring the presence of defences. They are shown on the Environment Agency's Flood Map for Planning (Rivers and Sea), available on the Environment Agency's website.

Flood Zone	Definition
Zone 1 **Low Probability**	Land having a less than 1 in 1,000 annual probability of river or sea flooding. (Shown as 'clear' on the Flood Map – all land outside Zones 2 and 3)
Zone 2 **Medium Probability**	Land having between a 1 in 100 and 1 in 1,000 annual probability of river flooding; or Land having between a 1 in 200 and 1 in 1,000 annual probability of sea flooding. (Land shown in light blue on the Flood Map)
Zone 3a **High Probability**	Land having a 1 in 100 or greater annual probability of river flooding; or Land having a 1 in 200 or greater annual probability of sea flooding. (Land shown in dark blue on the Flood Map)
Zone 3b **The Functional Floodplain**	This zone comprises land where water has to flow or be stored in times of flood. Local planning authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain and its boundaries accordingly, in agreement with the Environment Agency. (Not separately distinguished from Zone 3a on the Flood Map)

Table 1: Flood Zones

The Flood Zones shown on the Environment Agency's Flood Map for Planning (Rivers and Sea) do not take account of the possible impacts of climate change and consequent changes in the future probability of flooding.

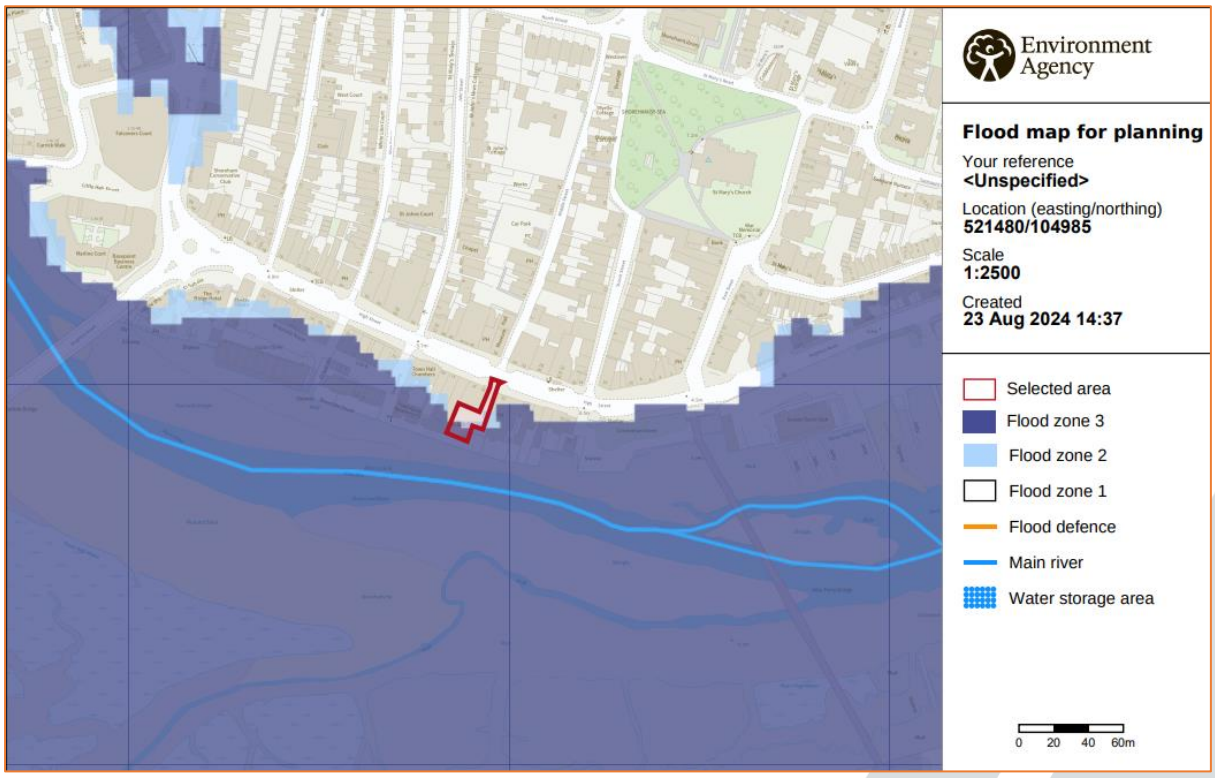


Figure 8: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site is located partially within Flood Zone 1 (Low Probability), which means it is defined as land having a less than 1 in 1,000 annual probability of river and sea flooding, Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river and sea flooding and Flood Zone 3 (High Probability), which means it is defined as land having at least a 1:100 annual probability of fluvial flooding, or a 1 in 200 or greater annual probability of sea flooding.

The risk would appear to be predominantly tidal and originate from the River Adur which borders the site to the south.

5.2 Tidal (River Adur):

The Adur is a river in Sussex, England. The river is 32 km long and is designated an Environment Agency Main River. The Adur begins as two separate branches, the western Adur and the eastern Adur, which meet 2km west of Henfield.

The western Adur rises at Slinfold from where it flows around Coolham and then through Shipley, where it meets Lancing Brook and flows on to West Grinstead and Knepp Castle. The western Adur is tidal as far north as Bines Bridge near Bines Green, south of West Grinstead.

The eastern Adur rises at Ditchling Common, in East Sussex, from where it crosses into West Sussex and meets another major stream at Twineham. At Shermanbury, the eastern Adur is fed by the Cowfold Stream. The Normal Tidal Limit is just below this at the footbridge near Shermanbury Church although a weir just above the confluence with the Western Adur means that only the highest tides reach here.

From west of Henfield, the two branches of the river meet, before flowing between Upper Beeding and Bramber, past Coombes, through a gap in the South Downs near Lancing College where the Adur is fed by the Ladywell Stream. The river continues on to the English Channel at Shoreham-by-Sea. The mouth of the Adur is now 3 km from the town centre of Shoreham due to longshore drift.

5.2.1 Modelled Flood Levels and Extents:

Modelled flood levels and extents have been requested from the EA for use within this report.

The EA has provided undefended and defended flood levels and extents from the Adur Coastal Modelling (2012) which was completed by JBA Consulting in 2012 with updated Shoreham Adur Tidal Wall Modelling completed by JBA Consulting in 2018. As such, a base year of 2018 has been used.

A 1:200 year and 1:1000 year flood level of 4.26mAOD and 4.48mAOD is provided for the present day. Comparison of these modelled flood levels with topographic site levels (4.04mAOD to 4.66mAOD) shows that the site is partially below the coastal flood levels.

The site is located within Flood Zone 3, and is classified as “more vulnerable”. The Flood Risk Assessments: climate change allowances guidance – updated May 2022, states that for flood risk assessments, both the higher central and upper end allowances should be assessed for tidal flood risk.

The 'Flood risk assessments: climate change allowances' guidance for the South East area of England provides the following sea level allowances.

Area of England		2000 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2000 to 2125 / metres (m)
South East	**Higher Central**	5.7	8.7	11.6	13.1	1.2
South East	**Upper End**	6.9	11.3	15.8	18.2	1.6

Table 2: Sea Level Allowances for the South East River Basin District for each epoch in mm per year (Source: 'Flood risk assessments: climate change allowances')

Area of England		2018 to 2035 (mm)	2036 to 2065 (mm)	2066 to 2095 (mm)	2096 to 2125 (mm)	Cumulative rise 2010 to 2125 / metres (m)
Site	**Higher Central**	103	261	348	393	1.10
Site	**Upper End**	124	339	474	546	1.48

Table 3: Sea Level Allowances for the site for each epoch in mm per year (Source: Flood risk assessments: climate change allowances)

	Present Day	Higher Central	Upper End
1:200yr	4.26mAOD	5.36mAOD	5.74mAOD
1:1000yr	4.48mAOD	5.58mAOD	5.96mAOD

Table 4: Coastal flood levels

The design flood levels for planning are the 1:200 year with Higher Central, and Upper End climate change. The 1:200 year flood levels are 5.36mAOD and 5.74mAOD respectively.

Comparison of these flood levels with topographic site levels (4.04mAOD to 4.66mAOD) shows the site is entirely below the flood levels, with a potential maximum flood depth of 1.32m for the 1:200yr plus Higher Central and 1.70m for the Upper End climate change allowances.

5.2.2 Flood Storage Areas:

Flood Storage Areas are areas that act as a balancing reservoir, storage basin or balancing pond. Their purpose is to attenuate an incoming flood peak to a flow level that can be accepted by the downstream channel. It may also delay the timing of a flood peak so that its volume is discharged over a longer time interval. Flood storage areas do not completely remove the chance of flooding and can be overtopped or fail in extreme weather conditions.

According to Environment Agency data, there are no Flood Storage Areas located in close proximity to the site.

5.2.3 Flood Defences:

Flood defences are typically raised structures that alter natural flow patterns and prevent floodwater from entering property in times of flooding. They are generally categorised as either 'formal' or 'informal' defences.

A 'formal' flood defence is a structure that was built specifically for the purpose of flood defence, and is maintained by its respective owner, which could be the Environment Agency, Local Authority, or an individual.

An 'informal' flood defence is a structure that has not been specifically built to retain floodwater, and is not maintained for this specific purpose, but may afford some protection against flooding. The structural integrity and design standard is unknown for these types of defences, and their existence cannot always be guaranteed for the lifetime of a proposed development. These defences can include boundary walls, industrial buildings, railway embankments and road embankments situated immediately adjacent to rivers.

The Environment Agency have completed construction of the Shoreham Adur Tidal Walls defence scheme which provides protection of extreme events with 0.33% probability (1 in 300 year), allowing for 50 years of sea level rise.

According to the EA and the Adur and Worthing Level 1 Strategic Flood Risk Assessment 2024, the site is defended by natural high ground, a wall and a beach with a standard of protection of 1:200 year, 1:50 year and 1:100 year respectively.

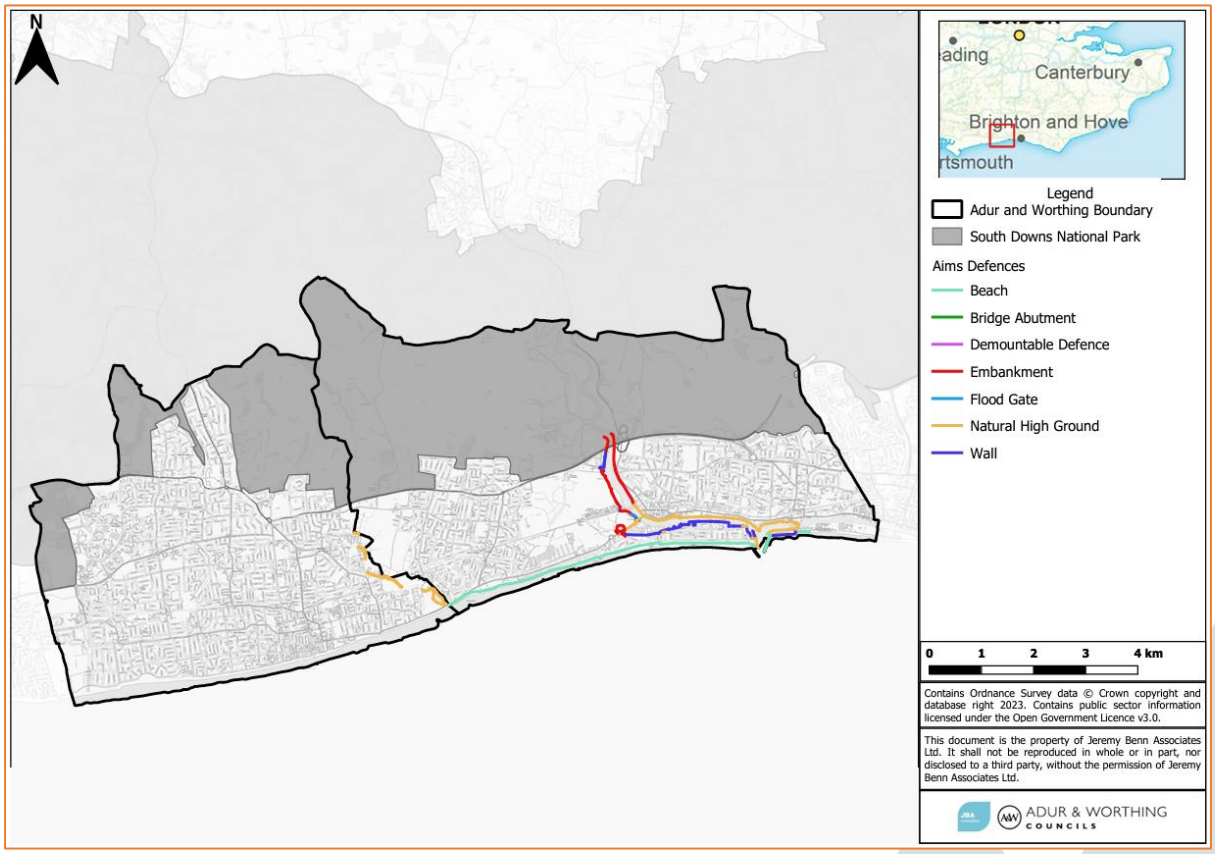


Figure 9: Adur and Worthing Flood Defences (Source: Adur and Worthing Councils SFRA)

5.2.4 Residual Risk (breach or overtopping of flood defences):

Breaching of flood defences can cause rapid inundation of areas behind flood defences as flow in the river channel discharges through the breach. A breach can occur with little or no warning, although they are much more likely to concur with extreme river levels or tides when the stresses on flood defences are highest. Flood water flowing through a breach will normally discharge at a high velocity, rapidly filling up the areas behind the defences, resulting in significant damage to buildings and a high risk of loss of life. Breaches are most likely to occur in soft defences such as earth embankments although poorly maintained hard defences can also be a potential source of breach.

Overtopping of flood defences occurs when water levels exceed the protection level of raised flood defences. The worst case occurs when the fluvial or tidal levels exceed the defence level as this can lead to prolonged flooding. Less severe overtopping can occur when flood levels are below defence levels, but wave action causes cyclic overtopping, with intermittent discharge over the crest level of the defence. Flood defences are commonly designed with a freeboard to provide protection against overtopping from waves. The risk from overtopping due to exceedance of the flood defence level is much more significant than the risk posed by wave overtopping. Exceedance of the flood defence level can lead to prolonged and rapid flooding with properties immediately behind the defences at highest risk.

Flood defences act to defend the site from direct inundation, but there is residual risk from each (failure) and overtopping (exceedance) of flood defences.

5.2.5 Historical Flood Events:

The EA hold records of historic flood events from rivers and the sea. The EA map flooding to land, not individual properties. Their historic flood event record outlines are an indication of the geographical extent of an observed flood event. Their historic flood event outlines do not give any indication of flood levels for individual properties. They also do not imply that any property within the outline has flooded internally.

The EA has no records of flooding affecting the site previously. According to the Adur and Worthing Level 1 Strategic Flood Risk Assessment 2024 there are no records of historical flooding affecting the site.

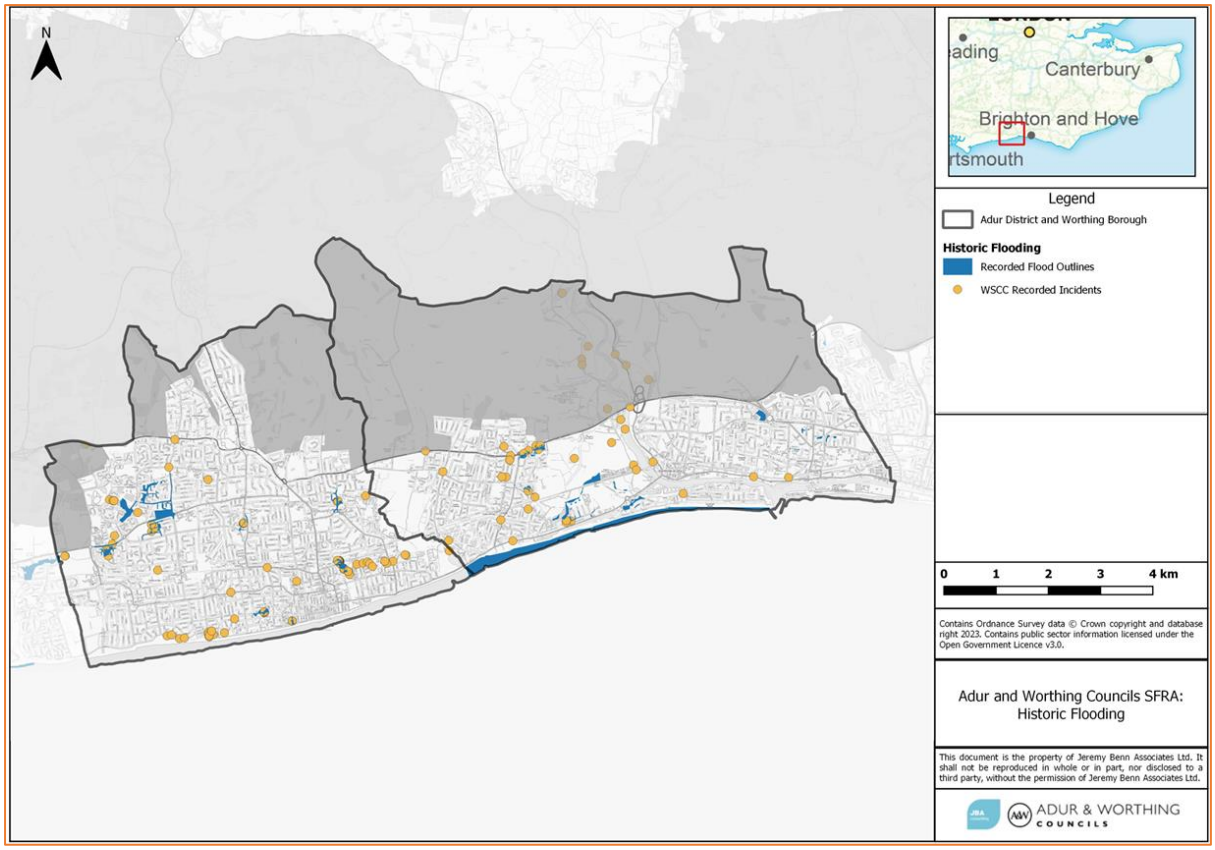


Figure 10: Historic Flooding Map (Source: Adur and Worthing Council SFRA)

5.3 Pluvial (Surface Water):

Pluvial (surface water) flooding happens when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead.

In 2013 the EA, working with Lead Local Flood Authorities (LLFAs), produced an updated Flood Map for Surface Water. It is considered to represent a significant improvement on the previous surface water flood maps available, both in terms of method and representation of the risk of flooding. The modelling techniques and data used are considerably improved, and also incorporated locally produced mapping where this is available to represent features best modelled at a local scale.

The Flood Map for Surface Water assesses flooding scenarios as a result of rainfall with the following chance of occurring in any given year (annual probability of flooding is shown in brackets):

- High: Greater than or equal to 3.3% (1 in 30) chance in any given year
- Medium: Less than 3.3% (1 in 30) but greater than or equal to 1% (1 in 100) chance in any given year
- Low: Less than 1% (1 in 100) but greater than or equal to 0.1% (1 in 1,000) chance in any given year
- Very Low: Less than 0.1% (1 in 1,000) chance in any given year

The mapping below shows the Risk of Flooding from Surface Water centred on the postcode. Please note that the EA to not consider this information suitable to be used to identify the risk to

individual properties or sites. It is useful to raise awareness in areas which may be at risk and may require additional investigation.

The EA Risk of Flooding from Surface Water Map suggests that the site lies in an area of "Very Low" risk of flooding from surface water.

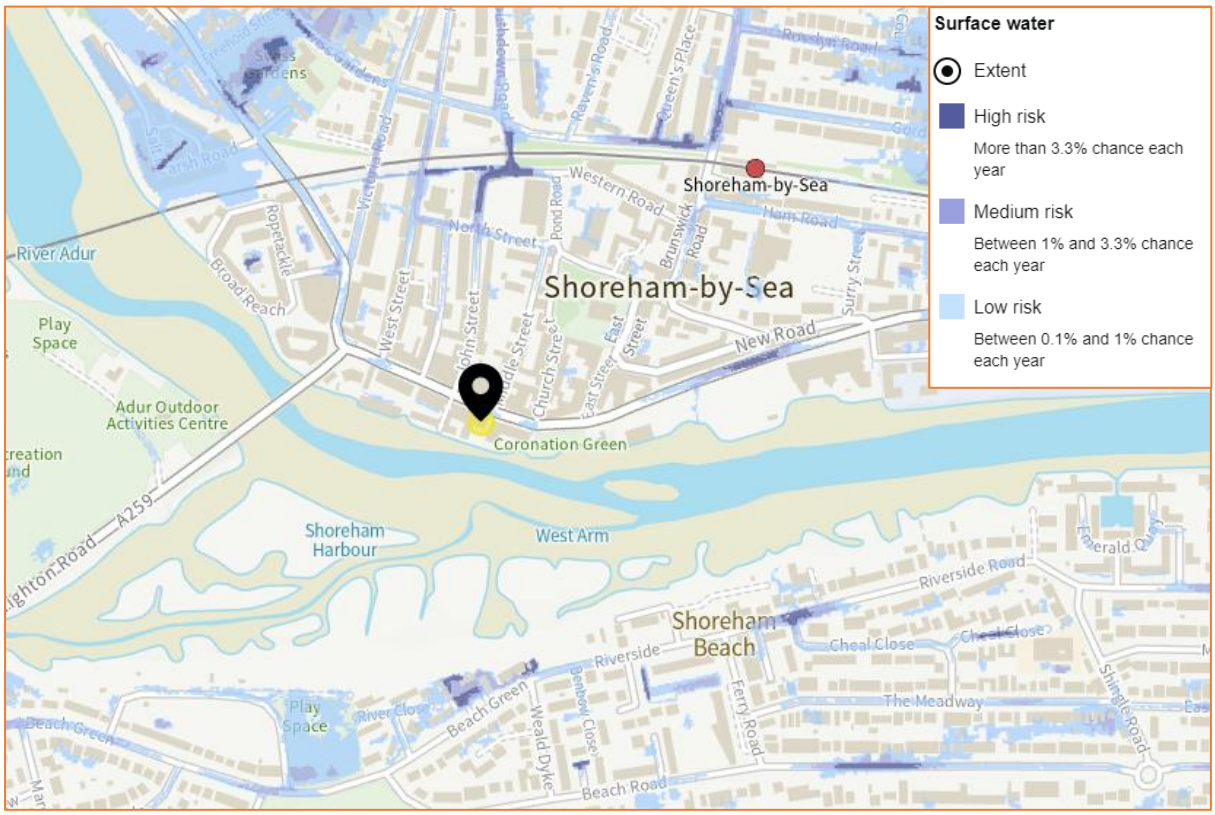


Figure 11: Extract from Environment Agency Surface Water Flood Map (Source: EA)

5.4 Groundwater:

Groundwater flooding occurs as a result of water rising up from the underlying rocks or from water flowing from abnormal springs. This tends to occur after much longer periods of sustained high rainfall. Higher rainfall means more water will infiltrate into the ground and cause the water table to rise above normal levels. Groundwater tends to flow from areas where the ground level is high, to areas where the ground level is low. In low-lying areas the water table is usually at shallower depths anyway, but during very wet periods, with all the additional groundwater flowing towards these areas, the water table can rise up to the surface causing groundwater flooding.

Groundwater flooding is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). These may be extensive, regional aquifers, such as chalk or sandstone, or may be localised sands or river gravels in valley bottoms underlain by less permeable rocks. Groundwater flooding takes longer to dissipate because groundwater moves much more slowly than surface water and will take time to flow away underground.

According to the Adur and Worthing Councils Level 1 Strategic Flood Risk Assessment 2024 the JBA groundwater Mapping shows the site to not be at risk of flooding. The Adur and Worthing SFRA has also provided mapping on the impact of sea level rise on groundwater flooding. The Map

shows the site is located within Zone GW1 and Zone GW2. GW1 is defined as groundwater level more than 0.5m below the surface and region is above the current tidal level but below the future tidal level. GW2 is defined as groundwater level more than 0.5m below the surface and region is below the present day tidal level OR groundwater level between 0.025m and 0.5m below the surface and region is above the current tidal level but below the future tidal level.

No further information has been provided to suggest that the site has flooded from groundwater flooding previously.

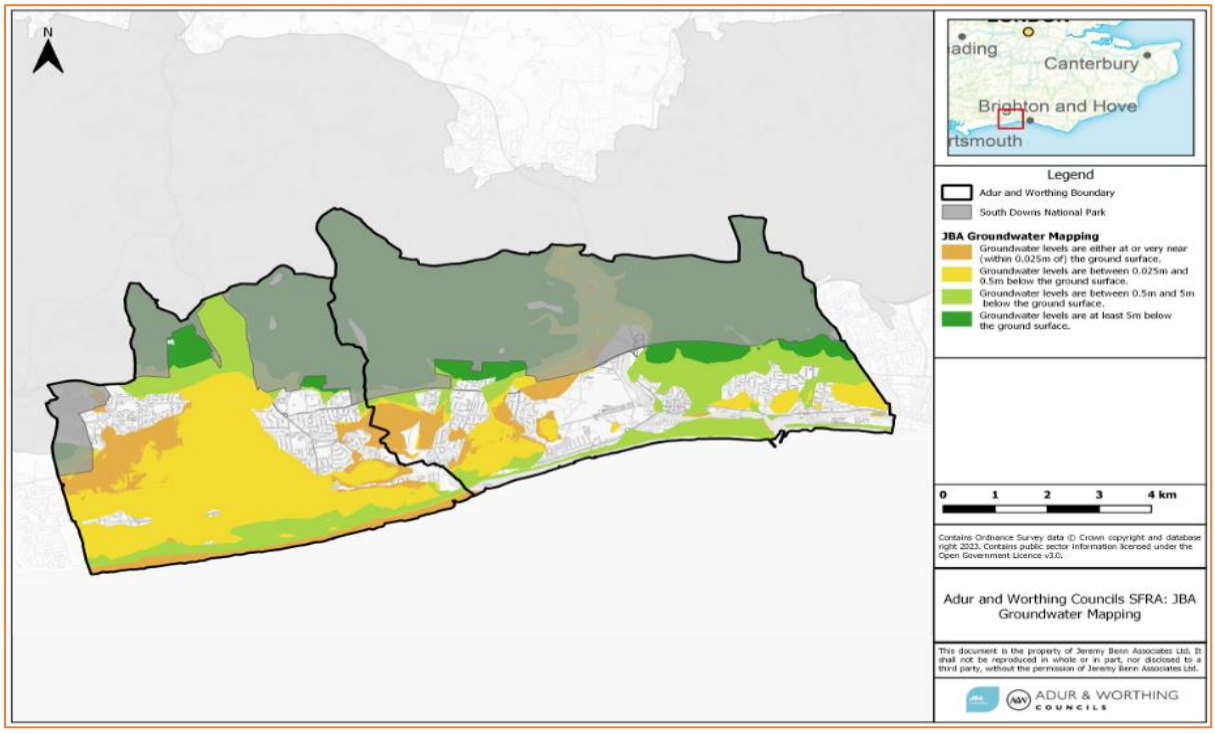


Figure 12: JBA Groundwater Mapping (Source: Adur and Worthing Councils SFRA)

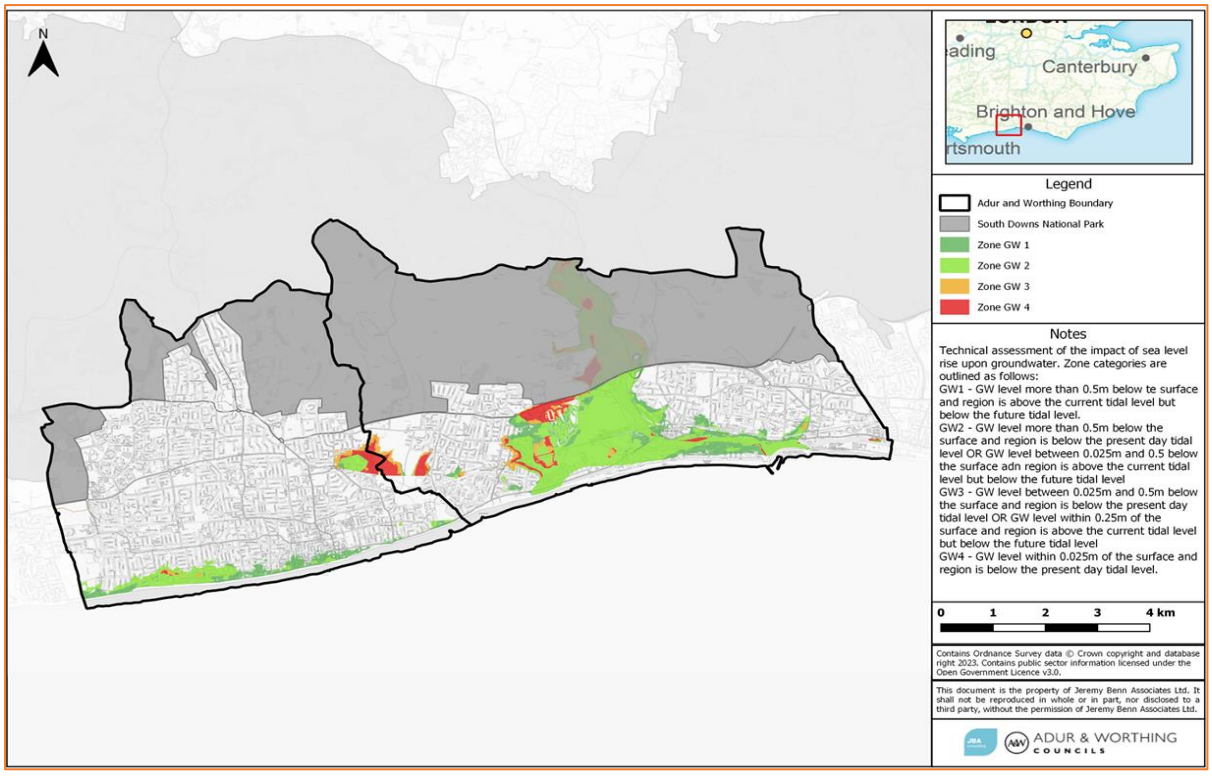


Figure 13: Impact of sea level rise upon groundwater technical assessment map (Source: Adur and Worthing Councils SFRA)

5.5 Sewer Surcharge:

Sewer flooding occurs when the sewer network cannot cope with the volume of water that is entering it. It is often experienced during times of heavy rainfall when large amounts of surface water overwhelm the sewer network causing flooding. Temporary problems such as blockages, siltation, collapses and equipment or operational failures can also result in sewer flooding.

All Water Companies have a statutory obligation to maintain a register of properties/areas which have reported records of flooding from the public sewerage system, and this is shown on the DG5 Flood Register. This includes records of flooding from foul sewers, combined sewers and surface water sewers which are deemed to be public and therefore maintained by the Water Company. The DG5 register records of flood incidents resulting in both internal property flooding and external flooding incidents. Once a property is identified on the DG5 register, water companies can typically put funding in place to address the issues and hence enable the property to be removed from the register. It should be noted that flooding from land drainage, highway drainage, rivers/watercourses and private sewers is not recorded within the register.

The sewer incident report form database indicates that in the BN43 5 postcode there have been 8 recorded sewer flood incidents.

No further information has been provided to suggest that the site has flooded from sewer surcharge flooding previously.

5.6 Other Sources:

Reservoirs with an impounded volume in excess of 25,000 cubic metres (measured above natural ground level) are governed by the Reservoirs Act and are listed on a register held by the Environment Agency. The site lies outside the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. There has been no loss of life in the UK from reservoir flooding since 1925. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. In accordance with the Reservoirs Act 1975 in England, these inspections are monitored and enforced by the EA themselves. The risk to the site from reservoir flooding is therefore minimal and is far lower than that relating to the potential for fluvial / tidal flooding to occur. The Environment Agency Reservoir Flood Map illustrated below, illustrates the largest area that might be flooded if the storage area were to fail and release the water it is designed to hold during a flood event.

Records of flooding from reservoirs and canals are erratic as there is no requirement for the Environment Agency to provide information on historic flooding from canals and raised reservoirs on plans. In particular, the NPPF does not require flood risk from canals and raised reservoirs to be shown on the Environment Agency flood zones.

Overflows from canals can be common as they are often fed by land drainage, and often do not have controlled overflow spillways. Occasionally, major bank breaches also occur, leading to rapid and deep flooding of adjacent land.

No further information has been provided to suggest the site is susceptible to from the failure of canals or other artificial infrastructure from the risk of flooding.

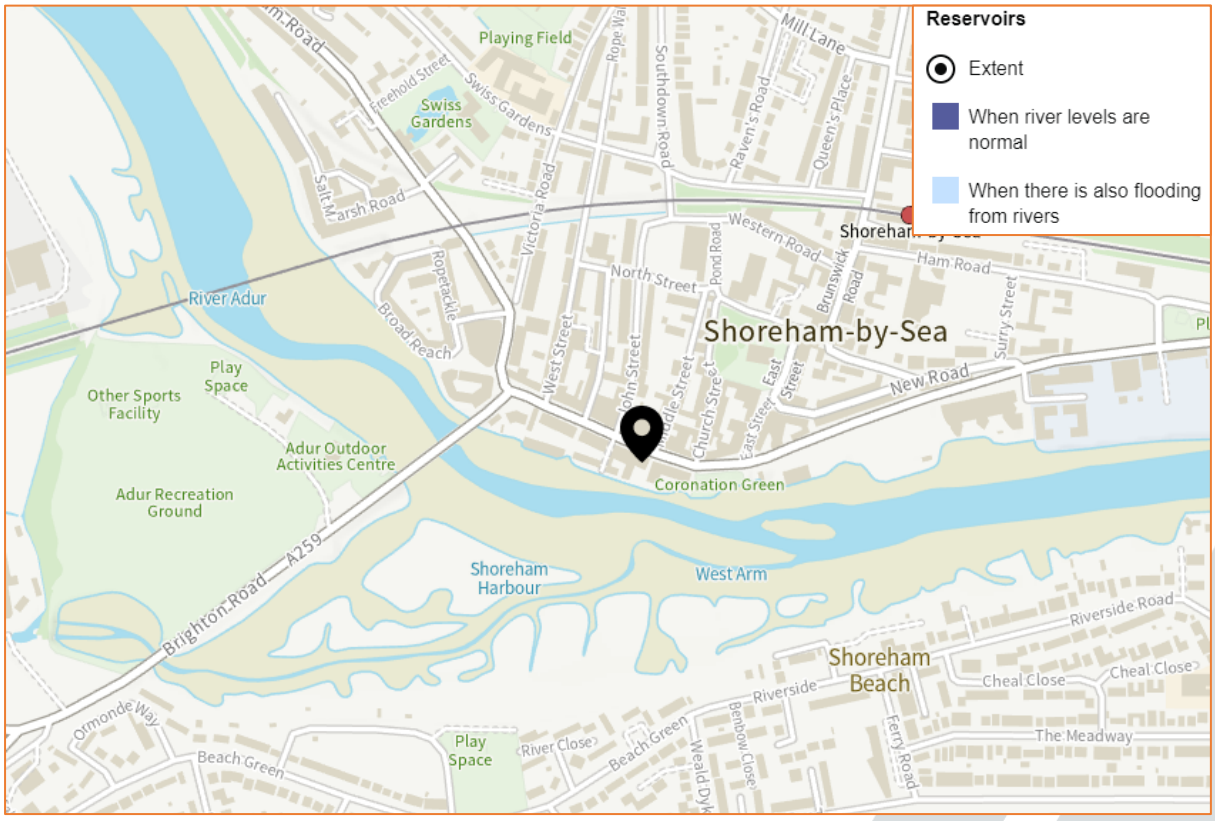


Figure 14: Extract from Environment Agency Reservoir Flood Map (Source: EA)

6. Flood Risk Management

6.1 Vulnerability to Flooding:

The NPPF classifies property usage by vulnerability to flooding.

The site has current valid planning permission for "Proposed 2no. one bedroom and 2no. two bedroom apartments set over three storeys with South facing balconies" (Adur and Worthing Planning Reference: AWDM/1863/22).

Post development, the site will become "more vulnerable", as the application is for the construction of a one bed flat and a house.

Accordingly, it is considered that the vulnerability of the site as a whole will not increase post development as compared to the existing approved planning permission.

6.2 EA Standing Advice:

The EA Standing Advice guidance is for domestic extensions and non-domestic extensions where the additional footprint created by the development does not exceed 250m^2. It should not be applied if an additional dwelling is being created, e.g. a self-contained annexe or additional commercial unit.

The application is for the construction of a one bed flat and a house.

6.3 Physical Design Measures:

The site has current valid planning permission for "Proposed 2no. one bedroom and 2no. two bedroom apartments set over three storeys with South facing balconies" (Adur and Worthing Planning Reference: AWDM/1863/22).

As part of this planning permission the following mitigation measure was made a Condition of Planning;

> *"Finished floor levels for the apartment accommodation shall be set no lower than 6.10m above Ordnance Datum."*

As such, and based on the plans provided, the applicant has agreed to set the finished floor level for all residential uses at least 6.10mAOD. This finished floor level is 0.74m above the 1:200 year plus Higher Central flood level (5.36mAOD) and 0.36m above the 1:200 year plus Upper End flood level (5.74mAOD).

To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the proposal, in consultation with the Local Authority building control department. These measures can include the following:

- Waterproof screed used on floors;
- Closed-cell foam used in wall cavities;
- Waterproof ground floor internal render;

- External walls rendered resistant to flooding to first floor level;
- Exterior ventilation outlets, utility points and air bricks fitted with removable waterproof covers;
- Ground floor electrical main ring run from high level; and on separately switched circuit;
- Electrical incomer and meter situated at high level;
- Boilers, control and water storage / immersion installed at high level;
- Gas meter installed at high level;
- Plumbing insulation of closed-cell design;
- Non-return valves fitted to all drain and sewer outlets;
- Manhole covers secured;
- Anti-syphon fitted to all toilets;
- Kitchen units of solid, water resistant material;
- Use of MDF carpentry (i.e. skirting, architrave, built-in storage) avoided at ground floor level;
- Stairs of solid hardwood/waterproof construction with wood faces treated to resist water penetration.

The applicant should consider the installation of flood proof doors for external ground floor level doors, or demountable flood defence barrier to defend ground level doorways and low windows if a flood door is not practical, or other planning constraints prevent it.

6.4 Safe Escape and Flood Action Plan:

The NPPF requires a route of safe escape for all residents and users to be provided from new residential properties in Flood Zone 3. Safe escape is usually defined as being through slow moving flood water no deeper than 25cm.

The site is situated within Flood Zone 1, 2 and 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea). Comparison of modelled flood levels with topographic site levels shows that the majority of the site access and the High Street are entirely above the modelled 1:200 year Higher Central flood level (5.36mAOD).

Accordingly, a route of safe refuge in line with the requirements of the NPPF can be provided.

In the case of an extreme flood event without warning, owners, occupants and users should seek refuge within the house and flat – which are at least 0.74m above the modelled 1:200 year plus Higher Central flood level.

6.5 Flood Warning:

The EA is responsible for issuing flood warnings. Flood warnings are issued to the emergency services and local authorities. Both private individuals and organisations can sign-up to receive warnings via phone, text or email. This system of receiving warnings is currently voluntary.

Advice regarding severe flood warnings will generally be given during weather forecasts on local radio and TV. In the case of extreme events, warnings can also be disseminated via door to door visits by the police or locally appointed flood wardens.

The site lies within an Environment Agency Flood Warning and Flood Alert Area. The EA issue flood warnings/alerts to specific areas when flooding is expected. It is recommended that the applicant registers online with the free Environment Agency Floodline Warnings/Alert Direct service at www.gov.uk/sign-up-for-flood-warnings to receive flood warnings by phone, text or email.

The applicant has agreed to subscribe to the EA's flood alert/warning service.

The flood warning service has three types of warnings that will help you prepare for flooding and take action:

Flood Warning	**Flood Alert**	**Flood Warning**	**Severe Flood Warning**
			
What it means?	Flooding is possible. Be prepared.	Flooding is expected. Immediate action required.	Severe flooding. Danger to life.
When it's used?	Two hours to two days in advance of flooding.	Half an hour to one day in advance of flooding.	When flooding poses a significant threat to life.
What to do?	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.	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.	Stay in a safe place with a means of escape. Be ready should you need to evacuate from your home. Co-operate with the emergency services. Call 999 if you are in immediate danger.

Table 5: EA Flood Warning Service

6.6 Flood Plan:

It is recommended that the applicant and future owners, occupiers and Landlords of the property prepare a flood plan to protect life and property during a flood event:

Before a flood:

- Prepare and keep a list of all your important contacts to hand or save them on your mobile phone.
- Think about what items you can move now and what you would want to move to safety during a flood.
- Know how to turn off electricity and water supplies to the site.
- Prepare a flood kit of essential items and keep it handy. It can include copies of important documents, a torch, a battery-powered or wind-up radio, blankets and warm clothing, waterproofs, rubber gloves and a first aid kit including all essential medication.

During a flood:

- Activate the evacuation plan and evacuate the site.
- Remove cars from the site if there is sufficient warning and the water levels are not rising rapidly.
- Switch off water and electricity for the site.
- Tune into your local radio station on a battery or wind-up radio.
- Listen to the advice of the emergency service and evacuate if told to do so.
- Avoid walking or driving through flood water. Six inches of fast-flowing water can knock over an adult and two feet of water can move a car.

After a flood:

- If you have flooded, contact your insurance company as soon as possible.
- Take photographs and videos of your damaged property as a record for your insurance company.
- If you don't have insurance, contact your local authority for information on grants and charities that may help you.
- Flood water can contain sewage, chemicals and animal waste. Always wear waterproof outerwear, including gloves, wellington boots and a face mask.
- Have your electrics and water checked by qualified engineers before switching them back on.

6.7 Off-Site Impacts:

6.7.1 Fluvial Floodplain Storage:

The NPPF requires that where development is proposed in undefended areas of floodplain, which lie outside of the functional floodplain, the implications of ground raising operations for flood risk elsewhere needs to be considered. Raising existing ground levels may reduce the capacity of the floodplain to accommodate floodwater and increase the risk of flooding by either increasing the depth of flooding to existing properties at risk or by extending the floodplain to cover properties normally outside of the floodplain. Flood storage capacity can be maintained by lowering ground levels either within the curtilage of the development or elsewhere in the floodplain, in order to maintain at least the same volume of flood storage capacity within the floodplain.

In undefended tidal areas, raising ground levels is unlikely to impact on maximum tidal levels so the provision of compensatory storage should not be necessary.

For development in a defended flood risk area, the impact on residual flood risk to other properties needs to be considered. New development behind flood defences can increase the residual risk of flooding if the flood defences are breached or overtopped by changing the conveyance of the flow paths or by displacing flood water elsewhere. If the potential impact on residual risk is unacceptable then mitigation should be provided.

The site is located within Flood Zones 1, 2 and 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea), however the flood risk is predominantly tidal. As such, there will be no unacceptable loss of flood storage post development.

6.7.2 Surface Water Drainage:

The development will utilise Sustainable Urban Drainage (SuDs) design in accordance with the NPPF for Planning Applications hierarchy as follows:

1. Store rainwater for later use;
2. Infiltration techniques;
3. Attenuate rainwater by storing in tanks for gradual release;
4. Discharge rainwater direct into watercourse;
5. Discharge rainwater into surface water sewer;
6. Discharge rainwater into a combined sewer;

Due to the scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning.

7. Sequential and Exception Test

The Sequential Test aims to ensure that development does not take place in areas at high risk of flooding when appropriate areas of lower risk are reasonably available.

The Sequential Test is applied to developments in areas identified as being at risk of any source of flooding now or in the future. The Sequential Test ensures that a sequential, risk-based approach is followed to steer new development to areas with the lowest risk of flooding, taking all sources of flood risk and climate change into account.

The sequential approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding. Other forms of flooding need to be treated consistently with river and tidal flooding in mapping probability and assessing vulnerability, so that the sequential approach can be applied across all areas of flood risk.

The site is located within Flood Zones 1, 2 and 3 when using the Environment Agency Flood Map for Planning (Rivers and Sea), and an area at "very low" risk of flooding from surface water.

Post development, the site will become "more vulnerable" (residential) throughout.

Flood Zones	**Flood Risk Vulnerability Classification**				
	Essential infrastructure	Highly vulnerable	More vulnerable	Less vulnerable	Water compatible
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test required	✓	✓	✓
Zone 3a	Exception Test required	✗	Exception Test required	✓	✓
Zone 3b	Exception Test required	✗	✗	✗	✓

Table 6: Flood risk vulnerability and flood zone 'compatibility'

Using the table above, the proposed application is considered to be suitable within Flood Zones 1,2 and 3, subject to passing the Sequential and Exception Test.

It should be noted that the site has current valid planning permission for "Proposed 2no. one bedroom and 2no. two bedroom apartments set over three storeys with South facing balconies" (Adur and Worthing Planning Reference: AWDM/1863/22).

8. Discussion and Conclusions

Unda Consulting Limited have been appointed by Jake Moss to undertake a Flood Risk Assessment for the proposed development at land to rear of 35 – 37 High Street, Shoreham, BN43 5DD. The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) and the associated technical guidance.

The purpose of the study is to support a planning application for the proposed development.

Post development, the site will become "more vulnerable", as the application is for the construction of a one bed flat and house.

The site has current valid planning permission for "Proposed 2no. one bedroom and 2no. two bedroom apartments set over three storeys with South facing balconies" (Adur and Worthing Planning Reference: AWDM/1863/22).

Accordingly, it is considered that the vulnerability of the site as a whole will not increase post development as compared to the existing approved planning permission.

The site is located partially within Flood Zone 1 (Low Probability), which means it is defined as land having a less than 1 in 1,000 annual probability of river and sea flooding, Flood Zone 2 (Medium Probability), which means it is defined as land having between a 1 in 100 and 1 in 1,000 annual probability of river and sea flooding and Flood Zone 3 (High Probability), which means it is defined as land having at least a 1:100 annual probability of fluvial flooding, or a 1 in 200 or greater annual probability of sea flooding.

The risk would appear to be predominantly tidal and originate from the River Adur which borders the site to the south.

Modelled flood levels and extents have been requested from the EA for use within this report.

The EA has provided undefended and defended flood levels and extents from the Adur Coastal Modelling (2012) which was completed by JBA Consulting in 2012 with updated Shoreham Adur Tidal Wall Modelling completed by JBA Consulting in 2018. As such, a base year of 2018 has been used.

A 1:200 year and 1:1000 year flood level of 4.26mAOD and 4.48mAOD is provided for the present day. Comparison of these modelled flood levels with topographic site levels (4.04mAOD to 4.66mAOD) shows that the site is partially below the coastal flood levels.

The site is located within Flood Zone 3 and is classified as "more vulnerable". The Flood Risk Assessments: climate change allowances guidance – updated May 2022, states for flood risk assessments both the higher central and upper end allowances should be assessed.

The design flood levels for planning are the 1:200 year with Higher Central, and Upper End climate change. The 1:200 year flood levels are 5.36mAOD and 5.74mAOD respectively.

Comparison of these flood levels with topographic site levels (4.04mAOD to 4.66mAOD) shows the site is entirely below the flood levels, with a potential maximum flood depth of 1.32m for the 1:200yr plus Higher Central and 1.70m for the Upper End climate change allowances.

According to Environment Agency data, there are no Flood Storage Areas located in close proximity to the site.

The Environment Agency have completed construction of the Shoreham Adur Tidal Walls defence scheme which provides protection of extreme events with 0.33% probability (1 in 300 year), allowing for 50 years of sea level rise.

According to the EA and the Adur and Worthing Level 1 Strategic Flood Risk Assessment 2024, the site is defended by natural high ground, a wall and a beach with a standard of protection of 1:200 year, 1:50 year and 1:100 year respectively.

Flood defences act to defend the site from direct inundation, but there is residual risk from breach (failure) and overtopping (exceedance) of flood defences.

The EA has no record of flooding affecting the site previously. According to the Adur and Worthing Level 1 Strategic Flood Risk Assessment 2024 there are no records of historical flooding affecting the site.

The EA Risk of Flooding from Surface Water Map suggests that the site lies in an area of "Very Low" risk of flooding from surface water.

According to the Adur and Worthing Councils Level 1 Strategic Flood Risk Assessment 2024 the JBA groundwater Mapping shows the site to not be at risk of flooding. The Adur and Worthing SFRA has also provided mapping on the impact of sea level rise on groundwater flooding. The Map shows the site is located within Zone GW1 and Zone GW 2.

The sewer incident report form database indicates that in the BN43 5 postcode there have been 8 recorded sewer flood incidents.

The site lies outside the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely.

The site has current valid planning permission for "Proposed 2no. one bedroom and 2no. two bedroom apartments set over three storeys with South facing balconies" (Adur and Worthing Planning Reference: AWDM/1863/22).

As part of this planning permission the following mitigation measure was made a Condition of Planning;

> *"Finished floor levels for the apartment accommodation shall be set no lower than 6.10m above Ordnance Datum."*

As such, and based on the plans provided, the applicant has agreed to set the finished floor level for all residential uses at least 6.10mAOD. This finished floor level is 0.74m above the 1:200 year plus Higher Central flood level (5.36mAOD) and 0.36m above the 1:200 year plus Upper End flood level (5.74mAOD).

Accordingly, a route of safe refuge in line with the requirements of the NPPF can be provided.

In the case of an extreme flood event without warning, owners, occupants and users should seek refuge within the house and flat.

Due to the scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning.

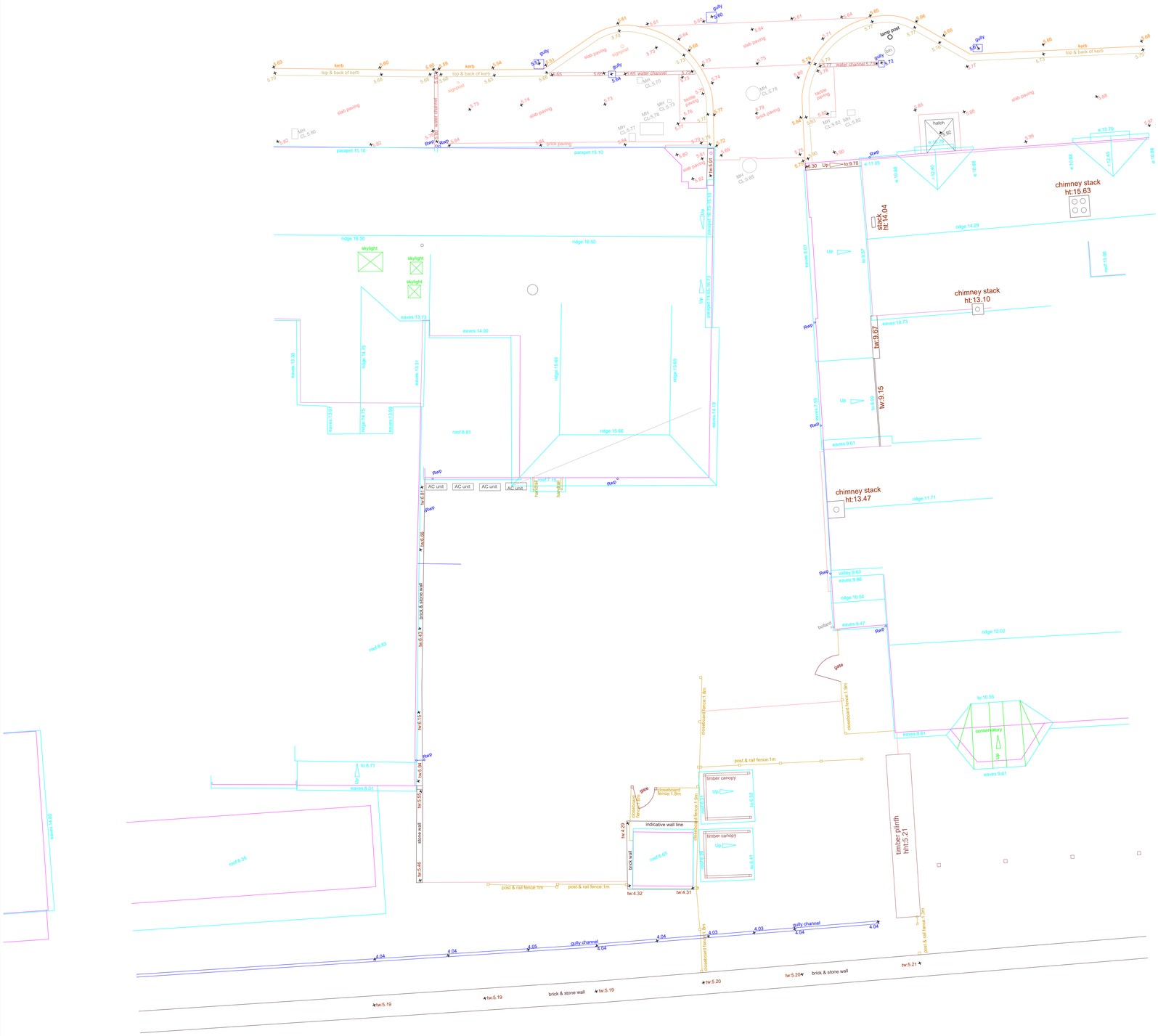
The applicant has confirmed that:

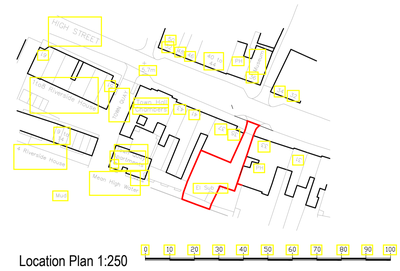
- The proposed application is for the construction of a one bed flat and a house.
- The finished floor level for all residential uses will be at least 6.10mAOD.
- A route of safe refuge in line with the requirements of the NPPF can be provided.
- Flood proofing of the development will be incorporated as appropriate.
- A flood warning and evacuation plan will be implemented post development.
- The applicant will register with the free Environment Agency Floodline Alert Direct service.
- Due to the small scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning.

Assuming accordance with these flood risk management measures, Unda Consulting Limited consider the proposed application to be suitable in flood risk terms.

Appendix

- Existing and Proposed Plans;
- EA Flood Map for Planning.





1:100 0 1 2 3 4 5 6 7 8 9 10m

1:50 0 1 2 3 4 5 6 7 8 9 10m

Rev A 21.05.24 Location plan amendments

bpm Architectural Services Ltd.

client	Ellen White
project	35-37 High Street Shoreham-by-sea West Sussex
project ref:	2870
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drawing title	Existing topo
drawn by	by others
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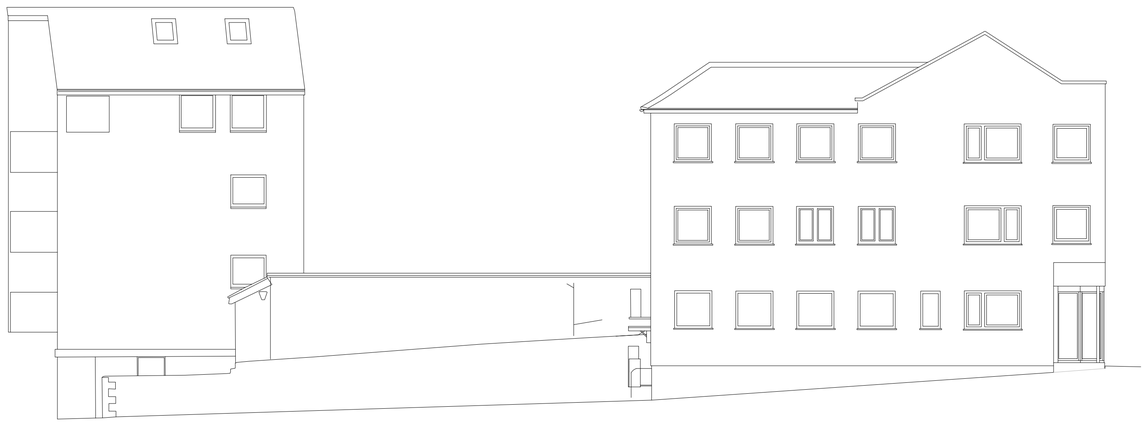
www.bpmnet.co.uk
info@bpmnet.co.uk

Do not scale off drawing, check all dimensions on site before all work is commenced

All goods materials workmanship to conform with current building regs BSS and COP's



Existing South Elevation 1:100



Existing East Elevation 1:100

1:100 0 1 2 3 4 5 6 7 8 9 10m

amendments

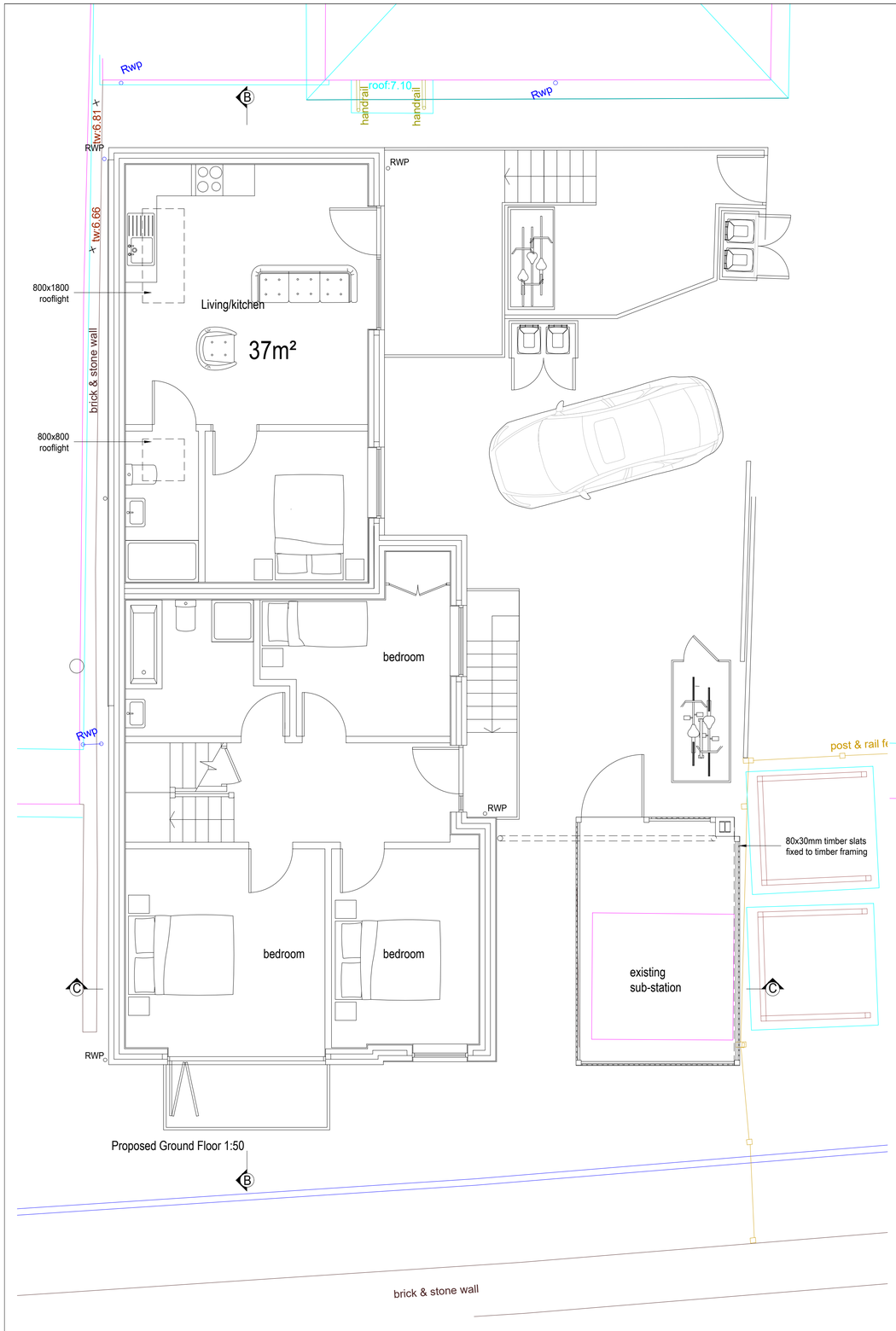
bpm Architectural Services Ltd.

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drawn by	by others
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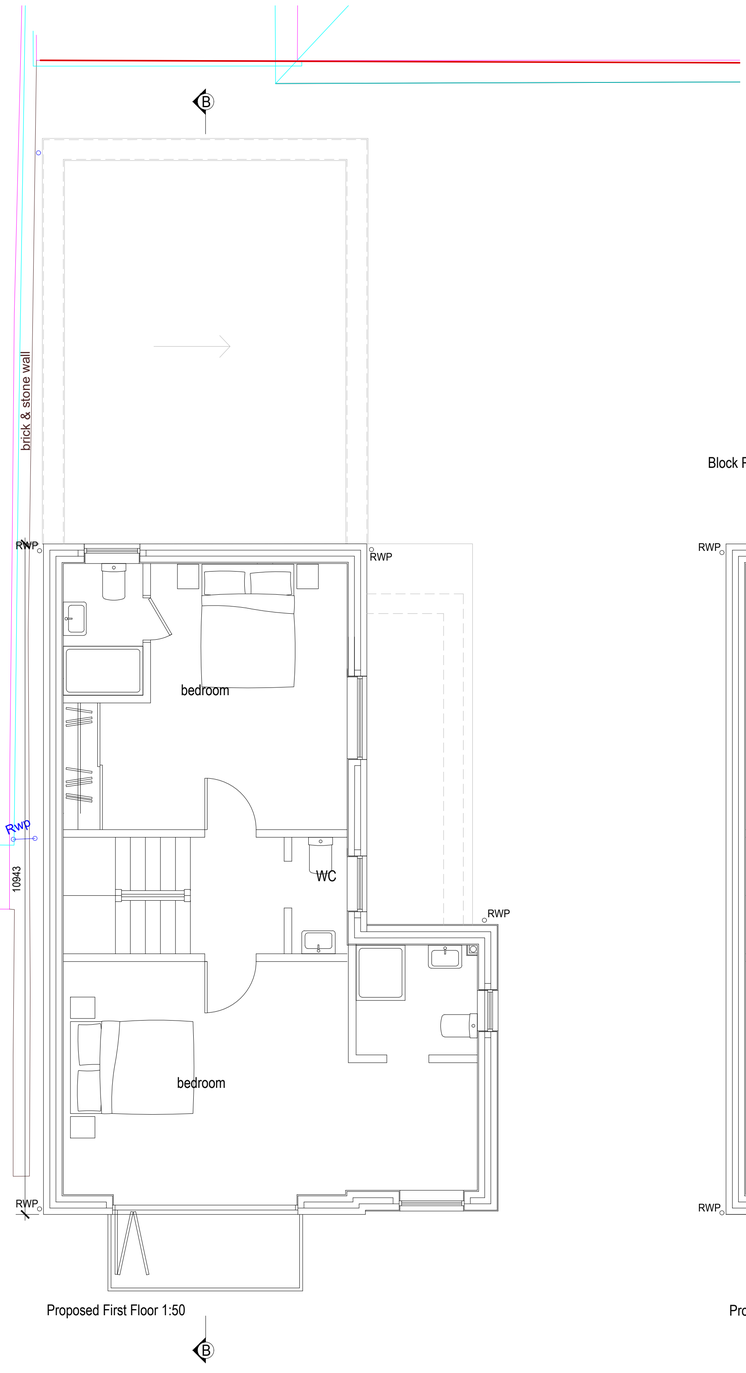
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Do not scale off drawing, check all dimensions on site before all work is commenced

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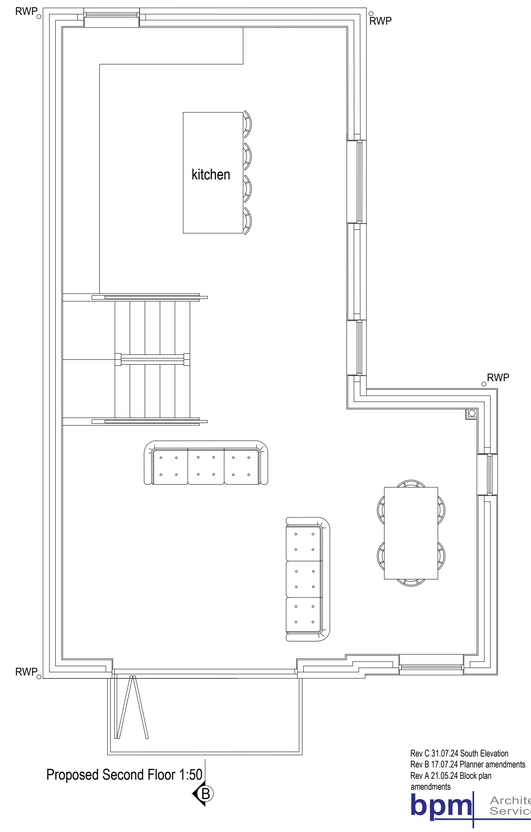
Proposed Ground Floor 1:50



Proposed First Floor 1:50



Block Plan 1:500



Proposed Second Floor 1:50

1:50 0 1 2 3 4 5 6 7 8 9 10m

Rev C 31.07.24 South Elevation
Rev B 17.07.24 Planner amendments
Rev A 21.05.24 Block plan amendments

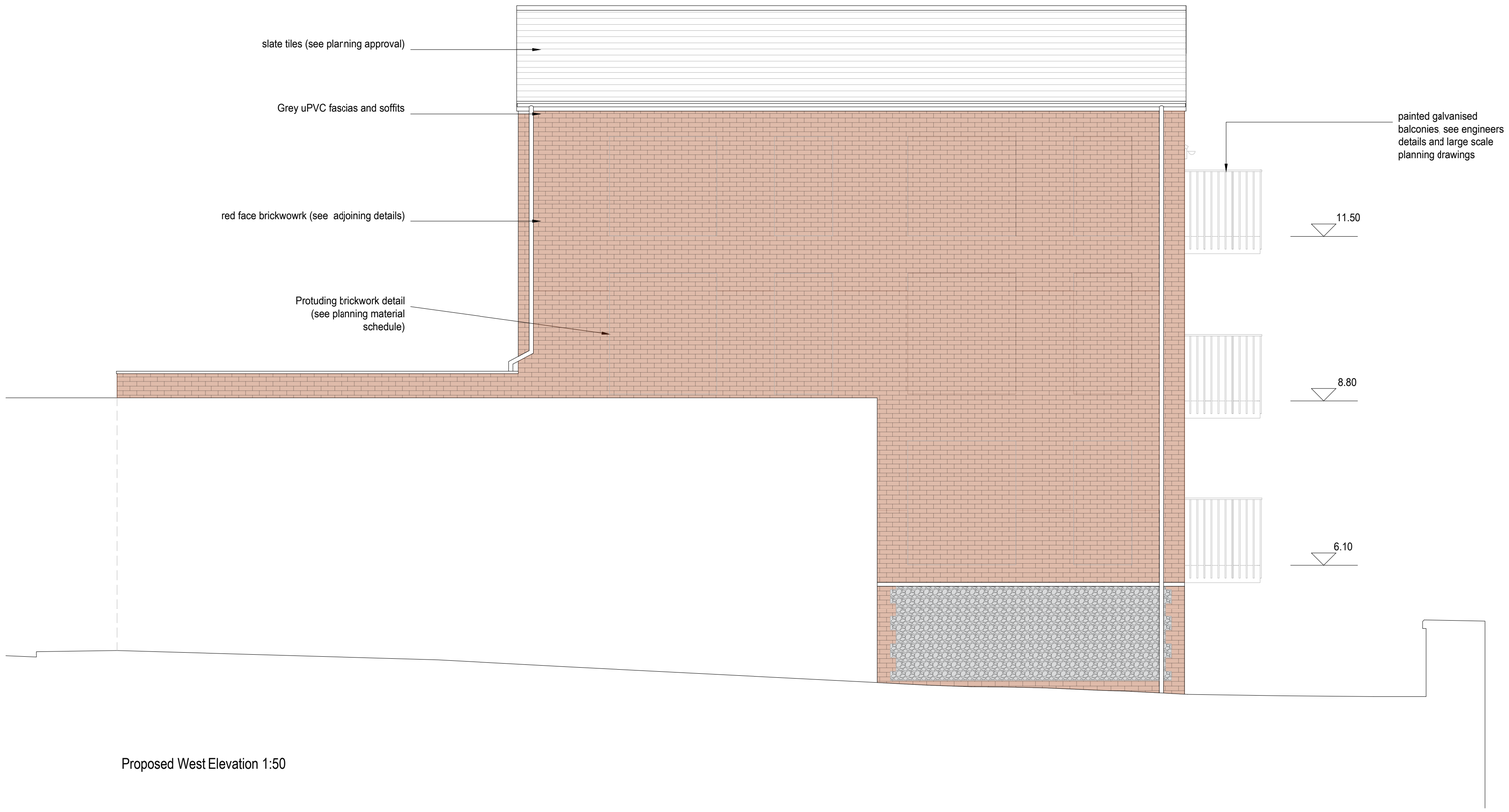
bpm Architectural Services Ltd.

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project	35-37 High Street Shoreham-by-sea West Sussex
project ref:	2870
Drawing No.	P100C
drawing title	Proposed floor plans
drawn by	J Boys
date	May 24
scale	1:50@ A1

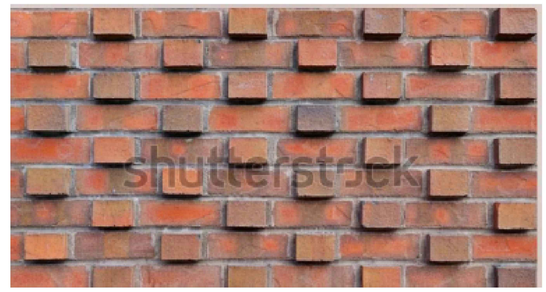
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Do not scale off drawing, check all dimensions on site before all work is commenced

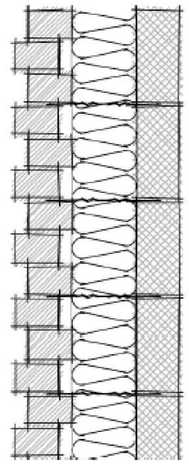
All goods materials workmanship to conform with current building regs BSS and COP's



Proposed West Elevation 1:50



West Elevation brickwork panel detail





Proposed North Elevation 1:50

Rev A 17.07.24 Planner amendments
amendments

bpm Architectural Services Ltd.

client: Ellen White

project: 35-37 High Street
Shoreham-by-sea
West Sussex

project ref: 2870 Drawing No P102A

drawing title: Proposed North and West Elevations

drawn by: J Boys

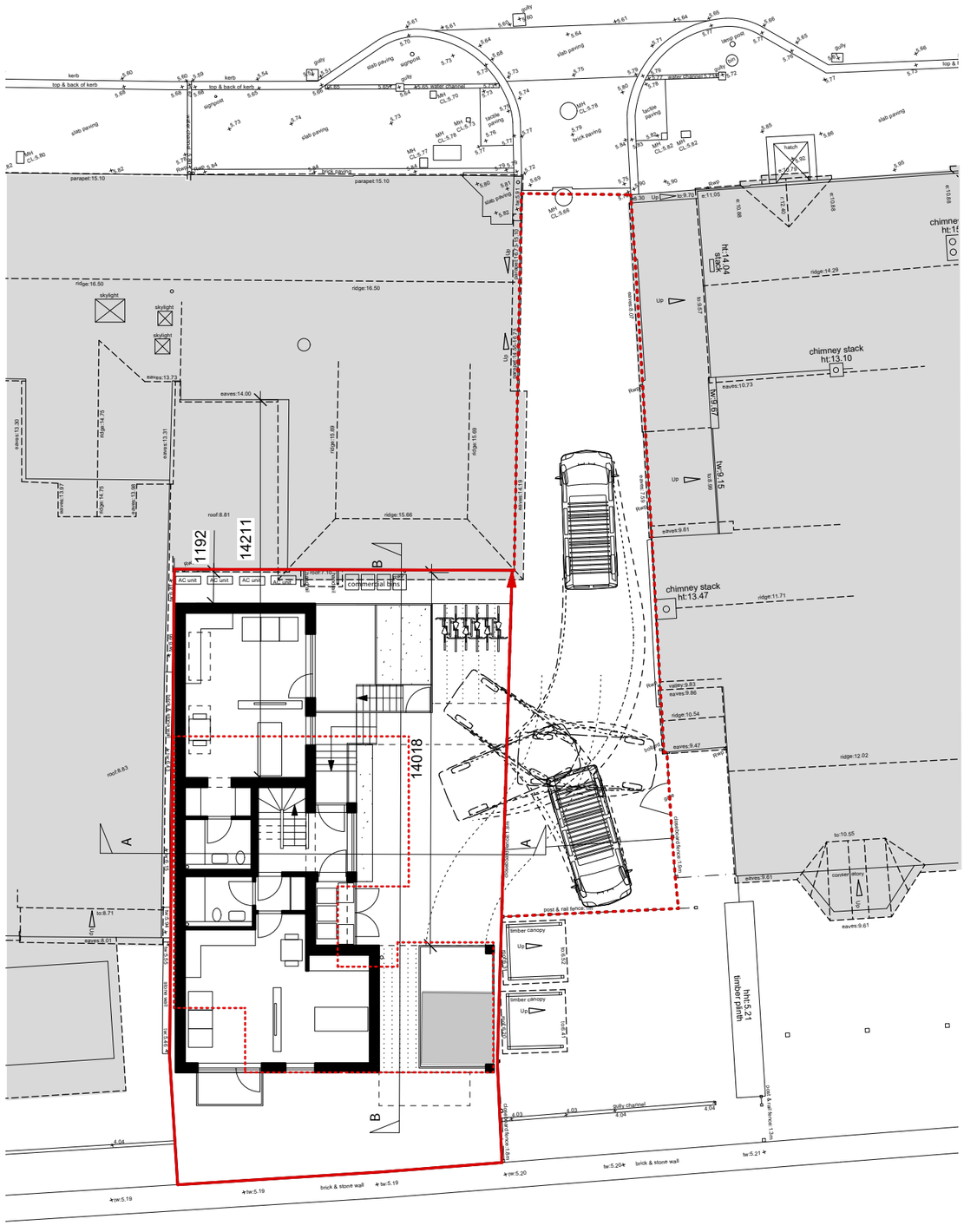
date: May 24 scale 1:50@ A1

www.bpmnet.co.uk
info@bpmnet.co.uk

Do not scale off drawing, check all dimensions on site before all work is commenced

All goods materials workmanship to conform with current building regs BSS and COP's

1:50 0 1 2 3 4 5 6 7 8 9 10m



Proposed site plan

1:200 @A3

4 Gloucester Passage, Brighton BN1 4AS
e: studio@sticklandwright.co.uk
t: 01273 964051
Company registered in England No. 11222477

Disclaimer:

This drawing is the copyright of Stickland Wright Ltd. and may not be reproduced or used except by written permission. Figured dimensions to have precedence over scaling. Check all site dimensions prior to fabrication. Refer any discrepancies found to Stickland Wright.

Revisions:

			Checked
A	11/11/2022	for Planning	ns
B	16/11/2022	Site access added	

N

1:200 | 2m | 4 | 6 | 8 | 10 | 12

Boundary Line

Dwg No.	**19117A-P-100 B**
Drawing Title	Proposed site plan
Address	Land at 35-37 High Street, Shoreham
Client	Moretons Investments
Scale	1:200 @A3
Stage	Planning
Drawn by	ah
Checked by	ns

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architecture + interiors
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Flood map for planning

Your reference	Location (easting/northing)	Created
<Unspecified>	**521480/104985**	**23 Aug 2024 14:37**

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

This means:

- you must complete a flood risk assessment for development in this area
- you should follow the Environment Agency's standing advice for carrying out a flood risk assessment (see www.gov.uk/guidance/flood-risk-assessment-standing-advice)

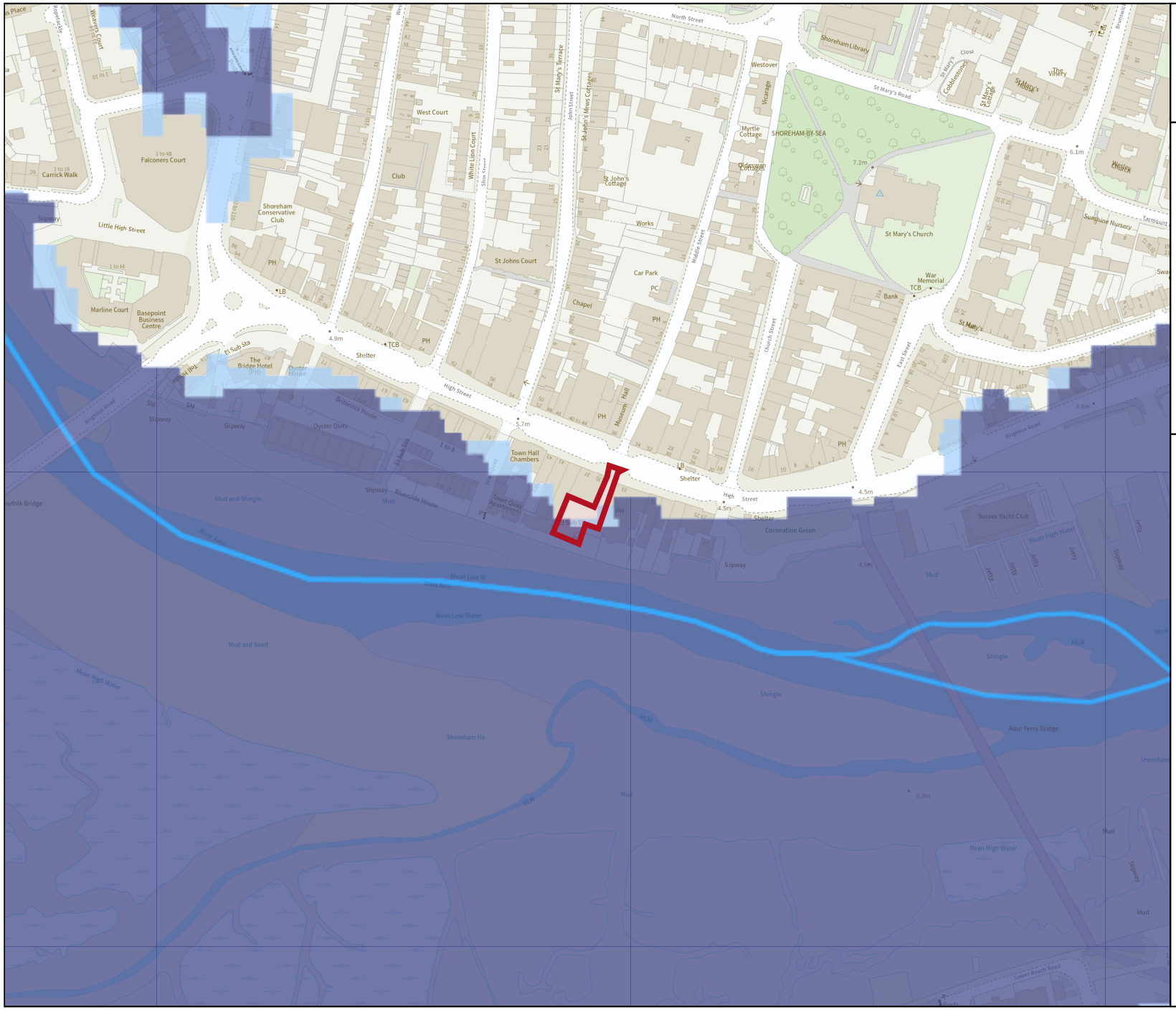
Notes

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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Environment Agency

Flood map for planning

Your reference
<Unspecified>

Location (easting/northing)
521480/104985

Scale
1:2500

Created
23 Aug 2024 14:37

- Selected area
- Flood zone 3
- Flood zone 2
- Flood zone 1
- Flood defence
- Main river
- Water storage area

0 20 40 60m

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