

AMBI^{IENTAL}

ENVIRONMENTAL ASSESSMENT

Flood Risk Assessment 5930

13 Elm Drive,
Bognor Regis,
PO22 6JE

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Document Issue Record

Project: Phase 1 Flood Risk Assessment

Prepared for: Julia Maynard

Reference: 5930

Site Location: 13 Elm Drive, Bognor Regis, PO22 6JE

Proposed Development: It is understood that the development is for the demolition of the existing residential dwelling on site, followed by the construction of a replacement dwelling, with a larger built footprint.

Consultant		Date	Signature
Author			
Document Check			
Authorisation			

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1. Summary

- 1.1 Ambient Environmental Assessment has been appointed by Julia Maynard to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the proposed development at 13 Elm Drive, Bognor Regis, PO22 6JE.
- 1.2 The existing site is currently a residential dwelling. It is understood that the development is for the construction of a replacement larger dwelling.
- 1.3 With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located within Flood Zone 3. Tidal Flood Zone 3 has a high probability of greater than 1 in 200 (0.5%) of flooding from seas or tidal estuaries in any year. The proposed development is considered “More vulnerable” under the NPPF.
- 1.4 Due to the nature of tidal flooding, there is a long warning period ahead of a tidal flood event occurring. As such, the site owner, management staff and residents would have extended response time in which to act when alerted of the possibility of a tidal flood event. Furthermore, the proposed site use is for holiday let so it is anticipated that occupants would be able to pack up and leave the site quickly, if needed.
- 1.5 Given the tidal nature of the flood mechanisms and the defences in the area, large flood depths on site are not expected to occur suddenly. Flooding would likely occur as a result of overtopping of defences in a gradual manner as tide levels rise. This should give site users enough time to evacuate the property while flood depths are low.
- 1.6 Flood Warnings can be issued at any time to provide as much lead time as possible. The EA aim to provide a minimum of 1-2 hours lead time Flood Warnings on rivers and 6 hours for tidal or coastal locations. Given that this location is within a tidal floodplain, it can be assumed that at least 6 hours warning will be given.
- 1.7 The maximum duration of a tidal flood event is assumed to be approximately 12 hours (length of the tidal cycle). However, depending on the size of the storm it is expected that a flood event would be significantly less than 12 hours as flood waters would recede as the tide level decreases.
- 1.8 As such, and given that:
 - The proposed development is for the construction of a replacement residential dwelling, located in an existing developed residential area.
 - All sleeping accommodation is to be located on the first floor and above.
 - Additional flood resilience measures are to be incorporated into the design of the replacement dwelling, providing betterment over the existing situation.
 - Residents to sign up to the EA flood warning and alert system and have an evacuation plan in place.
- 1.9 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:	Existing residential dwelling	Demolition of existing dwelling and construction of a replacement two-storey dwelling, with a larger built footprint.
Number of Bedrooms:	N/A	4no. bedrooms
EA Vulnerability Classification:	More vulnerable	More vulnerable
Ground Floor Level:	Existing ground levels are circa 3.60mAOD, according to the topographic survey.	
Level of Sleeping Accommodation:	N/A	First floor
Impermeable Surface Area:	Existing built footprint is approx. 81m ²	Proposed built footprint is approx. 183m ²
Surface Water Drainage:		
Site Size:	582m ²	
Risk to Development	Summary	Comment
EA Flood Zone:	Flood Zone 3	
Flood Source:	Tidal	
1:200 Year Flood Level	-	
1:200 Year Flood Level & Climate Change	-	
1:1000 Year Flood Level	-	
Recorded Flood Events in Area:	Yes	1997 flood event in Climping, according to EA flood records
Recorded Flood Events at Site:	No	EA flood records
SFRA Available:	Yes	Arun District Council SFRA (2016)
Management Measures	Summary	Comment
Ground floor level above extreme flood levels:	-	
Safe Access/Egress Route:	Yes	See Section 7
Flood Resilient Design:	Yes	See Section 7
Site Drainage Plan:		
Flood Warning & Evacuation Plan:	Yes	EA Flood Alert/Warning Service Area
Offsite Impacts	Summary	Comment
Displacement of floodwater:		
Increase in surface run-off generation:		
Impact on hydraulic performance of channels:		

Table 1 Summary of flood risks, impacts and proposed flood mitigation measures.
 N/A¹ not required for this assessment; N/A² data not available.

2. Development Description and Site Area

Proposed Development and Location

- 2.1 The proposed development is located at 13 Elm Drive, Bognor Regis, PO22 6JE (Figure 1).
- 2.2 The site currently comprises of an existing residential dwelling. It is understood that the development is for the demolition of the existing dwelling, followed by the construction of a replacement dwelling, with a slightly greater built footprint. Plans of the proposed development are in Appendix 1.
- 2.3 Existing ground levels are between 3.60mAOD and 3.70mAOD, according to the topographic survey provided by the client (see Appendix 1). The site topography is generally flat.

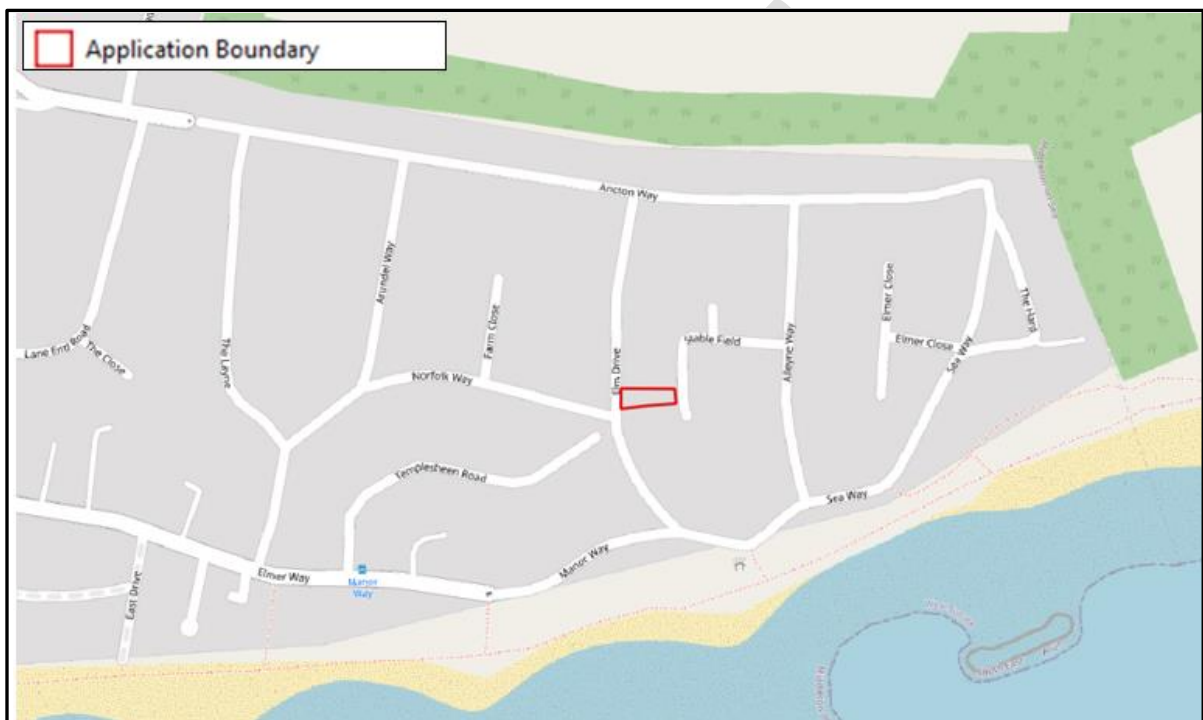


Figure 1 Location Map, identifying the location of the proposed development (Source: OS)

Vulnerability Classification

- 2.4 The EA Flood Map for Planning (Figure 2) demonstrates that the proposed development lies within Tidal 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.
- 2.5 Under Table 2 of the Flood Risk and Coastal Change Planning Practice Guidance and the principles of the National Planning Policy Framework (NPPF), the existing site is classified as 'More Vulnerable', due to its residential usage. The proposal is for the demolition of the existing dwelling and construction of a replacement dwelling. As such, post-development, the NPPF flood risk vulnerability will be unchanged compared to the existing situation.

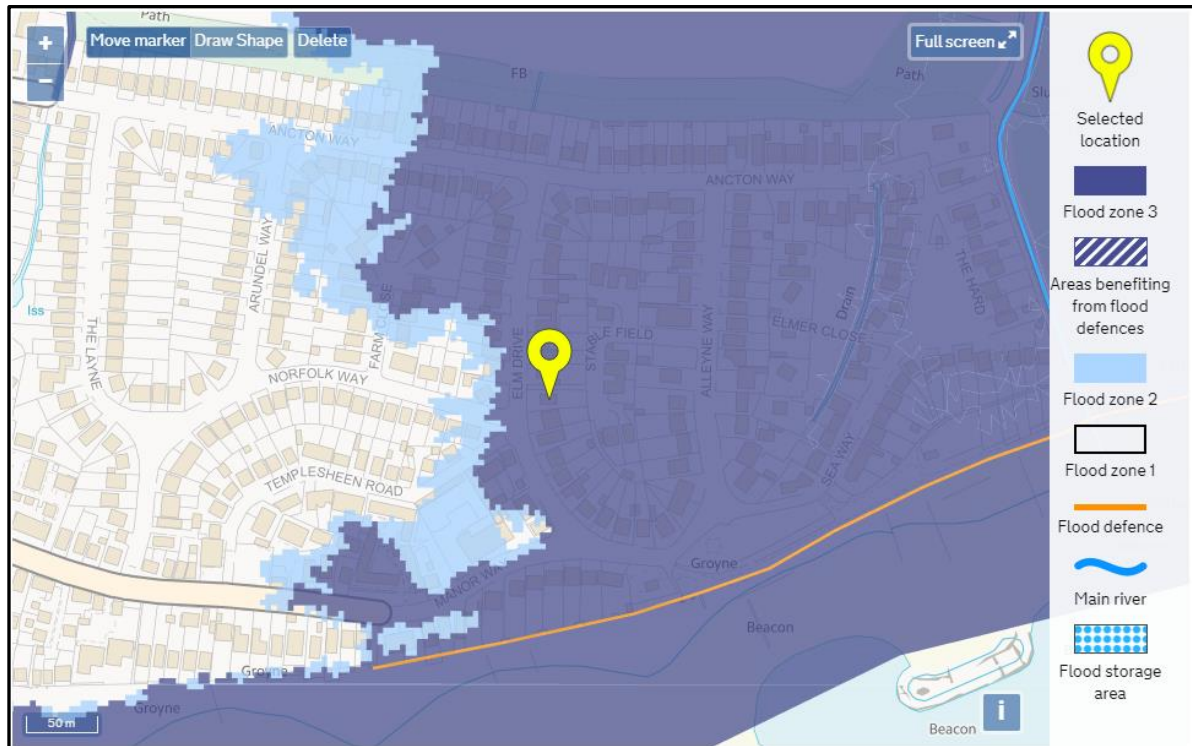


Figure 2 EA Flood Map for Planning (Source: EA)

Geology

- 2.6 The British Geological Survey (BGS) Geology of Britain Viewer indicates that the bedrock underlying the site is Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (undifferentiated), which predominantly comprises of chalk. (Source: BGS). This formation is considered to be a Principal aquifer (Source: EA; Magic Map online resource. See Figure 3). A Principal aquifer is highly permeable, supporting water supply and/or river base flow on a strategic scale.
- 2.7 The British Geological Survey (BGS) Geology of Britain Viewer indicates that the superficial deposits underlying the site are Raised Beach Deposits, 1, comprising of sand and gravel (Source: BGS). This formation is a Secondary 'A' aquifer (Source: EA; Magic Map online resource. See Figure 4). A Secondary 'A' aquifer is permeable, supporting water supplies at a local scale and may contribute to base flow of rivers.
- 2.8 The site is not within an area identified as an EA groundwater Source Protection Zone, according to the online Magic Maps. This is shown in Figure 5.

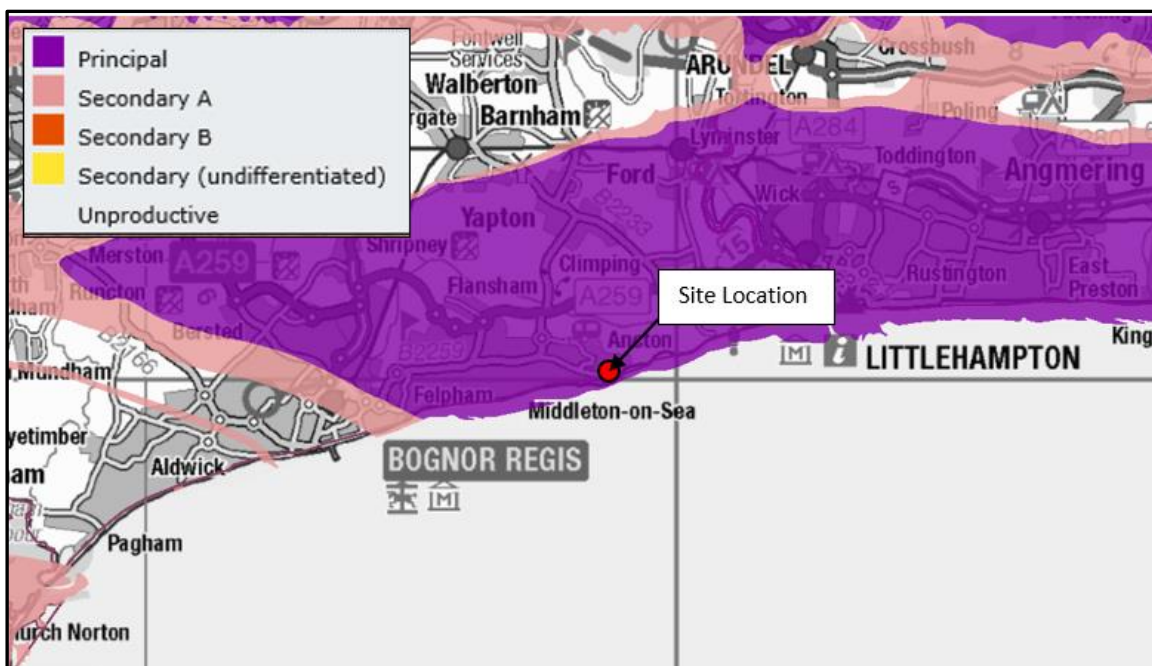


Figure 3 Aquifer Designation of Bedrock Geology, indicating location of site (Source: MagicMap online)

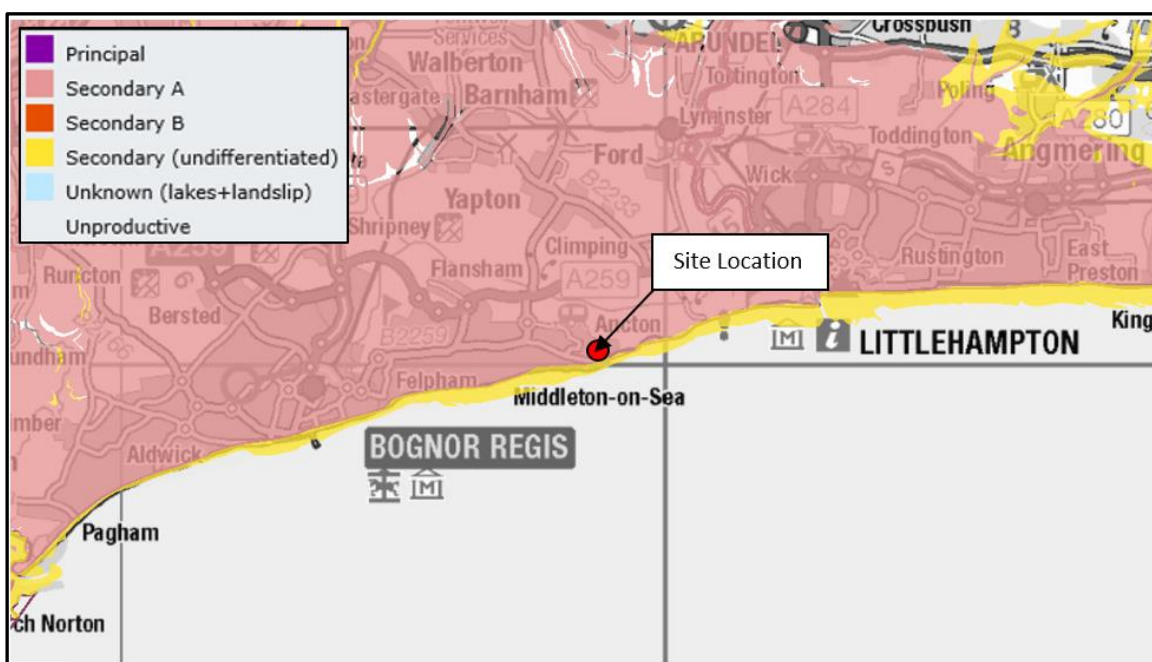


Figure 4 Aquifer Designation of Superficial Deposits, indicating location of site (Source: MagicMap online)

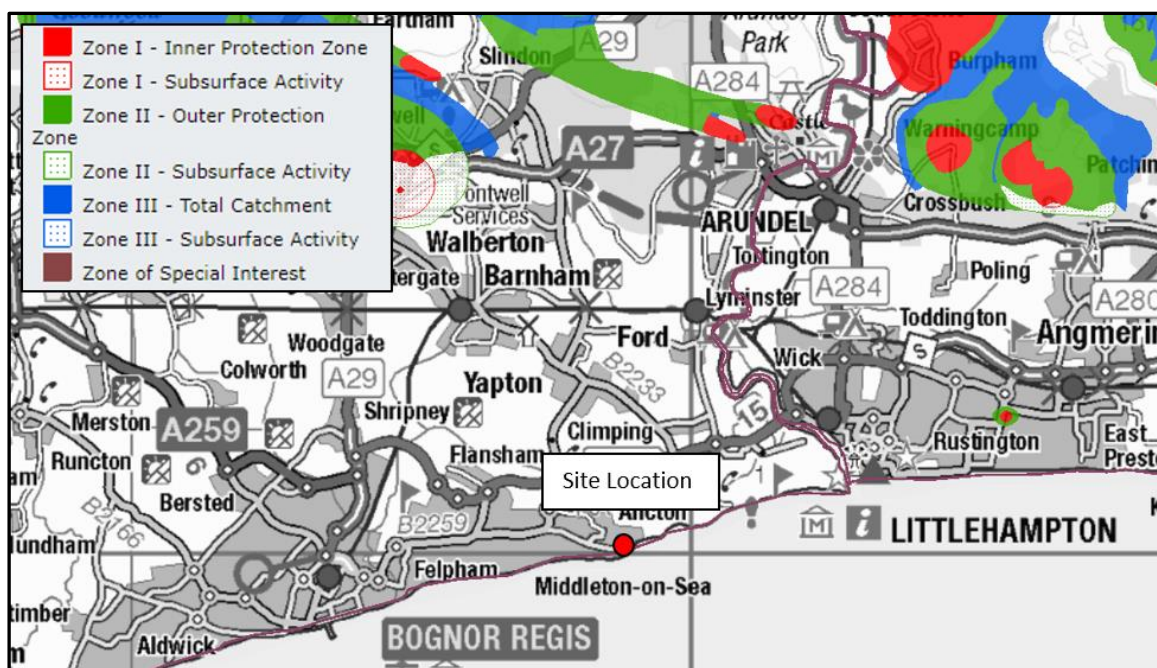


Figure 5 EA Groundwater Source Protection Zones, indicating location of site (Source: Magic Map online)

3. Sequential Test/Exception Test

- 3.1 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. 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 Functional Floodplain	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.

- 3.2 The proposal is considered as a 'More Vulnerable' development, under the NPPF guidance. The site is located in an area of Flood Zone 3. As indicated in Table 2 above, 'More Vulnerable' developments located in Flood Zone 3 are required to be submitted alongside an Exception Test. In accordance with this, the proposed development is required to have an Exception Test.
- 3.3 Paragraph 160 of the Flood Risk and Coastal Change Planning Practice Guidance states, for the Exception Test to be passed, it should be demonstrated that:
- The development would provide wider sustainability benefits to the community that outweigh the flood risk; and
 - The development would be safe for its lifetime without increasing flood risk elsewhere and, where possible, will reduce flood risk overall.
- 3.4 All developments in Flood Zones 2 and 3 require a site-specific flood risk assessment to be submitted alongside the planning application.
- 3.5 With specific reference to Paragraph: 033 Reference (ID: 7-033-20140306) of the NPPG, which states that when applying the Sequential Test, a pragmatic approach on the availability of alternatives should be taken. For example, in considering planning applications for extensions to existing business premises it might be impractical to suggest that there are more suitable alternative locations for that development elsewhere. For nationally or regionally important infrastructure the area of search to which the Sequential Test could be applied will be wider than the local planning authority boundary.
- 3.6 Given the proposed development is for the construction of replacement residential dwelling, and that residential is already established on site and in the surrounding area, it would be unreasonable to suggest that the development could be located elsewhere. Betterment is to be provided over the existing situation by moving all sleeping accommodation upstairs and constructing the building using flood resilient materials.
- 3.7 Therefore, the proposed development is required to have a flood risk assessment, which demonstrates that the development will be safe for its lifetime without increasing flood risk elsewhere.

4. Site Flood Hazards

Sources of Flooding

- 4.1 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	Flood Zone 3
Fluvial	Elmer Rife
Surface	Very Low risk at site; High risk on Elm Drive
Groundwater	<i>'Potential for groundwater flooding to occur at surface'</i>
Sewer	Local area has been affected by sewer flooding in the past

Table 3 Summary of flood sources.

Tidal

- 4.2 With reference to the EA Flood Map for Planning (Figure 2), the site is shown to be located within Flood Zone 3 (high risk of flooding).
- 4.3 The Mean High-Tide Water Level for the English Channel is approximately 185m south of the site.

Fluvial

- 4.4 Elmer Rifer, an EA Main River, is located approximately 345m east of the site. This is a tributary of Ryebank Rife, which is further north of the site.

Surface Water (Pluvial)

- 4.5 The Environment Agency Flood Risk from Surface Water map (Figure 6) shows the site to be within an area of 'Very Low' risk of flooding from surface water. The road to the west of the site, Elm Drive, which provides the main access route, is shown to have areas of 'High' risk of flooding from surface water.
- 4.6 The following definitions of the annual surface water flood risk labels are given by the EA:
- 'High Risk'; >3.3% AEP (more often than 1 in 30)
 - 'Medium Risk'; 3.3% to 1.1% AEP (between 1 in 30 and 1 in 100)
 - 'Low Risk'; 1% to 0.1% AEP (between 1 in 100 and 1 in 1000)
 - 'Very Low Risk'; <0.1% AEP (less often than 1 in 1000)
- 4.7 Ambiental have assessed the Environment Agency's Risk of Flooding from Surface Water (RoFSW) dataset on our internal GIS software. The 1 in 30-year, 1 in 100-year and 1 in 1,000-year flood extents and depths have been reviewed, which are indicative of the 'High', 'Medium' and 'Low' risk extents on the Environment Agency Flood Risk from Surface Water map.

- 4.8 Following this assessment, it has been confirmed that the site is located wholly outside the modelled flood extents for the 1 in 30-year, 1 in 100-year and 1 in 1,000-year surface water events, as shown in Figures 7, 8 and 9 respectively.
- 4.9 As mentioned before, Elm Drive is shown to be affected by flooding directly in front of the site, in all modelled events. Access and egress routes are discussed in Section 7 of the report.

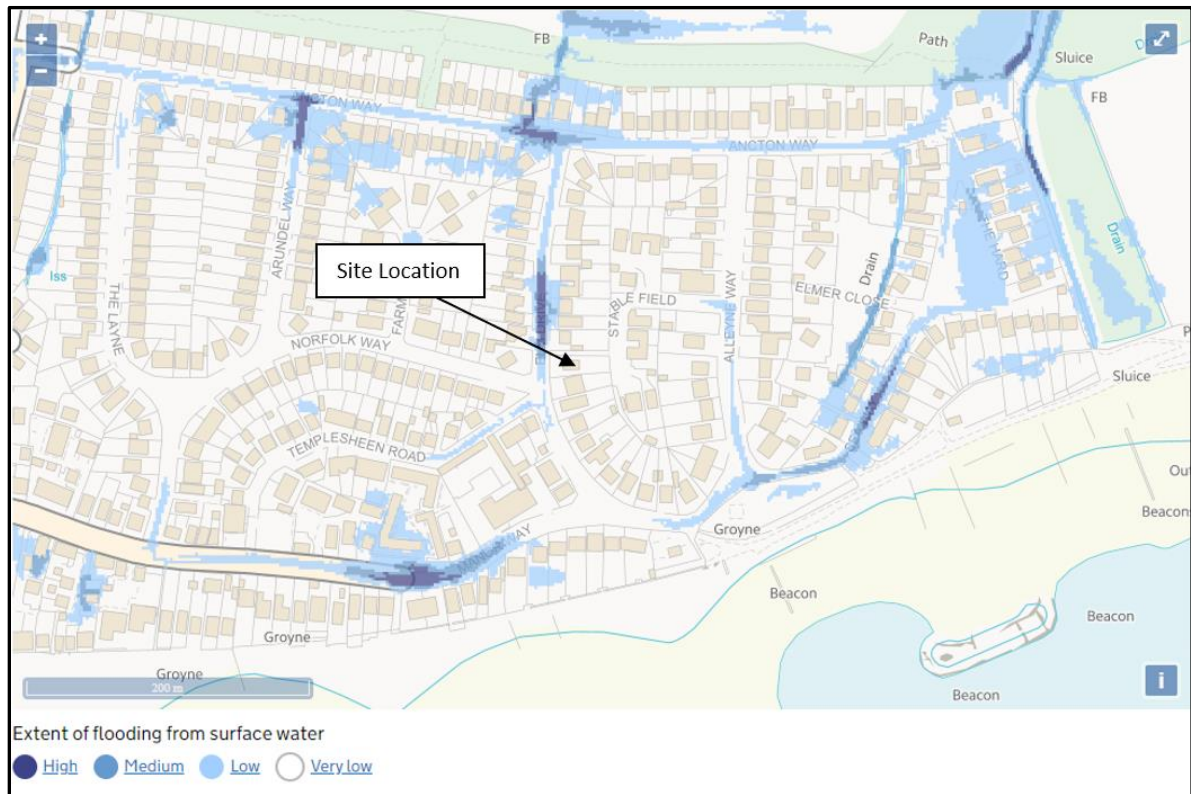


Figure 6 EA Surface Water Flood Risk Map. (Source: EA)

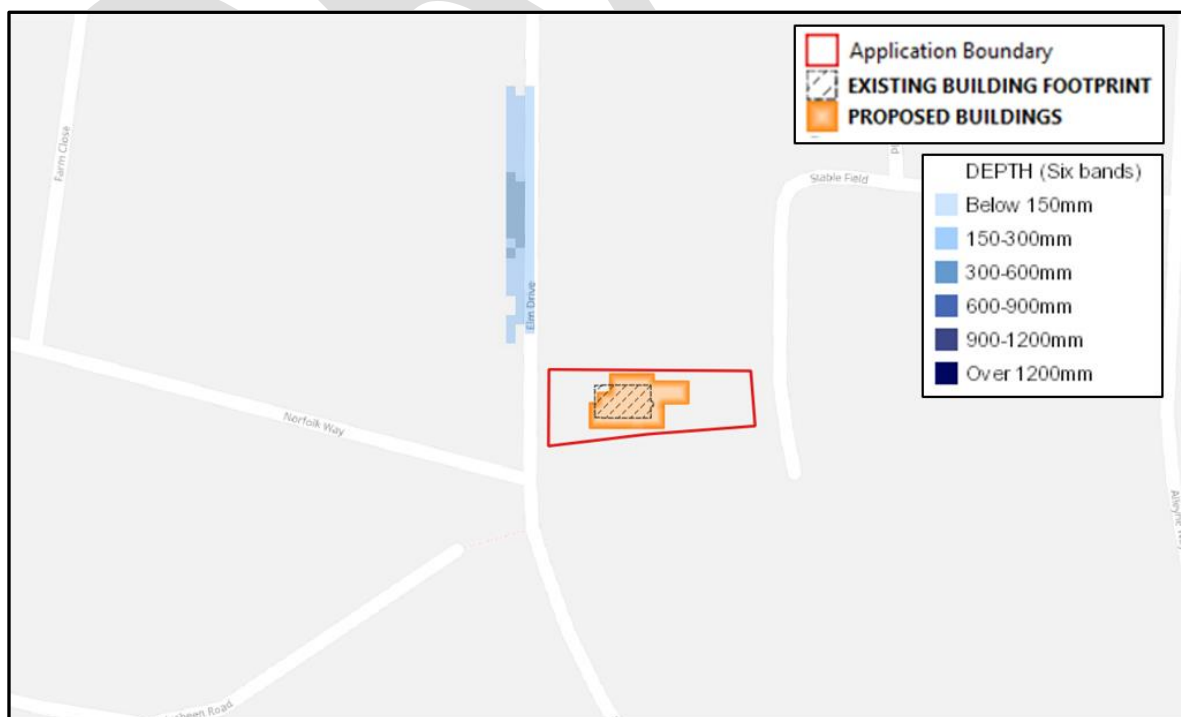


Figure 7 EA modelled 1 in 30-year surface water flood depths

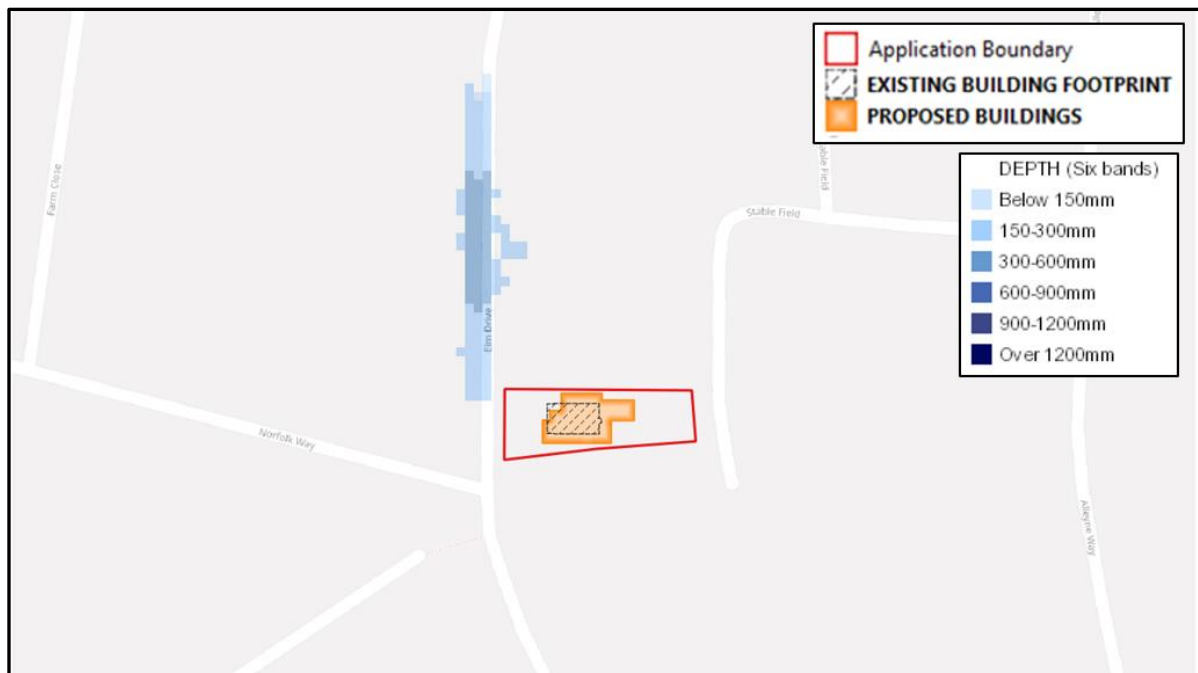


Figure 8 EA modelled 1 in 100-year surface water flood depths

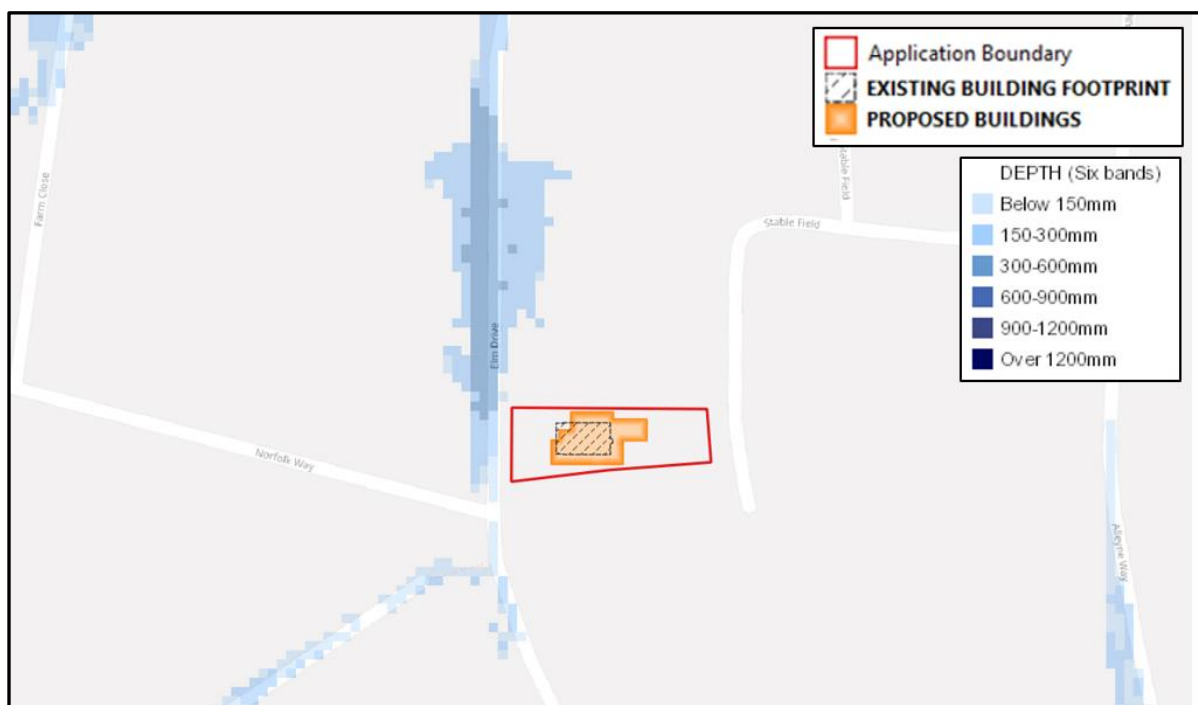


Figure 9 EA modelled 1 in 1,000-year surface water flood depths

Groundwater

- 4.10 Ambiental have used the British Geological Society's (BGS) Susceptibility to Groundwater Emergence mapping to discern whether there is any potential risk of flooding from groundwater at the proposed site.
- 4.11 As shown in Figure 10, the footprint of the proposed building is shown to be within an area identified as 'Potential for groundwater flooding to occur at surface'. This is considered as the highest risk category with regards to groundwater flooding.
- 4.12 As such, mitigation measures have been discussed in Section 7 of the report.

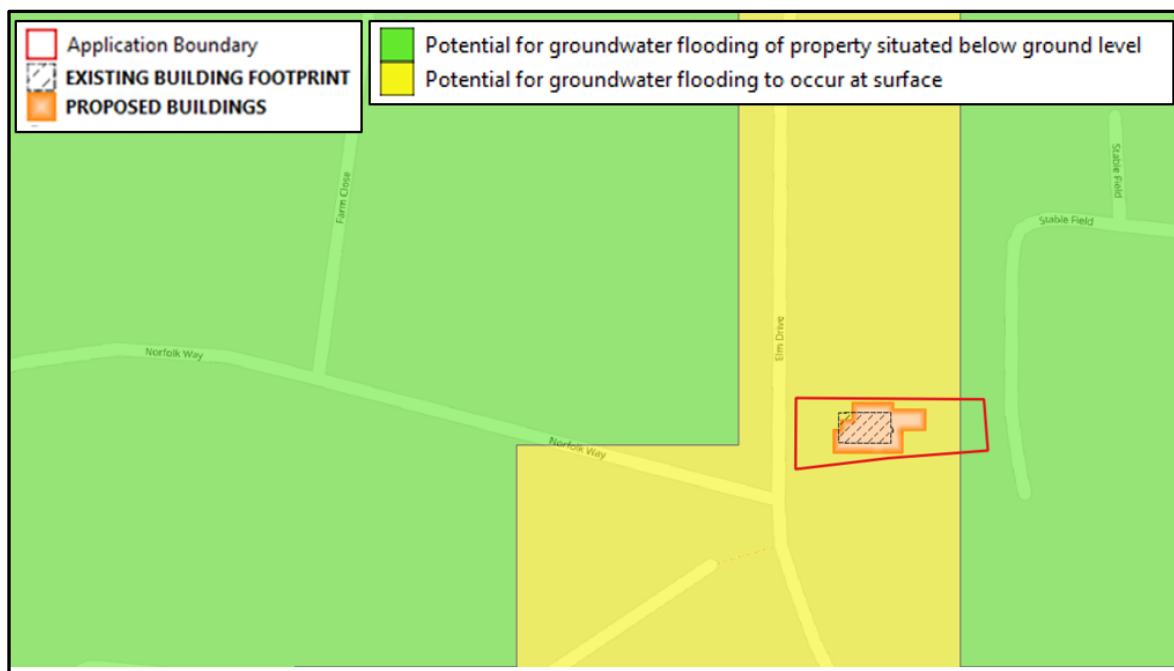


Figure 10 BGS Susceptibility to Groundwater Emergence mapping and location of proposed development

Sewer

- 4.13 Sewer Incident Report Form (SIRF) data was provided by Southern Water and included within the Arun District Council SFRA (2016). This data showed that there had been a total of 315 recorded flood incidents in the district, at the time at which the SFRA was written. There are 27 recorded incidences of sewer flooding within postcode area PO22 6, where the site is located. Due to the nature of this information, it is not known whether the existing property on site has been affected by sewer flooding in the past.
- 4.14 Any new sewer connection created as part of the development proposals should be first agreed with the local sewer provider and fitted with non-return valves to mitigate the risk of sewer flooding.

Surface Water Drainage Strategy

- 4.15 The site currently comprises of an existing residential dwelling. It is understood that the development is for the demolition of the existing dwelling, followed by the construction of a replacement dwelling, with a slightly greater built footprint.
- 4.16 In order to mitigate flood risk posed by the proposed development, adequate control measures are required to be considered. This will ensure that surface water runoff is dealt with at source and the flood risk on/off site is not increased over the lifetime of the development.
- 4.17 Ambiental have used the site plans provided by the client to draw an approximate built footprint of the existing and proposed dwellings, as well as the site boundary. The existing site has an area of approximately 582m². The residential dwelling currently on site has a built footprint of approximately 81m². The footprint of the proposed dwelling is approximately 183m². Given that the proposed development involves the demolition of the existing dwelling, a comparison of these built footprints demonstrates that there will be an increase in built footprint by approximately 102m².
- 4.18 If the site were 1 ha, the greenfield runoff rates would be 4.82 l/s. Using this value, the greenfield runoff rates for the site, which is 0.058ha, would be 0.279 l/s.

- 4.19 The site is positively drained as existing. Given that the proposal is for the replacement of the existing dwelling on site, with an increased built footprint, it is recommended that the surface runoff is discharged via the existing drainage infrastructure. Additional SuDS devices could be implemented to provide some additional betterment.

Records of Historical Flooding

- 4.20 The Arun District Council SFRA (2016) includes mapping of historic flood events. As indicated in Figure 11 below, the site is located in an area which has been affected by surface water flood events. It is not known whether the site has been affected by flooding in the past.

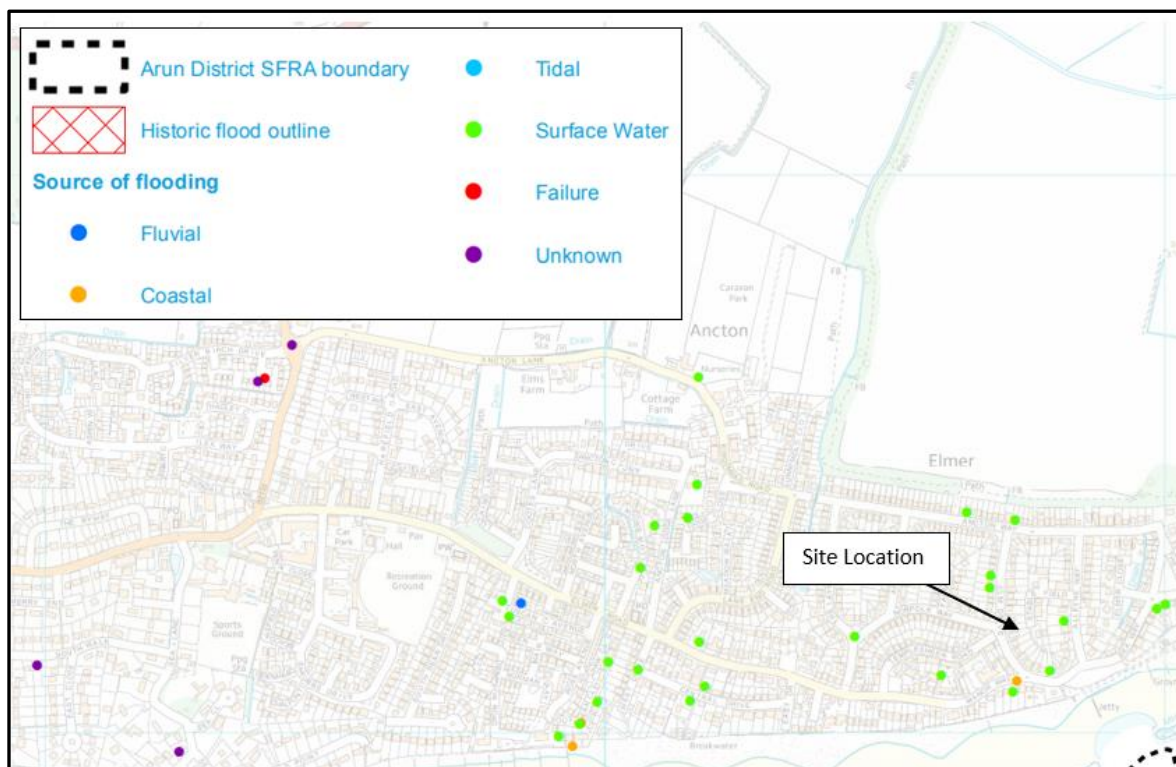


Figure 11 Extract from historic map in Arun DC SFRA (2016)

5. Probability of Flooding

Flood Zones

- 5.1 According to the EA Flood Map for Planning, the site is located within Flood Zone 3 (high risk of flooding).
- 5.2 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)

6. Residual Risks

Identification of Residual Risks

6.1 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

6.2 At the time of writing no information has been provided by the Arun SFRA (2016 update) or EA to indicate that the site is at risk of flooding from this source.

Reservoir Failure

6.3 The online EA Risk from Reservoir Flooding Map (Figure 12) demonstrates that the site is outside flood extents in the event of reservoir flooding.



Figure 12 EA Risk from Reservoir Flooding Map, showing approximate location of site (Source: EA)

Drainage Exceedance

- 6.4 In the event of drainage failure/exceedance, overland flows would be dictated by site topography. External levels should be designed to fall away from ground floor thresholds to direct overland flow away from the property and provide some mitigation against drainage exceedance.

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7. Flood Risk Management Measures

Flood Risks

- 7.1 The site currently comprises of an existing residential dwelling. It is understood that the development is for the demolition of the existing dwelling, followed by the construction of a replacement dwelling, with a slightly greater built footprint. Plans of the proposed development are in Appendix 1.
- 7.2 The site is in Flood Zone 3 (high risk of flooding), according to the EA Flood Map for Planning.
- 7.3 The different sources of flooding at the site of the proposed development have been summarised in the table below:
- 7.4 The site is in an EA Flood Alert/Warning Service Area, so residents should sign up to this service if they have not done so already. In the event of an EA Flood Warning, the site shall be evacuated for the duration of the warning.
- 7.5 The proposed replacement dwelling should incorporate flood resilience measures in line with current best practice for construction within an area at risk of flooding in line with CLG 2007 'Improving the Flood Performance of New Buildings'. It is also recommended that the proposed HMO is retrofitted with these flood resilience measures where possible. These measures are detailed below:
- Damp proof membranes should be included within the design of the dwelling to minimise the passage of water through ground floors. Impermeable polythene membranes should be at least 1200 gauge to minimise ripping. Effective methods of joining membrane sections are overlaps of 300mm, and also taping (mastic tape with an overlap of 50mm minimum). Care should be taken not to stretch the membrane in order to retain a waterproof layer.
 - Cavity insulation should preferably incorporate rigid closed cell materials as these retain integrity and have low moisture take-up. Other common types, such as mineral fibre, are not generally recommended as they can remain wet several months after exposure to flood water which slows down the wall drying process. Blown-in insulation can slump due to excessive moisture uptake, and some types can retain high levels of moisture for long periods of time (under natural drying conditions).
 - Avoid standard gypsum plasterboard as it tends to disintegrate when immersed in water.
 - Any new electrical sockets should be installed above flood level (0.3m) for ground floors to minimise damage to electrical services and allow speedy re-occupation.
 - Windows and patio doors are vulnerable to flood water and similar measures to those used for doors should be taken. Special care should be taken to ensure adequate sealing of any PVC window/door sills to the fabric of the house. Of concern would be excessive water pressure on the glazing of patio doors. Double glazing conforming to the relevant standards would, in principle, adequately resist the pressures generated by flood waters.

Flood Warning Service

- 7.6 It is recommended that residents are aware of the EA Flood Information service which identifies whether any flood warnings or alerts have been issued for a specific postcode or place in England or Wales: <https://flood-warning-information.service.gov.uk/>.

- 7.7 During periods of bad weather, site users should monitor local weather reports and sign up for the Met Office UK weather warnings. Warnings can be monitored through an Apple/Android app, Twitter or directly via emails. Further information can be found at <https://www.metoffice.gov.uk/>.
- 7.8 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.
- 7.9 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.
- 7.10 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.
- 7.11 If flood waters along the proposed evacuation route have exceed 25cm, site users are advised, if possible, to seek refuge at the upper floors on site.

What to do if you receive a Flood Alert

- 7.12 A flood alert means you need to prepare, flooding is possible. You should:

- check your flood risk - <https://flood-warning-information.service.gov.uk/long-term-flood-risk>
- sign up for flood warnings - <https://www.gov.uk/sign-up-for-flood-warnings>
- keep up to date with the latest situation - call Floodline on 0345 988 1188 or follow @EnvAgency and #floodaware on Twitter for the latest flood updates
- have a bag ready with vital items like insurance documents and medications in case you need to leave your home
- check you know how to turn off your gas, electricity and water mains supplies
- plan how you'll move family and pets to safety



What to do if you receive a Flood Warning

- 7.13 A flood warning means you need to act, flooding is expected. You should do all the actions for a flood alert but also:

- move vehicles to higher ground if it's safe to do so
- move family and pets to safety
- move important items upstairs or to a safe place in your property, starting with cherished items and valuables, then furniture and furnishings
- turn off gas, electricity and water supplies if it's safe to do so; never touch an electrical switch if you're standing in water
- if you have property protection products such as flood barriers, or air brick covers, use them now
- keep track of the latest situation - <https://flood-warning-information.service.gov.uk/warnings>



What to do if you receive a Severe Flood Warning

7.14 A severe flood warning means there is danger to life: you must act now:

- call 999 if you're in immediate danger
- follow advice from the emergency services and evacuate if you're told to do so
- make sure you have an emergency kit including a torch, spare batteries, mobile phone and charger, warm clothes, important numbers like your home insurance, water, food, first aid kit and any medicines and baby care items you may need
- alert neighbours and offer help if it's safe to do so
- avoid driving or walking through flood water: just 30cm (1 foot) of fast flowing water could move your car and even shallow moving water can knock you off your feet
- keep your family and pets away from floodwater – it may contain heavy debris, sharp objects, open manhole covers, sewage and chemicals
- wash your hands if you've been in contact with flood water which may contain toxic substances



Flood Evacuation Plan

- 7.15 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 water levels. This mechanism is well understood, so it is very likely that an early warning would be issued before a tidal flood event. Given the nature of the tidal cycle, flood waters on site would likely recede as in-channel water levels fall. It should be noted however that there may not be time to provide a Flood Warning in the event of the sudden and catastrophic failure of flood defences.
- 7.16 As with all Flood Evacuation Plans, in the first instance, all residents and occupants should always defer to, and cooperate with, the direction provided by "Blue Light Responders". This is especially true in areas which under normal circumstances would be protected by flood defences.
- 7.17 Upon receipt of a Flood Warning, site users are advised to evacuate the site to a designated place of safe refuge.

8. Off Site Impacts

Impact to Flood Risk Elsewhere

- 8.1 The proposed development is for the demolition of the existing dwelling on site, followed by the construction of a replacement building. The built footprint on site will increase by approximately 102m² post-development. Given that the site is in an area of Flood Zone 3, it is considered that there may be a displacement of floodwaters as a result of this development.

Generation of Runoff

- 8.2 The site currently comprises of an existing residential dwelling. It is understood that the development is for the demolition of the existing dwelling, followed by the construction of a replacement dwelling, with a slightly greater built footprint.
- 8.3 In order to mitigate flood risk posed by the proposed development, adequate control measures are required to be considered. This will ensure that surface water runoff is dealt with at source and the flood risk on/off site is not increased over the lifetime of the development.
- 8.4 The site is positively drained as existing. Given that the proposal is for the replacement of the existing dwelling on site, with an increased built footprint, it is recommended that the surface runoff is discharged via the existing drainage infrastructure. Additional SuDS devices could be implemented to provide some additional betterment.

9. Conclusion

- 9.1 Ambient Environmental Assessment has been appointed by Julia Maynard to undertake a National Planning Policy Framework (NPPF) compliant Flood Risk Assessment (FRA) for the proposed development at 13 Elm Drive, Bognor Regis, PO22 6JE.
- 9.2 The existing site is currently a residential dwelling. It is understood that the development is for the construction of a replacement larger dwelling.
- 9.3 With reference to the Environment Agency (EA) Flood Map for Planning, the proposed development is located within Flood Zone 3. Tidal Flood Zone 3 has a high probability of greater than 1 in 200 (0.5%) of flooding from seas or tidal estuaries in any year. The proposed development is considered “More vulnerable” under the NPPF.
- 9.4 Due to the nature of tidal flooding, there is a long warning period ahead of a tidal flood event occurring. As such, the site owner, management staff and residents would have extended response time in which to act when alerted of the possibility of a tidal flood event. Furthermore, the proposed site use is for holiday let so it is anticipated that occupants would be able to pack up and leave the site quickly, if needed.
- 9.5 Given the tidal nature of the flood mechanisms and the defences in the area, large flood depths on site are not expected to occur suddenly. Flooding would likely occur as a result of overtopping of defences in a gradual manner as tide levels rise. This should give site users enough time to evacuate the property while flood depths are low.
- 9.6 Flood Warnings can be issued at any time to provide as much lead time as possible. The EA aim to provide a minimum of 1-2 hours lead time Flood Warnings on rivers and 6 hours for tidal or coastal locations. Given that this location is within a tidal floodplain, it can be assumed that at least 6 hours warning will be given.
- 9.7 The maximum duration of a tidal flood event is assumed to be approximately 12 hours (length of the tidal cycle). However, depending on the size of the storm it is expected that a flood event would be significantly less than 12 hours as flood waters would recede as the tide level decreases.
- 9.8 As such, and given that:
- The proposed development is for the construction of a replacement residential dwelling, located in an existing developed residential area.
 - All sleeping accommodation is to be located on the first floor and above.
 - Additional flood resilience measures are to be incorporated into the design of the replacement dwelling, providing betterment over the existing situation.
 - Residents to sign up to the EA flood warning and alert system and have an evacuation plan in place.
- 9.9 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

Appendix II - EA Data

Appendix III - Supplementary Information