# Flood Risk Assessment for Planning

**Prepared for:**
Caldotec Ltd

**Location:**
Dormy Cottage
Rope Walk
Littlehampton
West Sussex
BN17 5DE

**September 2016**

**Our reference:**
FRA86591-Caldotec-RopeWalk



The Studio, Lime Tree Cottage, Oldlands Avenue, Balcombe, West Sussex, RH17 6LS

# Document Issue Record

| | |
|---|---|
| Project: | Flood Risk Assessment for Planning |
| Client: | Caldotec Ltd |
| Location: | Dormy Cottage, Rope Walk, Littlehampton, West Sussex, BN17 5DE |
| Application: | Construction of a detached, single storey self-contained annexe |
| Our reference: | FRA86591-Caldotec-RopeWalk |
| Version: | Draft v1.0 090916 |

| | |
|---|---|
| Lead Consultant: | Ms Jackie Stone |
| Authorisation: | Mr Edward Bouët |

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The Studio, Lime Tree Cottage, Oldlands Avenue, Balcombe, West Sussex, RH17 6LS

[redacted]



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# 1. Key Facts

## Flood Risk Posed:

- Site located in EA Flood Zone 3 (High Risk).
- Tidal flood risk originating from the River Arun and Rope Walk Ditch.
- Site below modelled 1:200 year and 1:1000 year tidal flood levels (defended and undefended).
- Risk of pluvial flooding would appear to be very low.
- Risk of groundwater and sewer surcharge flooding would appear to be low.

## Flood Risk Management:

- The applicant has agreed to set the internal ground floor level 300mm above site levels - at 2.87mAOD (which is 0.37m above the defended present day 1:200 year flood level, and 0.26m above the defended present day 1:1000 year flood level).
- Flood proofing of the building will be incorporated as appropriate.
- A flood warning and evacuation plan will be implemented post development.
- The applicant will register with the Environment Agency Floodline Warnings Direct service.
- 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).

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 Caldotec Ltd (hereinafter referred to as "the applicant") to undertake a Site Specific Flood Risk Assessment (FRA) for Planning at Dormy Cottage, Rope Walk, Littlehampton, West Sussex, BN17 5DE (hereinafter referred to as "the site"). The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance.

The site appears to be located within Flood Zone 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.

Given that the proposed application site is located within Flood Zone 3 (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.



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# 3. Existing Situation

## 3.1. Site Usage:

The site is occupied by an existing residential cottage and outbuilding/garage.

## 3.2. Topography:

The site is crossed by the Rope Walk Ditch, which also borders Dormy Cottage to the south. To the north of the site is the River Arun, with the closest Mean High Water approximately 5m to the north of the site.

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 our 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. 2.0m horizontal resolution DTM LiDAR data has been used for the purposes of this study.

2m LiDAR remotely sensed digital elevation data suggests that the ground topography on site in the area of the proposed annexe ranges from approximately 2.31mAOD to 2.57mAOD.



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



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## 3.3. Geology and Soil:

The British Geological Survey (BGS) Map indicates that the bedrock underlying the site is Chalk Formation.

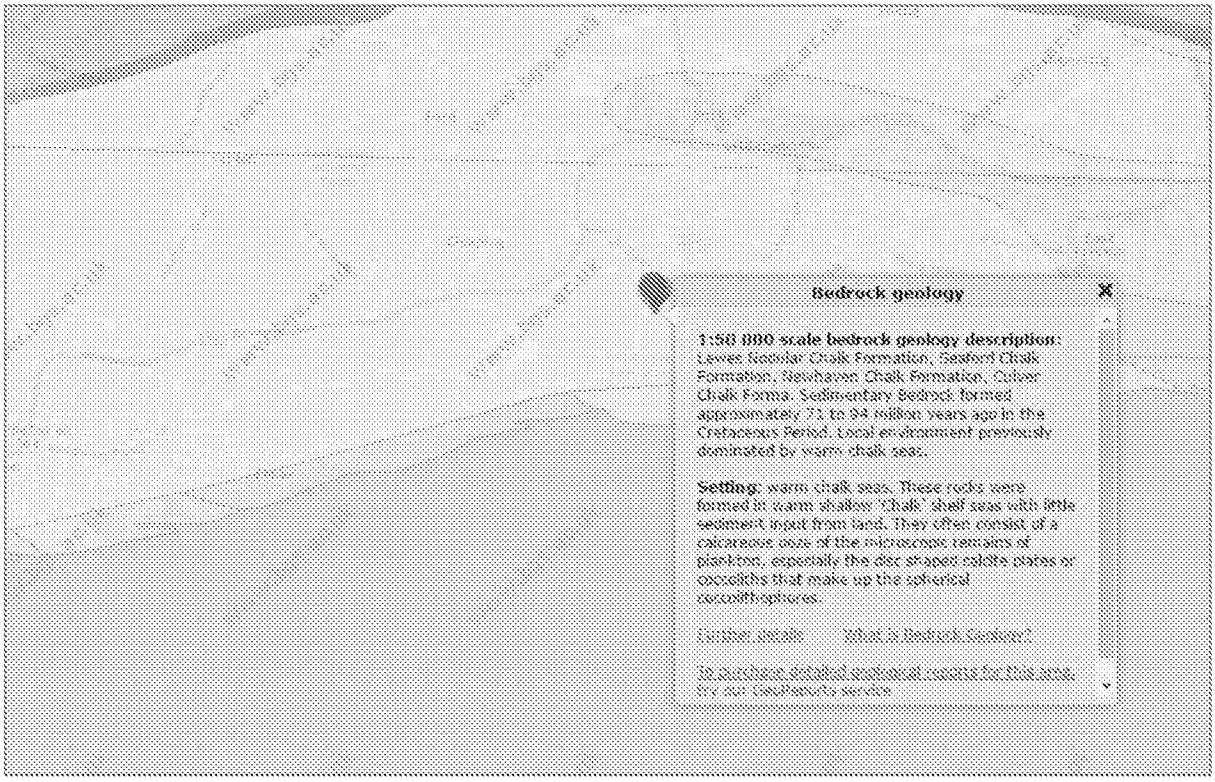


Figure 2: Local geology (Source: BGS)

The soil type in the area taken from the UKSO data is Marine / Estuarine sand and silt. With soil conditions such as these, it would be essential that this value is checked through trial pit infiltration tests on site prior to any final detailed drainage design requiring infiltration is carried out.



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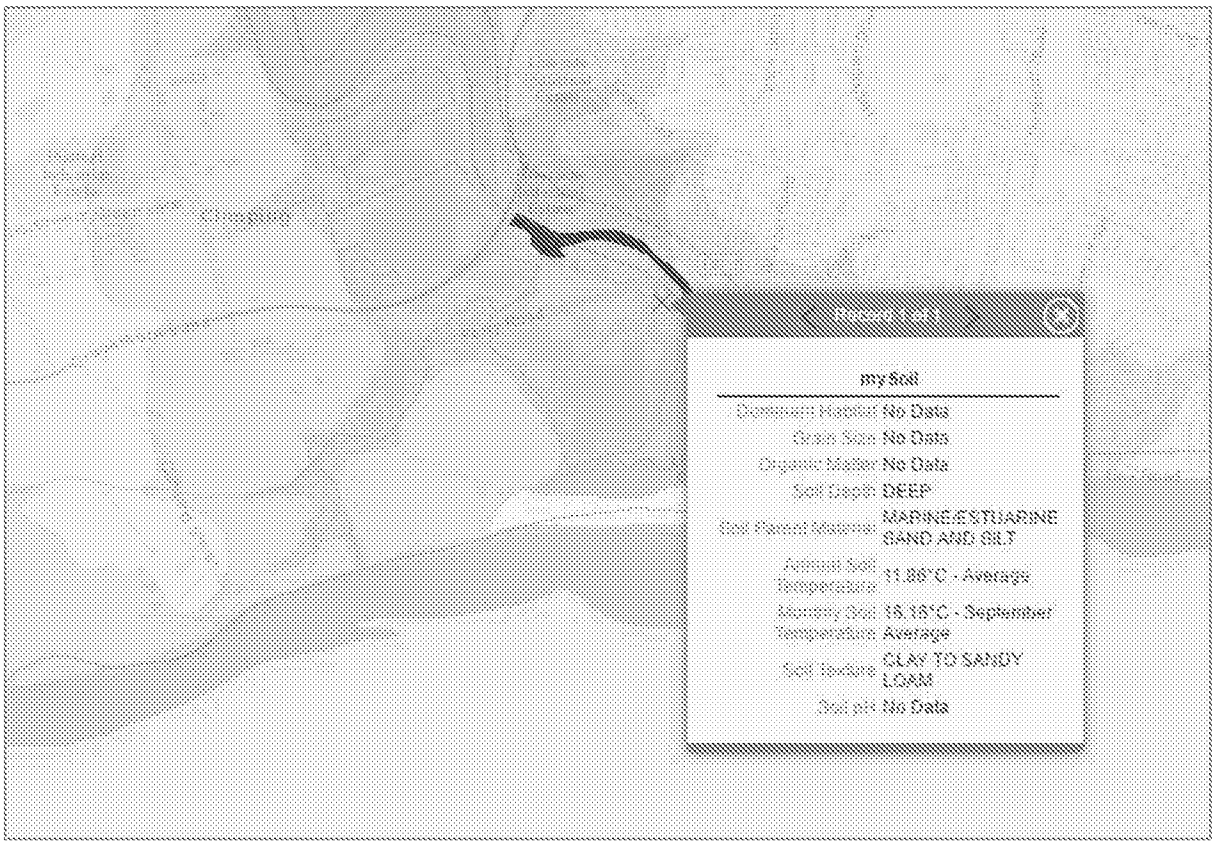


Figure 3: Local soil types (Source: UKSO)

## 3.4. Hydrology:

Greenfield runoff rates have been calculated using The Institute of Hydrology Report 124 Marshall and Bayliss, 1994), as recommended in the SuDs Manual CIRIA (C697). In keeping with standard practice, the calculations are carried out for a 50 hectare site, and the results presented here are factored accordingly for the actual site size (467m$^2$). As per the newly published climate change allowances (February 2016) for anticipated changes in extreme rainfall intensity in small and urban catchments, the upper end (40% increase) peak rainfall intensity allowances should be assessed to understand the range of impact. The increase in peak rainfall intensity has been assessed by increasing the SAAR (Standard average annual rainfall in mm) value in the calculations. Please note that a minimum flow of 5 l/s applies to any site.

| Return period | l/s /50ha | l/s/ha | l/s/ entire site |
|---|---|---|---|
| QBAR | 144.12 | 2.88 | 0.61 |
| 1yr | 122.50 | 2.45 | 0.52 |
| 30yr | 331.47 | 6.63 | 1.41 |
| 100yr | 459.74 | 9.19 | 1.95 |
| 100yr + CC | 681.52 | 13.63 | 2.89 |

Table 1: Greenfield runoff rates



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# 4. Proposed Development

The proposed planning application is for the construction of a detached single storey self-contained annexe.

Detailed proposed site plans are provided in the report Appendix.

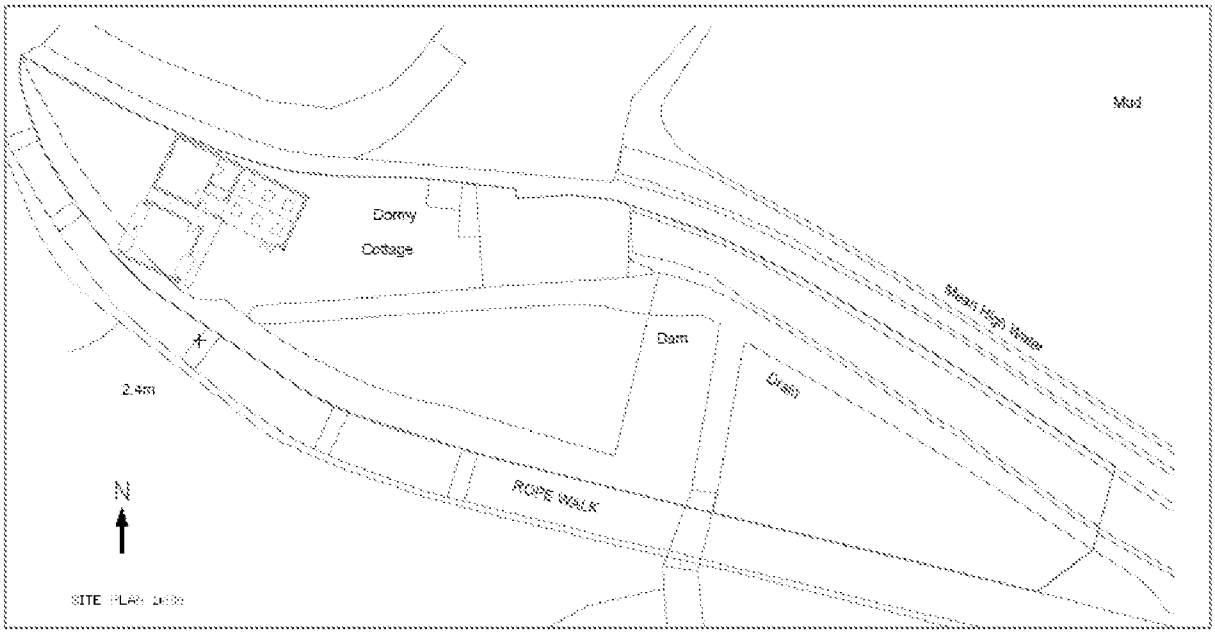


Figure 4: Proposed site layout (Source: Caldotec Ltd)

# 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 2: 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.

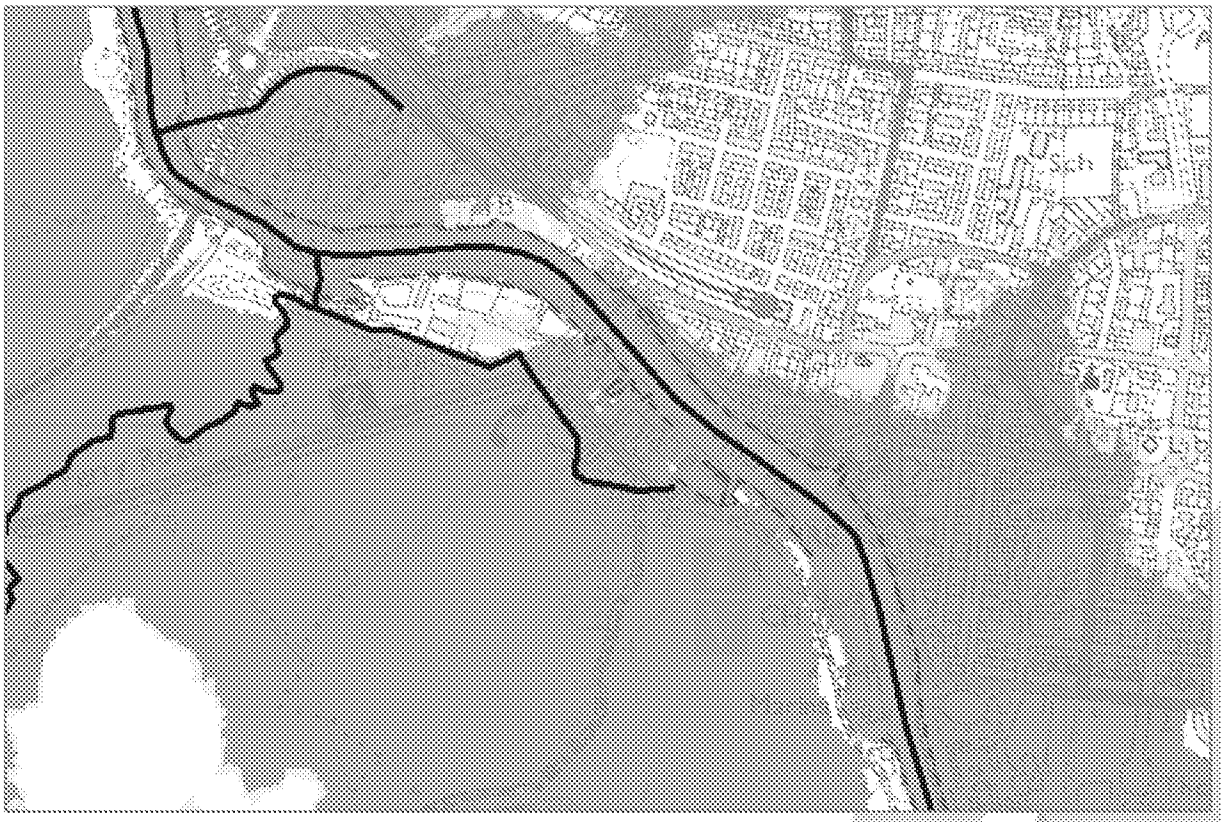

Figure 5: Environment Agency Flood Map for Planning (Rivers and Sea) (Source: EA)



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The site would appear to be located within Flood Zone 3 (High Probability), which means it is defined as land having at least a 1:200 annual probability of tidal flooding.

## 5.2. Tidal (River Arun and Rope Walk Ditch):

The Arun is a river in the English county of West Sussex. Its source is a series of small streams in the St Leonard's Forest area, to the east of Horsham. After flowing through Horsham to the west, it is joined by the North River at Nowhurst. Turning to the south, it is joined by its main tributary, the western River Rother, and continues through Arundel and past Arundel Castle, to join the English Channel at Littlehampton. The Arun local government district in West Sussex is named after it. It is one of the faster flowing rivers in England, and is tidal as far inland as Pallingham Quay, 41km upstream from the sea at Littlehampton.

### 5.2.1. Modelled flood levels and extents:

A Product 4 data request has been made to the EA (reference 20644). The EA has provided both undefended and defended modelled tidal flood levels and extents from the Emsworth to Littlehampton West Bank Coastal Modelling 2016 by JBA Consulting using TUFLOW.

The site is shown to be within the undefended 1:5 year extent, and within the defended 1:200 year extent (both at the present day and with an allowance for climate change).

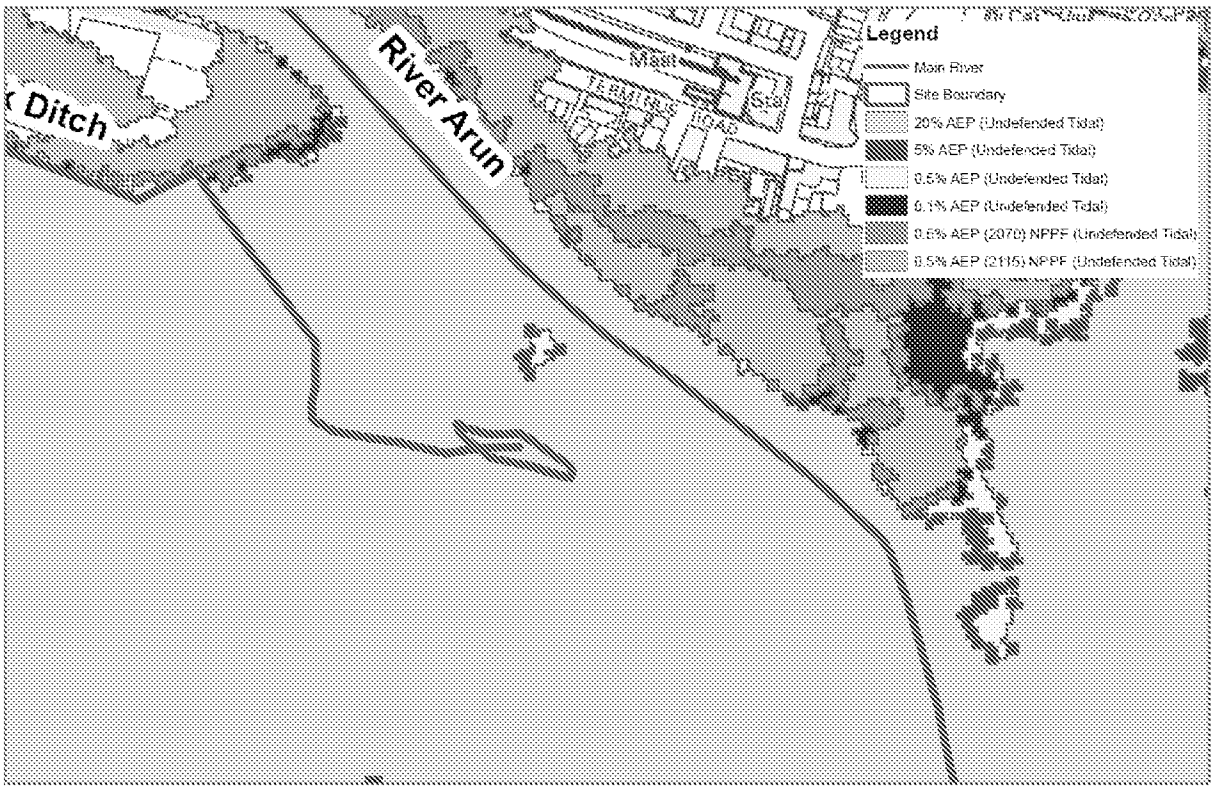


Figure 6: EA Undefended modelled flood outline map (Source: EA)



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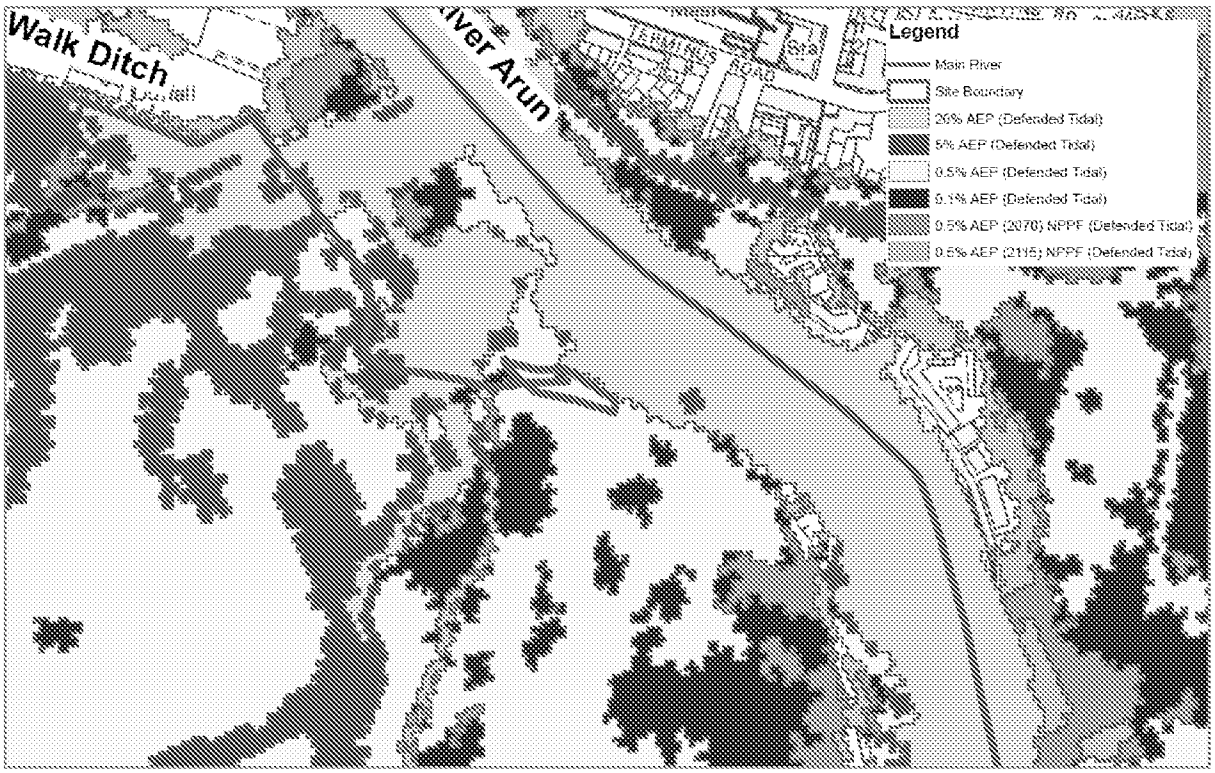


Figure 7: EA Defended modelled flood outline map (Source: EA)

The EA has also provided modelled flood levels at the site from the aforementioned TUFLOW modelling. Undefended 1:200 year and 1:1000 year modelled flood levels of 3.19mAOD and 3.33mAOD have been provided respectively. An undefended 1:200 year level in 2115 (accounting for climate change) of 4.33mAOD has been provided. Comparison with topographic site levels of 2.31mAOD to 2.57mAOD confirm that the site is below all of the undefended modelled flood levels.

Defended modelled flood levels have also been provided by the EA. Defended 1:200 year and 1:1000 year modelled flood levels of 2.50mAOD and 2.61mAOD have been provided respectively. An undefended 1:200 year level in 2115 (accounting for climate change) of 3.65mAOD has been provided. Comparison with topographic site levels of 2.31mAOD to 2.57mAOD confirm that the site is below all of the defended modelled flood levels, and could potentially flood with up to 0.19m of floodwater for the present day 1:200 year event and 0.30m for the present day 1:1000 year event. With climate change the site could flood with up to 1.34m of floodwater for the 1:200 year event (2115).

### 5.2.2. Flood defences:

The EA has confirmed that the eastern side of the site is currently protected by an embankment with a Designed Standard of Protection of 1 in 50. The embankment is in fair condition. The actual downstream crest level is 2.26m and the actual upstream crest level is 3.77m.

### 5.2.3. Residual risk (breach or overtopping of flood defences):

The EA has stated that the eastern part of the site is defended to the 1:50 year standard. The proposed annexe is however located within the western part of the site. The site could be exposed to a higher level of flooding than that predicted from the defended flood modelling provided if the flood defences were to be breached (failure) or overtopped (exceedance).



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Historical flood events:

No records of historical flooding for the site are held by the EA. The Arun District Council SFRA shows a historical record of fluvial flooding on site, in the vicinity of the Rope Walk Ditch.

## 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 avaialble, 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 partially within an area of "Very Low" risk of flooding from surface water.

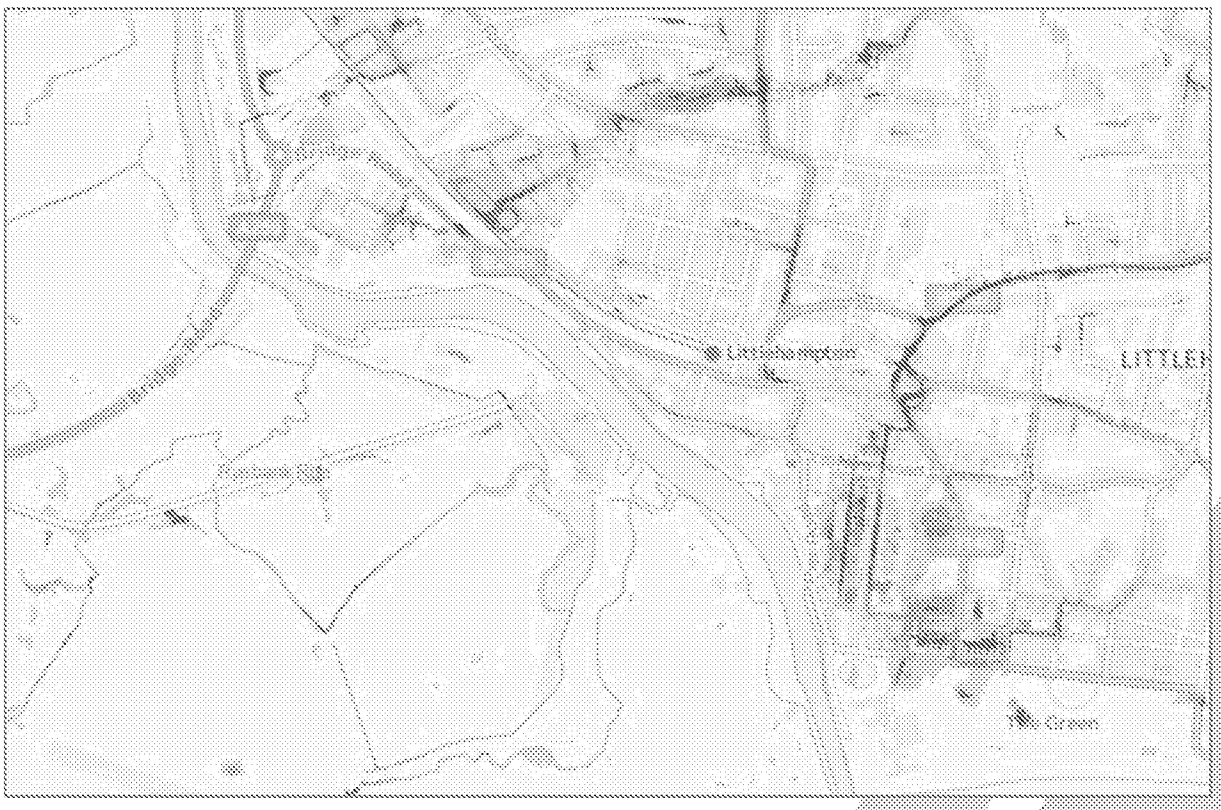


Figure 8: Extract from EA Risk of Flooding from Surface Water Map (Source: EA)



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## 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.

The Arun District Council SFRA shows the site to fall within an area with a greater than 75% likelihood of groundwater flooding. This is based on 250m grid cells, and there is no record of groundwater flooding within the whole Arun District.

No information has been provided to suggest that the site is particularly susceptible to groundwater flooding, or has experienced groundwater flooding previously.

## 5.5. Sewer Surcharge:

Sewer flooding events are usually the result of overloaded sewers following heavy rainfall or blockages caused by misuse of the sewerage system.

No information has been provided to suggest that the site is susceptible to sewer surcharge flooding.

## 5.6. Other Sources:

The site is outside of the maximum inundation extent on the EA Reservoir Inundation Map. The EA also advise on their website that reservoir flooding is extremely unlikely. All major reservoirs have to be inspected by specialist dam and reservoir Engineers. 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 flooding to occur.

There do not appear to be any further artificial (man-made) sources of flood risk (such as raised canals) in the vicinity of the site.




Figure 9: Extract from Environment Agency Risk of Flooding from Reservoirs Map (Source: EA)



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# 6. Flood Risk Management Measures

## 6.1. Vulnerability to flooding:

The NPPF classifies property usage by vulnerability to flooding.

The existing site is occupied by an existing cottage, 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 developer has confirmed that the annex will remain part of the main 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.

## 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.

## 6.3. Physical Design Measures:

The developer has confirmed that the finished floor level of the annexe will be set 300mm above the maximum adjacent ground level. This equates to a finished floor level of 2.87mAOD – which is 0.37m above the defended present day 1:200 year flood level, and 0.26m above the defended present day 1:1000 year flood level.

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

- Solid concrete ground floor, with waterproof membrane;
- 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.



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## 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. The site is located entirely within Flood Zone 3, and while the development is for a self-contained annexe, the developer has confirmed that the annex will remain part of the main property, and will not be able to be sold or rented as a separate dwelling for the lifetime of the development..

The site and wider area are within the defended and undefended modelled 1:200 year flood extents with an allowance for climate change (2115). Under the definitions of the NPPF there is no safe escape route from the site during this flood event.

As such, safe escape will be provided by a flood warning and evacuation plan, that will be prepared in liaison with the Emergency Planners and tied in with the existing Emergency Plans for the area.

## 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.

To further conform to the EA Standing Advice, the applicant has agreed to implement a flood warning and evacuation plan post development, and subscribe to the EA's flood warning service.

The site lies within an Environment Agency Flood Warning Area. The EA issue flood warnings to specific areas when flooding is expected. It is recommended that the applicant registers online with the free Environment Agency Floodline Warnings Direct service at https://fwd.environment-agency.gov.uk/app/olr/register to receive flood warnings by phone, text or email.



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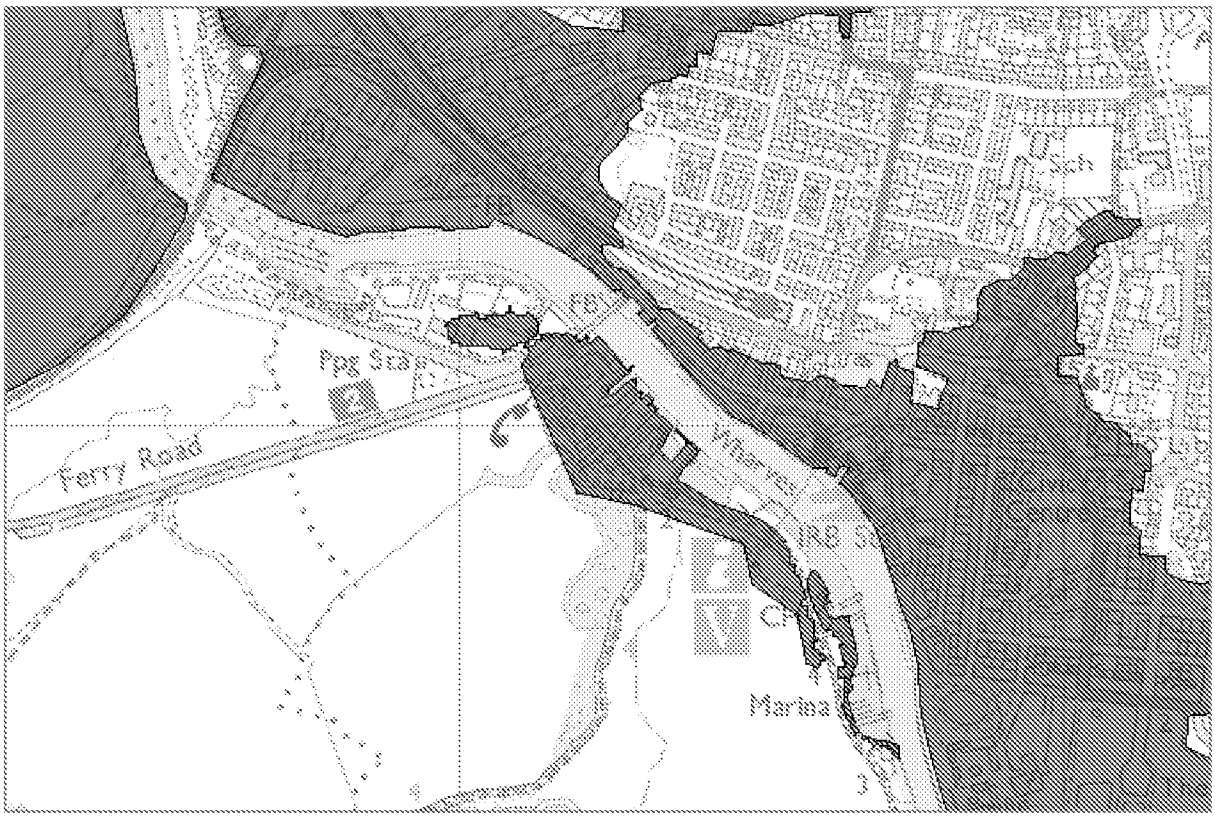


Figure 10: Extract from Environment Agency Flood Warning Area Map (Source: EA)



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

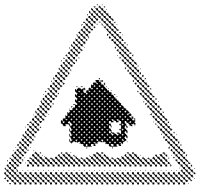
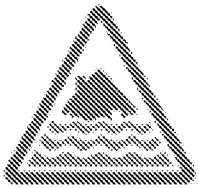
| Flood Warning | Flood Alert | Flood Warning | Severe Flood Warning |
|---|---|---|---|
| |  |  |  |
| What it means? | Flooding is possible.<br><br>Be prepared. | Flooding is expected.<br><br>Immediate action required. | Severe flooding.<br><br>Danger to life. |
| When it's used? | Two hours to two 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.<br><br>Prepare a flood kit of essential items.<br><br>Monitor local water levels and the flood forecast on our website. | Move family, pets and valuables to a safe place.<br><br>Turn off gas, electricity and water supplies if safe to do so.<br><br>Put flood protection equipment in place. | Stay in a safe place with a means of escape.<br><br>Be ready should you need to evacuate from your home.<br><br>Co-operate with the emergency services.<br><br>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.



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- 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.

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 an area at predominantly tidal flood risk.

### 6.6.2. Surface Water Drainage Strategy:

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;



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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.

# 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 in Flood Zone 1 when using the Environment Agency Flood Map for Planning (Rivers and Sea). Post development, the site will become "more vulnerable", as the application is for the construction of a residential properties.

| 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 Zone 3, subject to implementation of the Exception Test.

# 8. Conclusion

Unda Consulting Limited have been appointed by Caldotec Ltd to undertake a Site Specific Flood Risk Assessment (FRA) for Planning on Dormy Cottage, Rope Walk, Littlehampton, West Sussex, BN17 5DE. The FRA has been undertaken in accordance with the National Planning Policy Framework (NPPF) March 2012 and the associated technical guidance.

The proposed planning application is for the construction of a detached single storey self-contained annexe. The developer has confirmed that the annex will remain part of the main property, and will not be able to be sold or rented as a separate dwelling for the lifetime of the development.

The site is located within Flood Zone 3 as defined by the Environment Agency (EA) on their Flood Map for Planning. A Product 4 data request has been made to the EA (reference 20644). The EA has provided both undefended and defended modelled tidal flood levels and extents from the Emsworth to Littlehampton West Bank Coastal Modelling 2016 by JBA Consulting using TUFLOW. The site is shown to be within the undefended 1:5 year extent, and within the defended 1:200 year extent (both at the present day and with an allowance for climate change).

The EA has also provided modelled flood levels at the site from the aforementioned TUFLOW modelling. Comparison of undefended 1:200 year and 1:1000 year flood levels with topographic site levels confirm that the site is below all of the undefended modelled flood levels.

Defended modelled flood levels have also been provided by the EA. Comparison of defended 1:200 year and 1:1000 year flood levels with topographic site levels confirms that the site is below all of the defended modelled flood levels, and could potentially flood with up to 0.19m of floodwater for the present day 1:200 year event and 0.30m for the present day 1:1000 year event. With climate change the site could flood with up to 1.34m of floodwater for the 1:200 year event (2115).

The developer has confirmed that the finished floor level of the annexe will be set 300mm above the maximum adjacent ground level. This equates to a finished floor level of 2.87mAOD – which is 0.37m above the defended present day 1:200 year flood level, and 0.26m above the defended present day 1:1000 year flood level.

Safe escape will be provided by a flood warning and evacuation plan, that will be prepared in liaison with the Emergency Planners and tied in with the existing Emergency Plans for the area

In summary:

- EA Flood Zone 3 (High Risk).
- Tidal risk from the River Arun and Rope Walk ditch.
- Risk of pluvial flooding would appear to be very low.
- Risk of groundwater and sewer surcharge flooding would appear to be low.
- The applicant has agreed to set the internal ground floor level 300mm above site levels - at 2.87mAOD (which is 0.37m above the defended present day 1:200 year flood level, and 0.26m above the defended present day 1:1000 year flood level).
- Flood proofing of the building will be incorporated as appropriate.
- A flood warning and evacuation plan will be implemented post development.
- The applicant will register with the Environment Agency Floodline Warnings Direct service.
- 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).

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

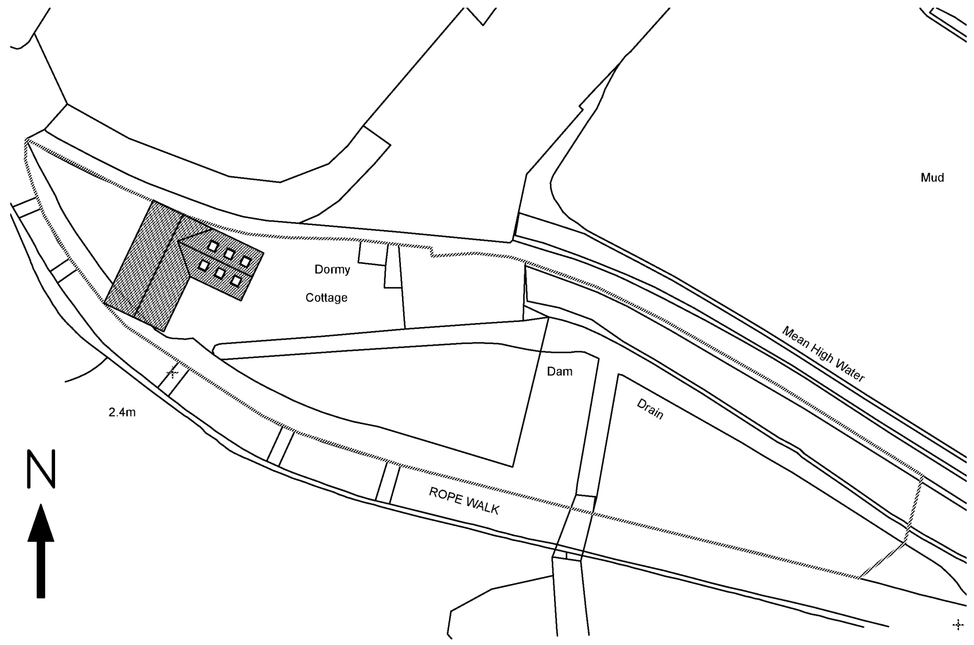


ARUN DISTRICT COUNCIL LU/281/16/HH

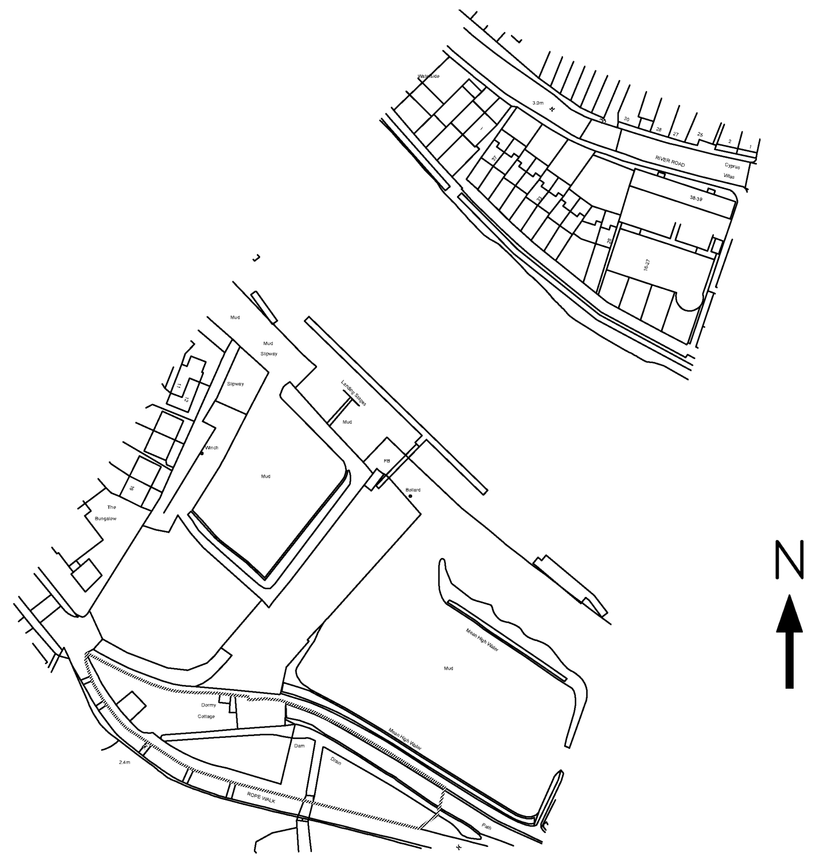
# Appendix

Pages 24-26: Proposed plans;

Pages 27-35: EA Product 4 data.




BLOCK 1:500

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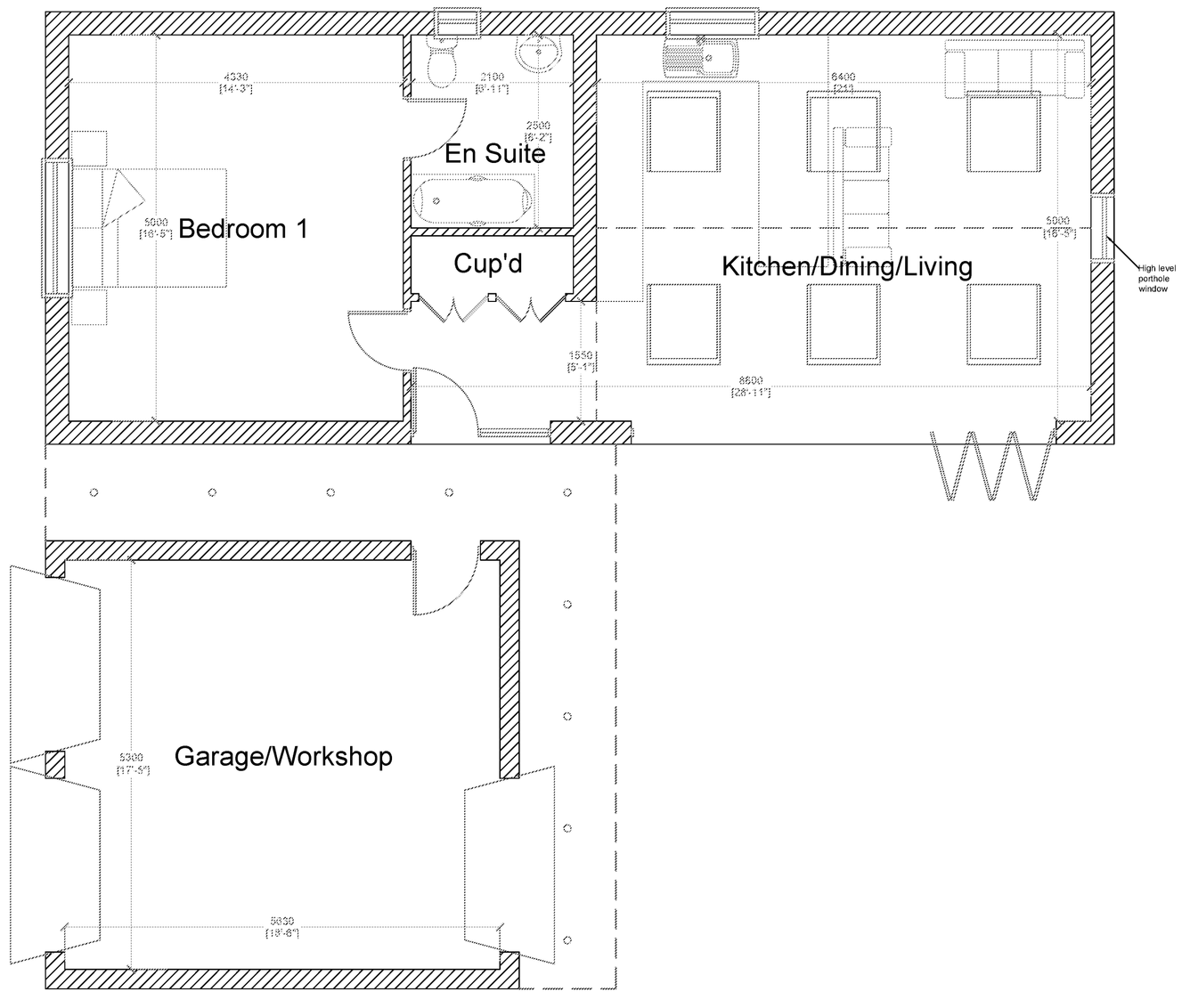
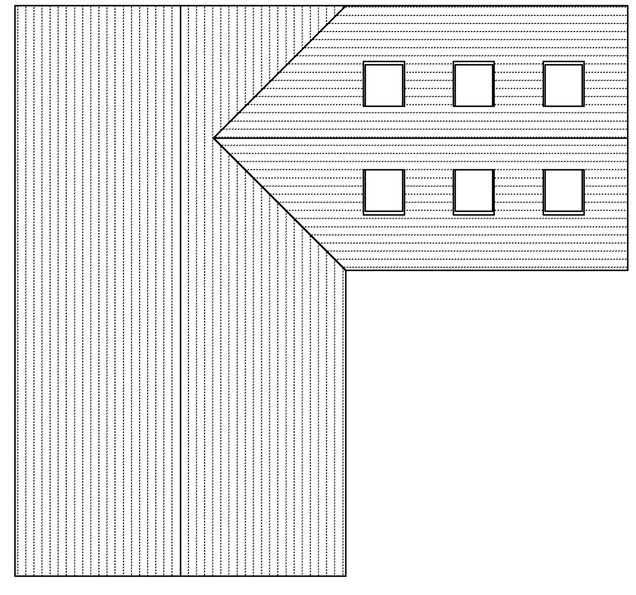
LOCATION 1:1250




PROPOSED FLOOR PLAN 1:50



PROPOSED ROOF PLAN 1:100

All dimensions to be checked on site prior to commencement of work, except for planning purposes.

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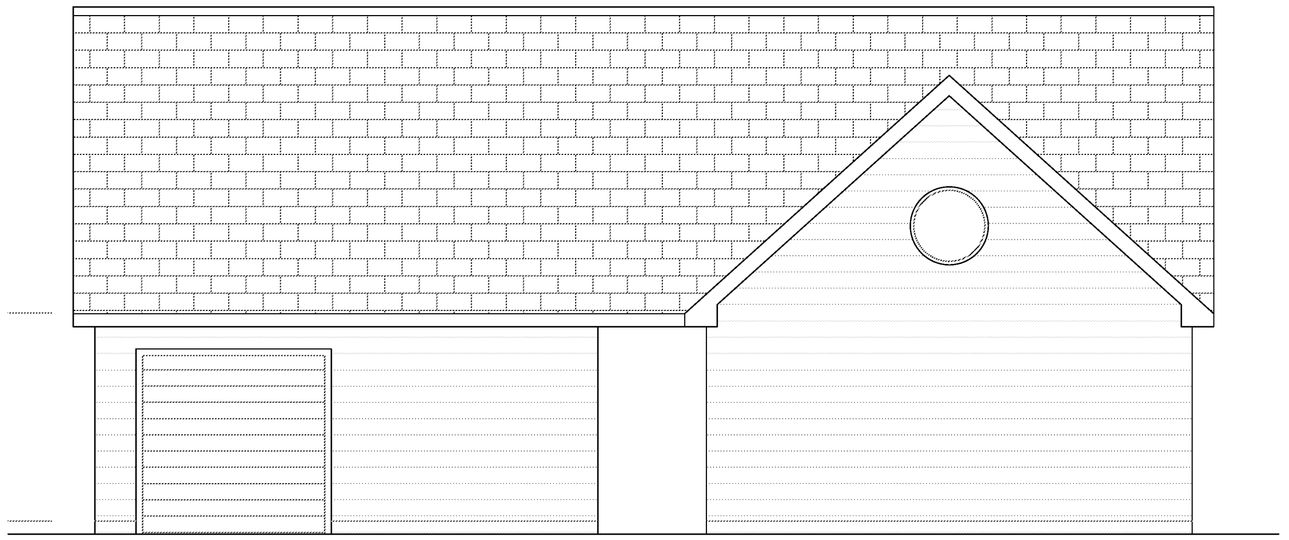
PROPOSED FLOOR PLAN, ROOF PLAN, LOCATION & BLOCK
Dormy Cottage Annexe
Rope Walk
Littlehampton
West Sussex BN17 5DE

CLIENT Ms S Maddox

| Issue | Details | Drawn | Check | Date |
|---|---|---|---|---|
| R1 | Porthole window | RM | RM | 08/08/16 |
| | | | | |
| | | | | |

SCALE AS SHOWN on A1
DATE 08/08/16
DRAWING NUMBER 16055/01R1

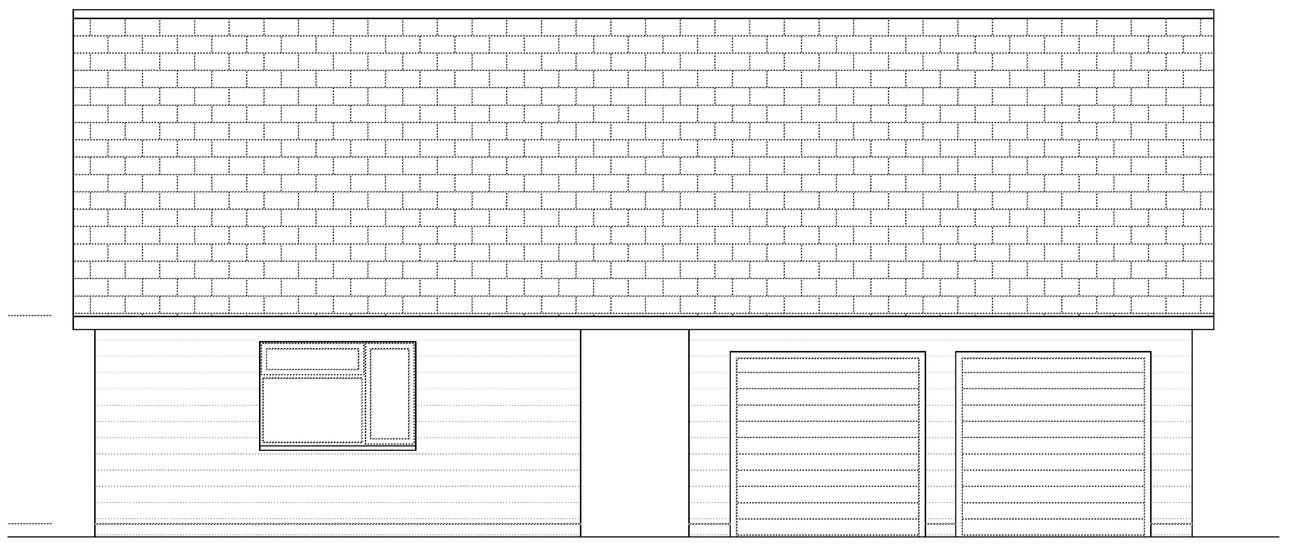


REAR ELEVATION
East

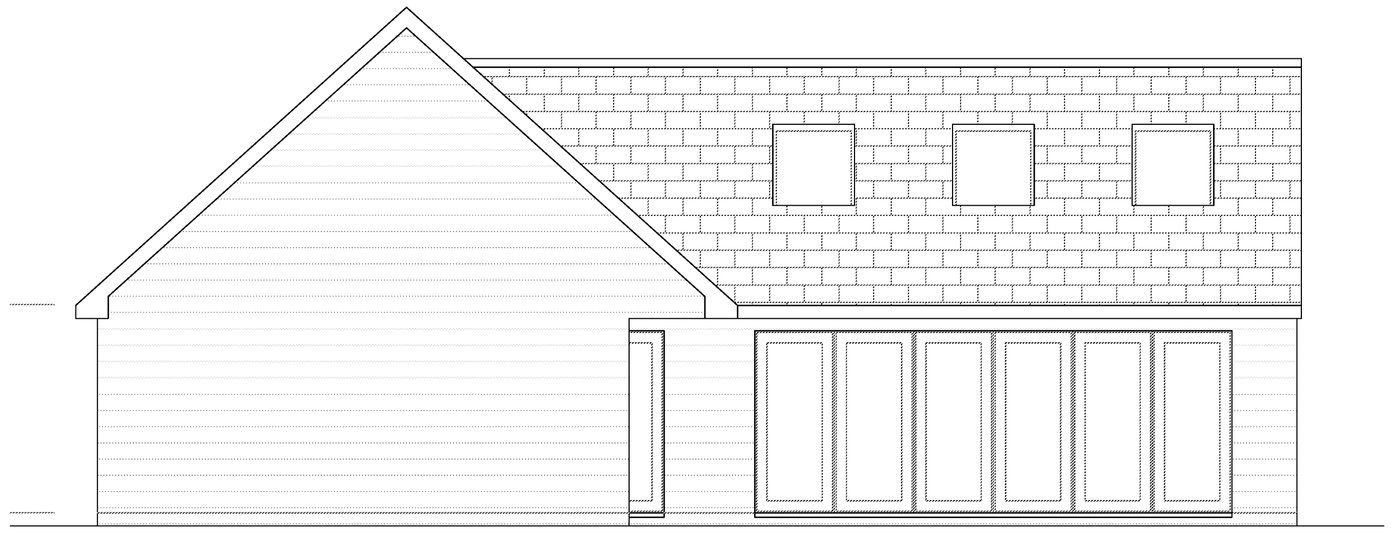


SIDE ELEVATION
North

PROPOSED ELEVATIONS 1:50



FRONT ELEVATION
West



SIDE ELEVATION
South

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PROPOSED ELEVATIONS

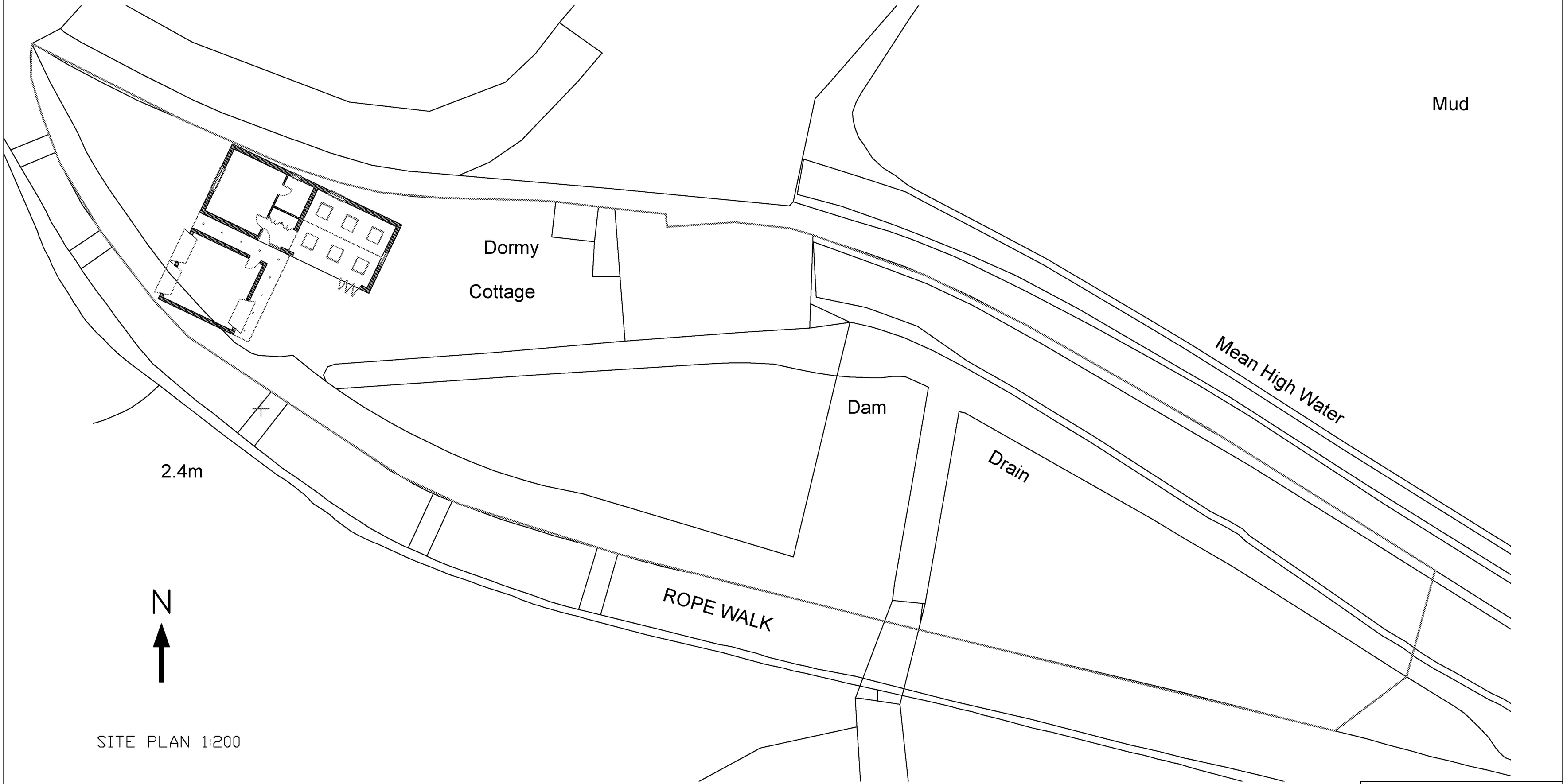
Dormy Cottage Annexe
Rope Walk
Littlehampton
West Sussex BN17 5DE

CLIENT Ms S Maddox

| Issue | Details | Drawn | Check | Date |
|---|---|---|---|---|
| R1 | Porthole window | RM | RM | 08/08/16 |

SCALE AS SHOWN on A3
DATE 08/08/16
DRAWING NUMBER 16058/02R1

ARUN DISTRICT COUNCIL LU/281/16/HH




SITE PLAN 1:200

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PROPOSED SITE PLAN

Dormy Cottage Annexe
Rope Walk
Littlehampton
West Sussex BN17 5DE

CLIENT Ms S Maddox

| Issue | Details | Drawn | Check | Date |
|---|---|---|---|---|
| R1 | Porthole window | RM | RM | 08/08/16 |

SCALE AS SHOWN on A1
DATE 08/08/16
DRAWING NUMBER 16055/03R1

ARUN DISTRICT COUNCIL LU/28/11/HH

# Flood Defence Location. Centred BN17 5DE. Created 05/09/2016.

Environment Agency




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ARUN DISTRICT COUNCIL LU/281/16/HH

# Modelled Flood Outlines centred on Dormy Cottage, Rope Walk, Littlehampton, West Sussex, BN17 5DE. Created 06/09/2016 (Ref: SSD/20644)




Environment Agency

N

**Legend**

- Main River
- Site Boundary
- 20% AEP (Defended Tidal)
- 5% AEP (Defended Tidal)
- 0.5% AEP (Defended Tidal)
- 0.1% AEP (Defended Tidal)
- 0.5% AEP (2070) NPPF (Defended Tidal)
- 0.5% AEP (2115) NPPF (Defended Tidal)

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

Scale: 1:10,000

0 245 490

Meters

ARUN DISTRICT COUNCIL LU/281/16/HH

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# Modelled Flood Outlines centred on Dormy Cottage, Rope Walk, Littlehampton, West Sussex, BN17 5DE. Created 06/09/2016 (Ref: SSD/20644)




Environment Agency

N

## Legend

- Main River
- Site Boundary
- 20% AEP (Undefended Tidal)
- 5% AEP (Undefended Tidal)
- 0.5% AEP (Undefended Tidal)
- 0.1% AEP (Undefended Tidal)
- 0.5% AEP (2070) NPPF (Undefended Tidal)
- 0.5% AEP (2115) NPPF (Undefended Tidal)

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

Scale: 1:10,000

0 245 490

Meters

ARUN DISTRICT COUNCIL LU25/1/6/HH

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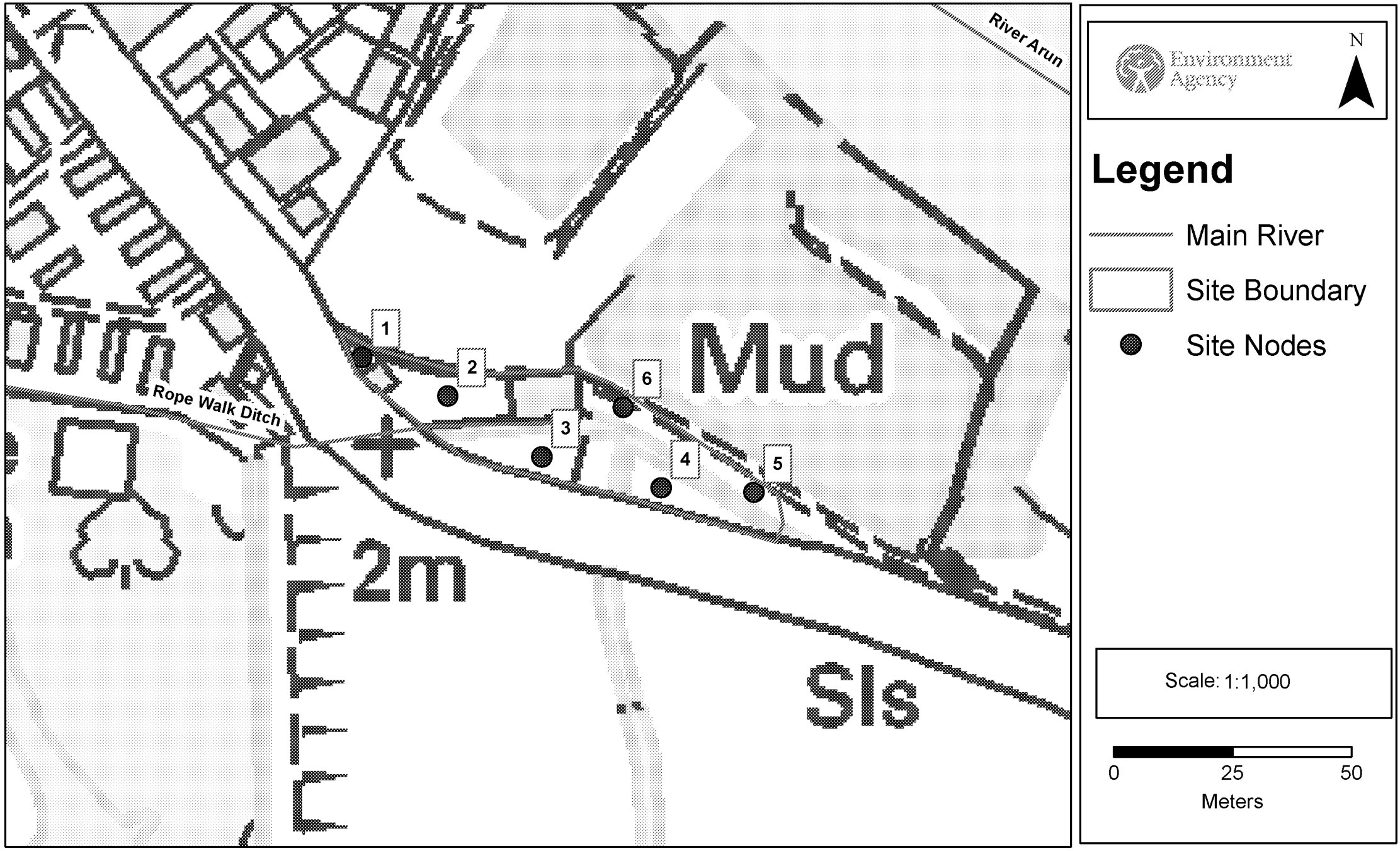
# Modelled Site Node Points centred on Dormy Cottage, Rope Walk, Littlehampton, West Sussex, BN17 5DE. Created 05/09/2016 (Ref: SSD/20644)

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# Risk of Flooding (Rivers and Sea) Centred BN17 5DE. Created 05/09/2016.



Environment Agency

Scale 1:10,000

N
W E
S

## Likelihood of Flooding from Rivers and the Sea

- Sealed Main Rivers
- Defences
- Flood Storage Areas
- Areas benefiting from flood defences
- Flood Zone 3
- Flood Zone 2

Likelihood of flooding from Rivers and the Sea (taking into account defences)

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

This information is shown on the Risk of Flooding from Rivers and the Sea map on our website.

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Unda Consulting Limited
The Studio
Lime Tree Cottage
Oldlands Ave
Balcombe
RH17 6LS

**Our ref: 20644**
**Your ref: 86591**

**Date: 06/09/2016**

Dear Jackie

Provision of Product 4 for address: Dormy Cottage, Rope Walk, Littlehampton, West Sussex, BN17 5DE.

Thank you for your request of 15/08/2016 to use Environment Agency data, Product 4. The information is attached.

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

**The property is in an area located within Flood Zone 3 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.*

Please find attached a copy of the Flood Map for Planning (Rivers and Sea) for the area relating to your address.

Further details about the Environment Agency information supplied can be found on the GOV.UK website:

https://www.gov.uk/browse/environment-countryside/flooding-extreme-weather

If you have requested this information to help inform a development proposal, then you should note the information on GOV.UK on the use of Environment Agency Information for Flood Risk Assessments

https://www.gov.uk/planning-applications-assessing-flood-risk
https://www.gov.uk/government/publications/pre-planning-application-enquiry-form-preliminary-opinion

Guildbourne House, Chatsworth Road, Worthing, West Sussex, BN11 1LD
Customer services line: 03708 506 506
Email: enquiries@environment-agency.gov.uk
www.environment-agency.gov.uk


ARUN DISTRICT COUNCIL LU/281/16/HH

## Supporting Information

Flood Defences

The eastern side of the site is currently protected by an embankment with Designed Standard of Protection of 1 in 50. Please see the attached Map for the line of this defence. The embankment is in fair condition. The actual downstream crest level is 2.26m and the actual upstream crest level is 3.77m.

Model Information

All levels, depths and flood outlines are taken from the Emsworth to Littlehampton West Bank Coastal Modelling completed by JBA Consulting in April 2016 using TUFLOW.

Flood History

We do not have any records of previous flood events affecting this location. However, I would suggest contacting Arun District Council for a more comprehensive flood history check.

Please note our records are not comprehensive and may not include all events, you can contact your Local Authority to check if they hold any relevant information regarding your application.

You are encouraged to use and re-use this information freely and flexibly, with only a few conditions. Details of which can be found here: http://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

We respond to requests for recorded information that we hold under the Freedom of Information Act 2000 (FOIA) and the associated Environmental Information Regulations 2004 (EIR).

If you are not satisfied with our response to your request for information you can contact us within 2 calendar months to ask for our decision to be reviewed.

If you have any queries or would like to discuss the content of this letter further please call us on 03708 506506.

Yours faithfully

**Eleonora Pilla**
**West Sussex PSO**

Enc. Flood Map for Planning (Rivers and Sea) / Node point locations / Flood levels/depths / Modelled flood outlines / Flood Defence Locations



ARUN DISTRICT COUNCIL LU/281/16/HH

**Product 4 Flood Risk Data Requested by:** Jackie Stone

**Site:** Dormy Cottage, Rope Walk, Littlehampton, West Sussex, BN17 5DE

**Table 1:** Water Levels: Tidal Undefended

| | NGR | | Modelled Flood Levels in Metres Undefended Annual Exceedance Probability | | | | | |
|---|---|---|---|---|---|---|---|---|
| Node Reference | Eastings | Northings | 20% | 5% | 0.5% | 0.5% (2070) | 0.5% (2115) | 0.1% |
| 1 | 502316 | 101908 | 2.91 | 3.02 | 3.19 | 3.59 | 4.33 | 3.33 |
| 2 | 502334 | 101900 | 2.94 | 3.04 | 3.19 | 3.59 | 4.33 | 3.33 |
| 3 | 502354 | 101887 | 2.96 | 3.05 | 3.20 | 3.59 | 4.33 | 3.33 |
| 4 | 502379 | 101881 | 2.96 | 3.05 | 3.20 | 3.59 | 4.33 | 3.34 |
| 5 | 502398 | 101880 | 2.96 | 3.05 | 3.20 | 3.59 | 4.33 | 3.34 |
| 6 | 502371 | 101898 | 2.96 | 3.05 | 3.20 | 3.59 | 4.33 | 3.34 |

**Table 2:** Water Levels: Tidal Defended

| | NGR | | Modelled Flood Levels in Metres Defended Annual Exceedance Probability | | | | | |
|---|---|---|---|---|---|---|---|---|
| Node Reference | Eastings | Northings | 20% | 5% | 0.5% | 0.5% (2070) | 0.5% (2115) | 0.1% |
| 1 | 502316 | 101908 | - | - | 2.50 | 2.74 | 3.65 | 2.56 |
| 2 | 502334 | 101900 | - | - | - | 2.77 | 3.65 | 2.61 |
| 3 | 502354 | 101887 | - | - | 2.03 | 2.77 | 3.65 | 2.23 |
| 4 | 502379 | 101881 | - | - | 2.01 | 2.76 | 3.65 | 2.21 |
| 5 | 502398 | 101880 | - | - | 2.75 | 3.35 | 3.83 | 2.91 |
| 6 | 502371 | 101898 | - | - | 3.42 | 3.72 | 3.95 | 3.54 |

**Table 3:** Water Depth: Tidal Undefended

| | NGR | | Modelled Flood Depth in Metres Undefended Annual Exceedance Probability | | | | | |
|---|---|---|---|---|---|---|---|---|
| Node Reference | Eastings | Northings | 20% | 5% | 0.5% | 0.5% (2070) | 0.5% (2115) | 0.1% |
| 1 | 502316 | 101908 | 0.50 | 0.60 | 0.77 | 1.17 | 1.92 | 0.92 |
| 2 | 502334 | 101900 | 0.46 | 0.55 | 0.71 | 1.10 | 1.84 | 0.85 |
| 3 | 502354 | 101887 | 1.23 | 1.32 | 1.47 | 1.86 | 2.60 | 1.61 |
| 4 | 502379 | 101881 | 1.09 | 1.18 | 1.33 | 1.72 | 2.46 | 1.47 |
| 5 | 502398 | 101880 | 0.94 | 1.04 | 1.19 | 1.58 | 2.32 | 1.33 |
| 6 | 502371 | 101898 | 1.11 | 1.21 | 1.36 | 1.75 | 2.49 | 1.50 |

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www.gov.uk/government/organisations/environment-agency

**Table 4:** Water Depth: Tidal Defended

| | NGR | | Modelled Flood Depth in Metres<br>Defended Annual Exceedance Probability | | | | | |
|---|---|---|---|---|---|---|---|---|
| Node Reference | Eastings | Northings | 20% | 5% | 0.5% | 0.5% (2070) | 0.5% (2115) | 0.1% |
| 1 | 502316 | 101908 | - | - | 0.08 | 0.32 | 1.24 | 0.15 |
| 2 | 502334 | 101900 | - | - | - | 0.24 | 1.12 | 0.08 |
| 3 | 502354 | 101887 | - | - | 0.41 | 1.16 | 2.04 | 0.62 |
| 4 | 502379 | 101881 | - | - | 0.54 | 1.30 | 2.19 | 0.75 |
| 5 | 502398 | 101880 | - | - | - | 0.10 | 0.22 | 0.02 |
| 6 | 502371 | 101898 | - | - | 0.03 | 0.08 | 0.31 | 0.05 |

All levels taken from: Emsworth to Littlehampton West Bank Coastal Modelling 2016 by JBA Consulting

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

Produced on 06/09/2016

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Customer services line: [redacted]