Flood Risk Assessment for Planning

Prepared for:
Mr and Mrs Battes

February 2020

Location:
59 Riverside Road
Shoreham
West Sussex
BN43 5RB

Our reference:
88245-Caldotec-RiversideRd



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Document Issue Record

Project:	Flood Risk Assessment for Planning
Client:	Mr and Mrs Battes
Location:	59 Riverside Road, Shoreham, West Sussex, BN43 5RB
Application:	Demolition of existing boathouse and erection of one and half storey garden annexe building which will remain part of the main property (extension of the existing property)
Our reference:	88245-Caldotec-RiversideRd
Version:	v2.0 110220

Lead Consultant:	Ms Jackie Stone
Authorisation:	Mrs Emma Jeffery

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1. Key Facts

Flood Risk Posed:

- Site within Flood Zones 1, 2 and 3a.
- Tidal Risk from the River Adur.
- Comparison of modelled flood levels with topographic site levels (of approximately 4.4 – 3.4m AOD in the area of the proposed garden annex building (built footprint) shows that the site is situated partly below the modelled 1:200 year flood levels at the present day, but could be inundated with up to 1.99m of floodwater for the 1:200 year event in 2115.
- Site is entirely outside of the defended modelled 1:100 year flood extent, both at the present day, in 2067 and in 2117.
- Risk of groundwater and sewer surcharge flooding would appear to be low.
- Risk of pluvial flooding would appear to be "Very Low".
- No history of flooding at the site provided.

Flood Risk Management:

- The Shoreham Adur Tidal Walls flood defence scheme will provide protection for extreme events with 0.33% probability (1-in-300-year) of occurring in 1 year, allowing for 50 years of sea-level rise.
- There will be no loss of fluvial flood storage within Flood Zone 3a.
- In the case of an extreme flood event without warning, owners, occupants and users should seek refuge on the upper floors of the existing residential property. The applicant has confirmed that the annex will remain as part of the main property for the lifetime of the development (i.e. not occupied independently).
- Flood proofing of the building will be incorporated as appropriate.
- The applicant will register with the Environment Agency Floodline Warnings/Alert Direct service.

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 Mr and Mrs Battes (hereinafter referred to as "the applicant") to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at 59 Riverside Road, Shoreham, West Sussex, BN43 5RB (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) July 2018 and the associated technical guidance.

The site appears to be located within Flood Zones 1, 2 and 3a 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.

Given that the proposed application site is located within Flood Zones 1, 2 and 3a (Low, Medium and High Risk of flooding from rivers or the sea), and includes building works, the applicant is required to submit a FRA under the NPPF. 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.

The objectives of a FRA to support a planning application are to establish:

- 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 detached single storey dwelling with a garage and boat house located within the rear garden. The dwelling is surrounded by associated gardens and served by a tarmac driveway.

Detailed existing site plans are provided in the report Appendix.

3.2. Topography:

The site is bordered by the River Adur to the north and Riverside Road to the south. The surrounding area is predominantly residential.

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 +/-5cm to 15cm with spatial resolutions ranging from 25cm to 2 metres. This dataset is derived from a combination of the EA's 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.

LiDAR remotely sensed digital elevation data suggests that the ground topography on site slopes from 4.5m AOD at the front of the site (Riverside Road) to 3.0m AOD at the rear of the site (which borders the River Adur). However the ground level in the area of the proposed garden annex (build footprint) is 4.4 – 3.4m AOD.



Figure 1: Aerial view of the site and immediate surrounding area (Source: Google Earth)

3.3. Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Tarrant Chalk Member - Chalk. Sedimentary Bedrock formed approximately 72 to 84 million years ago in the Cretaceous Period. The soil type in the area is taken from UKSO data, the site is deep Quaternary Marine / Estuarine Sand with a sand to sandy loam soil texture.

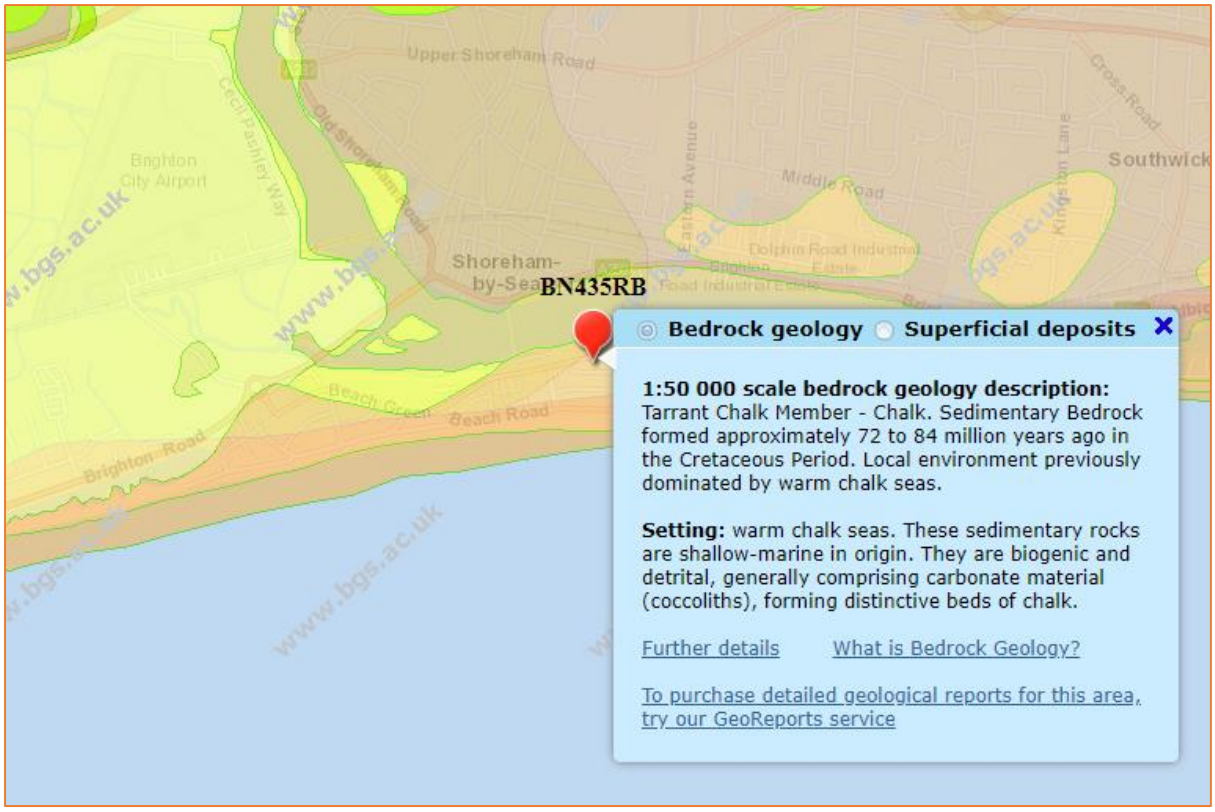


Figure 2: Local geology (Source: BGS)

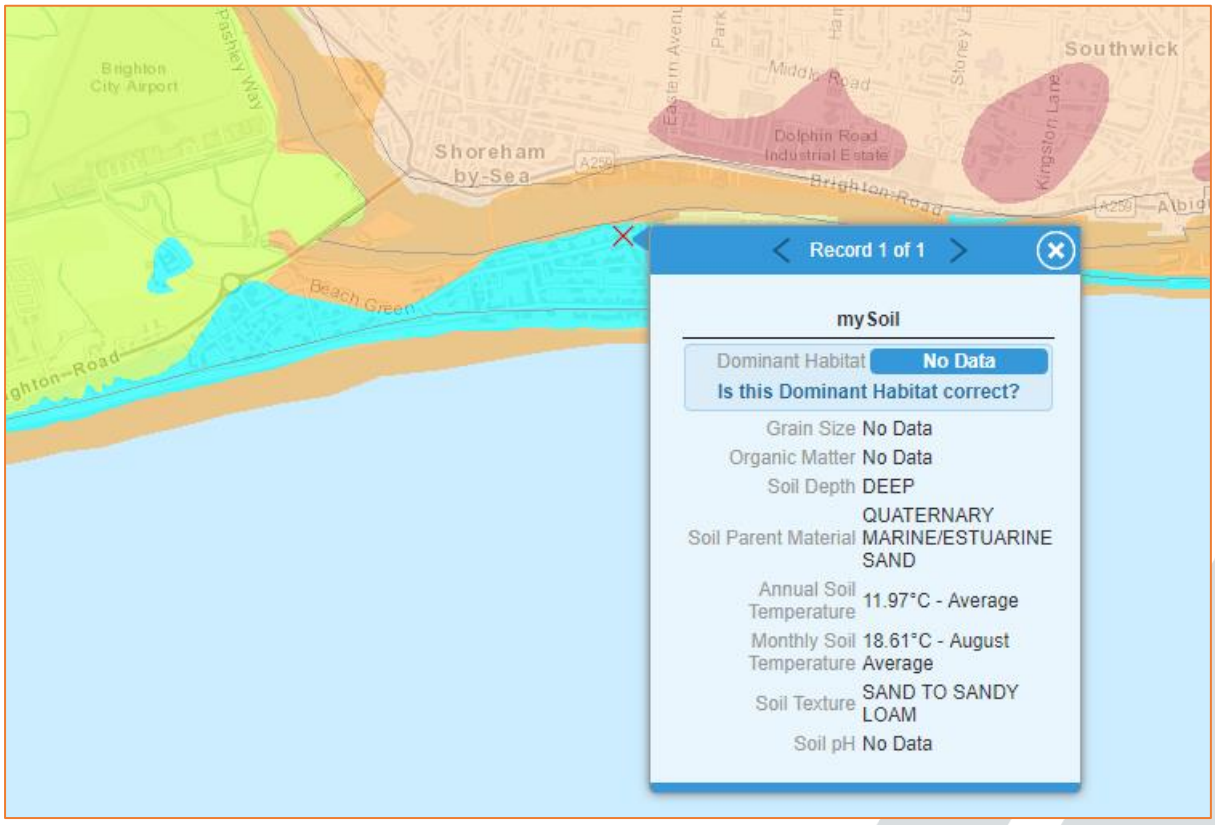


Figure 3: Local soil types (Source: UKSO)

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 main river. The EA responded in a letter dated 24th June 2019 their ref HA/2019/121382/01-L01 in relation to application AWDM/0899/19

> *"Although the Environmental Permitting (England and Wales) Regulations 2016 require a permit to be obtained for any activities which will take place within 16 meters of a tidal river and/or 16 meters of a tidal flood defence structure, we acknowledge through the submitted details that the works being carried out will be within the perimeters of the existing property, thus will not obstruct any access routes nor disrupt the Adur Tidal Wall.*
>
> *Therefore, we do not require the applicant to obtain a Flood Risk Activity Permit on this occasion."*

A copy of EA letter can be found in the report appendix.

4. Proposed Development

Based on the development plans provided, the application is for the demolition of existing boathouse and erection of one and half storey garden annexe building which will remain part of the main property (extension of the existing property).

Detailed proposed plans are provided in the report Appendix.

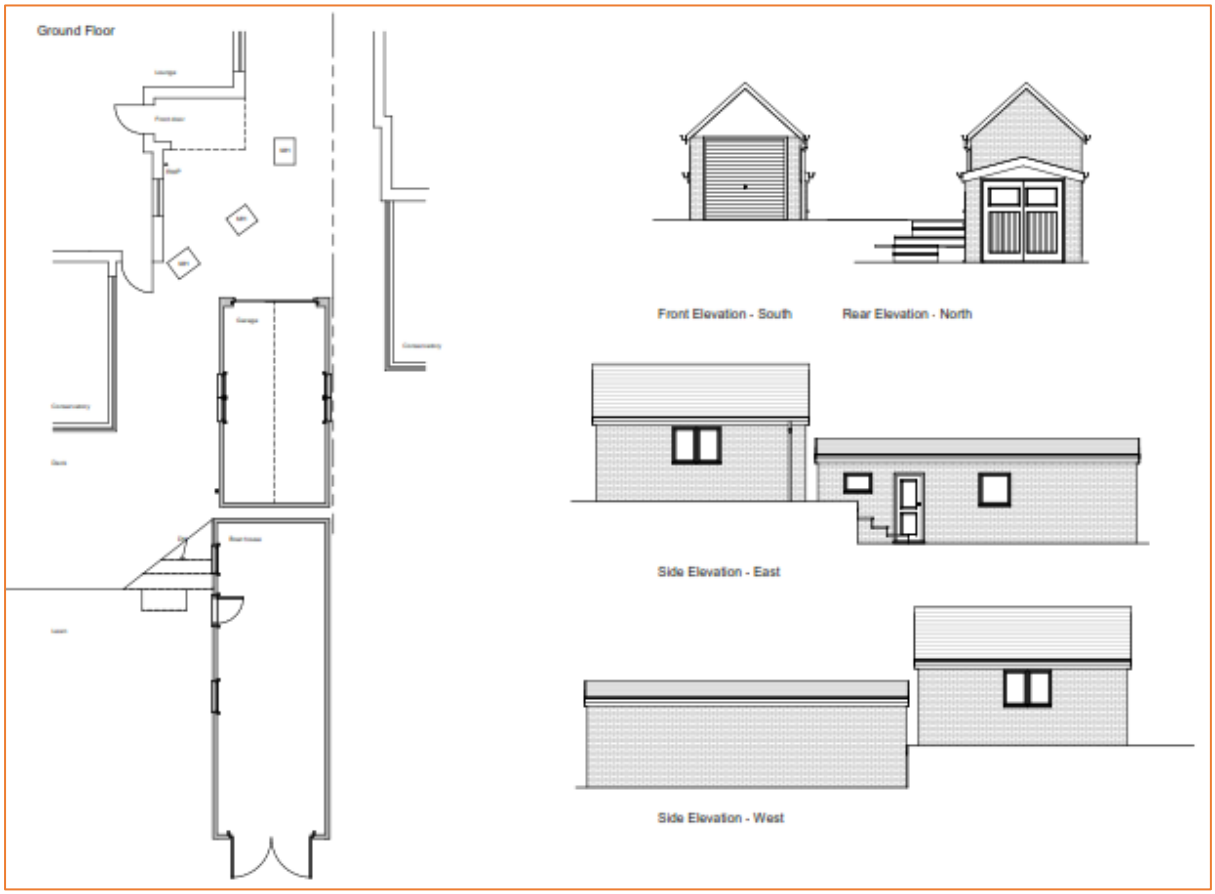


Figure 4: Existing plans and elevations (Source:M J Humphrey Ltd)

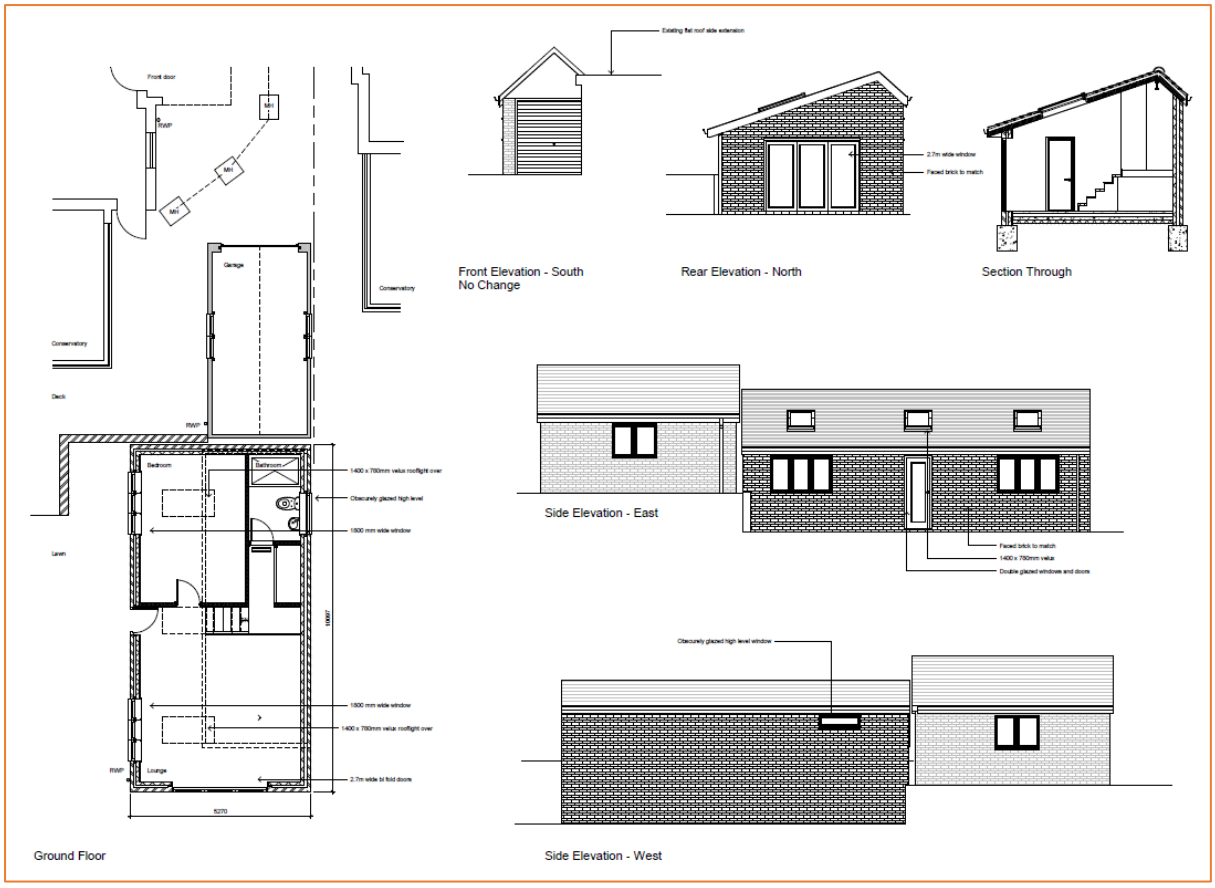


Figure 5: Proposed plans and elevations (Source:M J Humphrey Ltd)

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 web site.

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.

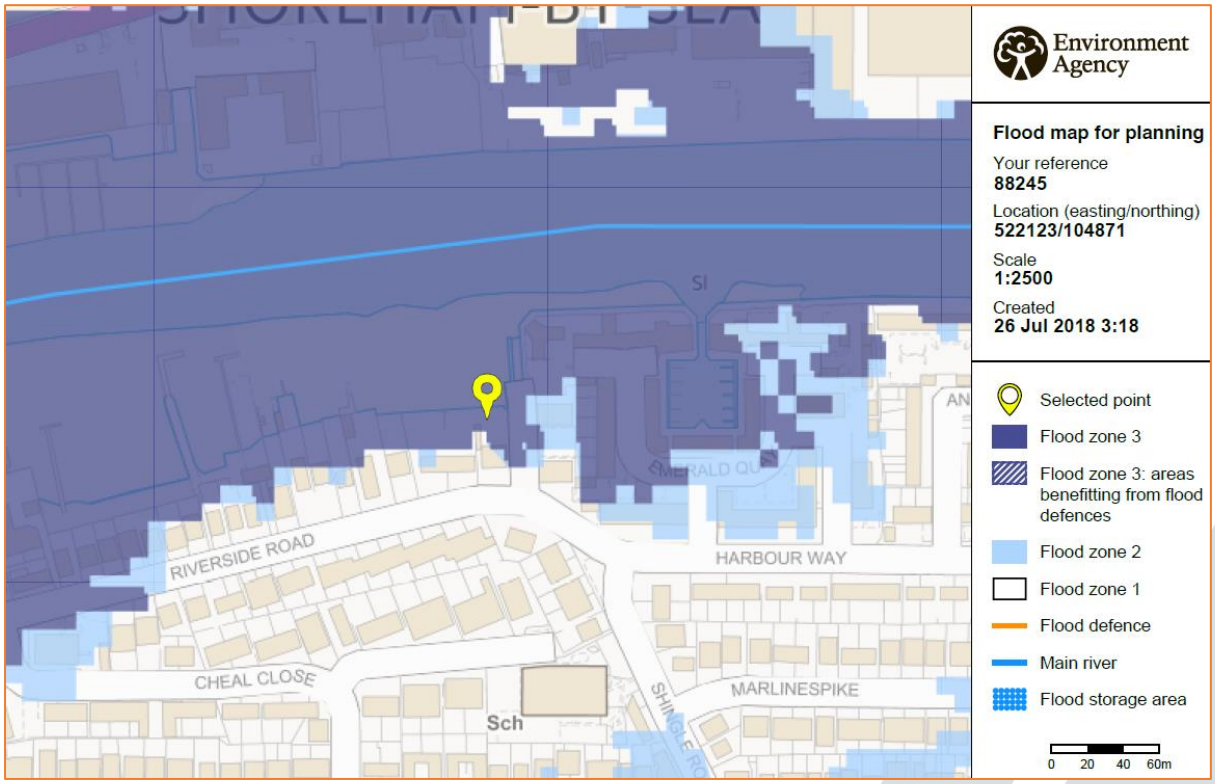


Figure 6: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)

The site would appear to be located partially within Flood Zone 1 (Low Probability), Flood Zone 2 (Medium Probability) and Flood Zone 3a (High Probability), which means it is defined as land having between a less than 1 in 1000 and a greater than 1 in 200 annual probability of tidal flooding.

The risk would appear to be tidal from the River Adur which borders the site to the north.

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:

Product 4 modelled flood levels and extents have been requested from the EA for use within this report (reference SSD156270). The EA has provided undefended onsite modelled flood levels and depths from the Adur Coastal Modelling (2012) with updated Adur Tidal Wall Scheme.



Figure 7: FRA Site Boundary & Node Points (Source: EA SSD156270)

Site specific flood levels have been provided for a range of return periods:

	NGR		Modelled Flood Levels in Metres AOD Undefended Annual Exceedance Probability			
Node Ref	Eastings	Northings	0.5%	0.5% (2070) *	0.5% (2115) *	0.1%
1	522124	104871	4.25	4.79	5.39	4.48
2	522126	104849	-	4.79	5.39	-

Table 2: Water Levels:Tidal Undefended

Node Ref 1 is deemed the most appropriate for the site. Comparison of these modelled flood levels with topographic site levels (of approximately 4.4 – 3.4m AOD in the area of the proposed garden annex building (built footprint) shows that the site is situated partly below the modelled 1:200 year flood levels at the present day, but could be inundated with up to 1.99m of floodwater for the 1:200 year event in 2115.

It should be noted that the site is entirely outside of the defended modelled 1:100 year flood extent, both at the present day, in 2067 and in 2117.

5.2.2. Flood defences:

The Environment Agency has been developing a major improvements scheme called the Shoreham Adur Tidal Walls which was officially opened on 22nd March 2019.

The scheme will provide protection for extreme events with 0.33% probability (1-in-300-year) of occurring in 1 year, allowing for 50 years of sea-level rise.

The Environment Agency is working with Coast to Capital Local Enterprise Partnership (LEP), Adur District Council and West Sussex County Council to reduce the risk of flooding to Shoreham-by-Sea and East Lancing.

The scheme will reduce the risk of flooding to over 2,300 homes and 169 commercial properties by significantly improving the standard of existing tidal defences in Shoreham-by-Sea.

The £45 million project is partnership funded, with a £23.8 million contribution from government attracting partnership contributions from West Sussex County Council, Coast to Capital LEP, and some private £'s through Adur District Council.

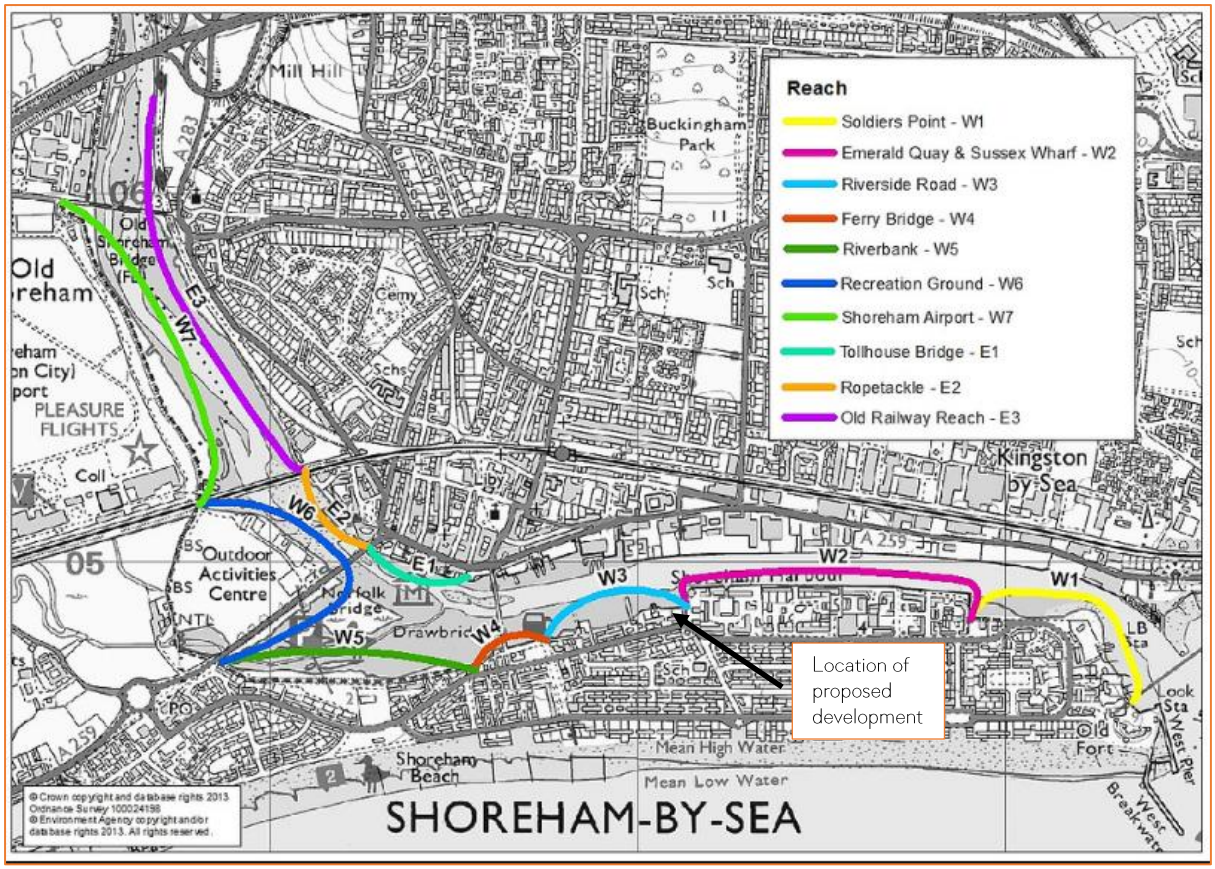


Figure 8: Shoreham Adur tidal walls scheme (Source: EA)

5.2.3. 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.

The site is at risk of inundation in the event of exceedance (overtopping) or failure (breach) of the flood defences.

5.2.4. Historical flood events:

The EA has provided no records of historical flooding at the site. According to the Adur Stratigic Flood Risk Assessment 2008 there are no records of historical flooding affecting the site.

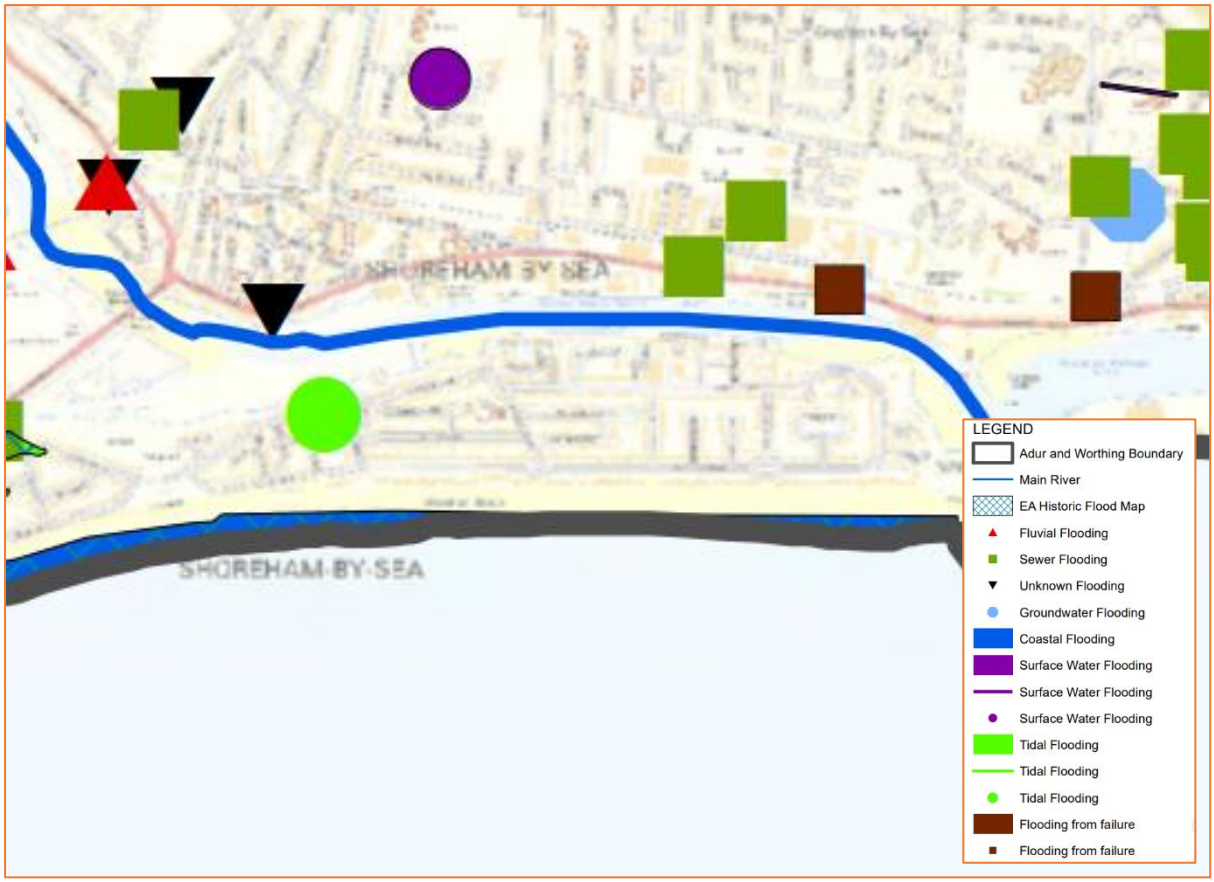


Figure 9: Extract from Map 3, Historical Flooding (Source Adur SFRA 2008)

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 and 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):

- 1:30 (3.3%)
- 1:100 (1%)
- 1:1000 (0.1%)

The mapping below shows the Risk of Flooding from Surface Water centred on the site. 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 within an area of "Very Low" risk of flooding from surface water.

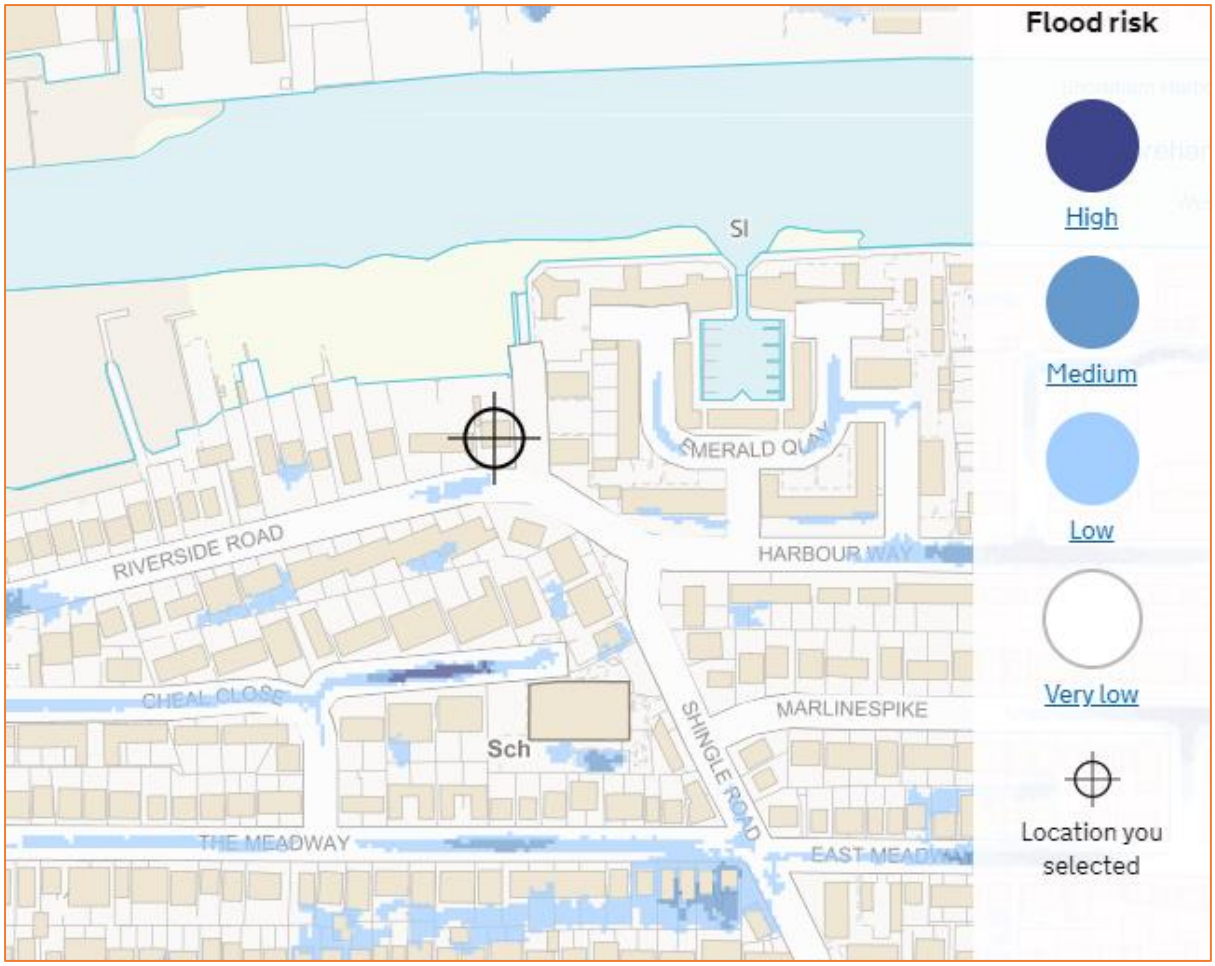


Figure 10: Extract from EA Risk of Flooding from Surface Water Map (Source: EA)

5.3. 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.

No records have been provided to suggest that the site has flooded from groundwater flooding previously.

The site is shown to be within an area of >=25% <50% susceptibility to groundwater flooding according to the Adur SFRA 2008.

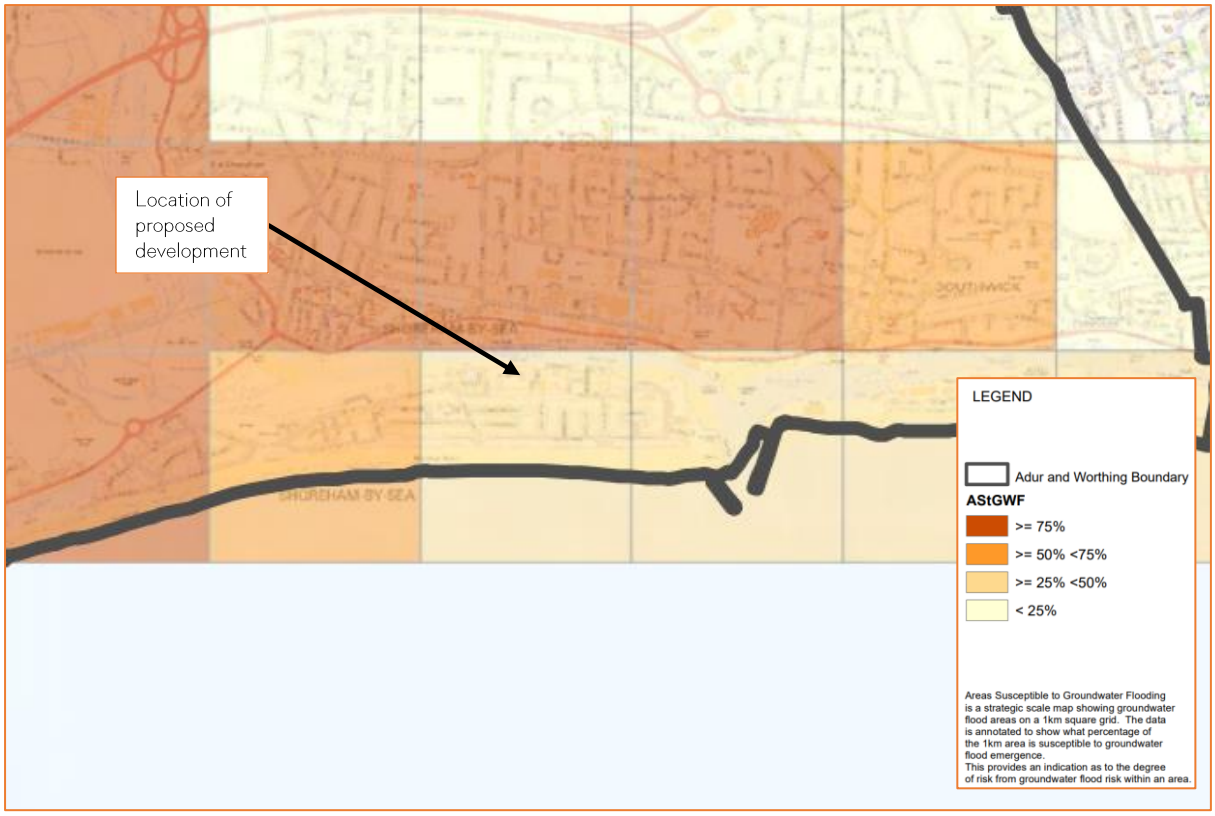


Figure 11: Extract from Map 15, Indicative Groundwater Flood Risk (Areas Susceptible to Groundwater Flooding) (Source Adur SFRA 2008)

5.4. 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.

For a sewer to remain adoptable, any storage capacity above the 1.3% AEP (1 in 30 year) storm volume must be incorporated as an offline storage feature outside the online sewer network.

No records have been provided to suggest that the site has flooded from sewer flooding previously.

5.5. 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 is 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.

There are no known Internal Drainage Boards covering the site area.

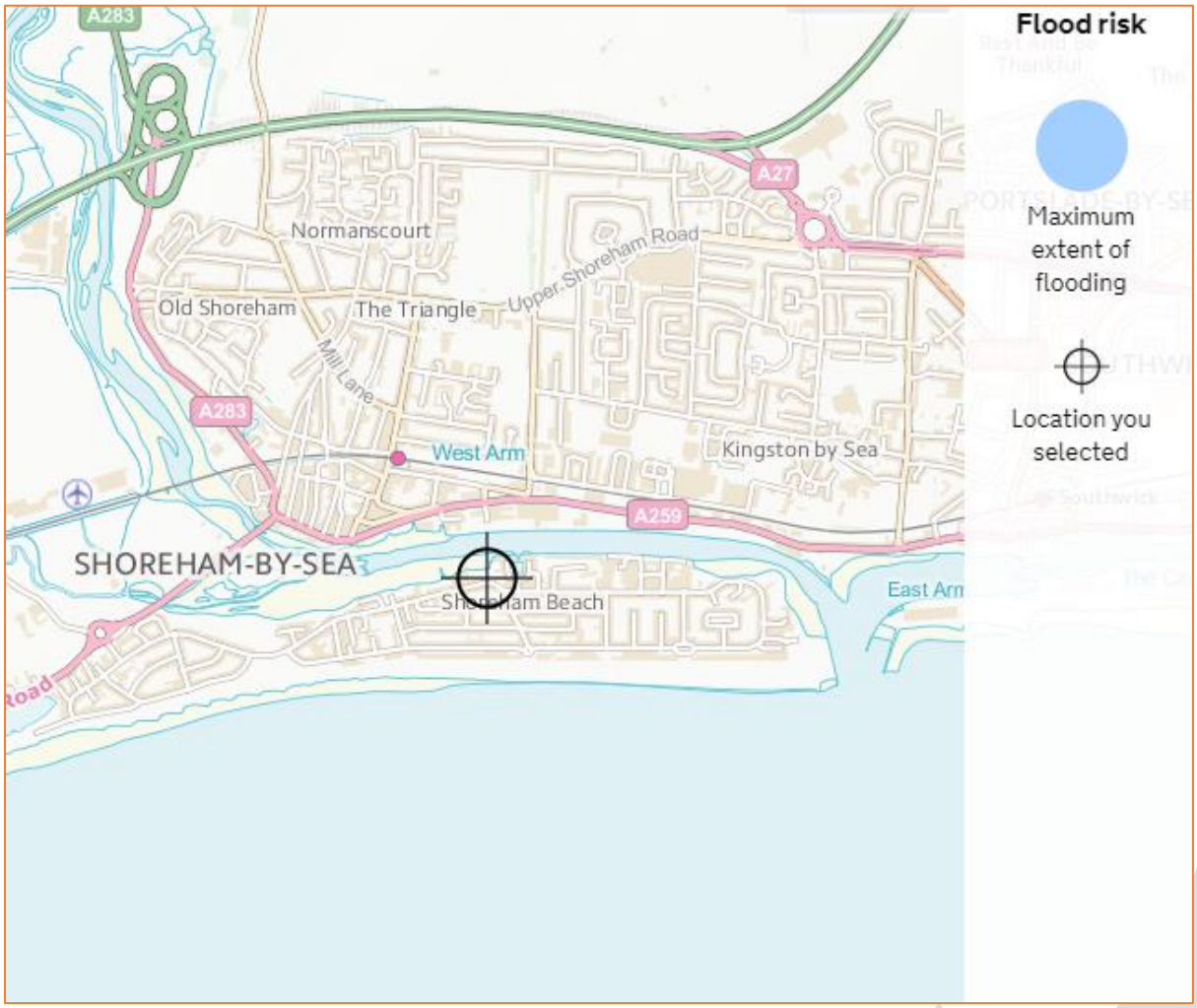


Figure 12: Maximum extent of flooding from reservoirs (Source: EA)

6. Flood Risk Management Measures

6.1. Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

The existing site is residential which is classified as "more vulnerable" under the NPPF.

Post development, the site will remain "more vulnerable", as the application is for the demolition of existing boathouse and erection of one and half storey garden annexe building. The applicant has confirmed that the annex will remain part of the main property (extension of the existing property), and will not be able to be sold or rented as a separate dwelling for the lifetime of the development.

Accordingly, is considered that the vulnerability of the site as a whole is not increased post development.

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 annex or additional commercial unit.

The application is for an extension of the existing domestic property.

6.3. Physical Design Measures:

The applicant has confirmed that the finished floor level of the annexe will be set 300mm above the maximum adjacent ground level. Access will be maintained from the ground floor of the annex to the above floors of the main house.

To help protect against flooding during extreme events, the applicant has agreed to implement flood resistant design measures into the extension, in consultation with the Local Authority building control department. These measures could 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 first floor level; and on separately switched circuit from first floor;
- Electrical incomer and meter situated at first floor level or above;
- Boilers, control and water storage / immersion installed at first floor level or above;
- Gas meter installed at first floor level or above;
- 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 construction with wood faces treated to resist water penetration.

The applicant should also consider the use of demountable flood defence barriers to defend ground level doorways and low windows.

6.4. Safe Escape:

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 during the 1:200 year plus allowance for climate change flood event.

The site is situated within Flood Zones 1, 2 and 3a when using the Environment Agency Flood Map for Planning (Rivers and Sea). The proposed escape route is to leave the front of the property onto Riverside Road. This route is entirely outside of Flood Zones 3 and 2 when using the Environment Agency Flood Map for Planning (Rivers and Sea). Accordingly, a route of safe escape 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 on the upper floors of the existing residential property.

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 Flood Zones 2 and 3a. 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 https://fwd.environment-agency.gov.uk/app/olr/register to receive flood warnings by phone, text or email.

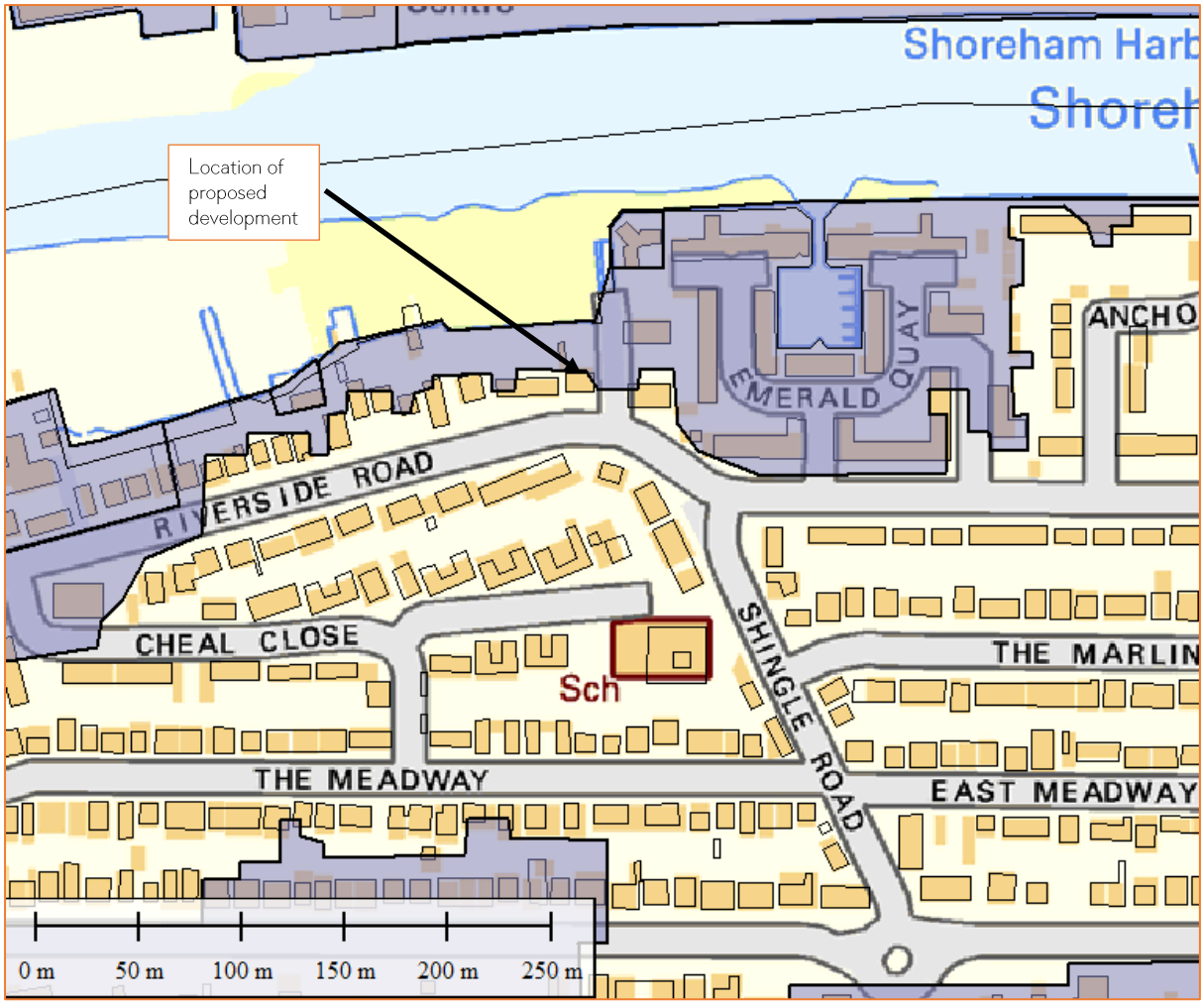


Figure 13: Extract from Environment Agency Flood Warning Area Map (Source: EA)

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 3: Flood Warnings

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:

- Find out if you are at risk of flooding.
- Find out if you can receive flood warnings.
- 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 such as pets, cars, furniture, and electrical equipment.
- Know how to turn off gas, electricity and water supplies .
- 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.
- Consider buying flood protection products such as flood boards and airbrick covers to help reduce flood water getting into your property.

During a flood:

- Tune into your local radio station on a battery or wind-up radio.
- Fill jugs and saucepans with water.
- Grab your flood kit - if you have prepared one.
- Collect blankets, torch, first aid kit, medication and food.

- Move important documents, personal items, valuables, and lightweight belongings upstairs or to high shelves.
- Raise large items of furniture, or put them in large bags if you have them.
- Move people, outdoor belongings, cars and pets to higher ground.
- Switch off water, gas and electricity at mains when water is about to enter your home. Do not touch sources of electricity when standing in water.
- Fit flood protection products, if you have them, for example flood boards, airbrick covers, sandbags.
- Put plugs in sinks and baths. Weigh them down with a pillowcase or plastic bag filled with soil.
- If you do not have non-return valves fitted, plug water inlet pipes with towels or cloths.
- Move your family and pets upstairs or to a high place with a means of escape.
- 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, central heating and water checked by qualified engineers before switching them back on.

6.6. Off-Site Impacts

6.6.1. 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 2 and 3a based on the EA floodmap, however the flood risk is predominantly tidal. As such, there will be no unacceptable loss of flood storage post development.

6.6.2. Surface Water Drainage Strategy:

The development will utilise Sustainable Drainage Systems (SuDS) design in accordance with the NPPF for Planning Applications and the drainage 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;
7. Attenuation of rainwater in ponds or open water features with controlled discharge into the local watercourse.

All surface water runoff generated by the proposed development up to 1:100 year rainfall event (plus climate change) will be stored on site, prior to being discharged.

Due to the scale of the development, a full Surface Water Drainage Strategy is not required at this stage of planning. The proposed application will utilise the existing drainage arrangements on site.

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 site is situated partially within Flood Zones 1, 2 and 3a when using the Environment Agency Flood Map for Planning (Rivers and Sea). Post development, the site will remain "more vulnerable".

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 4: 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 3a, further to implementation of the Exception Test. The Sequential and Exception Tests however do not need to be applied for applications for change of use or minor extensions. The application is for an annexe which acts as an extension to the existing residential property.

8. Conclusion

Unda Consulting Limited have been appointed by Mr and Mrs Battes (hereinafter referred to as "the applicant") to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at 59 Riverside Road, Shoreham, West Sussex, BN43 5RB (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) July 2018 and the associated technical guidance.

The site is currently occupied by a detached single storey dwelling with a garage and boat house located within the rear garden. The dwelling is surrounded by associated gardens and served by a tarmac driveway.

The existing site is residential which is classified as "more vulnerable" under the NPPF. Post development, the site will remain "more vulnerable", as the application is for the construction of a detached single storey self-contained annexe. The applicant has confirmed that the annex will remain part of the main property (extension of the existing property), and will not be able to be sold or rented as a separate dwelling for the lifetime of the development. Accordingly, is considered that the vulnerability of the site as a whole is increased post development.

The applicant has confirmed that development will take place within 16m of a tidal main river. A Flood Risk Activity Permit has been sort from the EA. The EA responded in a letter dated 24th June 2019 their ref HA/2019/121382/01-L01 in relation to application AWDM/0899/19

> *"Although the Environmental Permitting (England and Wales) Regulations 2016 require a permit to be obtained for any activities which will take place within 16 meters of a tidal river and/or 16 meters of a tidal flood defence structure, we acknowledge through the submitted details that the works being carried out will be within the perimeters of the existing property, thus will not obstruct any access routes nor disrupt the Adur Tidal Wall.*
>
> *Therefore, we do not require the applicant to obtain a Flood Risk Activity Permit on this occasion."*

The site would appear to be located partially within Flood Zone 1 (Low Probability), Flood Zone 2 (Medium Probability) and Flood Zone 3a (High Probability), which means it is defined as land having between a less than 1 in 1000 and a greater than 1 in 200 annual probability of tidal flooding. The risk would appear to be tidal from the River Adur which borders the site to the north.

Product 4 modelled flood levels and extents have been requested from the EA for use within this report (reference SSD156270). The EA has provided undefended onsite modelled flood levels and depths from the Adur Coastal Modelling (2012) with updated Adur Tidal Wall Scheme. Comparison of these modelled flood levels with topographic site levels (of approximately 4.4 – 3.4m AOD in the area of the proposed garden annex (built footprint) shows that the site is situated partly below the modelled 1:200 year flood levels at the present day, but could be inundated with up to 1.99m of floodwater for the 1:200 year event in 2115.

It should be noted that the site is entirely outside of the defended modelled 1:100 year flood extent, both at the present day, in 2067 and in 2117.

The Environment Agency has been developing a major improvements scheme called the Shoreham Adur Tidal Walls which was officially opened on 22nd March 2019. The scheme will provide protection for extreme events with 0.33% probability (1-in-300-year) of occurring in 1 year, allowing for 50 years of sea-level rise.

The EA has provided no records of historical flooding at the site. According to the Adur Stratigic Flood Risk Assessment 2008 there are no records of historical flooding affecting the site.

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

The site is located within Flood Zones 2 and 3a based on the EA floodmap, however the flood risk is predominantly tidal. As such, there will be no unacceptable loss of flood storage post development.

The applicant has confirmed that the finished floor level of the annexe will be set 300mm above the maximum adjacent ground level. Access will be maintained from the ground floor of the annex to the above floors of the main house.

The proposed escape route is to leave the front of the property onto Riverside Road. This route is entirely outside of Flood Zones 3a and 2 when using the Environment Agency Flood Map for Planning (Rivers and Sea). Accordingly, a route of safe escape 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 on the upper floors of the existing residential property. The applicant has agreed that a permanent means of access be provided to the first floor of the existing residential property, thus providing safe refuge within the building.

The applicant will register with the Environment Agency Floodline Warnings/Alert Direct service.

In summary:

- Site within Flood Zones 1, 2 and 3a.
- Tidal Risk from the River Adur.
- Comparison of modelled flood levels with topographic site levels (of approximately 4.4 – 3.4m AOD in the area of the proposed garden annex building (built footprint) shows that the site is situated partly below the modelled 1:200 year flood levels at the present day, but could be inundated with up to 1.99m of floodwater for the 1:200 year event in 2115.
- Site is entirely outside of the defended modelled 1:100 year flood extent, both at the present day, in 2067 and in 2117.
- Risk of groundwater and sewer surcharge flooding would appear to be low.
- Risk of pluvial flooding would appear to be "Very Low".
- No history of flooding at the site provided.
- The Shoreham Adur Tidal Walls flood defence scheme will provide protection for extreme events with 0.33% probability (1-in-300-year) of occurring in 1 year, allowing for 50 years of sea-level rise.
- There will be no loss of fluvial flood storage within Flood Zone 3a.
- In the case of an extreme flood event without warning, owners, occupants and users should seek refuge on the upper floors of the existing residential property. The applicant has confirmed that the annex will remain as part of the main property for the lifetime of the development (i.e. not occupied independently).
- Flood proofing of the building will be incorporated as appropriate.
- The applicant will register with the Environment Agency Floodline Warnings/Alert Direct service.

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

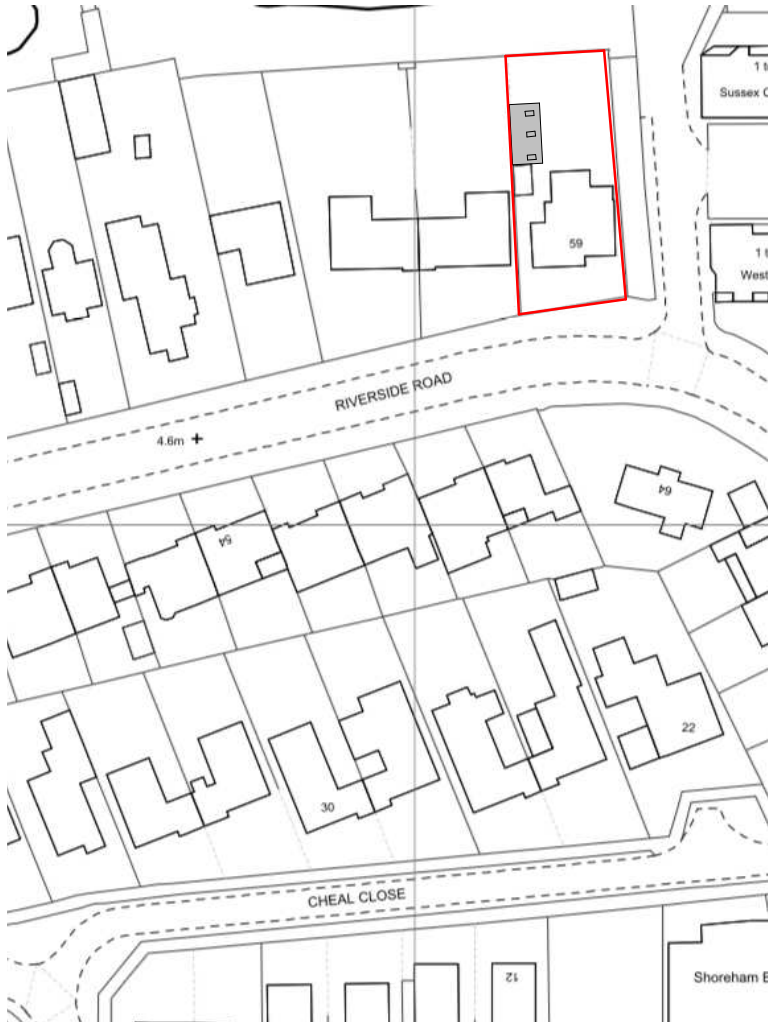
Appendix

- Site location, existing and proposed plans;
- EA Flood Data.

Site Plan - 1:1250

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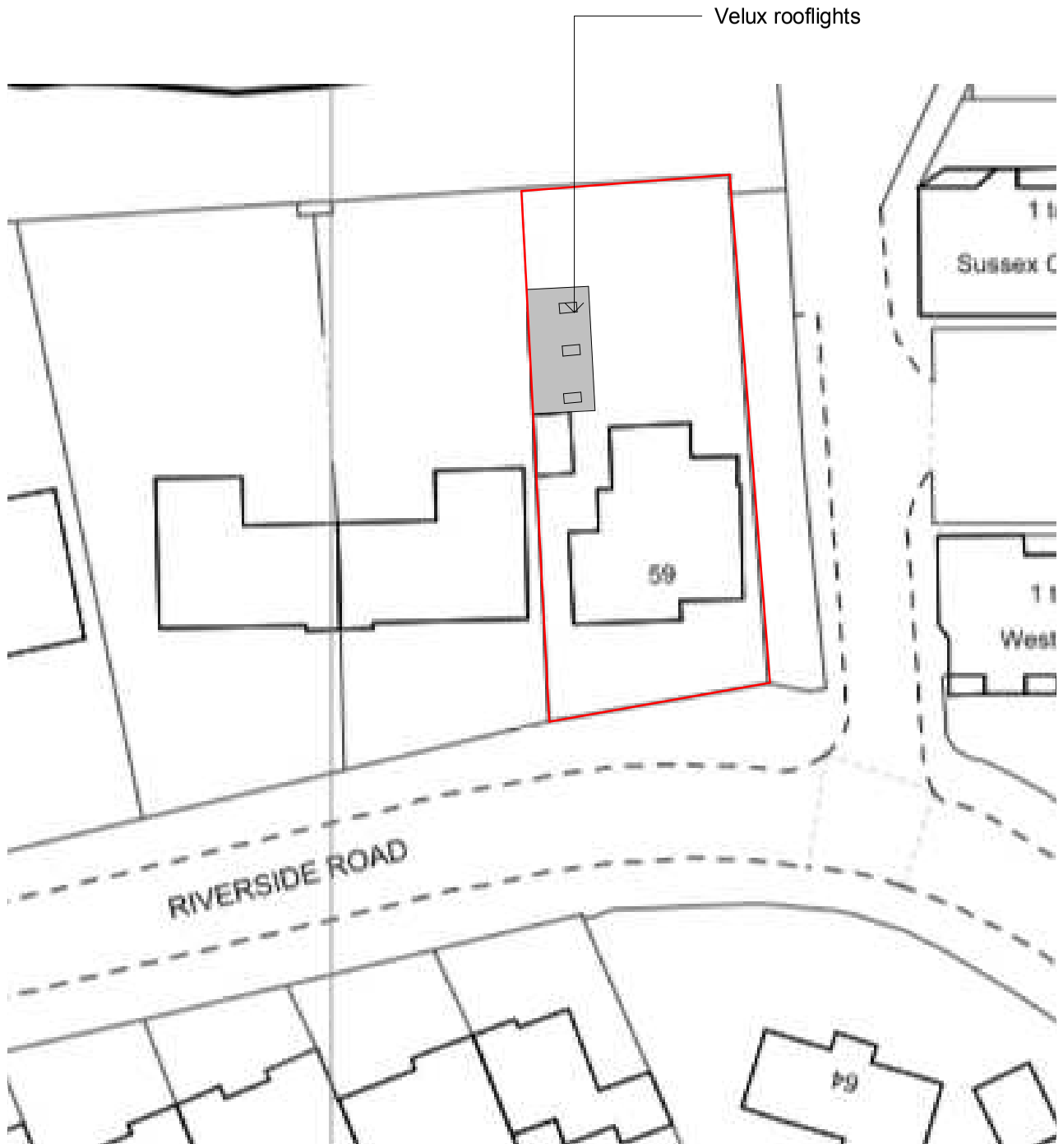
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Site Plan - 1:500

5 0 5 10 15 20 25

SCALE 500 m
1:



North

Revisions	
Drawing Number 2019/15	Sheet 1 of 1
Size A3	Scale 1:500, 1:1250

Project

Site Plan
October 2019

Job Title

59 Riverside
Shoreham by Sea
West Sussex
BN43 5RB

Do Not scale from this drawing except for planning as photocopies will be subject to distortion
Drawings to be read in conjunction with all other Designers and structural engineers contract drawings and specifications: Any discrepancies must be brought to the attention of the Designer immediatialy
The contractor must verify all dimensions by site measurement before ordering materials or manufacturing components
Substitute materials and products to those named will be acceptable if proven to be of equal or higher performance and not in conflict with other elements

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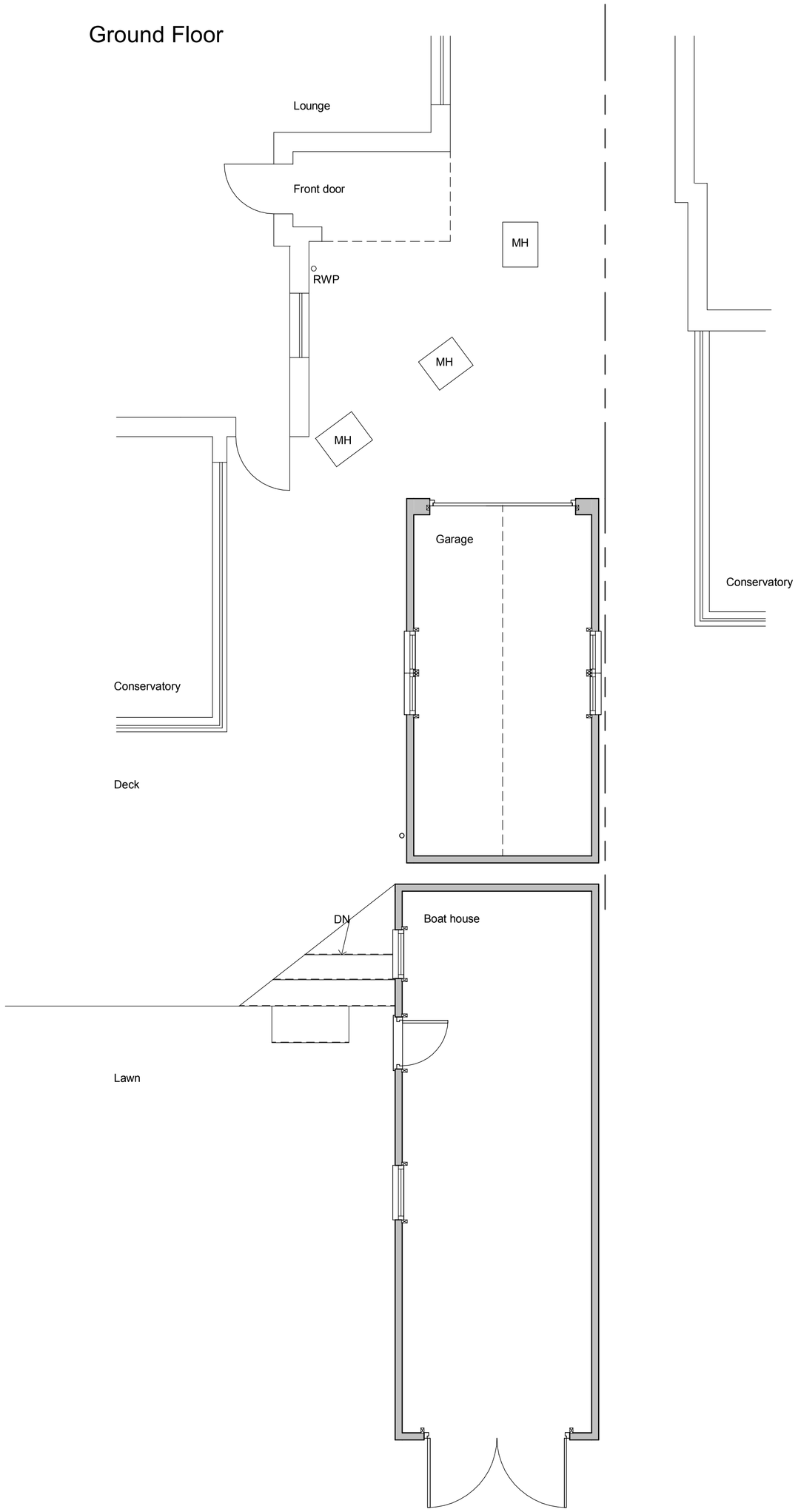
Mel Humphrey MRICS, MBEng
39 Northease Drive
Hove
East Sussex
BN3 8PQ

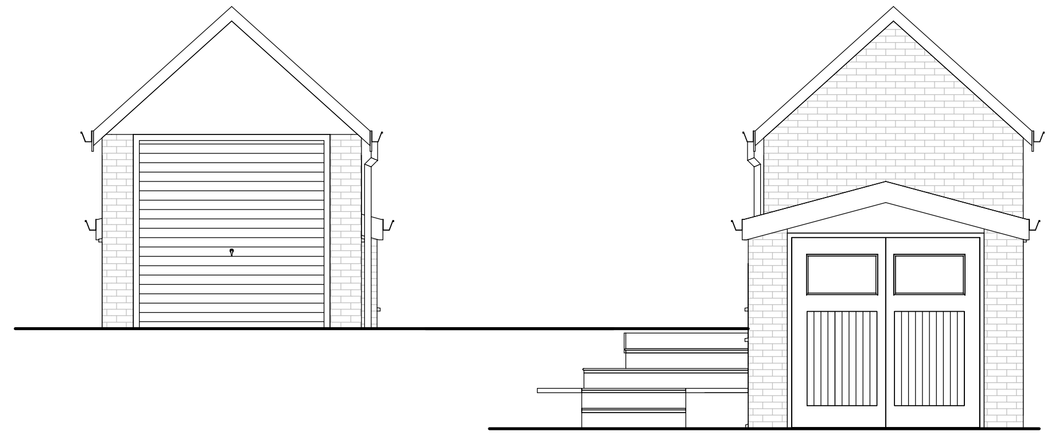
Mel@mjhumphrey.co.uk
07701055182

Adam Humphrey
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Emsworth
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PO10 7SY

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07812419142

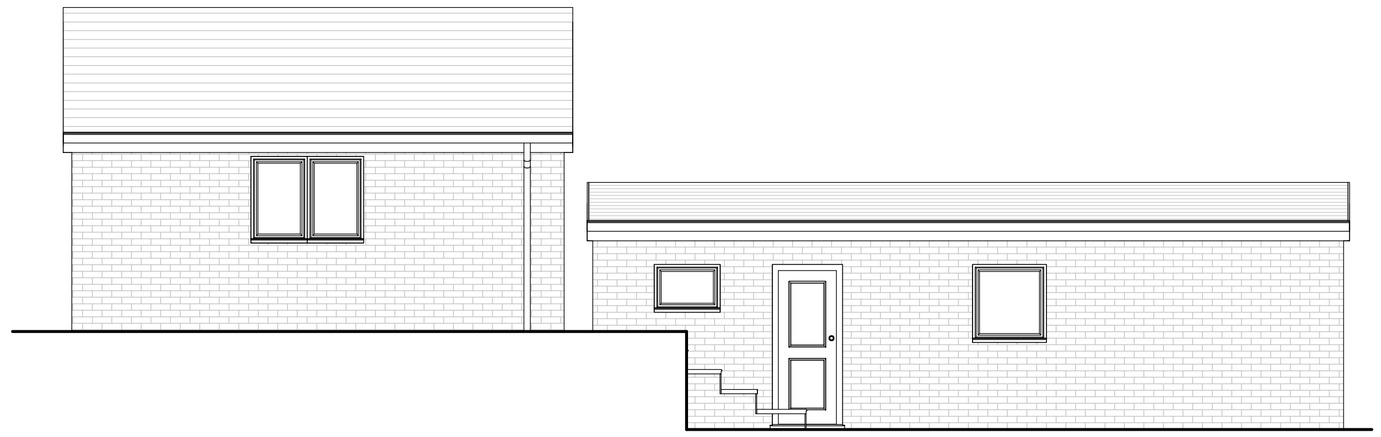
Ground Floor



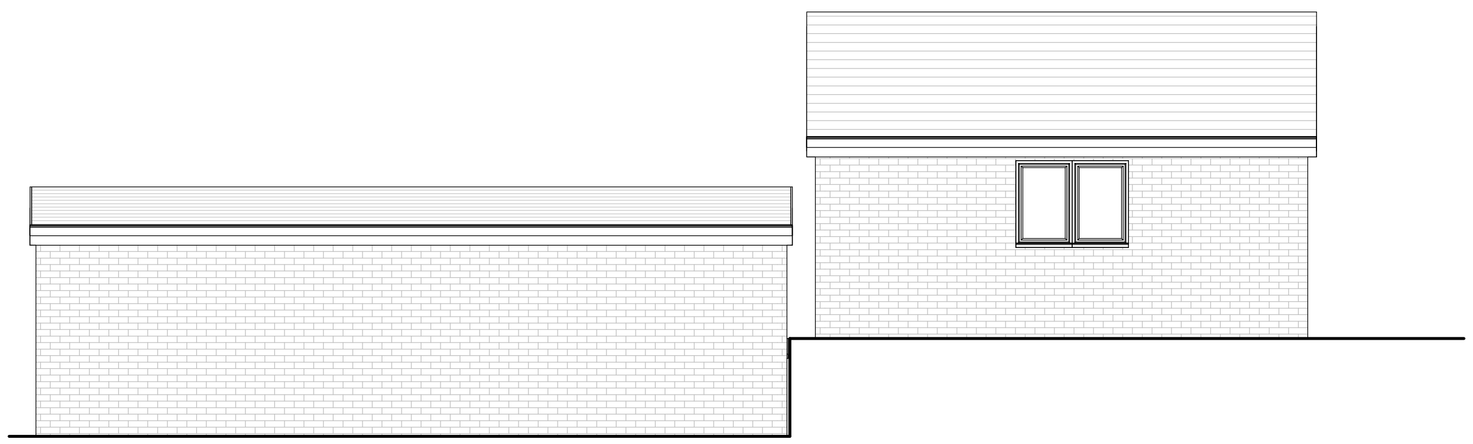


Front Elevation - South

Rear Elevation - North



Side Elevation - East



Side Elevation - West

Revisions

0.5 0 0.5 1 1.5 2 2.5

SCALE 50 m

1:

Materials

Drawing Number	2019/15	Sheet	1 of 1
Size	A1	Scale	1:50

Project

Existing details
January 2019

Job Title

59 Riverside
Shoreham by Sea
West Sussex
BN43 5RB

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M.J.Humphrey Ltd

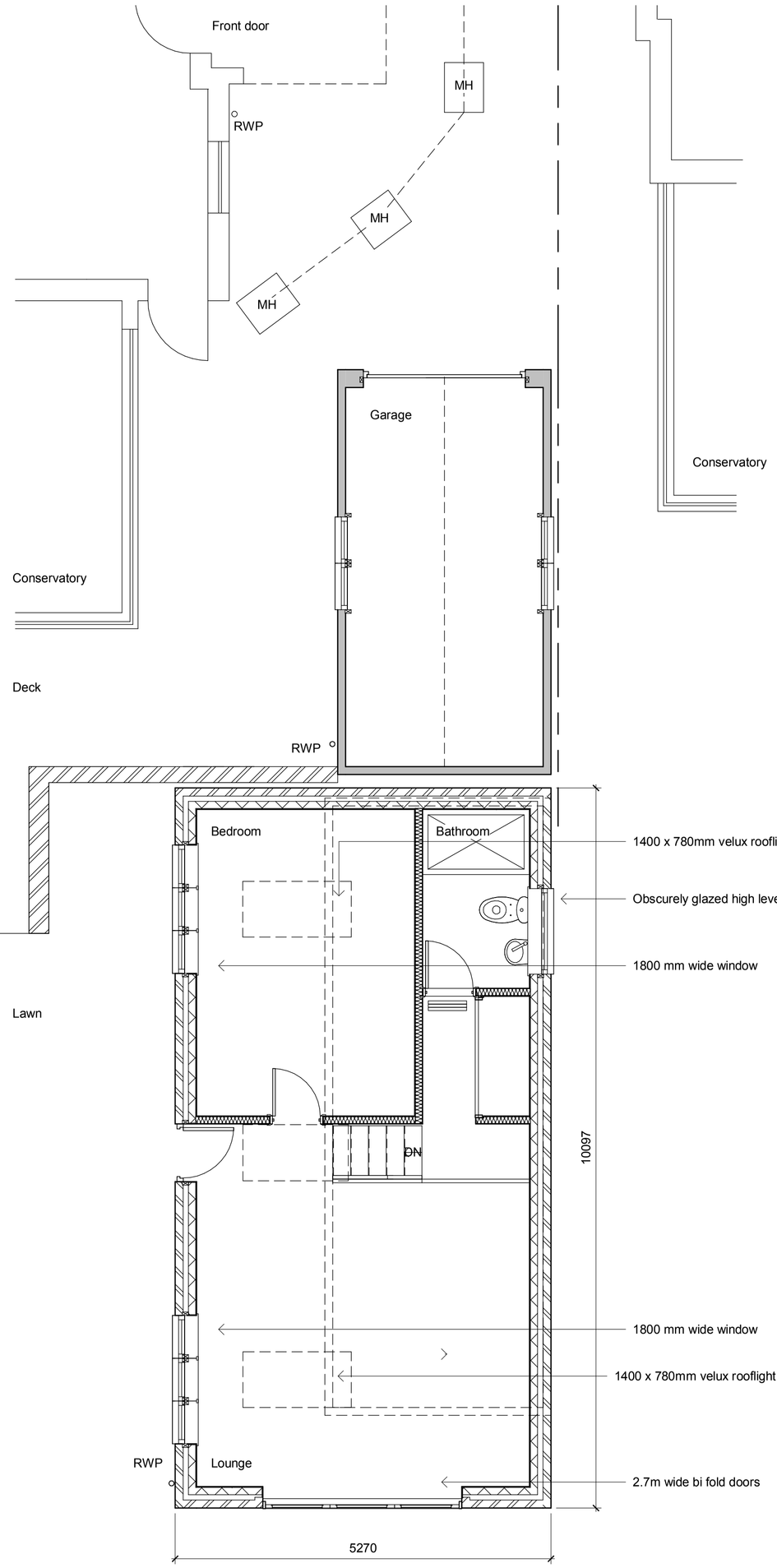
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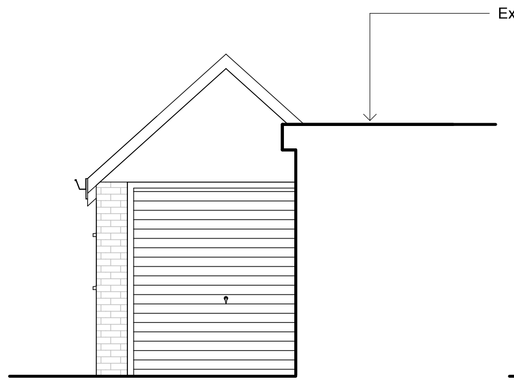
Mel@mjhumphrey.co.uk
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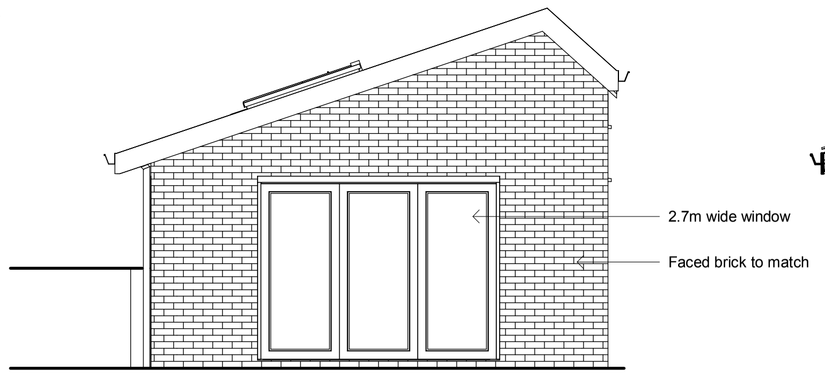
Adam@mjhumphrey.co.uk
07812419142



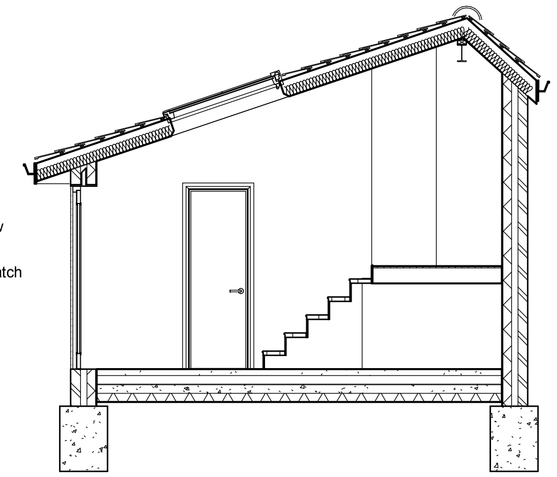
Ground Floor



Front Elevation - South
No Change



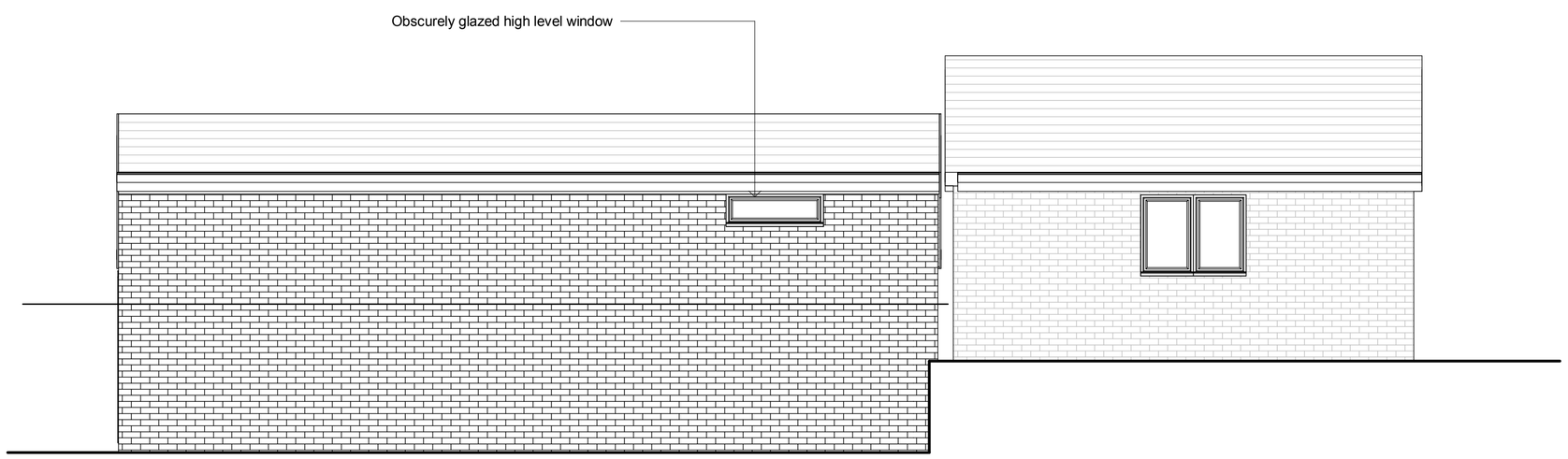
Rear Elevation - North



Section Through



Side Elevation - East



Side Elevation - West

Revisions

0.5 0 0.5 1 1.5 2 2.5
SCALE 50 m
1:

1 0 1 2 3 4 5
SCALE 100 m
1:

Materials

Walls - Faced brick work to match existing

Doors and windows - to be white alluminium PVC coated

Roof tiles - Plain tiles to match suitable for shallow pitch

Velux rooflights

Drawing Number	2019/15	Sheet	1 of 1
Size	A1	Scale	1:50, 1:100

Project

Proposed details
October 2019

Job Title

59 Riverside
Shoreham by Sea
West Sussex
BN43 5RB

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Adam Humphrey
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Emsworth
Hampshire
PO10 7SY

Adam@mjhumphrey.co.uk
07812419142

Our ref: HA/2019/121382/01-L01
Your ref: AWDM/0899/19

Date: 24 June 2019

Adur & Worthing Councils
Development Control
Portland House Richmond Road
Worthing
West Sussex
BN11 1LF

Dear Sir/Madam

DEMOLITION OF EXISTING BOATHOUSE AND ERECTION OF 2 STOREY GARDEN ANNEX BUILDING 59 RIVERSIDE ROAD, SHOREHAM-BY-SEA, WEST SUSSEX, BN43 5RB

Thank you for the consultation on the above application, please quote our reference on all correspondence.

We have reviewed the information as submitted and have the following comments.

Environment Agency Position
The Environment Agency requests that the following condition be attached to any planning permission granted, and that the details in relation to these condition be submitted and approved by the Local Planning Authority.The proposed development will only meet the National Planning Policy Framework's requirements if the following planning condition is included.

Condition

The development shall be carried out in accordance with the submitted flood risk assessment (submitted August 2018 by UNDA Consulting Ltd.) and the following mitigation measures it details:

- Finished floor levels shall be set no lower than 300mm above external ground levels
- Flood resistant design measures shall be implemented as set out in section 6.3 of the Flood Risk Assessment

These mitigation measures shall be fully implemented prior to occupation and subsequently in accordance with the scheme's timing/phasing arrangements. The measures detailed above shall be retained and maintained thereafter throughout the

lifetime of the development.

Reason
To reduce the risk of flooding to the proposed development and future occupants.

Advice to applicant
Although the Environmental Permitting (England and Wales) Regulations 2016 require a permit to be obtained for any activities which will take place within 16 meters of a tidal river and/or 16 meters of a tidal flood defence structure, we acknowledge through the submitted details that the works being carried out will be within the perimeters of the existing property, thus will not obstruct any access routes nor disrupt the Adur Tidal Wall.

Therefore, we **do not** require the applicant to obtain a Flood Risk Activity Permit on this occasion.

Advice to LPA
We do not normally comment on or approve the adequacy of flood emergency response procedures accompanying development proposals, as we do not carry out these roles during a flood. Our involvement with this development during an emergency will be limited to delivering flood warnings to occupants/users covered by our flood warning network.

The planning practice guidance to the National Planning Policy Framework states that, in determining whether a development is safe, the ability of residents and users to safely access and exit a building during a design flood and to evacuate before an extreme flood needs to be considered. One of the key considerations to ensure that any new development is safe is whether adequate flood warnings would be available to people using the development.

In all circumstances where warning and emergency response is fundamental to managing flood risk, we advise local planning authorities to formally consider the emergency planning and rescue implications of new development in making their decisions. As such, we recommend you consult with your emergency planners and the emergency services to determine whether the proposals are safe in accordance with the guiding principles of the Planning Practice Guidance (PPG).

Please do not hesitate to contact me on the number below should you have any queries on the above information.

Yours faithfully

Mrs Sophie Brown
Sustainable Places Planning Advisor

Direct dial 02030 257250
Direct e-mail planningSSD@environment-agency.gov.uk

End

Jackie Stone
UNDA
Southpoint
Old Brighton Road South
Gatwick
RH11 0PR

Our ref: SSD156270
Date: 22/01/2020

Dear Jackie Stone,

Enquiry Regarding Product 4 for Flood Risk Assessment for 59 Riverside Road Shoreham-by-sea, West Sussex, BN43 5RB.

Thank you for your enquiry which was received on 08 January 2020.

We respond to requests under the Freedom of Information Act 2000 and Environmental Information Regulations 2004. The information is attached.

The information on Flood Zones in the area relating to this address is as follows:

The site is in an area located within Flood Zone 1, 2 & 3 as shown on our Flood Map for Planning (Rivers and Sea).

Note - This information relates to the area that the above named property is in and is not specific to the property itself as it is influenced by factors such as the height of door steps, air bricks or the height of surrounding walls. We do not have access to this information and is not currently used in our flood modelling.

Flood Zone definitions can be found at www.gov.uk/guidance/flood-risk-and-coastal-change#Table-1-Flood-Zones

Flood Defences
Flood defences in this area have been upgraded as part of the Shoreham Adur Tidal Walls scheme. For more information please visit https://www.gov.uk/government/publications/shoreham-adur-tidal-walls-scheme/shoreham-adur-tidal-walls-scheme

Model Information
The model used was the Arun to Adur Coastal Modelling which was completed by JBA Consulting in 2012. The defended scenarios were taken from the 2018 Adur Tidal Walls Scheme modelling update.

Flood History
We hold no record of previous flooding events affecting this site.

Please note our records are not comprehensive and may not include all events. I recommend contacting the Lead Local Flood Authority, **West Sussex County**

Council or the Local Authority, **Adur And Worthing District Councils** for a more comprehensive flood history check.

FRA advisory text

Name	Product 4
Description	Detailed Flood Risk Assessment Map for **59 Riverside Road Shoreham-by-sea, West Sussex, BN43 5RB.**
Licence	Open Government Licence
Information Warnings	The flood risk data provided is based on existing EA hydraulic models for existing 0.5% annual probability events with an allowance for climate change. Please note the climate change allowances provided are not up to date. These were updated on 17 December 2019. You should refer to 'Flood risk assessments: climate change allowances' for the most up to date allowances. You will need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.
Information Warning - OS background mapping	*The mapping of features provided as a background in this product is © Ordnance Survey. It is provided to give context to this product. The Open Government Licence does not apply to this background mapping. You are granted a non-exclusive, royalty free, revocable licence solely to view the Licensed Data for non-commercial purposes for the period during which the Environment Agency makes it available. You are not permitted to copy, sub-license, distribute, sell or otherwise make available the Licensed Data to third parties in any form. Third party rights to enforce the terms of this licence shall be reserved to OS.*
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2020 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

- Flood Map For Planning (Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences)
- Risk of Flooding from Rivers and Sea
- Historic Flood Map
- Current Flood Warnings

Please get in touch if you have any further queries or contact us within two months if you'd like us to review the information we have sent.

Yours sincerely,

Tom Lamboo
FCRM Officer, Partnership & Strategic Overview West Sussex, Solent and South Downs
Environment Agency, Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD

FRA Site Boundary & Node Points. Centred BN43 5RB. Created 22/01/2020.



Environment Agency

N

Legend

- Site_Nodes
- Site_Boundary

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:1,000

0 0.0225 0.045

Kilometers

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Contact us: National Customer Contact Centre, PO Box 544, Rotherham, S60 1BY. Tel: 03708 506 506. Email:enquiries@environment-agency.gov.uk

Product 4 Flood Risk Data Requested by: UNDA

Site: 59 Riverside Road, Shoreham-by-sea, West Sussex, BN43 5RB

Table 1: Water Levels: Tidal Undefended

	NGR		Modelled Flood Levels in Metres AOD Undefended Annual Exceedance Probability			
Node Ref	Eastings	Northings	0.5%	0.5% (2070) *	0.5% (2115) *	0.1%
1	522124	104871	4.25	4.79	5.39	4.48
2	522126	104849	-	4.79	5.39	-

Table 2: Water Levels: Tidal Defended

	NGR		Modelled Flood Levels in Metres AOD Defended Annual Exceedance Probability		
Node Ref	Eastings	Northings	0.5%	0.5% (2067) *	0.5% (2117) *
1	522124	104871	-	-	-
2	522126	104849	-	-	-

Table 3: Water Depths: Tidal Undefended

	NGR		Modelled Flood Depths in Metres Undefended Annual Exceedance Probability			
Node Ref	Eastings	Northings	0.5%	0.5% (2070) *	0.5% (2115) *	0.1%
1	522124	104871	0.71	1.25	1.85	0.94
2	522126	104849	-	0.23	0.83	-

Table 4: Water Depths: Tidal Defended

	NGR		Modelled Flood Depths in Metres Defended Annual Exceedance Probability		
Node Ref	Eastings	Northings	0.5%	0.5% (2067) *	0.5% (2117) *
1	522124	104871	-	-	-
2	522126	104849	-	-	-

All levels taken from: Adur Coastal Modelling (2012) with updated Adur Tidal Wall Scheme Modelling (2018)

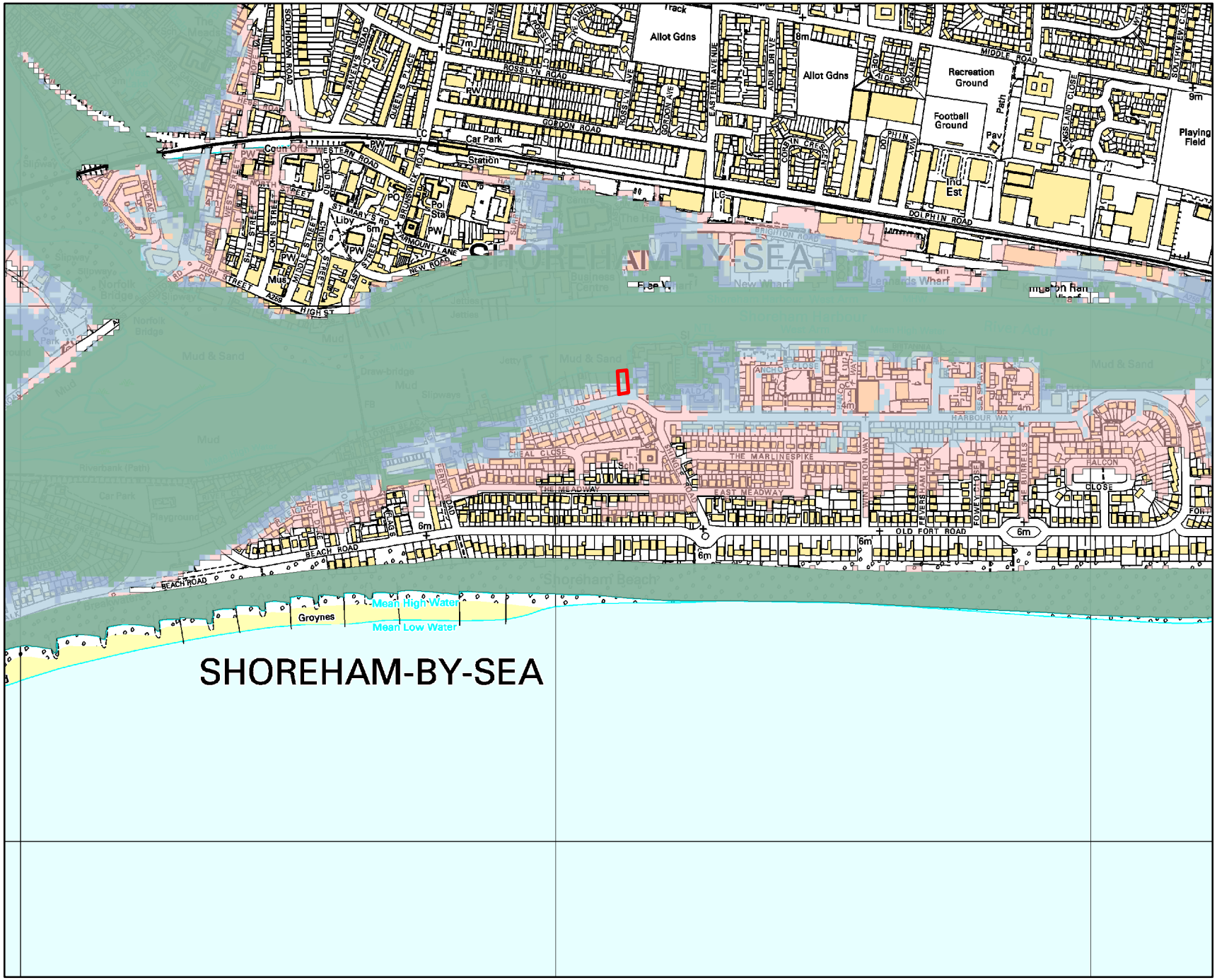
Produced on: 22/01/2020

***The flood risk data provided is based on existing EA hydraulic models for existing 0.5% annual probability events with an allowance for climate change. Please note the climate change allowances provided are not up to date. These were updated on 17 December 2019.**
You should refer to 'Flood risk assessments: climate change allowances' for the most up to date allowances. You will need to undertake further assessment of future flood risk using different allowances to ensure your assessment of future flood risk is based on best available evidence.

There is no additional information or health warnings for these levels/depths or the model from which they have been produced.

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Modelled Flood Outlines (Undefended Tidal). Centred BN43 5RB. Created 22/01/2020.



Environment Agency

N

Legend

- Site_Boundary
- 0.5% AEP (2012) (Undefended)
- 0.5% AEP (2070) (Undefended)
- 0.5% AEP (2115) (Undefended)
- 0.1% AEP (2012) (Undefended)

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

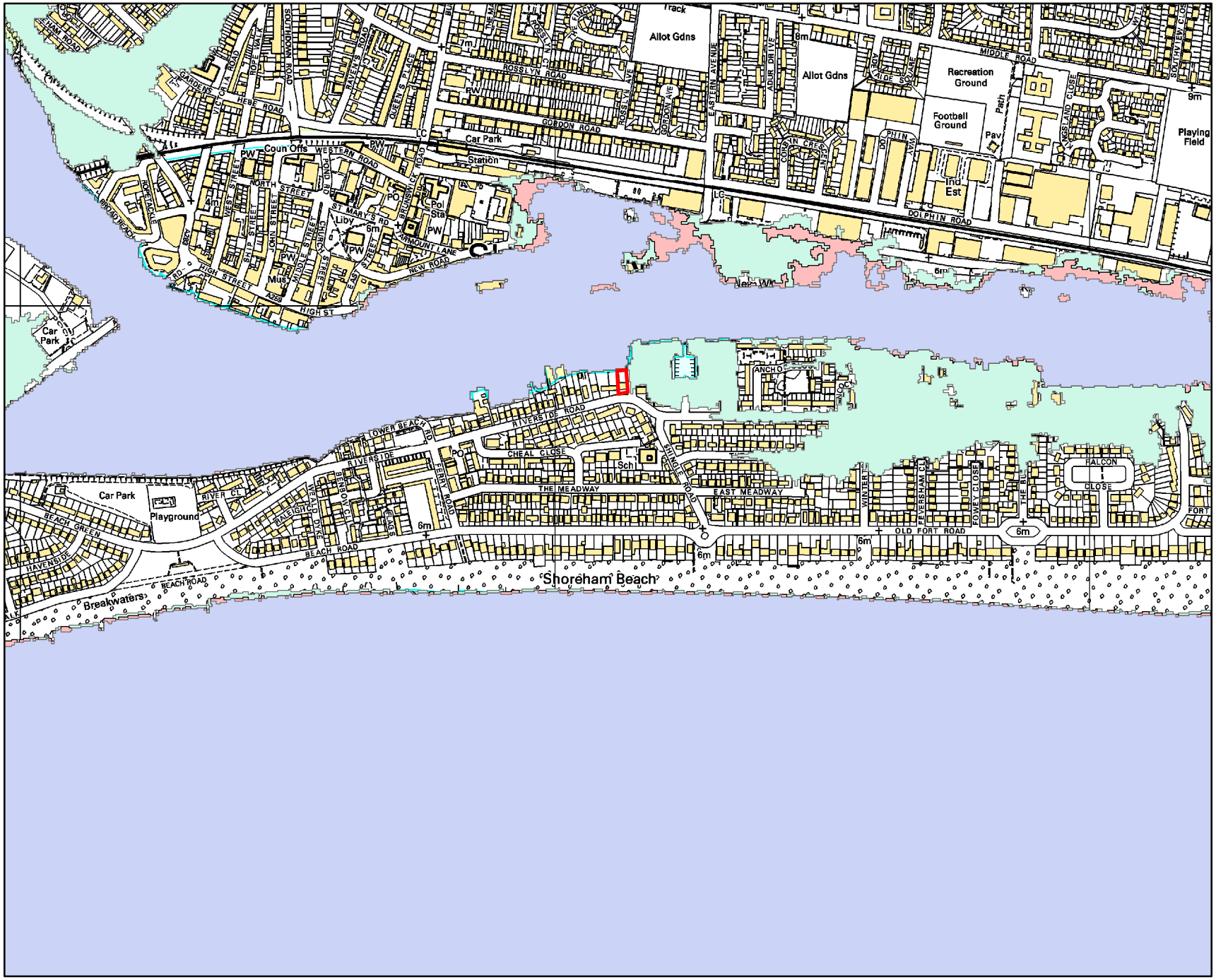
Scale: 1:10,000

0 0.225 0.45

Kilometers

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Modelled Flood Outlines (Defended Tidal). Centred BN43 5RB. Created 22/01/2020.



Legend

- Site_Boundary
- 0.5% AEP (2017) (Defended)
- 0.5% AEP + CC (2067) (Defended)
- 0.5% AEP + CC (2117) (Defended)

N

Annual Exceedance Probability (AEP) The probability of a flood of a particular magnitude, or greater occurring in any given year.

Scale: 1:10,000

0 0.225 0.45
Kilometers

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