

AMBIENTAL

ENVIRONMENTAL ASSESSMENT

Flood Risk Assessment

4184

36-38 Surrey Street, Littlehampton,
West Sussex, BN17 5BH

Ambiental Environmental Assessment
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Science Park Square,
Brighton, BN1 9SB



Document Issue Record

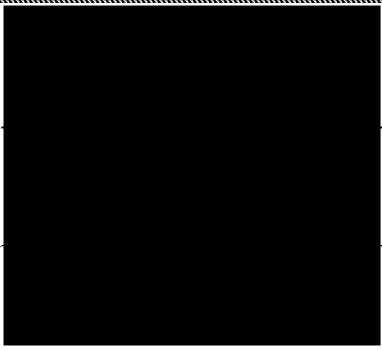
Project: Phase 1 Flood Risk Assessment

Prepared for: Caldotec on behalf of Peter Bedford

Reference: 4184

Site Location: 36-38 Surrey Street, Littlehampton, West Sussex, BN17 5BH

Proposed Development: It is understood that the development is for the conversion of the ground floor bookshop and basement office to create three self-contained holiday let apartments. The ground floor hairdressers are to be retained. It is understood that the application is retrospective.

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1. Summary

- 1.1 Ambiental Environmental Assessment has been appointed by Caldotec on behalf of Peter Bedford to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the proposed development at 36-38 Surrey Street, Littlehampton, West Sussex, BN17 5BH.
- 1.2 The site is currently a commercial premises. It is understood that the development is for the conversion of the ground floor bookshop and basement office to create three self-contained holiday let apartments. The ground floor hairdressers are to be retained. It is understood that the application is retrospective.
- 1.3 With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located within Flood Zone 3.
- 1.4 Table 2 of the PPG Flood Risk and Coastal Change states that sites used for holiday or short-let (caravans and camping) use would be considered “More Vulnerable” subject to a specific warning and evacuation plan.
- 1.5 As a holiday let use, the site could be considered to have a 65 year lifetime – resulting in a lifetime until approximately 2083. Calculating the change in flood level per year between the 1:200 year (2070) and 1:200 year (2115) could be used to interpolate an estimated flood level for the 1:200 year (2083) undefended event. Based on 2m LiDAR data, the site could experience a potential maximum flood depth of 0.98m for the calculated 1:200 year (2083) undefended event.
- 1.6 The controlling residual flood risk mechanism on site is tidal. Tidal flooding is generally caused by low pressure weather systems creating storm-surges (or storm tides), chiefly via high speed winds. These winds (and to a certain extent, the low pressure) create a ‘bulge’ of water which, if it coincides with high tide, can generate very high, stormy, water levels. However, because this mechanism is well understood, it is very likely that an early warning will be issued before such an event strikes.
- 1.7 Section 9.4.1 of the Arun SFRA (2016) states that the lead time for EA Flood Warnings are at least 2 hours, with the aim to provide warning up to 24 hours in advance for the area of Littlehampton. **As such, it is very unlikely that the site would be subject to tidal flooding without several hours of early warning.**
- 1.8 It is important to note that the existing defences offer a (present day) 1:300 year standard of protection, and that the Beach Head to Selsey Bill Shoreline Management Plan (2006) states that the management policy for Policy Unit 4d18 (Angmering-on-sea to Littlehampton) and Policy Unit 4d19 is Hold the Line (HtL) for the long term. As such, although the EA data indicates that the site could be affected for the 1:200 year (2115) event, the Shoreline Management Plan indicates that the strategy is to maintain or improve the 1:300 year standard defences until at least 2105. **As such, if the Shoreline Management Plan for this area is implemented, the development *may* benefit from the presence of defences to the 1:300 year standard over its lifetime.**
- 1.9 The site owner has stated that they have already signed up to the EA Flood Warning Service, and that the housekeeper who currently lives on site is also signed up to this Service and is aware of the procedures in place. The site owner/ management are also responsible for ensuring all site users are aware of the risk of flooding and the procedures to adopt upon receipt of a Flood Warning.
- 1.10 The proposed evacuation route and places of safe refuge should be agreed with the Local Planning Authority Emergency Planning Team and should be communicated to all site users upon booking of the property. The route, once confirmed, should also be included within any ‘welcome packs’ provided to

guests arriving at the holiday let apartments. Signage should also be clear within the apartments detailing the flood evacuation procedures, similar to fire evacuation procedures. The site owner has advised that information of flooding is to be given on all booking websites.

- 1.11 If the site owner/ management receives an EA Flood Warning when the site is not currently being let out/ in use, it is recommended that the apartments are closed and remain so until the Flood Warning is lifted. The site owner/ management are responsible for informing all upcoming site users/ bookings that the apartments are closed for the foreseeable future (until the Flood Warning is lifted). This may be result in bookings being cancelled/ suspended pending further details from the EA.
- 1.12 The site owner has advised that they are looking to install electric flood shutters to the 2 windows and front door of the property.
- 1.13 As such, and given that:
- The development is for the change of use of the existing building within a developed area;
 - The development could be considered “More Vulnerable” under the NPPF;
 - The site is located within an EA Flood Warning Area and within an area of tidal flood risk, which could provide sufficient warning to enable prior evacuation;

Following the guidelines contained within the NPPF, the proposed development is considered to be suitable assuming appropriate mitigation (including adequate warning procedures) can be maintained for the lifetime of the development.

Development Description	Existing	Proposed
Development Type:	Former bookshop (GF) and offices (BF)	Retrospective creation of 3 holiday let apartments (2 at GF, 1 at BF)
Number of Bedrooms:	N/A²	
EA Vulnerability Classification:		More vulnerable
Ground Floor Level:	Elevations on site vary between approximately 3.52mAOD and 3.78mAOD (2m LiDAR data).	2 x 1 bed apartment at GF, 1 x 2 bed apartment at BF
Level of Sleeping Accommodation:	N/A²	Basement and ground floors
Impermeable Surface Area:	N/A²	No change; development is change of use
Surface Water Drainage:	N/A²	No change; development is change of use – discharge via existing
Site Size:	Approximately 134m²	No change
Risk to Development	Summary	Comment
EA Flood Zone:	3	
Flood Source:	Tidal	River Arun
Recorded Flood Events in Area:	Yes	Tidal, surface water
Recorded Flood Events at Site:	No	Site located outside EA recorded tidal flooding extents and SFRA incident mapping
SFRA Available:	Yes	Arun District Council SFRA (2016)
Defended		
1:200 year (2070)	N/A²	Site outside 1:200 year (2070) defended extent. Levels from SSD105294
1:200 year (2115)	4.10mAOD	
Undefended		
1:200 year (2070)	4.33mAOD	Calculated using rate of change between 2070 and 2115 levels. 2083 used to consider 65 commercial lifetime of holiday let use
Interpolated 1:200 year (2083)	4.50mAOD	
1:200 year (2115)	4.92mAOD	
Management Measures	Summary	Comment
Ground floor level above extreme flood levels:	No	Prior evacuation of holiday let apartments recommended
Safe Access/Egress Route:	No	Prior evacuation of holiday let apartments recommended
Flood Resilient Design:	Yes	
Site Drainage Plan:	Discharge via existing	Development is change of use
Flood Warning & Evacuation Plan:	Yes	Prior evacuation of holiday let apartments recommended. Dominant source of flooding is tidal and site is within EA Flood Warning Area – should provide sufficient warning
Offsite Impacts	Summary	Comment
Displacement of floodwater:	None	Development is change of use
Increase in surface run-off generation:	None	Development is change of use
Impact on hydraulic performance of channels:	None	Development will not affect channel

Table 1 Summary of flood risks, impacts and proposed flood mitigation measures.
N/A² not required for this assessment; N/A² data not available.

2. Policy Compliance

- 2.1 Table 2 of the PPG Flood Risk and Coastal Change states that sites used for holiday or short-let (caravans and camping) use would be considered “More Vulnerable” subject to a specific warning and evacuation plan. Paragraph 056 of the PPG Flood Risk and Coastal Change also states that *“flood warning and evacuation plan is a requirement for sites at risk of flooding used for holiday or short-let caravans and camping and are important at any site that has **transient occupants** (e.g. hostels and **hotels**)”*.
- 2.2 As such, Section 8 of this report will set out procedures that should be adopted on site in the event of an EA Flood Warning.

3. Development Description and Site Area

Proposed Development and Location

- 3.1 The proposed development is located at 36-38 Surrey Street, Littlehampton, West Sussex, BN17 5BH (Figures 1 & 2).
- 3.2 The site was formerly a bookshop at ground floor with offices at basement level. There is an existing hairdresser currently at ground floor. It is understood that the development is for the conversion of the ground floor bookshop and basement office to create three self-contained holiday let apartments. The ground floor hairdressers are to be retained. It is understood that the application is retrospective.
- 3.3 Elevations on site vary between approximately 3.52mAOD and 3.78mAOD (2m LiDAR data). Existing Finished Floor Levels (FFLs) are unknown at the time of writing.

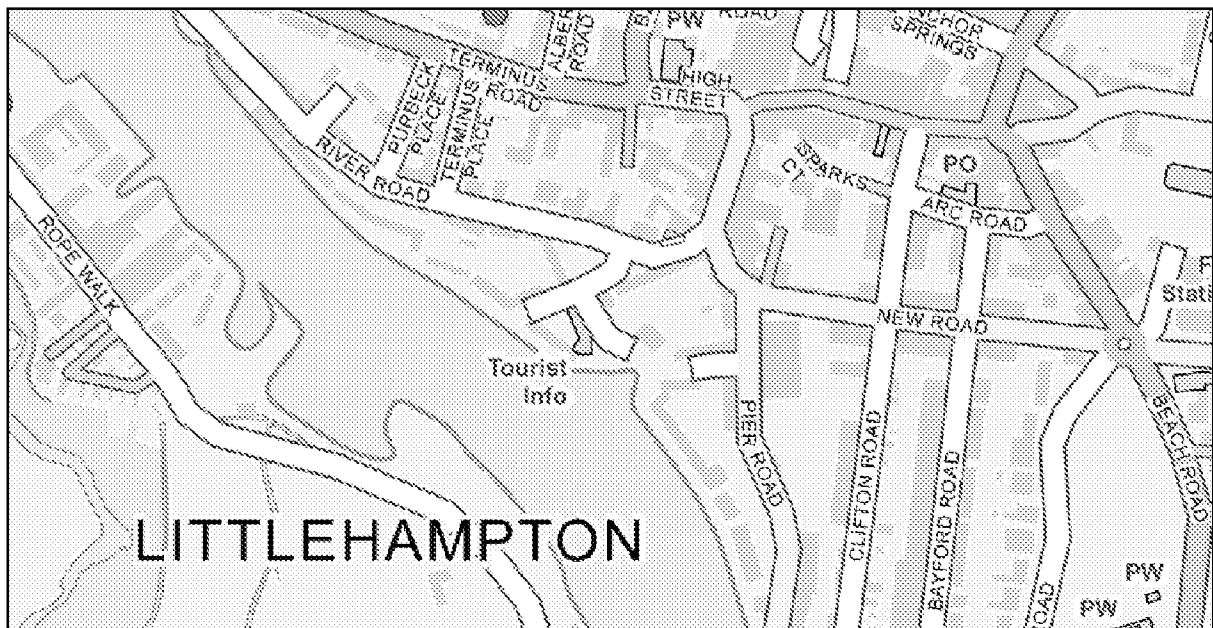


Figure 1 Location Map, identifying the location of the proposed development (Source: OS)



Figure 2 Aerial Map, identifying the location of the proposed development (Source: Google Earth)

Vulnerability Classification

- 3.4 The EA Flood Map for Planning demonstrates that the proposed development lies within Flood Zone 3 with a high probability of greater than 1 in 200 (0.5%) of flooding from seas or tidal estuaries in any year.
- 3.5 The former site uses (bookshop and offices) would be considered “Less Vulnerable” under the NPPF. Table 2 of the PPG Flood Risk and Coastal Change states that sites used for holiday or short-let (caravans and camping) use (in this case holiday let apartments) would be considered “More Vulnerable” subject to a specific warning and evacuation plan. As such, Section 8 of this report will set out procedures that should be adopted on site in the event of an EA Flood Warning.



Figure 3 EA Flood Map for Planning

Geology

- 3.6 The British Geological Survey (BGS) Geology of Britain Viewer indicates that the bedrock underlying the site is Lewes, Seaford, Newhaven, Culver and Portsdown Chalk Formations comprising chalk.
- 3.7 The British Geological Survey (BGS) Geology of Britain Viewer indicates that the superficial deposits underlying the site are Raised Beach Deposits comprising sand and gravel.

4. Sequential Test/Exception Test

- 4.1 Under the NPPF, all new planning applications should undergo a *Sequential Test*. This test should be implemented by local planning authorities with a view to locating particularly vulnerable new developments (e.g. residential, hospitals, mobile homes etc.) outside of the floodplain.
- 4.2 The NPPF *Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table* is reproduced below;

Flood Risk Vulnerability Classification		Essential Infrastructure	Water Compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone	Zone 1	✓	✓	✓	✓	✓
	Zone 2	✓	✓	Exception Test Required	✓	✓
	Zone 3a	Exception Test Required	✓	✗	Exception Test Required	✓
	Zone 3b <i>Functional Floodplain</i>	Exception Test Required	✓	✗	✗	✗

Table 2 The Sequential Test: Flood Risk Vulnerability and Flood Zone 'Compatibility' Table as specified by NPPF.
 Please note: ✓ means development is appropriate; ✗ means the development should not be permitted.

- 4.3 Using the principles of the NPPF above, the development would normally be required to implement the Exception Test, due to its More Vulnerable use within Flood Zone 3.
- 4.4 However, the 2018 Revised NPPF states:
- "Applications for some minor development and **changes of use** should not be subject to the sequential or exception tests but should still meet the requirements for site-specific flood risk assessments"*
- 4.5 As such, as the development is a change of use, under the 2018 NPPF, the Sequential and Exception Tests are not required.
- 4.6 As the proposed development resides within Flood Zone 3, the planning application submitted by the client is required to be accompanied by an FRA which shows the development can be achieved in a sustainable manner, with an overall reduction of flood risk to the site and surrounding area.

5. Site Flood Hazards

Sources of Flooding

- 5.1 The proposed development is located within Flood Zone 3 (high risk of flooding) and is considered to be “More Vulnerable” according to NPPF guidelines. Table 3 summarises the potential sources of flooding to the site:

Source	Description
Tidal	River Arun
Surface	In Area
Groundwater	On Site
Sewer	Local Sewer Network

Table 3 Summary of flood sources.

Mechanisms and History of Flooding

- 5.2 The EA Flood Map for Planning demonstrates the site to be located within Flood Zone 3 (high risk of flooding). It is important to note that the EA Flood Map for Planning shows only the potential floodplain; the mitigating effects of any flood defences currently in place are not considered.
- 5.3 While the site is not located within an area benefitting from the presence of defences according to the EA Flood Map for Planning, the EA have indicated that there are flood defences within proximity of the site in the form of a wall, with an estimated standard of protection of 1:300 year years (0.3% AEP).

Tidal

- 5.4 The River Arun is located approximately 100m southwest of the proposed development site.
- 5.5 The EA have provided modelled flood extents and levels for the 1:200 year and 1:1000 year events, for defended and undefended scenarios.
- 5.6 While the site is not located within an area benefitting from the presence of defences according to the EA Flood Map for Planning, the EA have indicated that there are flood defences within proximity of the site in the form of a wall, with an estimated standard of protection of 1:300 year years (0.3% AEP).
- 5.7 As a result, while the defended scenarios could be considered more representative of the flood mechanisms in the area, previous project experience in Littlehampton has indicated that the EA request that the undefended scenarios are used for analysis to considered a worst case scenario. To demonstrate a realistic and worst case scenario, the defended and undefended scenarios will be considered.

Tidal – Defended

- 5.8 The EA have provided modelled flood extents for a range of return periods for a defended scenario (Figure 4). It can be seen that the proposed development site is located outside the 1:200 year flood extent for the present day and 2070 events. It is also located outside the present day 1:1000 year flood extent. The site would be affected for the 1:200 year (2115) defended event. The EA have provided modelled flood levels at one node on site. This indicates a flood level of 4.10mAOD for the 1:200 year (2115) defended event.

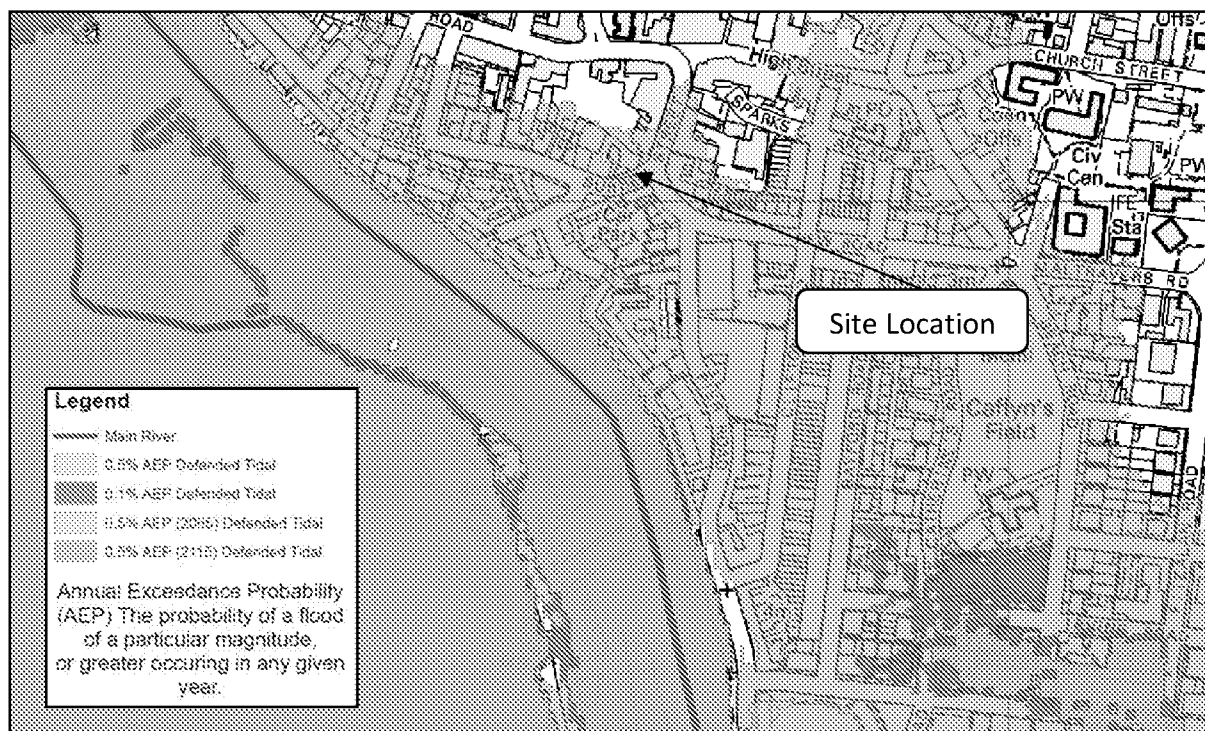


Figure 4 EA Modelled Defended Flood Extents

- 5.9 Elevations on site vary between approximately 3.52mAOD and 3.78mAOD (2m LiDAR data). Existing Finished Floor Levels (FFLs) are unknown at the time of writing.
- 5.10 As such, based on 2m LiDAR, the development site could experience a potential maximum flood depth of 0.58m for the 1:200 year (2115) defended event, based on 2m LiDAR (which doesn't account for internal FFLs of basement and ground floor).
- 5.11 The development, as a holiday let use, could have a 65 year commercial lifetime. As such, a 1:200 year (2083) defended event could be considered more representative of the defended 1:200 year event over the lifetime of the development. However, as the site is located outside the 1:200 year (2070) defended event, a 2083 level cannot be interpolated between 2070 and 2115 flood levels.
- 5.12 The 2070 epoch could be considered more representative of the lifetime of the development, rather than the 2115. However, adopting a worst case approach, the 2115 would reflect a more conservative representation of the 1:200 year (defended) event over the lifetime of the development.

Tidal – Undefended

- 5.13 The EA have provided modelled flood extents for a range of return periods for an undefended scenario (Figure 5).
- 5.14 It can be identified from Figure 5 that if the defences were not present in the area, the site would be affected for the 1:200 year and 1:1000 year present day events, and the 1:200 year (2070) and 1:200 year (2115) events.
- 5.15 The EA have provided modelled flood levels for each return period at a 2D node on site.

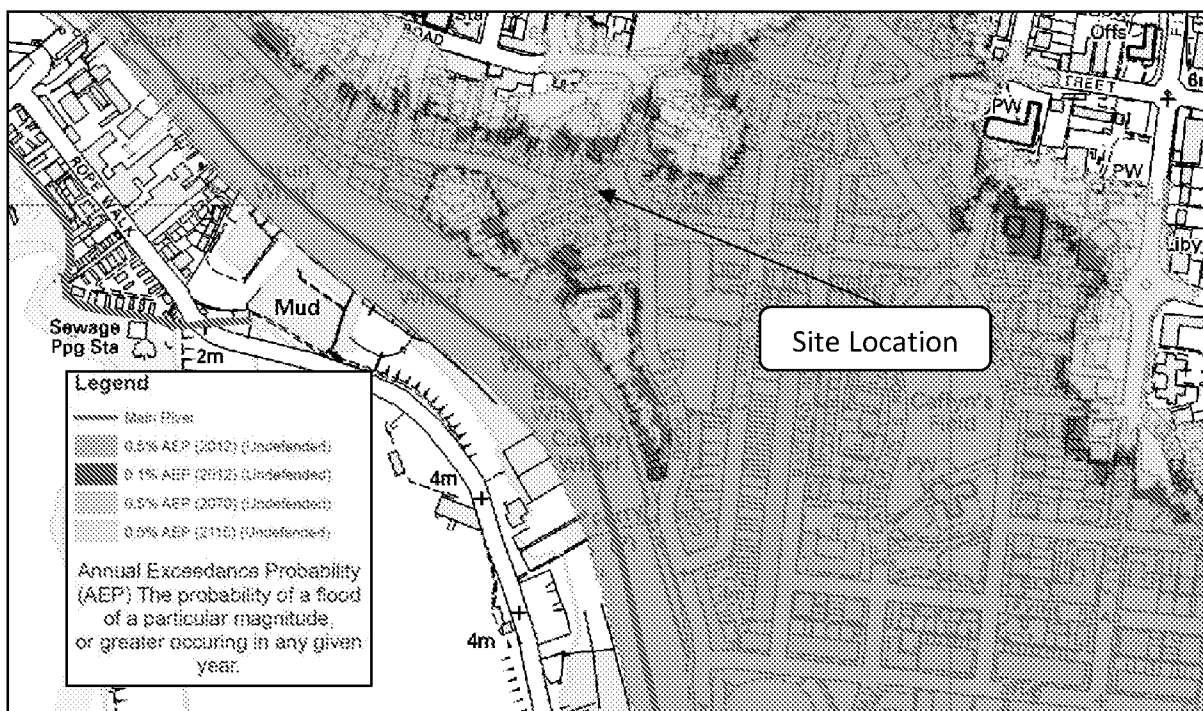


Figure 5 EA Modelled Undefended Flood Extents

- 5.16 Elevations on site vary between approximately 3.52mAOD and 3.78mAOD (2m LiDAR data). Existing Finished Floor Levels (FFLs) are unknown at the time of writing.
- 5.17 The undefended 2D flood levels, along with potential maximum flood depths based on 2m LiDAR, are summarised below:
- 1:200 year (present day) – 3.74mAOD – Depth of 0.22m against minimum topography
 - 1:200 year (2070) – 4.33mAOD – Depth of 0.81m against minimum topography
 - 1:200 year (2115) – 4.92mAOD – Depth of 1.4m against minimum topography
 - 1:1000 year (present day) – 4.05mAOD – Depth of 0.53m against minimum topography
- 5.18 The development, as a holiday let use, could have a 65 year commercial lifetime. As such, a 1:200 year (2083) defended event could be considered more representative of the defended 1:200 year event over the lifetime of the development. Calculating the change in flood level per year between the 1:200 year (2070) and 1:200 year (2115) can be used to interpolate an estimated flood level for the 1:200 year (2083) undefended event.
- 5.19 Calculations indicate a 0.013m change per year between the 1:200 year (2070) and 1:200 year (2115) flood levels. Applying this rate of change to the 13 years between 2070 and 2083 indicates a calculated 1:200 year (2083) undefended flood level of 4.50mAOD.
- 5.20 Based on 2m LiDAR, the site could experience a potential maximum flood depth of 0.98m for the calculated 1:200 year (2083) undefended event.
- 5.21 The EA request that the undefended scenario is considered to provide a worst case approach in the absence of defence breach modelling in Littlehampton.
- 5.22 As such, the risk of flooding from tidal sources over the lifetime of the development could be considered high.

- 5.23 However, given that; the site is located in an EA Flood Warning Area, the nature of tidal flooding, and given the temporary stay/ holiday let use of the site, it is likely that sufficient warning could be given to site users to enable prior evacuation/ closure of the site before tidal flooding occurs.
- 5.24 In addition, it is important to note that the existing defences offer a (present day) 1:300 year standard of protection, and that the Beach Head to Selsey Bill Shoreline Management Plan (2006) states that the management policy for Policy Unit 4d18 (Angmering-on-SEA to Littlehampton) and Policy Unit 4d19 is Hold the Line (HtL) for the long term. As such, although the EA data indicates that the site could be affected for the 1:200 year (2115) event, the Shoreline Management Plan indicates that the strategy is to maintain or improve the 1:300 year standard defences until at least 2105. As such, if the Shoreline Management Plan for this area is implemented, the development may benefit from the presence of defences to the 1:300 year standard over its lifetime.

Surface Water (Pluvial)

- 5.25 The Environment Agency Flood Risk from Surface Water mapping (Figure 6) shows the proposed development itself to be within an area of 'Very Low' risk of flooding from surface water. Areas identified to be at 'Very Low' risk have a less than 0.1% annual risk of flooding from this source. The adjacent road network is at a 'Low' and 'Medium' risk of surface water flooding, in places. Areas identified to be at 'Low' risk have between 0.1% and 1% annual risk of flooding from this source. Areas identified to be at 'Medium' risk have between 1% and 3.3% annual risk of flooding from this source.
- 5.26 The EA Surface Water Flood Depth Map for the High Risk Scenario indicates that the proposed development is not affected in this event.
- 5.27 The EA Surface Water Flood Depth Map for the Medium Risk Scenario (Figure 7) indicates that the proposed development is not affected in this event. Some areas of the nearby road network could experience depths of less than 300mm in places for the Medium Risk Scenario.
- 5.28 The EA Surface Water Flood Depth Map for the Low Risk Scenario (Figure 8) indicates that the proposed development is not affected in this event. The nearby road network could experience depths of less than 300mm and between 300mm and 900mm in places for the Low Risk Scenario.
- 5.29 The EA Risk of Flooding from Surface Water (RoFSW) dataset indicates that the proposed development site itself would remain unaffected for the 1:1000 year scenario, with depths confined to the road network (Figure 9).
- 5.30 Appendix H of the Arun District Council SFRA maps historic flooding across the District from a range of sources. It can be identified that the closest recorded surface water incident was located approximately 110m east of the proposed development site (Figure 10).
- 5.31 As such, the risk of flooding from surface water to the development could be considered **low**.

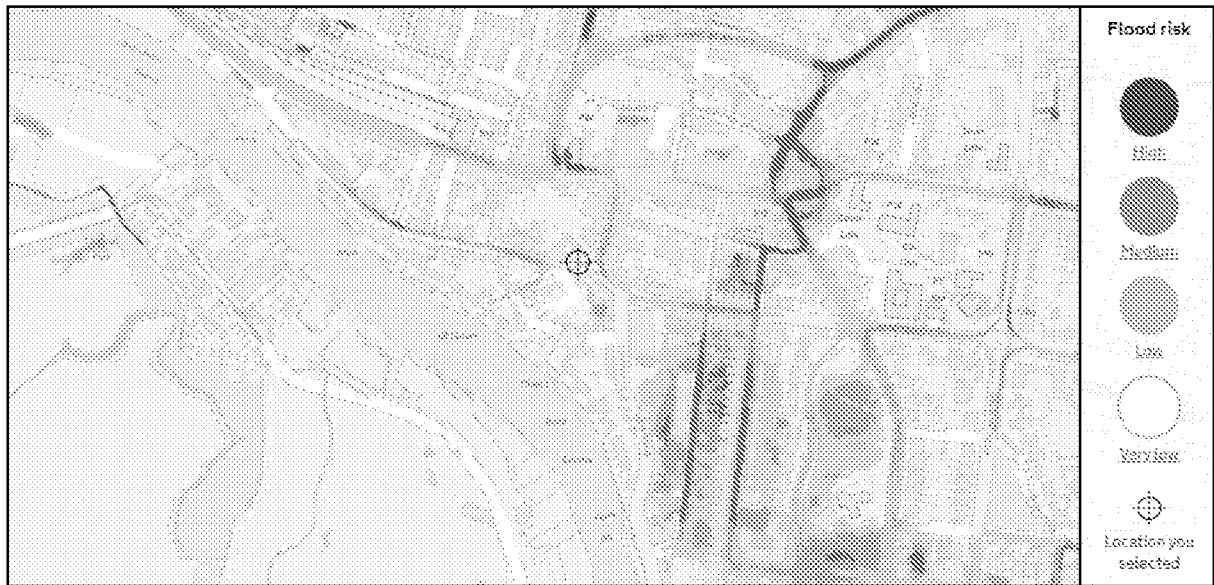


Figure 6 EA Surface Water Flood Risk Map (Source: EA)

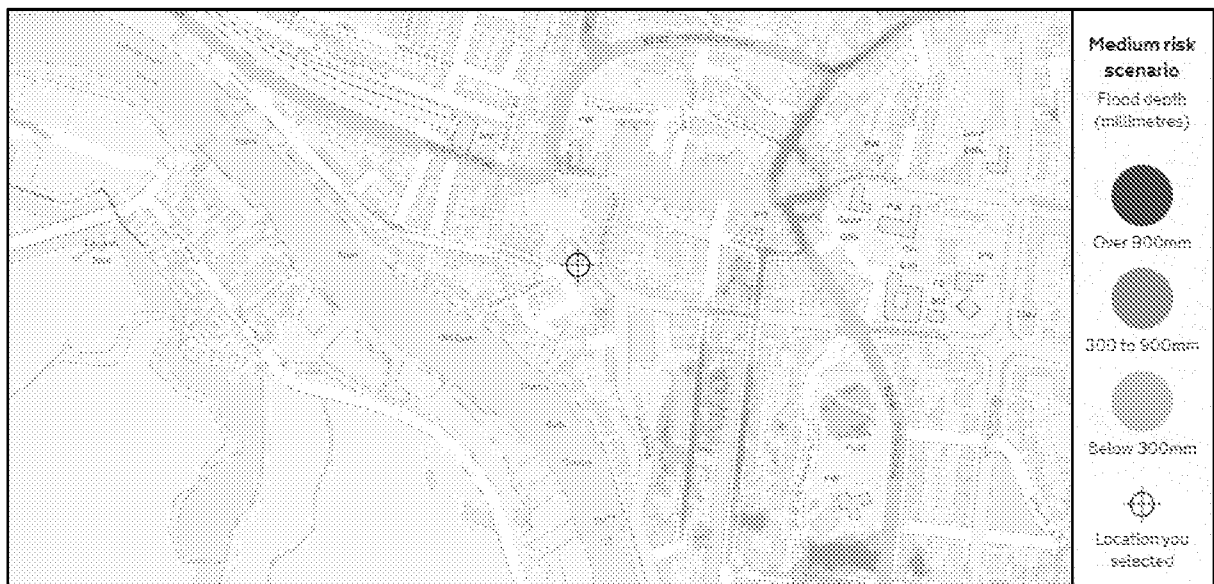


Figure 7 Surface Water Depths for a Medium Risk Scenario (Source: EA)

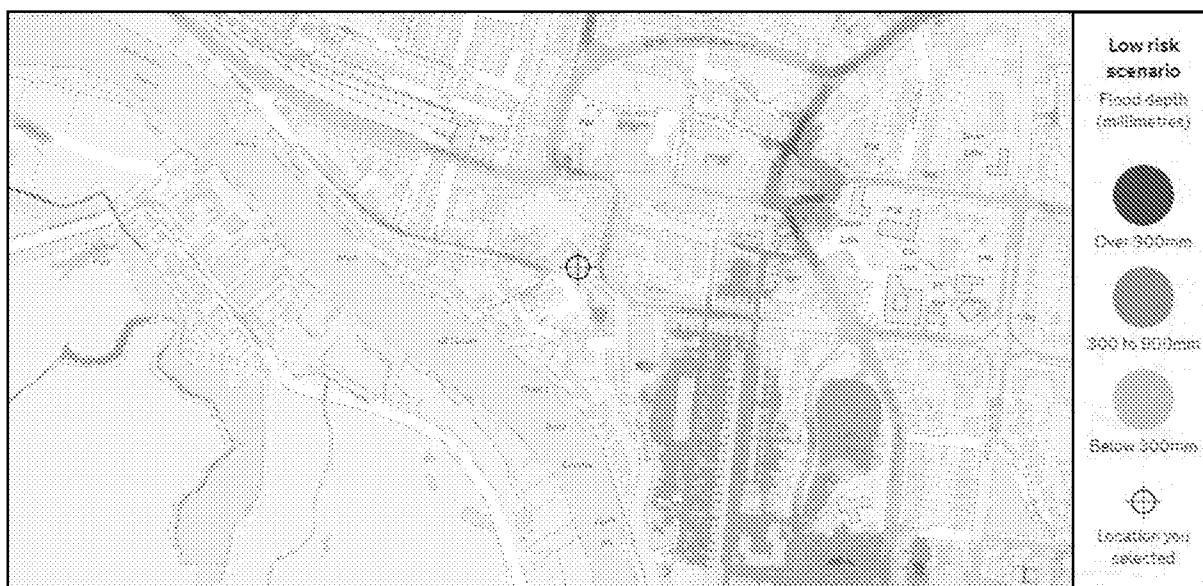


Figure 8 Surface Water Depths for a Low Risk Scenario. (Source: EA)

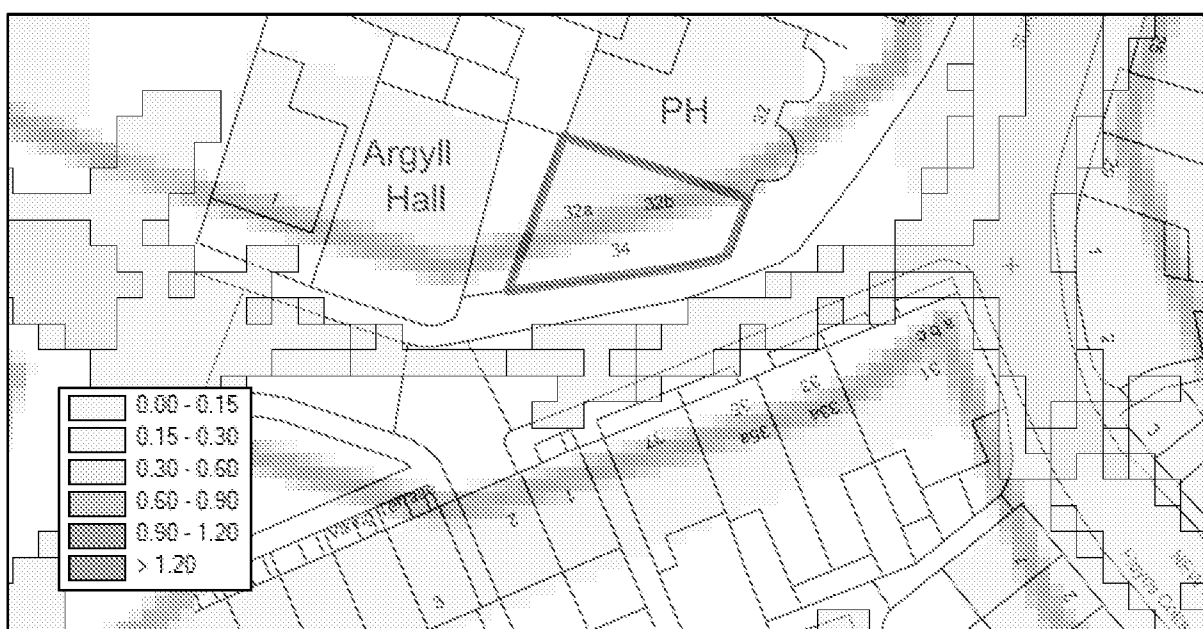


Figure 9 EA Risk of Flooding from Surface Water 1:1000 year event (Sources: EA, OS)

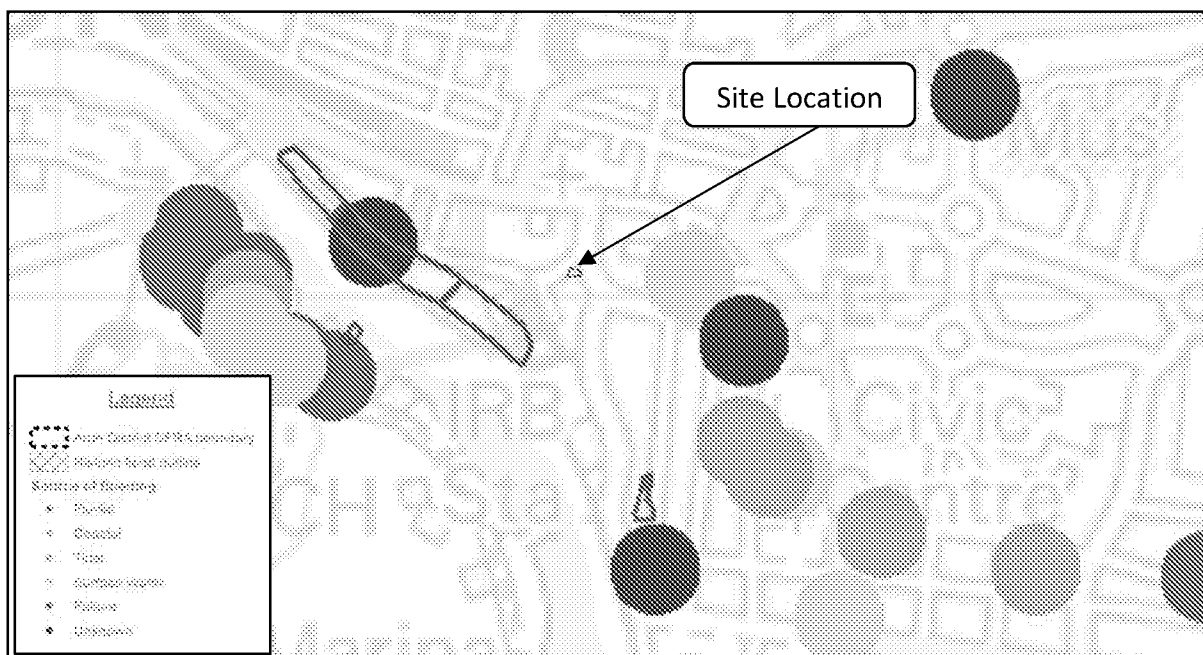


Figure 10 Historical Flooding (Source: Arun SFRA, 2016)

Groundwater

- 5.32 Appendix F of the Arun District SFRA (2016) indicates that the proposed development site is located within a 1km grid square of which $\geq 75\%$ is considered to be susceptible to groundwater flooding (Figure 11).
- 5.33 However, no records could be found in the Arun SFRA (2016) to indicate historic groundwater flooding at the site.
- 5.34 As the development includes a change of use of the existing basement, a conservative approach to mitigate flooding should be adopted- demountable barriers at entry thresholds etc.
- 5.35 As such, the risk of flooding from groundwater sources could be considered **moderate**.
- 5.36 The basement level should be of flood proof construction to mitigate the ingress of groundwater.

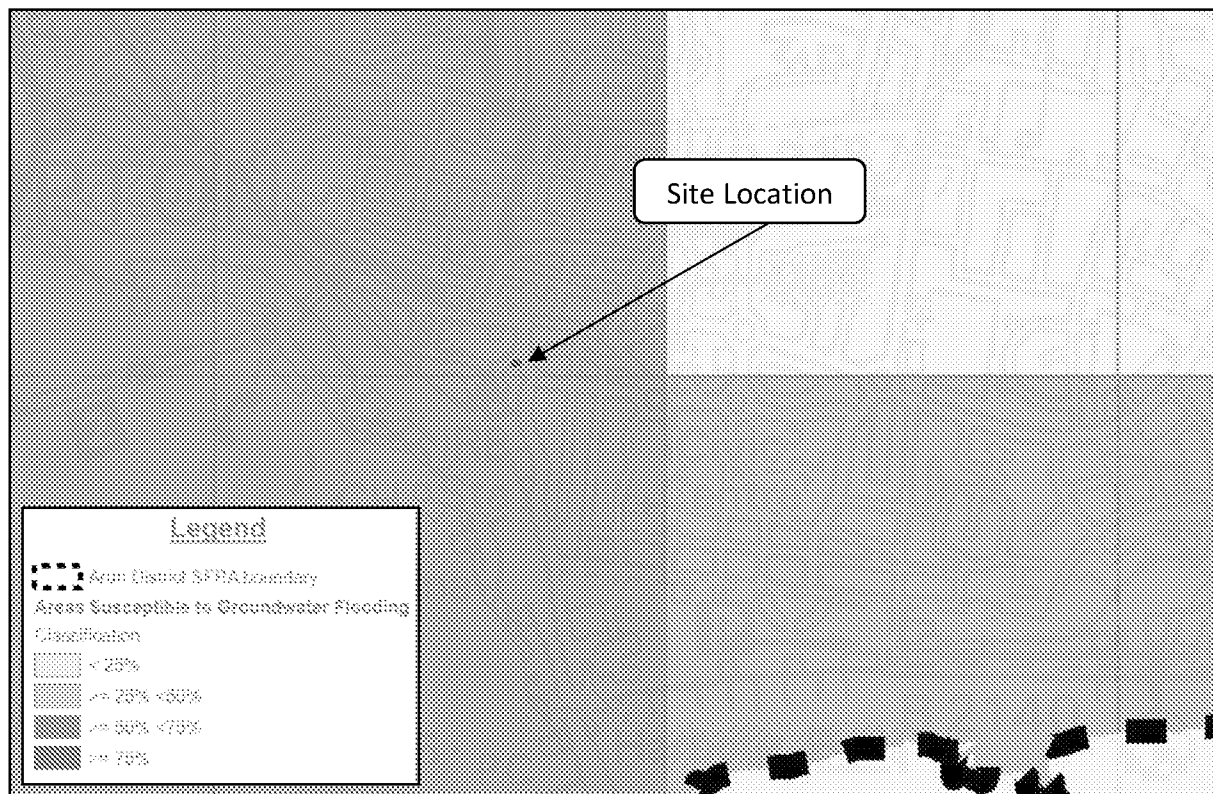


Figure 1.1 Groundwater Susceptibility (Source: Arun SFRA, 2016)

Sewer

- 5.37 Table 5-2 of the Arun SFRA (2016) indicates that as of 25/02/2016, there had been 22 recorded incidents of sewer flooding within the BN17 5 postcode area, based on DG5 data.
- 5.38 As the DG5 data is published at postcode level, the locations of these recorded incidents with regards to the site itself are unknown. As such, it is unknown whether the site itself has flooded from sewer sources previously.
- 5.39 As such, the risk of flooding from sewer sources could be considered **moderate**.

Surface Water Drainage Strategy

- 5.40 The retrospective application is for the change of use of part of the existing building. As such, it is understood that there was/ will be no external alterations as part of the scheme.
- 5.41 As such, the development could continue discharge surface water runoff via the existing mechanism.

Records of Historical Flooding

- 5.42 The EA have provided a recorded flood extent for a tidal event in 1983, caused by overtopping of defences (Figure 12). It can be identified that the site is located outside the EA recorded flood extent for the 1983 event.
- 5.43 Appendix H of the Arun District Council SFRA maps historic flooding across the District from a range of sources. It can be identified that based on the SFRA sources, no records of flooding have been recorded at the site from any source of flooding (Figure 10).

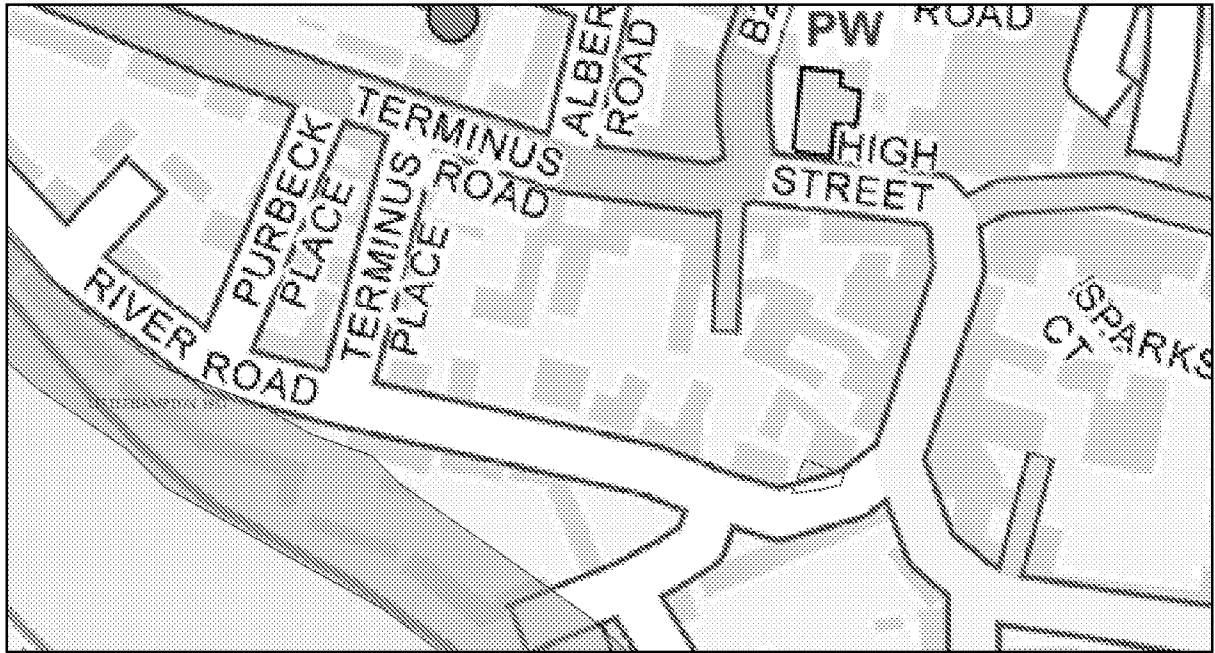


Figure 12 Recorded flood outlines -site demonstrated as redline (Sources: EA, OS)

6. Probability of Flooding

Flood Zones

- 6.1 According to the EA Flood Map for Planning, the site is located within Flood Zone 3 (high risk of flooding).
- 6.2 The EA Flood Map for Planning has been produced in part using a relatively coarse, national scale flood modelling strategy, and in part by detailed modelling. It is important to note that only the potential floodplain is modelled; **the mitigating effects of any flood defences currently in place are not considered.** For reference, the definition of the NPPF flood risk zones is included below.

Zone	Description
1	Low Probability. This zone comprises land assessed as having a less than 1 in 1000 annual probability of river or sea flooding in any year (<0.1%).
2	Medium Probability. This zone comprises land assessed as having between a 1 in 100 and 1 in 1000 annual probability of river flooding (1% – 0.1%) or between a 1 in 200 and 1 in 1000 annual probability of sea flooding (0.5% – 0.1%) in any year.
3a	High Probability. This zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (>0.5%) in any year.
3b	The Functional Floodplain. This zone comprises land where water has to flow or be stored in times of flood. SFRA's should identify this Flood Zone (land which would flood with an annual probability of 1 in 20 (5%) or greater in any year or is designed to flood in an extreme (0.1%) flood, or at another probability to be agreed between the LPA and the EA, including water conveyance routes).

Table 4 Definition of the NPPF Flood Zones. (Source: EA)

Climate Change on Site

- 6.3 Climate change is likely to increase the flow in rivers and raise sea levels and storm intensity.
- 6.4 The EA have recently updated the peak river flow allowances to use for different types of development. Communication with the EA, Flood and Coastal Risk Management Officer has confirmed that the changes are only focused to river flow and rainfall allowances. Tidal allowances are detailed in Table 3 of the new changes (<https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances>). As a result of this dialogue it has been confirmed that the EA detailed data sets provided are relevant for the purposes of this assessment given that the dominant source of flooding is tidal.
- 6.5 As a holiday let use, the site could be considered to have a 65 year lifetime – resulting in a lifetime until approximately 2083.
- 6.6 For the defended scenario, only 1:200 year (2115) flood extents and levels were provided (as the site is located outside the 1:200 year (2070) defended modelled extent. The 2070 epoch could be considered more representative of the lifetime of the development, rather than the 2115. However, adopting a worst case approach, the 2115 would reflect a more conservative representation of the 1:200 year (defended) event over the lifetime of the development. Based on minimum topography from 2m LiDAR, the development site could experience a potential maximum flood depth of 0.58m for the 1:200 year (2115) defended event.

- 6.7 The site is however located within the EA modelled 1:200 year (2070) and 1:200 year (2115) undefended extents. Calculating the change in flood level per year between the 1:200 year (2070) and 1:200 year (2115) could be used to interpolate an estimated flood level for the 1:200 year (2083) undefended event.
- 6.8 Calculations indicate a 0.013m change per year between the 1:200 year (2070) and 1:200 year (2115) flood levels. Applying this rate of change to the 13 years between 2070 and 2083 indicates a calculated 1:200 year (2083) undefended flood level of 4.50m AOD.
- 6.9 Based on 2m LiDAR, the site could experience a potential maximum flood depth of 0.98m for the calculated 1:200 year (2083) undefended event.
- 6.10 As such, the risk of flooding from tidal sources over the lifetime of the development could be considered **high**.
- 6.11 However, given that; the site is located in an EA Flood Warning Area, the nature of tidal flooding, and given the temporary stay/ holiday let use of the site, it is likely that sufficient warning could be given to site users to enable prior evacuation/ closure of the site before tidal flooding occurs.
- 6.12 In addition, it is important to note that the existing defences offer a (present day) 1:300 year standard of protection, and that the Beach Head to Selsey Bill Shoreline Management Plan (2006) states that the management policy for Policy Unit 4d18 (Angmering-on-SEA to Littlehampton) and Policy Unit 4d19 is Hold the Line (HtL) for the long term. As such, although the EA data indicates that the site could be affected for the 1:200 year (2115) event, the Shoreline Management Plan indicates that the strategy is to maintain or improve the 1:300 year standard defences until at least 2105. As such, if the Shoreline Management Plan for this area is implemented, the development may benefit from the presence of defences to the 1:300 year standard over its lifetime.
- 6.13 The EA has also stated that the climate change will increase the peak rainfall intensity allowance in small and urban catchments (Table 5). As such, the site could be more at risk of surface water flooding in the future.

**Table 2 peak rainfall intensity allowance in small and urban catchments
(use 1961 to 1990 baseline)**

Applies across all of England	Total potential change anticipated for the '2020s' (2015 to 2039)	Total potential change anticipated for the '2050s' (2040 to 2069)	Total potential change anticipated for the '2080s' (2070 to 2115)
Upper end	10%	20%	40%
Central	5%	10%	20%

Table 5: Peak rainfall intensity allowance in small and urban catchments (Source: EA).

7. Residual Risks

Identification of Residual Risks

7.1 Residual risks are those remaining after applying the sequential approach to the location of development and taking mitigating actions. Examples of residual flood risk include:

- the failure of flood management infrastructure such as a breach of a raised flood defence, blockage of a surface water conveyance system, overtopping of an upstream storage area, or failure of a pumped drainage system;
- failure of a reservoir, or;
- a severe flood event that exceeds a flood management design standard, such as a flood that overtops a raised flood defence, or an intense rainfall event which the drainage system cannot cope with.

Defence Breach

7.2 While the site is not located within an area benefitting from the presence of defences according to the EA Flood Map for Planning, the EA have indicated that there are flood defences within proximity of the site in the form of a wall, with an estimated standard of protection of 1:300 year years (0.3% AEP).

7.3 This is further supported by the Arun District Council SFRA (2016) that states “A Flood Management Scheme for defences along the eastern bank of the River Arun adjacent to Littlehampton has recently been completed. The new defences, which extend from the coastal frontage of Littlehampton to approximately 500m beyond the A259, are reported by the Environment Agency to have been constructed to a 1 in 300 annual exceedance probability standard of protection”.

7.4 No defence breach data is available from the EA/ SFRA at the time of writing.

7.5 The EA request that the undefended scenario is considered to provide a worst case approach in the absence of defence breach modelling in Littlehampton.

7.6 Based on 2m LiDAR, the site could experience a potential maximum flood depth of 0.98m for the calculated 1:200 year (2083) undefended event.

7.7 However, given that; the site is located in an EA Flood Warning Area, the nature of tidal flooding, and given the temporary stay/ holiday let use of the site, it is likely that sufficient warning could be given to site users to enable prior evacuation/ closure of the site before tidal flooding occurs.

Defence Overtopping

7.8 The EA have provided modelled flood extents and levels for the 1:200 year defended event over the lifetime of the development.

7.9 As a holiday let use, the site could be considered to have a 65 year lifetime – resulting in a lifetime until approximately 2083.

7.10 For the defended scenario, only 1:200 year (2115) flood extents and levels were provided (as the site is located outside the 1:200 year (2070) defended modelled extent. The 2070 epoch could be considered more representative of the lifetime of the development, rather than the 2115. However, adopting a worst case approach, the 2115 would reflect a more conservative representation of the 1:200 year (defended) event over the lifetime of the development. Based on minimum topography from 2m LiDAR, the

development site could experience a potential maximum flood depth of 0.58m for the 1:200 year (2115) defended event.

Reservoir Failure

7.11 The EA Risk from Reservoir Map demonstrates that the site is outside flood extents in the event of reservoir flooding.

Drainage Exceedance

7.12 In the event of drainage exceedance/ failure, overland flows will be dictated by external levels. Built footprint covers the majority of the redline application boundary. A review of 2m LiDAR indicates that levels fall away from the building towards the surrounding road network (Figure 13). As such, in the event of drainage failure, runoff could be directed away from the basement lightwells and ground floor thresholds towards the surrounding road network.

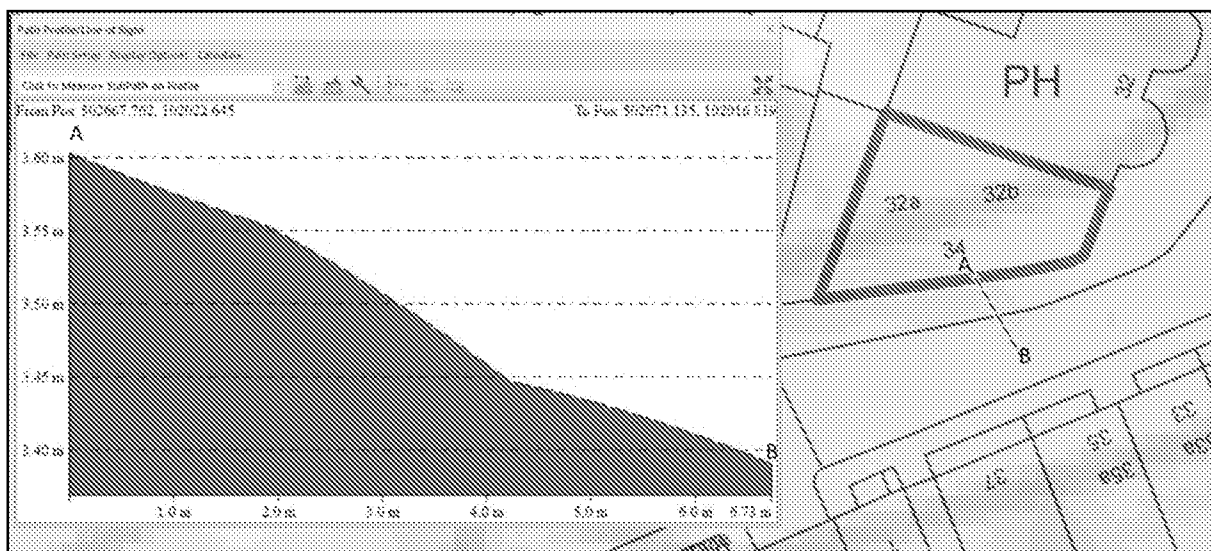


Figure 13 External Topographic Levels (Sources: EA 2m LiDAR, OS)

8. Flood Risk Management Measures

Flood Risks

- 8.1 The site is located in Flood Zone 3 (High Risk of flooding as defined in the NPPF) according to the EA Flood Map for Planning, as such the development will require flood mitigation measures.
- 8.2 The controlling residual flood risk mechanism on site is tidal. Tidal flooding is generally caused by low pressure weather systems creating storm-surges (or storm tides), chiefly via high speed winds. These winds (and to a certain extent, the low pressure) create a 'bulge' of water which, if it coincides with high tide, can generate very high, stormy, water levels. However, because this mechanism is well understood, it is very likely that an early warning will be issued before such an event strikes. As such, it is very unlikely that the site would be subject to tidal flooding without several hours of early warning. Section 9.4.1 of the Arun SFRA (2016) states that the lead time for EA Flood Warnings are at least 2 hours, with the aim to provide warning up to 24 hours in advance for the area of Littlehampton.
- 8.3 **Table 2 of the PPG Flood Risk and Coastal Change states that sites used for holiday or short-let (caravans and camping) use would be considered "More Vulnerable" subject to a specific warning and evacuation plan.**
- 8.4 As such, the following mitigation measures are recommended:
- Site owner(s) sign up to EA Flood Warning Service and make all site users aware of procedures to be adopted upon receipt of Flood Warning;
 - Formalisation of an evacuation plan to be implemented in the event of severe flood or weather warnings;
 - Basement to be of flood proof construction.
- 8.5 The site owner has advised that they are looking to install electric flood shutters to the 2 windows and front door of the property.
- 8.6 It is important to note that the existing defences offer a (present day) 1:300 year standard of protection, and that the Beach Head to Selsey Bill Shoreline Management Plan (2006) states that the management policy for Policy Unit 4d18 (Angmering-on-SEA to Littlehampton) and Policy Unit 4d19 is Hold the Line (HtL) for the long term. As such, although the EA data indicates that the site could be affected for the 1:200 year (2115) event, the Shoreline Management Plan indicates that the strategy is to maintain or improve the 1:300 year standard defences until at least 2105. As such, if the Shoreline Management Plan for this area is implemented, the development may benefit from the presence of defences to the 1:300 year standard over its lifetime.

Flood Warning Service

- 8.7 The proposed development site is located within an EA Flood Warning Service Area. As such, it is recommended that site users sign up to this service.
- 8.8 The EA operates a 24-hour telephone service on 0345 988 1188 that provides frequently updated flood warnings and associated floodplain information. Further information can be found on www.environment-agency.gov.uk/floodline. Floodline Warnings Direct is a free service operated by the EA that provides flood warnings direct to occupants by telephone, mobile phone, fax or pager.
- 8.9 Upon receipt of a Flood Warning, site users are advised to evacuate the site to a designated place of safe refuge within Flood Zone 1.

Flood Evacuation Plan

- 8.10 The development site includes three holiday let apartments.
- 8.11 The site owner/ management should sign up to the EA Flood Warning Service and ensure that this service is available to all maintenance staff. The site owner/ management are also responsible for ensuring all site users are aware of the risk of flooding and the procedures to adopt upon receipt of a Flood Warning.
- 8.12 Upon receipt of a Flood Warning, site users should exit the properties onto Surrey Street and travel north towards high street. They should bear left onto High Street and then turn right (north) onto Arundel Road. They should then continue north on Arundel Road for approximately 150m, at which point they should be located in Flood Zone 1, outside the undefended 1:200 year (2115) modelled flood extent. A number of properties in the area could provide a place of safe refuge, such as St James the Great Church on Arundel Road, or River Beach Primary School north of Franciscan Way. The proposed evacuation route and potential places of safe refuge is demonstrated in Figures 14 & 15 below.
- 8.13 When following the proposed evacuation route, site users should be in Flood Zone 1 within approximately 105m from leaving the site, and outside the undefended 1:200 year (2115) within approximately 250m from leaving the site.
- 8.14 The controlling residual flood risk mechanism on site is tidal. As this mechanism is well understood, it is very likely that an early warning will be issued before such an event strikes.
- 8.15 Section 9.4.1 of the Arun SFRA (2016) states that the lead time for EA Flood Warnings are at least 2 hours, with the aim to provide warning up to 24 hours in advance for the area of Littlehampton. As such, it is very unlikely that the site would be subject to tidal flooding without several hours of early warning, allowing for site users to evacuate the site and travel approximately 250m north of the site outside the 1:200 year (2115) undefended flood extent.
- 8.16 The proposed evacuation route and places of safe refuge should be agreed with the Local Planning Authority Emergency Planning Team and should be communicated to all site users upon booking of the property. The route, once confirmed, should also be included within any 'welcome packs' provided to guests arriving at the holiday let apartments. Signage should also be clear within the apartments detailing the flood evacuation procedures, similar to fire evacuation procedures.
- 8.17 Section 9.4 of the Arun SFRA (2016) states that:

"Arun District Council have drafted a Part 2 Multi-Agency Flood Plan for Bognor Regis, Littlehampton, Arundel and Pagham (MAFP). The Part 2 MAFP provides additional detail for the management of a flood incident for Bognor Regis, Littlehampton, Arundel and Pagham. The plan is owned by Arun District Council Emergency Planning Services and should be reviewed by the council at least every three years.

The aim of the MAFP is to set out the procedures for the multi-agency response and management to a flooding incident, as well as to provide site specific information to assist the implementation of evacuation if required. The plan applies for flooding from pluvial, sewer, groundwater and coastal sources. It aims to facilitate effective response to the threat of flooding by initiating a multi-agency response at the earliest possible stage.

The multi-agency response is divided into two levels: 'standby' and 'full activation'. The MAFP sets out the roles and responsibilities of Arun District Council, Sussex Police, West Sussex County Council and the Environment Agency under each of these levels."

- 8.18 The MAFP is unavailable for review at the time of writing. However, the SFRA continues to state that the MAFP sets out the Littlehampton Swimming and Sports Centre as an allocated emergency rest centre to provide temporary accommodation to those displaced in an extreme event. This rest centre is located in Flood Zone 3. However, the rest centre could be utilised by site users seeking emergency rest (once the EA lift the Flood Warning and it is deemed safe to do so) if the apartments are closed during their stay, if the property is flooded. This rest centre is located approximately 1.5km southeast of the development site, on Sea Road. In the first instance, site users should seek to follow the proposed evacuation route to the proposed places of safe refuge in Flood Zone 1/ outside the 1:200 year (2115) undefended flood extent, and then seek emergency rest at the Littlehampton Swimming and Sports Centre once Flood Warnings have been lifted, if alternative accommodation cannot be sought.
- 8.19 The above paragraphs details procedures that should be adopted should the apartments be in use upon receipt of a Flood Warning.
- 8.20 If the site owner/ management receives an EA Flood Warning when the site is not currently being let out/ in use, it is recommended that the apartments are closed and remain so until the Flood Warning is lifted. The site owner/ management are responsible for informing all upcoming site users/ bookings that the apartments are closed for the foreseeable future (until the Flood Warning is lifted). This may be result in bookings being cancelled/ suspended pending further details from the EA.**

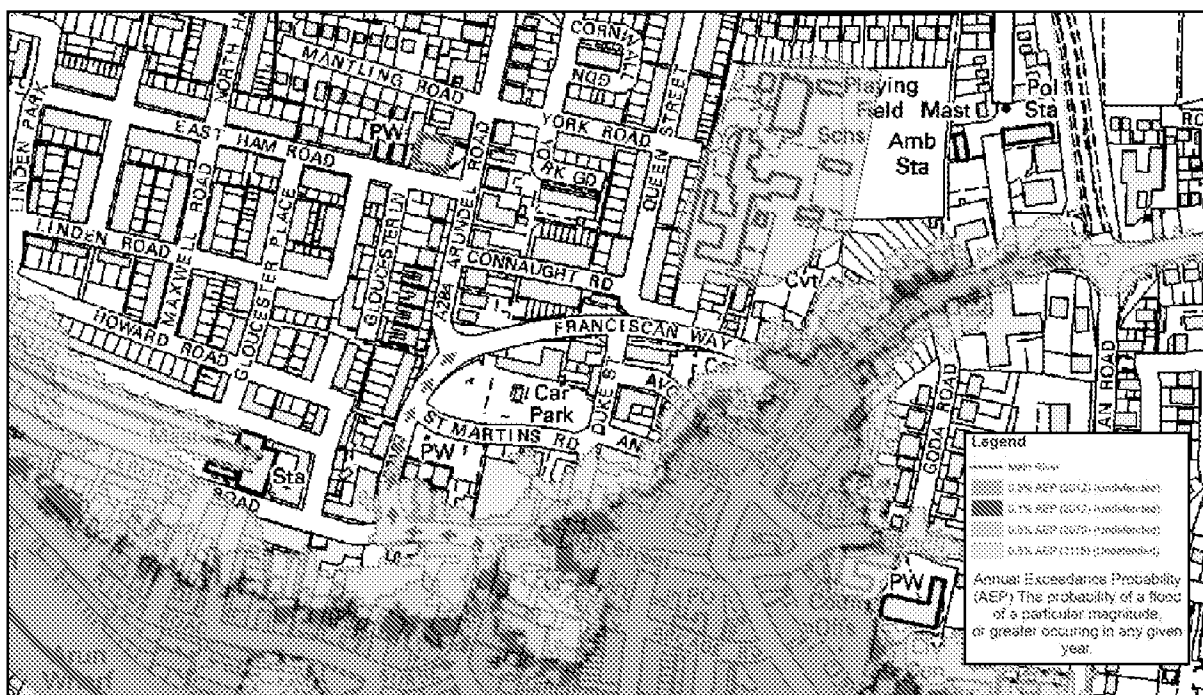


Figure 14 Proposed evacuation route (green arrows) and potential places of safe refuge -- shown as green polygons
(Source: EA)

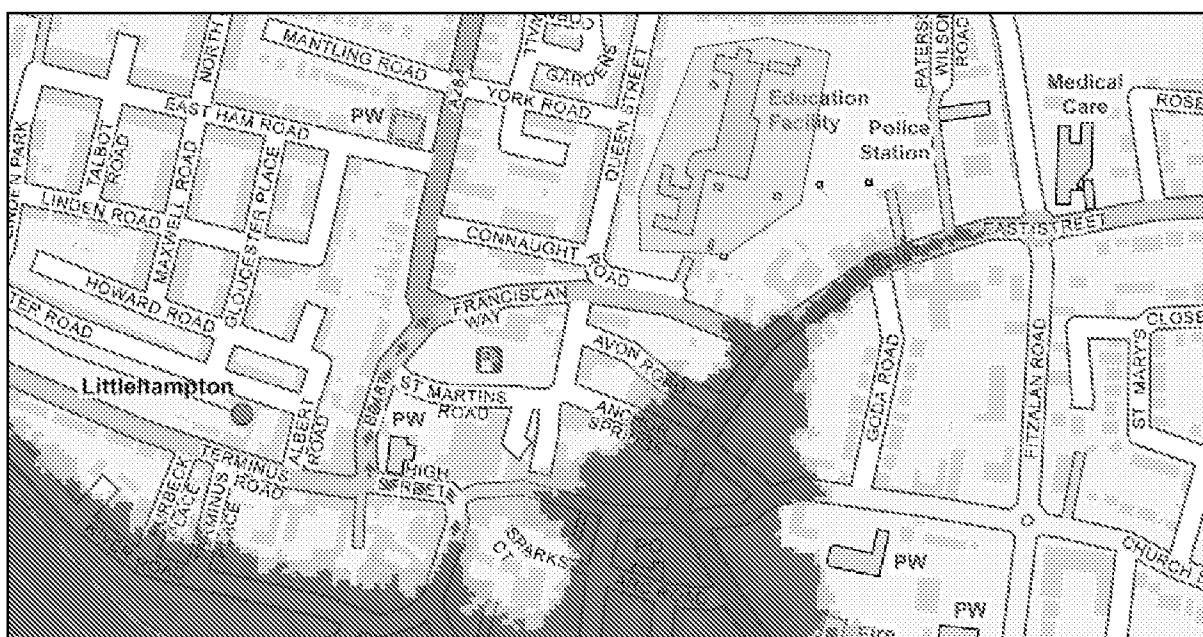


Figure 15 Proposed evacuation route (green arrows) and potential places of safe refuge -- shown as green polygons
(Source: EA)

9. Off Site Impacts

Impact to Flood Risk Elsewhere

- 9.1 The development is located within an area of tidal flood risk and is a change of use of an existing building. As such, there would be no increase in flood risk elsewhere.

Generation of Runoff

- 9.2 The retrospective application is for the change of use of part of the existing building. As such, it is understood that there was/ will be no external alterations as part of the scheme.
- 9.3 As such, there would be no impact on the surface water runoff regime on site and the development could continue to discharge via the existing surface water drainage mechanism.

10. Conclusion

- 10.1 Ambiental Environmental Assessment has been appointed by Caldotec on behalf of Peter Bedford to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the proposed development at 36-38 Surrey Street, Littlehampton, West Sussex, BN17 5BH.
- 10.2 The site is currently a commercial premises. It is understood that the development is for the conversion of the ground floor bookshop and basement office to create three self-contained holiday let apartments. The ground floor hairdressers are to be retained. It is understood that the application is retrospective.
- 10.3 With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located within Flood Zone 3.
- 10.4 Table 2 of the PPG Flood Risk and Coastal Change states that sites used for holiday or short-let (caravans and camping) use would be considered “More Vulnerable” subject to a specific warning and evacuation plan.
- 10.5 As a holiday let use, the site could be considered to have a 65 year lifetime – resulting in a lifetime until approximately 2083. Calculating the change in flood level per year between the 1:200 year (2070) and 1:200 year (2115) could be used to interpolate an estimated flood level for the 1:200 year (2083) undefended event. Based on 2m LiDAR data, the site could experience a potential maximum flood depth of 0.98m for the calculated 1:200 year (2083) undefended event.
- 10.6 The controlling residual flood risk mechanism on site is tidal. Tidal flooding is generally caused by low pressure weather systems creating storm-surges (or storm tides), chiefly via high speed winds. These winds (and to a certain extent, the low pressure) create a ‘bulge’ of water which, if it coincides with high tide, can generate very high, stormy, water levels. However, because this mechanism is well understood, it is very likely that an early warning will be issued before such an event strikes.
- 10.7 Section 9.4.1 of the Arun SFRA (2016) states that the lead time for EA Flood Warnings are at least 2 hours, with the aim to provide warning up to 24 hours in advance for the area of Littlehampton. **As such, it is very unlikely that the site would be subject to tidal flooding without several hours of early warning.**
- 10.8 It is important to note that the existing defences offer a (present day) 1:300 year standard of protection, and that the Beach Head to Selsey Bill Shoreline Management Plan (2006) states that the management policy for Policy Unit 4d18 (Angmering-on-sea to Littlehampton) and Policy Unit 4d19 is Hold the Line (HtL) for the long term. As such, although the EA data indicates that the site could be affected for the 1:200 year (2115) event, the Shoreline Management Plan indicates that the strategy is to maintain or improve the 1:300 year standard defences until at least 2105. **As such, if the Shoreline Management Plan for this area is implemented, the development *may* benefit from the presence of defences to the 1:300 year standard over its lifetime.**
- 10.9 The site owner has stated that they have already signed up to the EA Flood Warning Service, and that the housekeeper who currently lives on site is also signed up to this Service and is aware of the procedures in place. The site owner/ management are also responsible for ensuring all site users are aware of the risk of flooding and the procedures to adopt upon receipt of a Flood Warning.
- 10.10 The proposed evacuation route and places of safe refuge should be agreed with the Local Planning Authority Emergency Planning Team and should be communicated to all site users upon booking of the property. The route, once confirmed, should also be included within any ‘welcome packs’ provided to guests arriving at the holiday let apartments. Signage should also be clear within the apartments detailing

the flood evacuation procedures, similar to fire evacuation procedures. The site owner has advised that information of flooding is to be given on all booking websites.

10.11 If the site owner/ management receives an EA Flood Warning when the site is not currently being let out/ in use, it is recommended that the apartments are closed and remain so until the Flood Warning is lifted. The site owner/ management are responsible for informing all upcoming site users/ bookings that the apartments are closed for the foreseeable future (until the Flood Warning is lifted). This may be result in bookings being cancelled/ suspended pending further details from the EA.

10.12 The site owner has advised that they are looking to install electric flood shutters to the 2 windows and front door of the property.

10.13 As such, and given that:

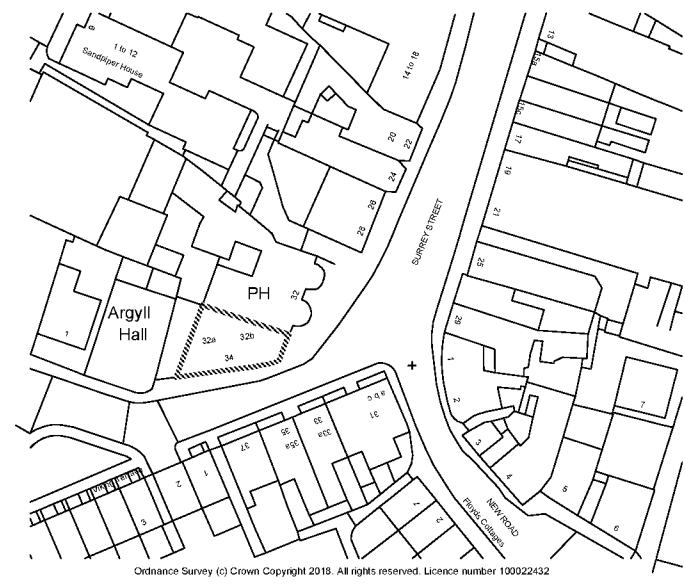
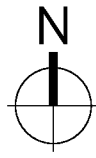
- The development is for the change of use of the existing building within a developed area;
- The development could be considered “More Vulnerable” under the NPPF;
- The site is located within an EA Flood Warning Area and within an area of tidal flood risk, which could provide sufficient warning to enable prior evacuation;

Following the guidelines contained within the NPPF, the proposed development is considered to be suitable assuming appropriate mitigation (including adequate warning procedures) can be maintained for the lifetime of the development.

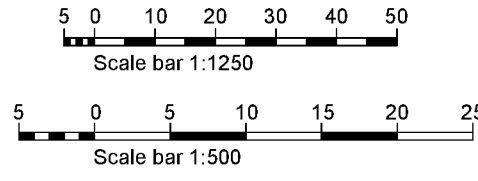
Appendix I - Site Plans



Block Plan 1:500



Location Plan 1:1250



Dimensions & Scales
Do not scale off this drawing unless for Local Authority purposes. The Contractor is responsible for checking all levels, site dimensions etc. prior to ordering materials and starting work on any element.

Any discrepancies or anomalies should be brought to the attention of Caldotec Ltd prior to commencement of the works.

Rev.	Details	Date



Caldotec Architectural
design

10-11 The Parade
Willowhayne Crescent
East Preston
West Sussex
BN16 1NS

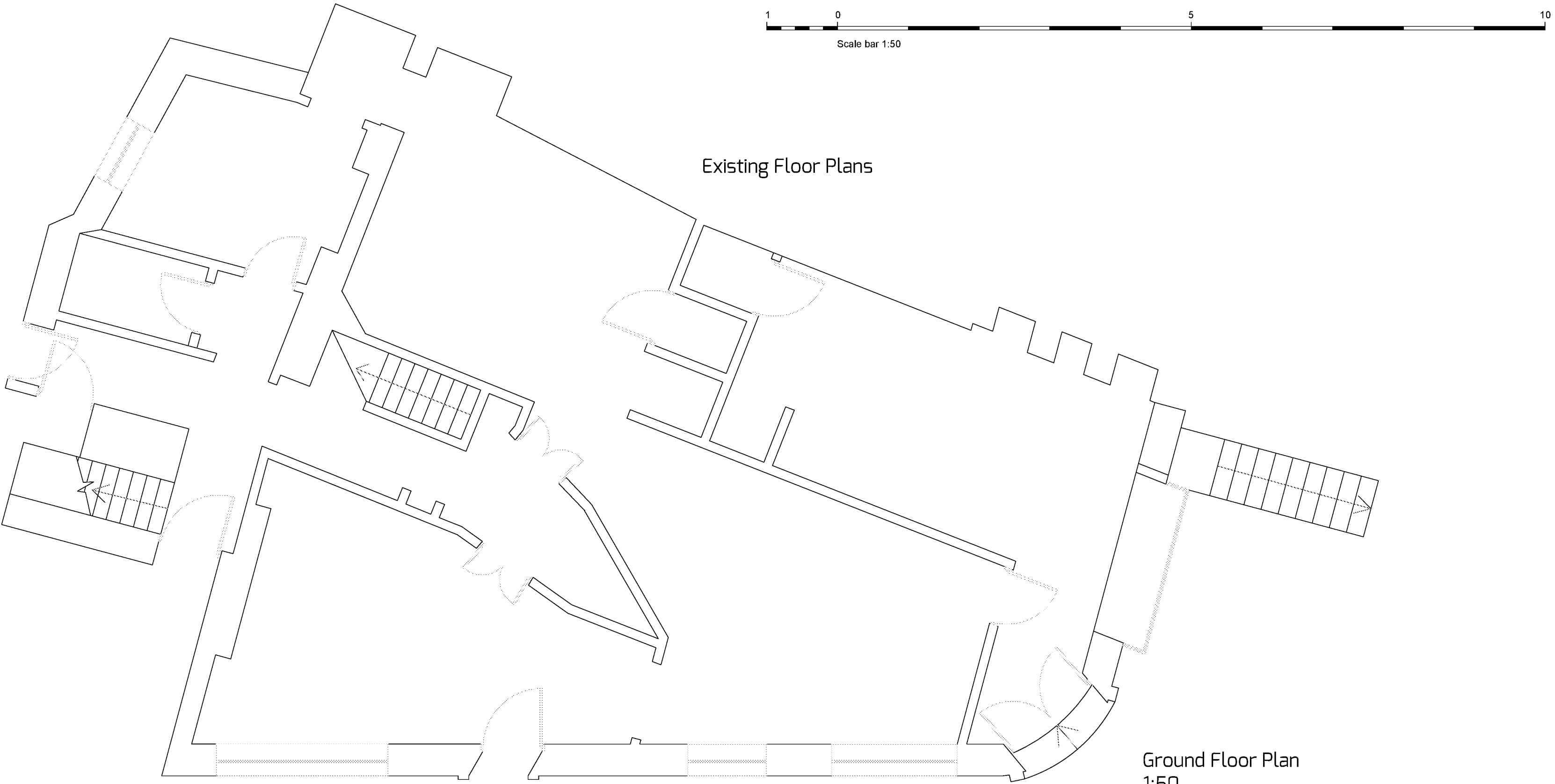
01903 859176
info@caldotec.co.uk
www.caldotec.co.uk

Issued for:	Drawn	Checked
Discussion	NJ	RM
Planning Application	NJ	RM
Building Control		
Construction Issue		
As Built		

Location & Block Plans

Client Mr P Bedford
Site Address
36-38 Surrey Street
Littlehampton
West Sussex
BN17 5BH

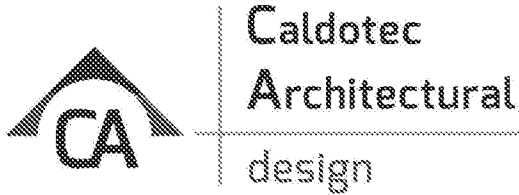
Printed As Shown on A3
Date 21/06/18
Drawing Number 17279/03



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Any discrepancies or anomalies should be brought to the attention of Caldotec Ltd prior to commencement of the works.

Rev.	Details	Date



10-11 The Parade
Willowhayne Crescent
East Preston
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BN16 1NS

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www.caldotec.co.uk

Issued for:	Drawn	Checked
Discussion	NJ	RM
Planning Application	NJ	RM
Building Control		
Construction Issue		
As Built		

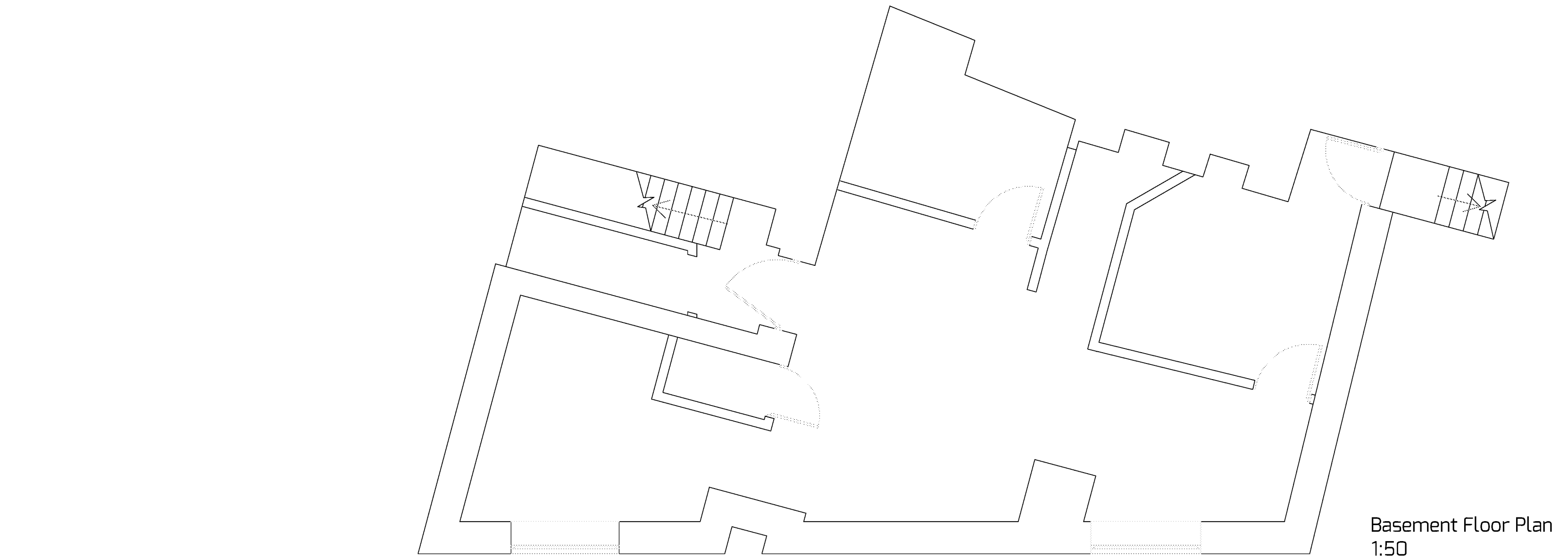
Existing Floor Plans

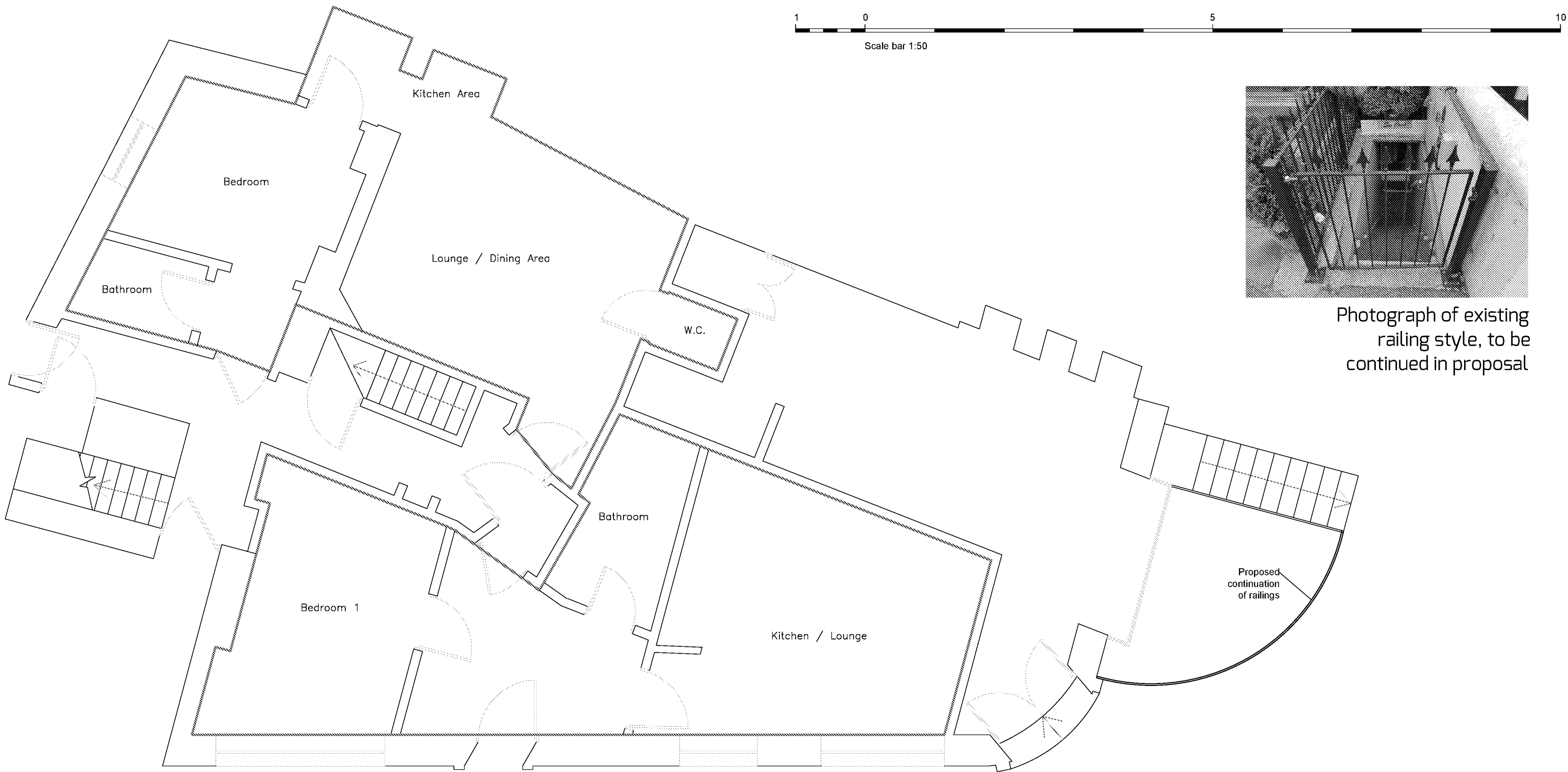
Client
Site Address
36-38 Surrey Street
Littlehampton
West Sussex
BN17 5BH

Mr P Bedford

Printed Date
Drawing Number

As Shown on A2
19/06/2018
17279/01

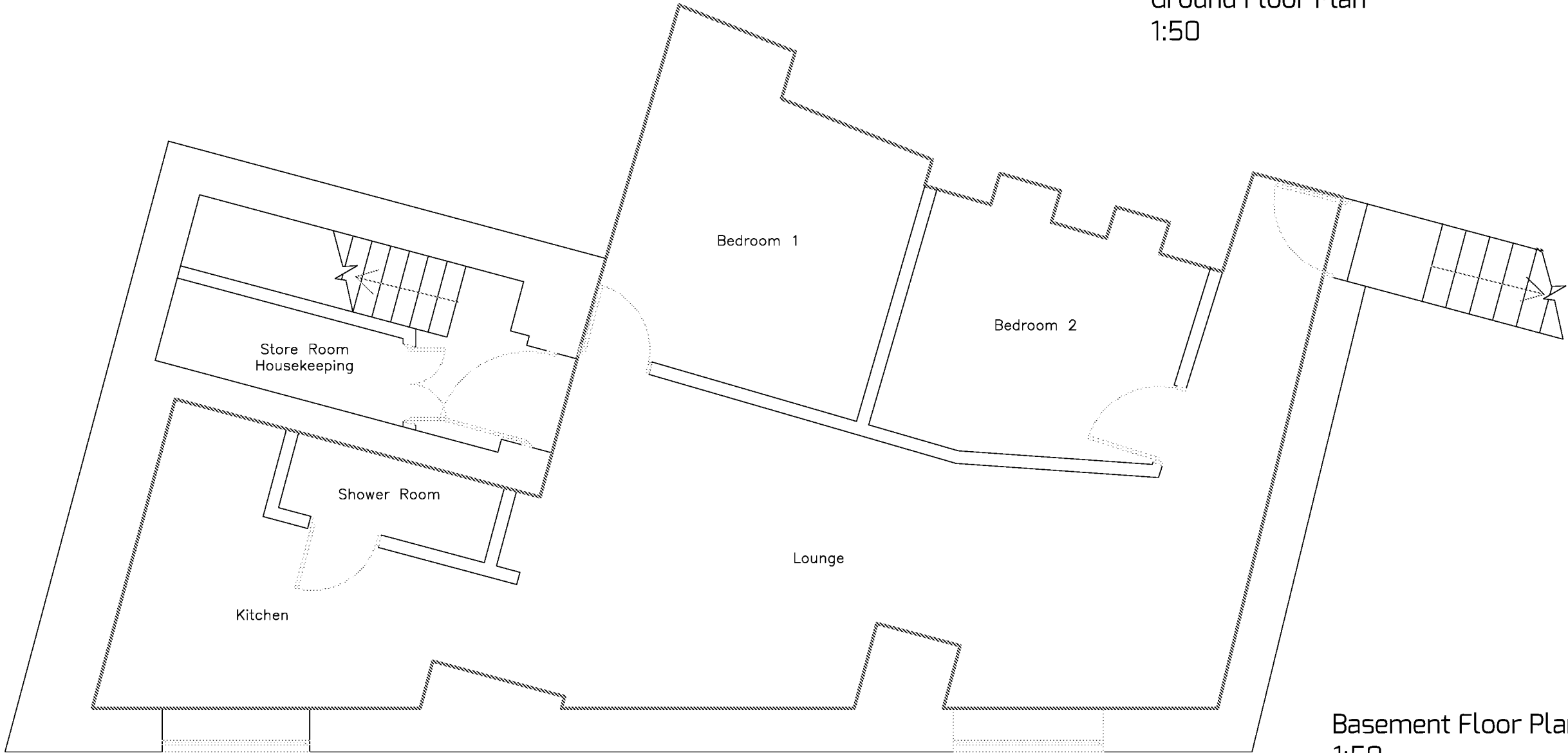




Photograph of existing railing style, to be continued in proposal

Proposed Floor Plans

Ground Floor Plan
1:50

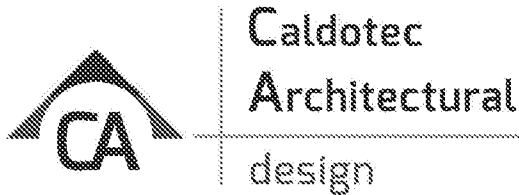


Basement Floor Plan
1:50

Dimensions & Scales
Do not scale off this drawing unless for Local Authority purposes. The Contractor is responsible for checking all levels, site dimensions etc. prior to ordering materials and starting work on any element.

Any discrepancies or anomalies should be brought to the attention of Caldotec Ltd prior to commencement of the works.

Rev.	Details	Date
R1	Client addition of railings	19/07/18
R2	Annotation update	23/07/18



10-11 The Parade
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Issued for:	Drawn	Checked
Discussion	NJ	RM
Planning Application	NJ	RM
Building Control		
Construction Issue		
As Built		

Proposed Floor Plans

Client
Site Address
36-38 Surrey Street
Littlehampton
West Sussex
BN17 5BH
Mr P Bedford

Printed Date
Drawing Number
As Shown on A2
23/07/2018
17279/02R2

Appendix II - EA Data

Thea Powell
Ambiental
Science Park Square
Brighton
BN1 9SB

Our ref: SSD105294
Your ref: 9992
Date: 13/11/2018

Dear Thea Powell,

Enquiry Regarding Product 4 for Flood Risk Assessment for St John's Church Hall
36-38 Surrey Street, Littlehampton, BN17 5BH

Thank you for your enquiry which was received on 25 October 2018.

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 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

There are flood defences in the form of a wall. The estimated standard of protection is 1 in 300 years (0.3% AEP). The asset is maintained privately.

Model Information

The model used was the Arun To Adur Coastal Modelling which was completed by JBA Consulting in 2012. A model update was run in 2017 to take into account the new flood defences.

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, **Arun District Council** for a more comprehensive flood history check.

FRA advisory text

Name	Product 4
Description	Detailed Flood Risk Assessment Map for St John's Church Hall 36-38 Surrey Street, Littlehampton, BN17 5BH.
Licence	<u>Open Government Licence</u>
Information Warnings	None
Information Warning - OS background mapping	<i>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.</i>
Attribution	Contains Environment Agency information © Environment Agency and/or database rights. Contains Ordnance Survey data © Crown copyright 2018 Ordnance Survey 100024198.

Data Available Online

Many of our flood datasets are available online:

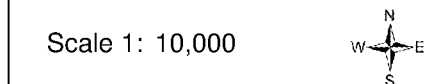
- [Flood Map For Planning \(Flood Zone 2, Flood Zone 3 ,Flood Storage Areas, Flood Defences, Areas Benefiting from Defences\)](#)
- [Risk of Flooding from Rivers and Sea](#)
- [Historic Flood Map](#)
- [Current Flood Warnings](#)

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,

Eleonora Pilla
FCRM Officer - PSO West Sussex

Flood Map for Planning (Rivers and Sea) created 13/11/2018



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

Flood Zone 3 shows the area that could be affected by flooding:

- from the sea with a 1 in 200 or greater chance of happening each year
- or from a river with a 1 in 100 or greater chance of happening each year.

Flood Zone 2 shows the extent of an extreme flood from rivers or the sea with up to a 1 in 1000 chance of occurring each year.



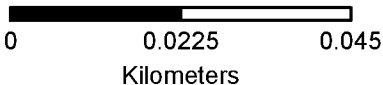
Environment
Agency



Legend

- Node_Points
- ==== Main River

Scale: 1:1,000



Product 4 Flood Risk Data Requested by: Ambiental

Site: St John's Church Hall, 36-38 Surrey Street, Littlehampton, BN17 5BH

Table 1: Water Levels: Tidal Undefended

Node Ref	NGR		Modelled Flood Levels in Metres AOD			
	Eastings	Northings	Undefended Annual Exceedance Probability			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502668	102020	3.74	4.33	4.92	4.05

Table 2: Water Levels: Tidal Defended (2017 update)

Node Ref	NGR		Modelled Flood Levels in Metres AOD			
	Eastings	Northings	Defended Annual Exceedance Probability			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502668	102020	-	-	4.10	-

Table 3: Water Depths: Tidal Undefended

Node Ref	NGR		Modelled Flood Depths in Metres			
	Eastings	Northings	Undefended Annual Exceedance Probability			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502668	102020	0.23	0.82	1.41	0.54

Table 4: Water Depths: Tidal Defended (2017 update)

Node Ref	NGR		Modelled Flood Depths in Metres			
	Eastings	Northings	Defended Annual Exceedance Probability			
			0.5%	0.5% (2070)	0.5% (2115)	0.1%
1	502668	102020	-	-	0.59	-

All levels taken from: Arun to Adur Coastal Modelling, 2012, JBA Consulting. A model update was run in 2017 to take into account the new flood defences.

Produced on: 13/11/2018

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

Office Address: Guildbourne House, Chatsworth Road, Worthing BN11 1LD.





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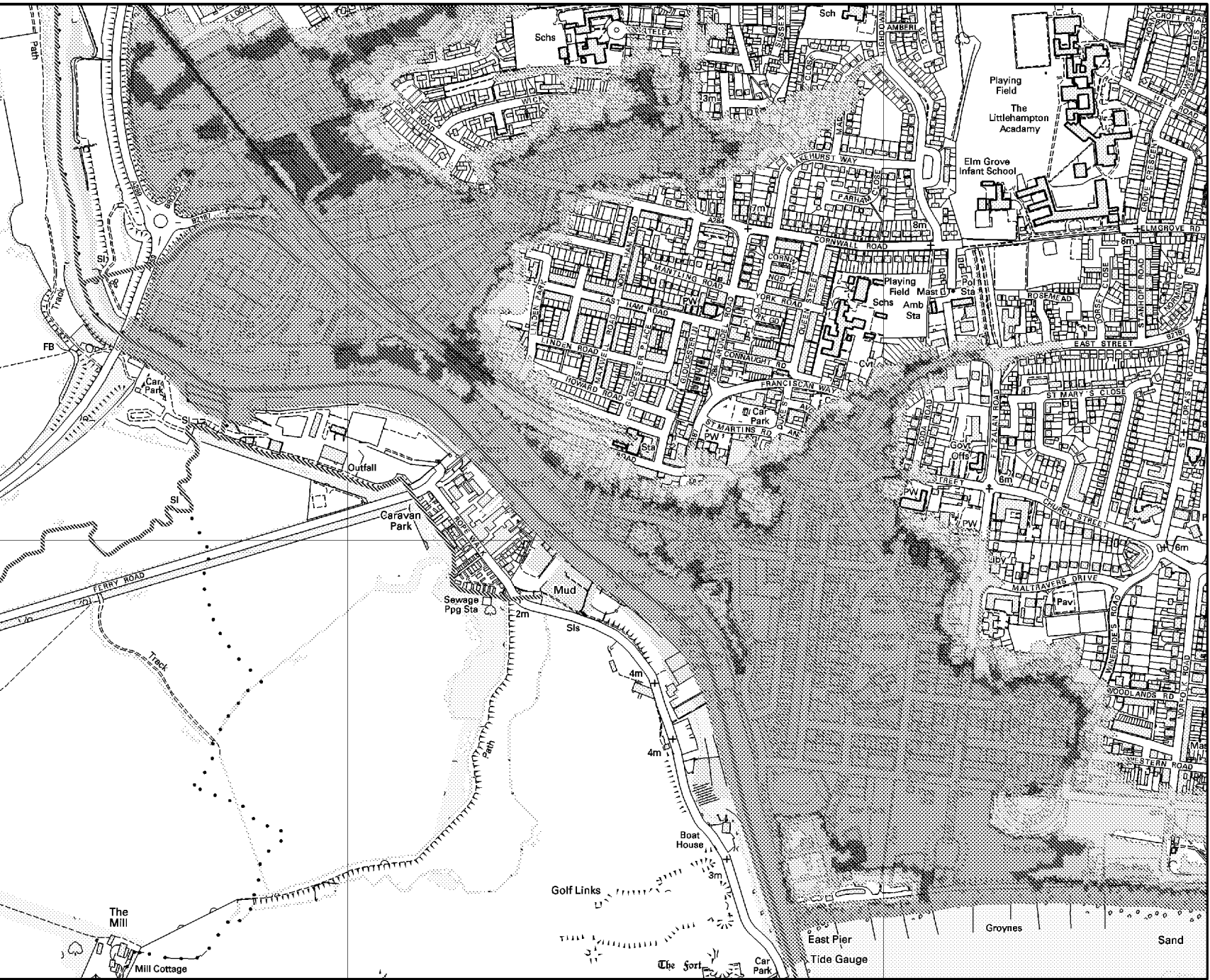
- Main River
- 0.5% AEP Defended Tidal
- 0.1% AEP Defended Tidal
- 0.5% AEP (2065) Defended Tidal
- 0.5% AEP (2115) Defended Tidal

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

Scale: 1:10,000

00.2250.45

Kilometers





Environment
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Legend

- Main River
- 0.5% AEP (2012) (Undefended)
- 0.1% AEP (2012) (Undefended)
- 0.5% AEP (2070) (Undefended)
- 0.5% AEP (2115) (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

00.2250.45

Kilometers

Appendix III - Supplementary Information

