



# FloodSmart Pro

Site address	Athol Villa Westbourne Road College Town Sandhurst Surrey GU47 0QX
Site coordinates	485334, 161181
Report prepared for	Rio Homes 38 Fleet Road Fleet Hampshire GU51 4PW
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# 1. Executive summary

A review has been undertaken of national environmental data sets to assess the flood risk to the Site from all sources of flooding in accordance with The National Planning Policy Framework (NPPF) (2023) and National Planning Practice Guidance (NPPG) (2022). A site-specific flood risk assessment, to assess the flood risk to and from the development site, is provided within this concise interpretative report written by an experienced GeoSmart consultant. Baseline flood risk and residual risks that remain after the flood risk management and mitigation measures are implemented are summarised in the table below.

## Site analysis

Source of Flood Risk	Baseline	After Mitigation
River (fluvial) and Sea (coastal/tidal)	Very Low to Low	Very Low
Surface water (pluvial) flooding	Very Low to Low	Very Low to Low
Groundwater flooding	Negligible - Low	Negligible
Other flood risk factors present	No	N/A
Is any other further work recommended?	Yes	Yes (see below)

N/A = mitigation not required

The Site is currently used within a residential capacity comprised of two separate plots, with associated landscaped areas. One plot (Woodside) consists of a bungalow and garage and the other (Atholl Villa) as a two storey detached dwelling.

Development proposals comprise the demolition of the existing dwellings and the construction of 9 residential plots; comprised of eight 2-bedroom 2 story dwellings and one 1 bedroom first floor dwelling with a 3-space car port including the formation of new associated access, 15 outside parking spaces and landscaping. The flood risks from all sources have been assessed as part of this report and are as follows:

- According to the Environment Agency's (EA) Flood Map for Planning Purposes, the Site is partially located within a fluvial Flood Zone 2 (Medium probability), with the remainder of the Site within Flood Zone 1 (Low probability).
- There is an open surface water drainage ditch (Cove Brook) located adjacent to the northeastern Site boundary which then runs adjacent to the eastern boundary of the Site. Cove Brook is culverted in several places.

- The Site could potentially be at risk from flooding due to a blockage or failure of the culvert located on Cove Brook.
- According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map, which considers the type, condition and crest height of flood defences, the Site has a variable risk of flooding from Rivers and the Sea, ranging from Very Low to Low.
- The EA were contacted to obtain detailed flood data and national generalised (JFLOW) data was downloaded from the data.gov portal. However, the EA confirmed they do not hold detailed flood data and the JFLOW data obtained does not align with the Flood Zones in this area.

In order to calculate a flood level to inform the design of the proposed development, the Flood Zone 2 extent has been compared with a topographic survey of the ground levels on the Site. The resultant flood level has been used as a proxy for the 1 in 100 year plus 62% climate change event (the design flood level) which is 62.79 mAOD in the northern area and 62.43 mAOD in the southern area of the Site. These values are greater than the required 1 in 100 + 14% central climate change allowance due to a lack of detailed modelling on site.

Emergency evacuation routes are available to the west and south. In the event of a flood, safe refuge could also be taken at ground and 1<sup>st</sup> floor level, where Finished Floor Levels (FFL) are raised to the recommended level.

- According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site has a Low to Very Low risk of pluvial flooding.
- Groundwater Flood Risk screening data indicates there is a Low risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event.
- The risk of flooding from artificial (man-made) sources such as reservoirs, sewers and canals has been assessed:
  - The EA's Risk of Flooding from Reservoir map confirms the Site is not at risk of reservoir flooding.
  - Ordnance Survey (OS) data confirms there are no canals near to the Site.
  - A sewer flooding history search was undertaken with the utility provider and using the Strategic Flood Risk Assessment. This confirms no recorded incidences of sewer flooding at or within the vicinity of the Site

The risk of flooding from artificial sources is considered to be Negligible.

- The risk to the development has been assessed over its expected 100 year lifetime, including appropriate allowances for the impacts of climate change. More extreme weather events could increase the risk to the site from increases in river flooding and increased potential for surface water. Site specific assessment indicates risk to the Site is unlikely to increase significantly and appropriate mitigation measures are proposed.

## Recommendations

Recommendations for flood mitigation are provided below, based upon the proposed development and the flood risk identified at the Site:

- As there is a risk of flooding from Cove Brook (fluvial sources), Finished Floor Levels (FFL) of Units 7, 8 and 9 in the northern area of the Site will be set to at least 63.09 mAOD<sup>1</sup>.
- Units 1, 2, 3 and 4 in the southern area of the Site will set FFL's at least 62.73 mAOD<sup>2</sup>.

Although FFL can be raised for the proposed development at this Site, the following avoidance and resistance measures could also be considered as part of the design plans. Final details will be secured by planning condition:

- Passive flood door systems;
- Temporary flood barriers;
- Air brick covers (manual or automatic closing);
- Non-return flap valves on sewer outfalls.
- Flood resilient materials and designs:
  - Use of low permeability building materials up to 0.3 m such as engineering bricks (Classes A and B) or facing bricks;
  - Hard flooring and flood resilient metal staircases;
  - The use of internal lime plaster/render or where plasterboards are used these should be fitted horizontally instead of vertically and/or using moisture resistant plasterboard at lower levels;
  - Water, electricity and gas meters and electrical sockets should be located above the predicted flood level;
  - Communications wiring; wiring for telephone, TV, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage.

Based on the EA's Pre-App advice, it is likely that a Flood Risk Activity Permit will be required as the proposed development is likely to result in activities within 8m of a non-tidal main river or any flood defence structure or culvert on a main river (Cove Brook).

Compensatory floodplain storage may be required for the displacement of flooding, which would involve ground lowering in the raised areas of the Site. Alternatively, voids beneath the proposed dwellings could also be considered to prevent floodplain displacement.

The regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk.

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<sup>1</sup> 300 mm above the 1 in 100 year plus climate change estimated flood level of 62.79 mAOD.

<sup>2</sup> 300 mm above the 1 in 100 year plus climate change estimated flood level of 62.43 mAOD.

A Sustainable Drainage Strategy (SuDS) should be developed for the Site, for effective management of surface water runoff from the proposed development.

Specific groundwater measures that may also be considered include:

- Waterproof tanking of the ground floor and any basements;
- Interceptor drains;
- Automatic sump to extract flood water; and
- Non-return flap valves on the proposed foul and surface water sewer lines.

A Flood Warning and Evacuation Plan (FWEP) is recommended, and occupants should be signed up to receive EAs Flood Alerts.

GeoSmart recommend the mitigation measures discussed within this report are considered as part of the proposed development where possible and evidence of this is provided to the Local Planning Authority as part of the planning application.

## 2. Introduction

### Background and purpose

A site-specific flood risk assessment has been undertaken, to assess the flood risk to and from the development site. This assessment has been undertaken by firstly compiling information concerning the Site and the surrounding area. The information gathered was then used to construct a 'conceptual site model', including an understanding of the appropriateness of the development as defined in the NPPF (2023) and the source(s) of any flood risk present. Finally, a preliminary assessment of the steps that can be taken to manage any flood risk to the development was undertaken.

This report has been prepared with reference to the NPPF (2023) and NPPG (2022).

*"The National Planning Policy Framework set out the Government's planning policies for England and how these are expected to be applied" (NPPF, 2023).*

The NPPF (2023) and NPPG (2022) promote a sequential, risk based approach to the location of development. This also applies to locating a development within a Site which has a variable risk of flooding.

*"This general approach is designed to ensure that areas at little or no risk of flooding from any source are developed in preference to areas at higher risk. The aim should be to keep development out of medium and high risk flood areas (Flood Zones 2 and 3) and other areas affected by other sources of flooding where possible" (NPPG, 2022).*

The purpose of this report is to provide clear and pragmatic advice regarding the nature and potential significance of flood hazards which may be present at the Site.

### Report scope

In accordance with the requirements set out within NPPG 2022 (Paragraph: 030 Reference ID: 7-030-20140306), a thorough review of a commercially available flood risk report and EA supplied data indicating potential sources of flood risk to the Site from rivers and coastal sources, surface run-off (pluvial), groundwater and reservoirs, including historical flood information and modelled flood extent. Appropriate measures are recommended to manage and mitigate the flood risk to the property.

Information obtained from the EA and a review of the Bracknell Forest Council Level 1 Strategic Flood Risk Assessment SFRA (JBA Consulting, 2018) is used to ascertain local flooding issues and, where appropriate, identify information to support a Sequential and/or Exception test required as part of the NPPF (2023).

The existing and future flood risks to and from the Site from all flood sources is assessed in line with current best practice using the best available data. The risk to the development has been assessed over its expected lifetime, including appropriate allowances for the impacts of climate change. Residual risks that remain after the flood risk management and mitigation measures are implemented, are considered with an explanation of how these risks can be managed to keep the users of the development safe over its lifetime.

An indication of whether the site will potentially increase flood risk elsewhere is provided, including where the proposed development increases the building footprint at the Site. A

drainage strategy to control runoff can be commissioned separately if identified as a requirement within this report.

## Report limitations

It is noted that the findings presented in this report are based on a desk study of information supplied by third parties. Whilst we assume that all information is representative of past and present conditions, we can offer no guarantee as to its validity and a proportionate programme of site investigations would be required to fully verify these findings.

The basemap used is the OS Street View 1:10,000 scale, however the Site boundary has been drawn using BlueSky aerial imagery to ensure the correct extent and proportion of the Site is analysed.

This report excludes consideration of potential hazards arising from any activities at the Site other than normal use and occupancy for the intended land uses. Hazards associated with any other activities have not been assessed and must be subject to a specific risk assessment by the parties responsible for those activities.

## Datasets

The following table shows the sources of information that have been consulted as part of this report:

**Table 1: Datasets consulted to obtain confirmation of sources of flooding and risk**

Source of flooding	Datasets consulted				
	Commercial Flood Maps (Appendix B)	SFRA	Environment Agency (Appendix C)	Thames Water (Appendix D)	OS Data
Historical	X	X	X		
Fluvial/tidal	X	X	X		
Surface water (pluvial)	X	X	X		
Groundwater	X	X			
Sewer		X		X	
Culvert/bridges		X			X
Reservoir		X	X		

\*The SFRA and local guidance has been used to inform this report as referenced in Section 6.

### 3. Site analysis



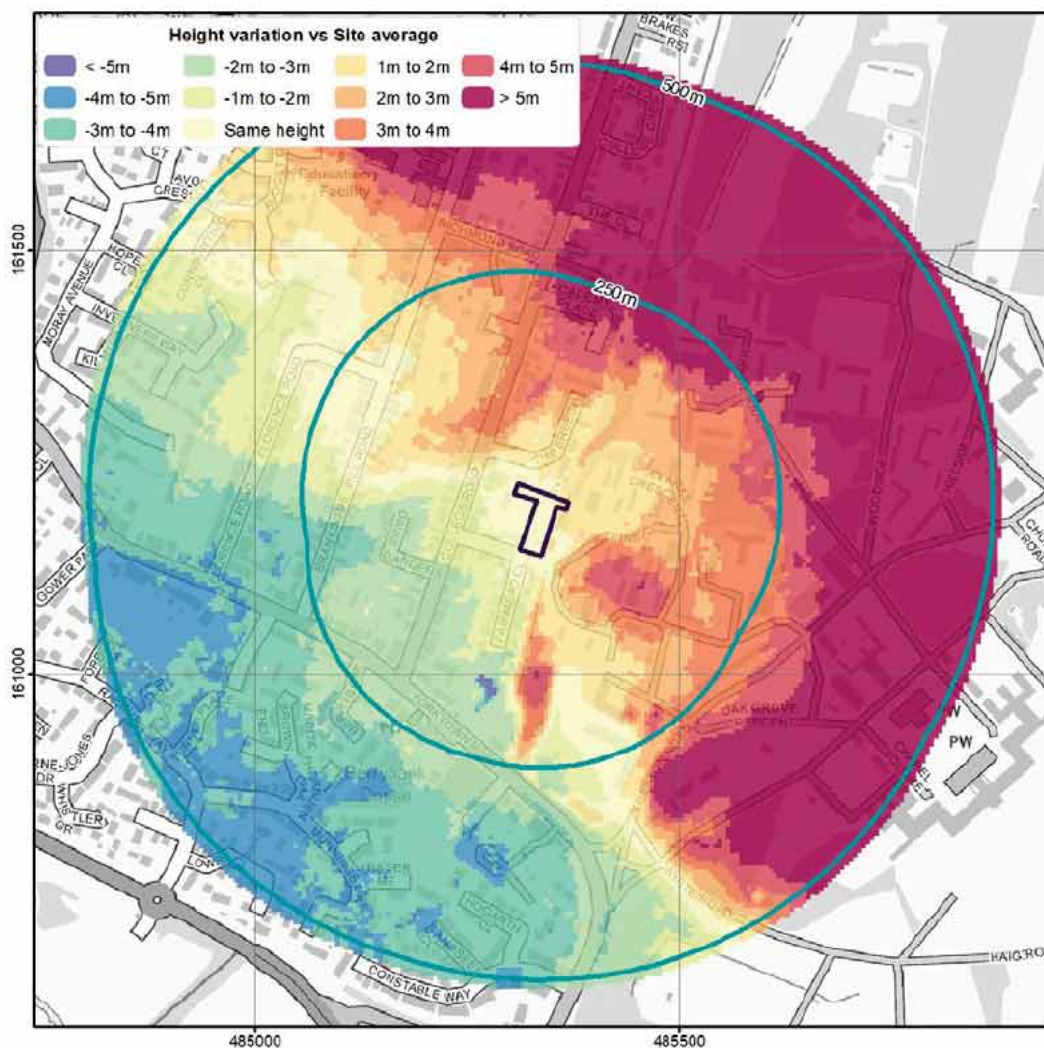
#### Site information

The Site is located in the College Town area of Camberley in a setting of residential land use at National Grid Reference (NGR) SU 85334 61181. Site plans and drawings are provided in Appendix A.

According to OS data, using a 500 m buffer around the Site, the area is on a gentle slope (Figure 1). It is noted that to the north and east, land rises to c. 70 m above Ordnance Datum (AOD). To the south and west land falls to c. 59 m AOD.

The general ground levels on the Site are between 62.06 m AOD in the far north western area and 63.04 m AOD along the far northeastern boundary, with the Site falling very gradually in a westerly direction. This is based upon a Site specific topographic survey undertaken by Landarb Solutions, 2019 (Appendix A).

Figure 1 Site Location and Relative Elevations



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## Development

The Site is currently used within a residential capacity comprised of two separate plots, with associated landscaped areas. One plot (Woodside) consists of a bungalow and garage and the other (Atholl Villa) as a 2-story detached dwelling.

Development proposals comprise the demolition of the existing dwellings and the construction of 9 residential plots. Comprised of six 2-bedroom, two 3-bedroom, 2-story dwellings and one 1-bedroom first floor dwelling with a 3-space undercroft parking. Including the formation of new associated access, 18 allocated and 2 visitor parking spaces and landscaping.

Site plans are included within Appendix A.

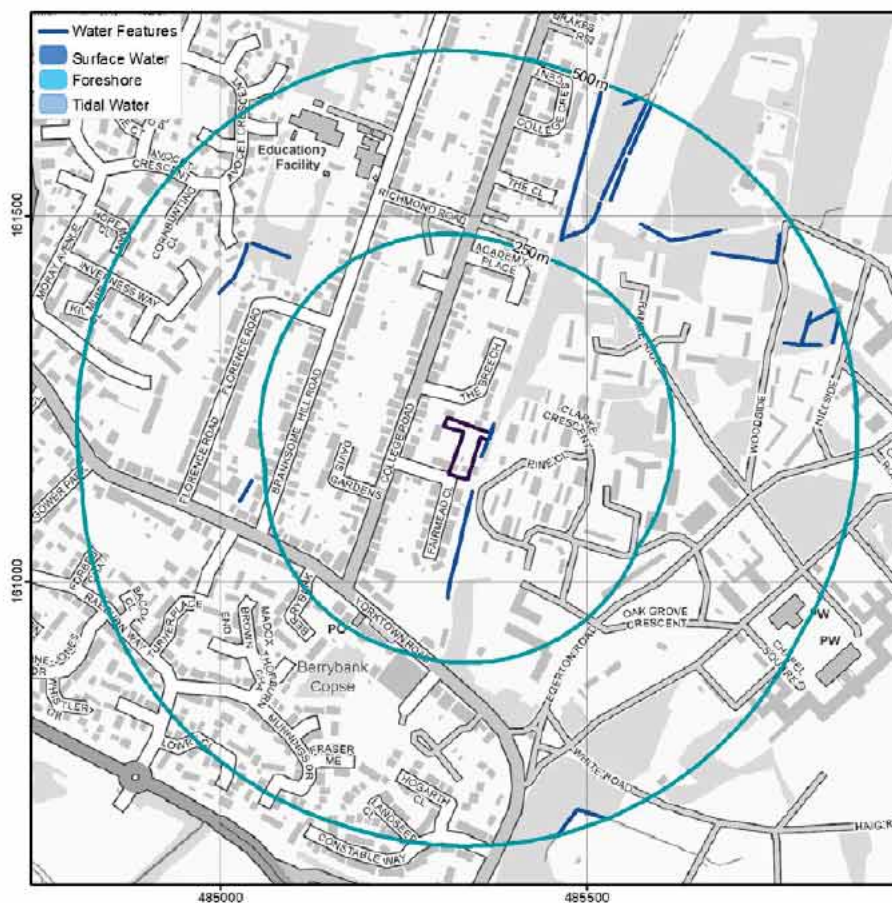
The effect of the overall development will result in an increase in number of occupants and/or users of the Site but will not result in the change of use, nature or times of occupation. According to Table 2 of the NPPG (2014), the vulnerability classification of the existing development is More Vulnerable and proposed development is More Vulnerable. The estimated lifespan of the development is 100 years.



## Hydrological features

There are numerous surface water features within 500 m of the Site (Figure 2), these are included in the mapping below:

Figure 2 Surface water features



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There is a surface watercourse (Cove Brook) located adjacent to the northeast of the Site, which continues adjacent to the far eastern boundary of the Site. It is recognised by the EA as a designated Main River. Therefore, there is the potential requirement for flood risk activity permits to proceed with the development in this area.



### Proximity to relevant infrastructure:

The Cove Brook located adjacent to the Site becomes culverted approximately 10 m north of the Site, and 15 m south of the Site.



### Hydrogeological features

British Geological Survey (BGS) mapping indicates the underlying superficial geology consists of Head – clay, silt, sand and gravel (BGS, 2023) and is classified as a Secondary Undifferentiated Aquifer (EA, 2023).

BGS mapping indicates the underlying bedrock geology consists of the Windlesham Formation - sand, silt and clay (BGS, 2020) and is classified as a Secondary (A) Aquifer (EA, 2020).

The Site does not lie within a groundwater Source Protection Zone (SPZ) (EA, 2020).

A review of the BGS borehole database (BGS, 2023) indicates the nearest and most relevant borehole (ref: SU86SE292) is approx. 30 metres to the north of the Site boundary at an elevation of c. 63 mAOD (at a similar elevation to the Site), and indicates the underlying geology is comprised of:

- Topsoil underlain by sand to a depth of 1.10 m below ground level (bgl); underlain by
- Gravelly sandy clay to a depth of 2.0 m bgl; underlain by
- Silty sand to a depth of 2.8 m bgl (end of borehole).

The standing water level was recorded within this borehole at 1.8 m bgl.

The hydrogeological characteristics suggest there is potential for a groundwater table beneath the site.

Groundwater levels may rise in the bedrock and superficial aquifers in response to high river events, subject to the hydraulic continuity between the driving water level, the groundwater system and the Site.

## 4. Flood risk to the development

### Historical flood events

According to the EA's historical flood map no historical flood events have been recorded at the Site (EA, 2023). The map in Appendix B and Map 3 of Appendix C of the SFRA does not provide any records of Westbourne Close being affected by historical flood events (JBA Consulting, 2018). The purpose of historical flood data is to provide information on where and why flooding may have occurred in the past. The absence of any recorded events does not mean flooding has never occurred on Site or that flooding will never occur at the Site.

### Rivers (fluvial) / Sea (coastal/tidal) flooding

The predominant risk at the Site is from flooding from rivers, termed as fluvial flooding. The Site is located in an inland location and the risk of flooding from coastal and tidal processes are therefore considered to be Very Low. River (fluvial) flooding occurs during times of heavy rainfall or snow melt when watercourses' capacity can be exceeded, over topping the banks and flood defences.

According to the EA's Flood Map for Planning Purposes (Figure 3), approx. 31% of the Site in the far north eastern and south eastern areas is located within fluvial Flood Zone 2 and is therefore classified as having a Medium probability of fluvial flooding from the drainage ditch. The remainder of the Site is within Flood Zone 1 and has a Low probability of flooding.

As defined in the NPPF (2023):

Guidance

Ignoring the presence of any defences, land located in a Flood Zone 2 is considered to have a Medium probability of flooding, with between a 1 in 100 and 1 in 1000 annual probability of fluvial flooding or between a 1 in 200 and 1 in 1000 annual probability of coastal flooding in any one year.

Development of "Water-Compatible", "Essential Infrastructure", "Less Vulnerable" and "More Vulnerable" land uses are suitable for this zone with "Highly Vulnerable" land uses requiring an Exception Test to be passed prior to development taking place (see glossary for terminology).

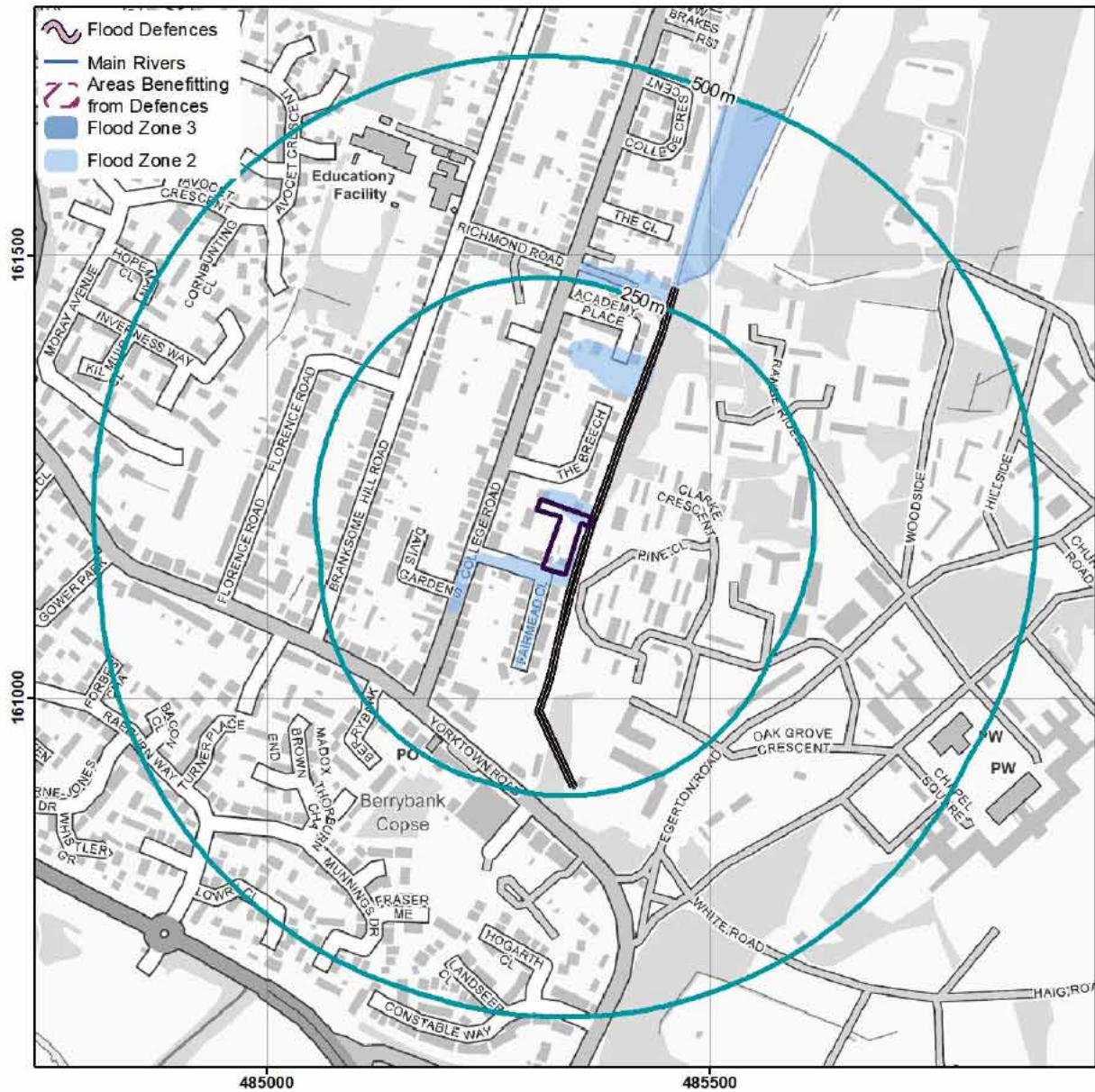
Ignoring the presence of any defences, land located in a Flood Zone 1 is considered to have a Low probability of flooding, with less than a 1 in 1000 annual probability of fluvial or coastal flooding in any one year.

Development of all uses of land is appropriate in this zone (see glossary for terminology).

### Flood defences

There are no formal flood defences within close proximity to the Site, although the Cove Brook culvert is technically defined as a "flood defence asset" and has a certain capacity to convey flows during a flood event.

Figure 3 EA Flood Map for Planning Purposes (EA, 2023)



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## Model data

As the Site is located within the EA's fluvial floodplain, modelled flood elevation data was requested from the EA. However, the EA stated in their response (Appendix C):

*"We unfortunately do not have any detailed flood risk modelling in this location. We are sorry that we are therefore unable to provide modelled flood levels and extents for your site."*

The EA's national generalised (JFLOW) data was obtained from the data.gov portal and analysed, however it was also found to not cover the drainage ditch within and adjacent to the eastern Site boundary.

It is assumed therefore that the extent of Flood Zone 2 may be based on a historical flood extent, but one which is potentially not recorded by the EA.

## Flood level calculation

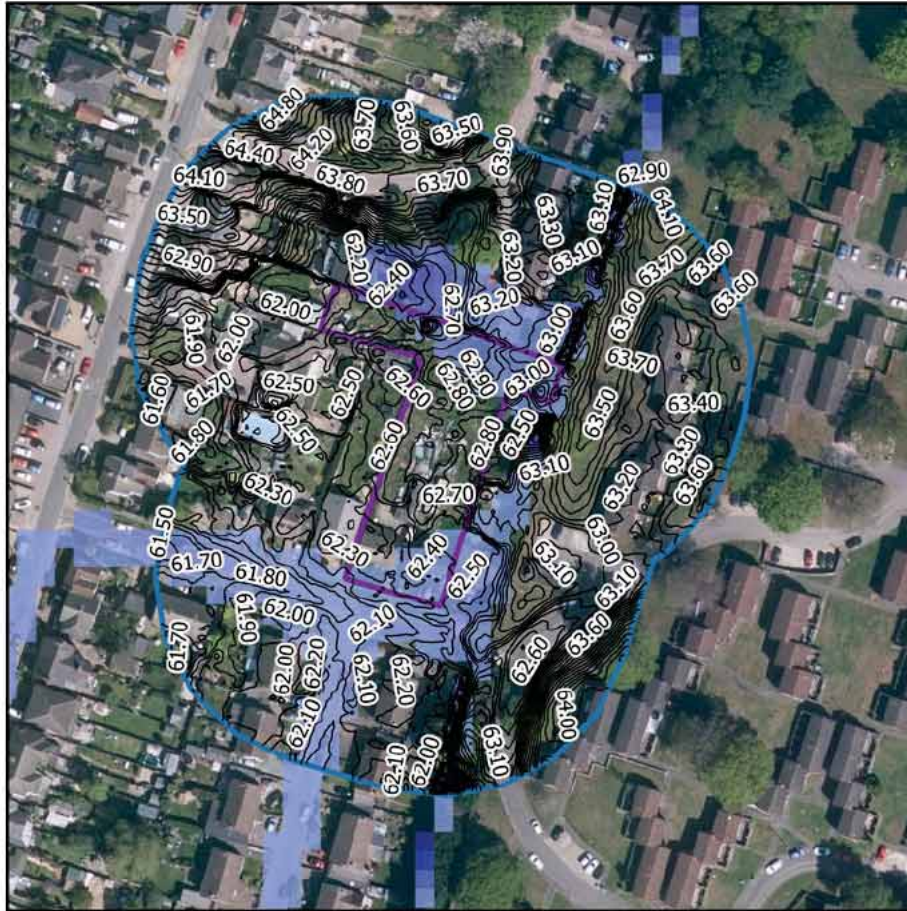
In order to determine the Finished Floor Levels required in the areas of the Site within Flood Zone 2, which are detailed in Section 7 of this report, the extent of Flood Zone 2 (1 in 1000 year flood) has been compared to the highest ground levels at the Site recorded in the topographic survey. The levels for the 1 in 1000 year flood event (Flood Zone 2) for hydrological region 6 (within which the Site is located) are equivalent to a 1 in 100 + 62% climate change allowance event, greater than the 1 in 100 + 14% central climate change allowance event upon which relevant national and local planning policy is determined. In the absence of model data for such an event, the flood extent and depths associated with a 1 in 1000 year event have been used to inform recommendations outlined herein to ensure no adverse impacts of flooding during a worst case scenario event.

### Proxy

Geosmart Analytics has been used in conjunction with EA flood risk maps to model flooding depths on site. Figure 4 shows flooding extent and elevations on the area proposed for development.

Flood Zone 2 Area	Worst-case estimated flood level (mAOD)	Worst-case estimated flood depths (m)
Northern	62.79	Depths up to 0.40
Southern	62.43	Depths up to 0.20

Figure 4. Risk of Flooding from Rivers and Sea map (GeoSmart Analytics, 2023)



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## Flood risk from Cove Brook

According to the EA's Risk of Flooding from Rivers and the Sea (RoFRS) mapping (Figure 4), which considers the crest height, standard of protection and condition of any defences present, the flood risk from Cove Brook is variable. Approx. 31% of the Site has a Low risk and the remainder of the Site has a Very Low risk. The Cove Brook which impacts the northeast of the Site boundary has a High risk associated with it, but this is likely to remain within the main channel of Cove Brook according to the mapping.

Figure 5. Risk of Flooding from Rivers and Sea map (EA, 2023)



## Surface water (pluvial) flooding

Surface water flooding occurs when intense rainfall exceeds the infiltration capacity of the ground and overwhelms the drainage systems. It can occur in most locations even at higher elevations and at significant distances from river and coastal floodplains.

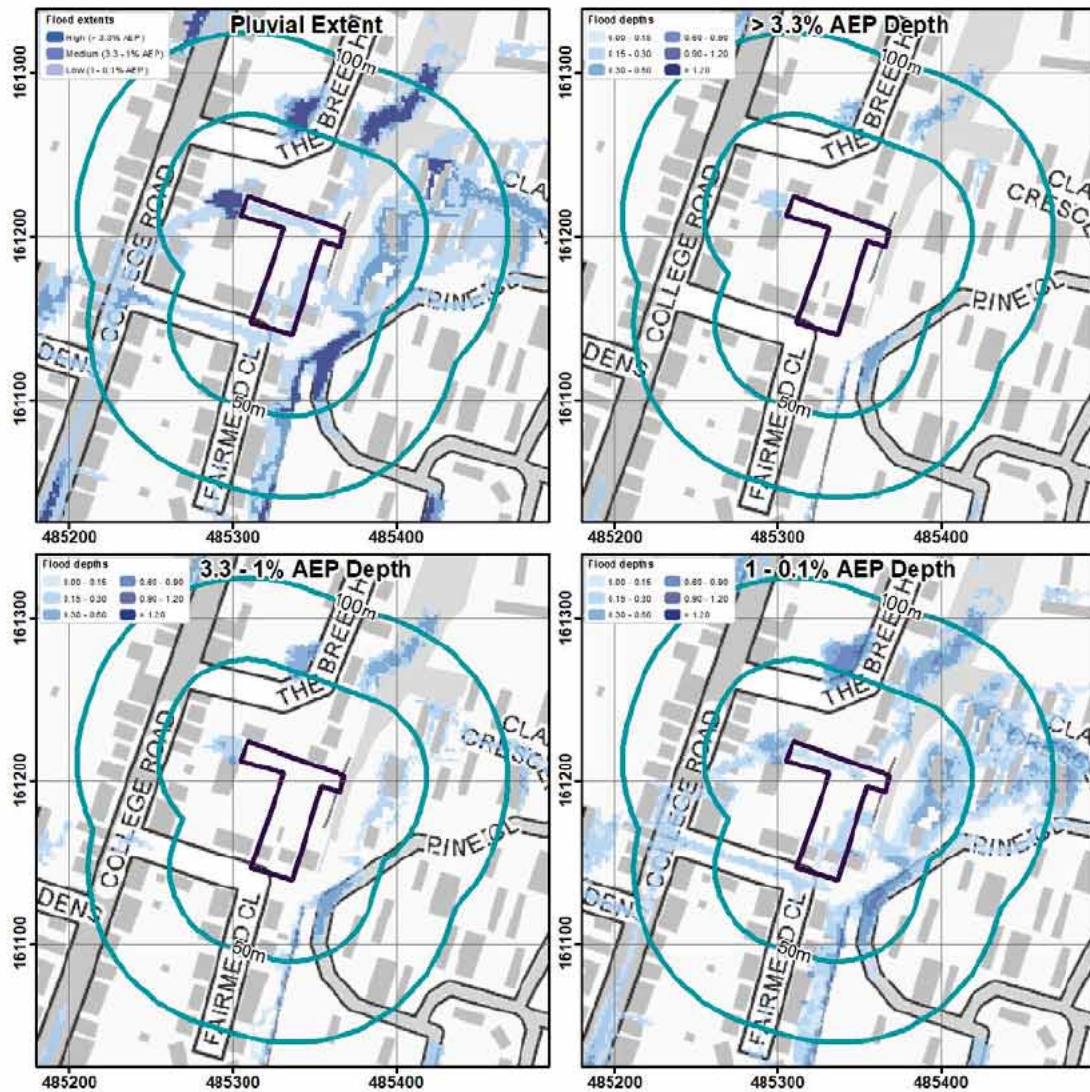
According to the EA's Risk of Flooding from Surface Water (pluvial) mapping, there is a variable risk of pluvial flooding at the Site, ranging from Very Low to Low.

### Guidance

- Very Low risk - chance of flooding of less than 1 in 1000 (0.1%).
- Low risk - chance of flooding of between 1 in 1000 & 1 in 100 (0.1% and 1%).

Figure 5 confirms the extent and depth of flooding during a 1% AEP (1 in 100 year - Medium risk) event, which would not impact the Site. However, during a 1 in 1000 year - Low risk event, areas along the northern and eastern boundaries of the Site are located on a pluvial flow route, although the depths would typically be below 0.3 m.

Figure 6. EA Medium surface water flood risk map (EA, 2020)



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**Guidance**

According to EA's surface water flood risk map the following advisory guidance applies to the Site:

Flood Depth (m)

- 0.15 to 0.30 - Flooding would: typically exceed kerb height, likely exceed the level of a damp-proof course, cause property flooding in some areas.

Analysis of OS mapping, ground elevation data and the EA's pluvial flow route mapping in the 1 in 1000 year event confirms some areas of the Site are located on a potential overland flow route during a Low risk scenario. During this event the majority of flow velocities are greater than 0.25 m/s. Water may flow onto the Site from adjacent land to the north and should be managed, in addition to run-off generated on-site. The Site may potentially transmit overland flows off site in a south direction.



A review of the site plans, topography and the EA's Risk of Flooding from Surface Water Direction mapping indicates any overland flows on the Site could potentially be obstructed by the proposed development, particularly units 8, 9 and 10, and occur across the landscaped areas of the Site for units 1, 2, 3 and 4 (Drg No. PL02, Appendix A), access to the Site from Westbourne Road could also be impacted.

Climate change may lead to an increase in rainfall intensity which affects river levels, land and urban drainage systems. Rainfall intensity for small and urban catchments may increase from 5 to 20% (central estimate) or 10% to 40% (Upper estimate) over the period to 2115 (EA, 2020). The increase in surface water flood risk is best represented by the 1 in 1000 year pluvial flood extent and as the Site is susceptible to overland flow and/or surface water flooding in this event, it may be increased as a result of climate change.

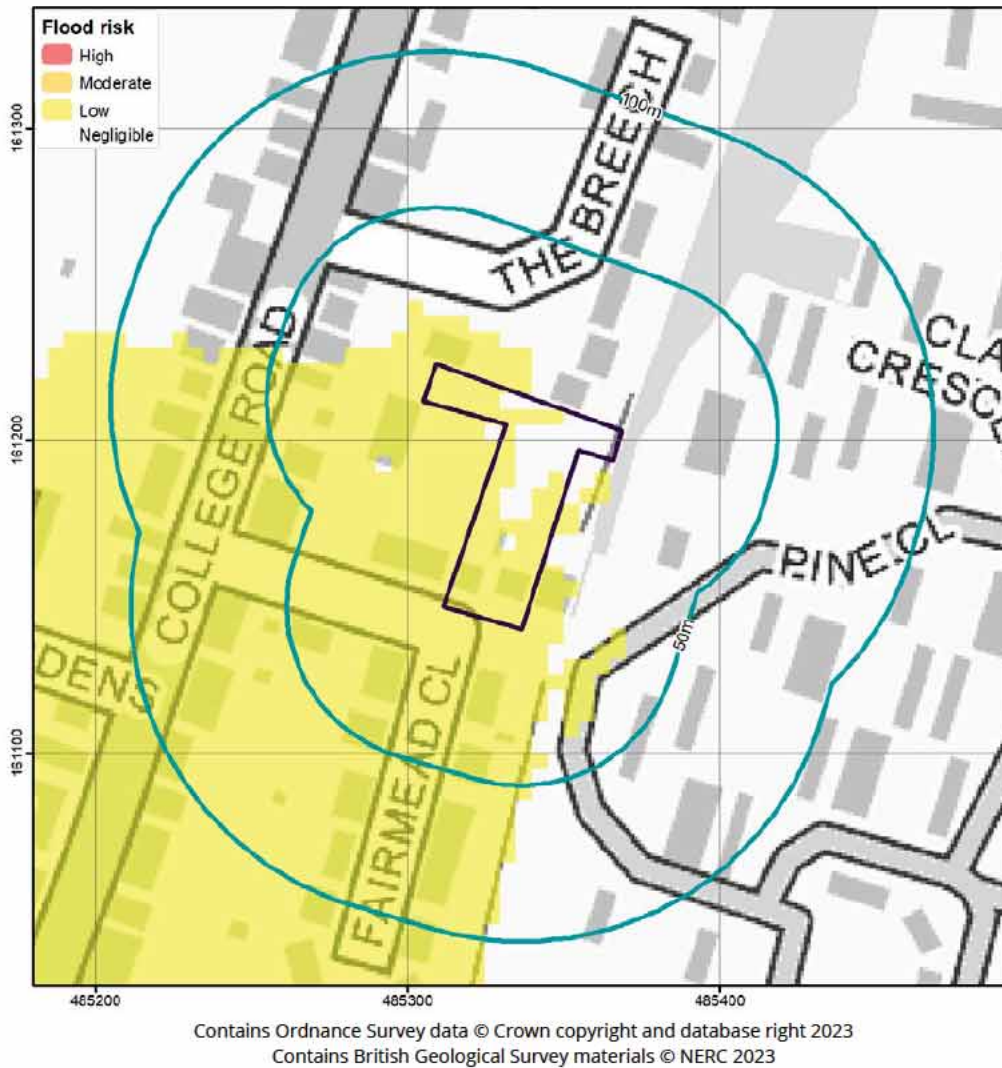
On-Site surface water drainage systems should be designed appropriately to manage the run-off, using SuDS features.

## Groundwater flooding

Groundwater flooding occurs when sub-surface water emerges from the ground at the surface or into Made Ground and structures. This may be as a result of persistent rainfall that recharges aquifers until they are full; or may be as a result of high river levels, or tides, driving water through near-surface deposits. Flooding may last a long time compared to surface water flooding, from weeks to months. Hence the amount of damage that is caused to property may be substantially higher.

Groundwater Flood Risk screening data (Figure 7) indicates there is a Low risk of groundwater flooding at surface in the vicinity from permeable bedrock and superficial geology during a 1 in 100 year event. Mapped classes combine likelihood, possible severity and the uncertainty associated with predicting the subsurface system. The map is a national scale screening tool to prompt site-specific assessment where the impact of groundwater flooding would have significant adverse consequences. Mapping limitations and a number of local factors may reduce groundwater flood risk to land and property even where it lies within mapped groundwater flood risk zones, which do not mean that groundwater floods will occur across the whole of the risk area.

Figure 7 GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2023)



Map 8 of Appendix C of the SFRA does not indicate reported incidents of historical ground water flooding within close proximity to the Site, however the Site is in an area where 'Groundwater levels are either at or very near (within 0.025 m of) the ground surface' (JBA Consulting, 2018).

Based on a review of (limited) site specific data groundwater levels may rise in the bedrock and superficial aquifer in response to high river events. It is noted that groundwater flooding may occur in response to prolonged high river levels even if overtopping of the watercourse channel does not occur.

A shallow water table has been identified within the nearest borehole record, potentially within 2 metres of the ground surface. Site specific assessment suggests that groundwater levels could reach the surface and appropriate mitigation is required.

<b>Guidance</b>
Low Risk - There will be a remote possibility that incidence of groundwater flooding could lead to damage to property or harm to other sensitive receptors at, or near, this location.

Climate change predictions suggest an increase in the frequency and intensity of extremes in groundwater levels. Rainfall recharge patterns will vary regionally resulting in changes to

average groundwater levels. A rise in peak river levels will lead to a response of increased groundwater levels in adjacent aquifers subject to the predicted climate change increases in peak river level for the local catchment.

The impact of climate change on groundwater levels beneath the Site is likely to be linked to the predicted rise in peak river levels.

## Flooding from Artificial Sources

Artificial sources of flood risk include waterbodies or watercourses that have been amended by means of human intervention rather than natural processes. Examples include reservoirs (and associated water supply infrastructure), docks, sewers and canals. The flooding mechanism associated with flood risk from artificial sources is primarily related to breach or failure of structures (reservoir, lake, sewer, canal, flood storage areas, etc.)

### Sewer flooding

Table 4-2 of the SFRA has identified 2 properties on the Thames Water sewer flooding register, however, it is recognised that this five digit postcode (GU47 0) covers a large area and instances of flooding are not specific to the Site (JBA Consulting, 2018).

Records held by Thames Water indicate that there have been no incidences of flooding related to the surcharging of public sewers at the Site (Thames Water, 2020; Appendix D).

#### Guidance

Properties classified as “at risk” are those that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system either once or twice in the ten year reference period. Records held by the sewage utility company provide information relating to reported incidents, the absence of any records does not mean that the Site is not at risk of flooding.

### Canal Failure

According to Ordnance Survey (OS) mapping, there are no canals within 500 m of the Site.

### Water supply infrastructure

Water supply infrastructure is comprised of a piped network to distribute water to private houses or industrial, commercial or institution establishments and other usage points. In urban areas, this represents a particular risk of flooding due to the large amount of water supply infrastructure, its condition and the density of buildings. The risks of flooding to properties from burst water mains cannot be readily assessed.

If more information regarding the condition and history of the water supply infrastructure within the vicinity of the Site is required, then it is advisable to contact the local water supplier (Thames Water).

## Culverts and bridges

The blockage of watercourses or structures by debris (that is, any material moved by a flowing stream including vegetation, sediment and man-made materials or refuse) reduces flow capacity and raises water levels, potentially increasing the risk of flooding. High water levels can cause saturation, seepage and percolation leading to failure of earth embankments or other structures. Debris accumulations can change flow patterns, leading to scour, sedimentation or structural failure.

A culvert has been identified adjacent to the Site, associated with the Cove Brook, comprised of a covered channel or pipe that is used to continue a watercourse or drainage path under an artificial obstruction. Culverts range in size and capacity and require appropriate maintenance to function. Screens may be installed across openings to prevent entry and reduce the risk of blockage inside the culvert. However, they can cause flooding when they are poorly maintained or trap large amounts of debris in times of high flow

Discussions with the regulator/client indicates the Local authority/adjacent landowner/site owner is responsible for maintenance of the infrastructure. It is recommended that an appropriate maintenance regime is put in place to maintain effective operation of the culvert.

## Reservoir flooding

According to the EA's Risk of Flooding from Reservoir mapping (EA, 2023), the Site is not considered to be at risk of flooding from a breach in any nearby reservoirs.

### Guidance

The risk of reservoir flooding is related to the failure of a large reservoir (holding over 25,000 m<sup>3</sup> of water) and is based on the worst-case scenario. Reservoir flooding is extremely unlikely to occur (EA, 2023).

## 5. Flood risk from the development

### Floodplain storage

The proposed residential development is located within a fluvial Flood Zone and involves an increase in building footprint. Only some areas of the Site, in particular units 1, 2, 3, 4, 8, 9 would be impacted by the 1 in 100 year plus climate change event. Therefore, compensatory flood storage may be required for any loss in flood plain storage. Any losses in floodplain storage are likely to displace flooding and could potentially alter flood flow routes, increasing flood risk elsewhere.

Compensation for any reduction in floodplain storage and displacement of flood water (up to the 1 in 100 year event with allowance made for climate change) should be provided. Compensatory flood storage must be provided through a level for level, volume for volume approach and may require an area at the edge of the floodplain to provide storage.

Where this is not possible, the EA and Lead Local Flood Authority (LLFA) may accept voids as options for flood plain storage compensation. These solutions should be discussed at an early stage and may require a management and maintenance plan, as they can become blocked over time leading to a gradual reduction in storage. More information is provided in the EA's *"Framework and Guidance for Assessing and Managing Flood Risk for New Development"* FD2320/TR2 publication (EA, 2005).

Scoping estimates of the storage requirements can be made by multiplying the increase in building footprint by the average flood depth at the development, during the 1 in 100 year flood event with an allowance for climate change.

### Drainage and run-off

The proposed development involves an increase of impermeable surfaces at the Site. An estimation of run-off is therefore required to permit effective site water management and prevent any increase in flood risk to off-site receptors from the Site.

Using FEH 2022 rainfall data from the online Flood Estimation Handbook (FEH), developed by NERC (2009) and CEH (2016), the potential surface water run-off generated from the Site during a 1 in 100 year return period should be calculated. The NPPF (2023) recommends the effects of climate change are incorporated into FRA's and the updated climate change guidance confirms the requirements.

As the proposed development at the Site is residential, the lifespan of the development and requirements for climate change should allow up to the 2115 scenario.

**Table 4: Climate change rainfall allowances**

Loddon and Tributaries management Catchment	3.3% Annual exceedance rainfall event		1% Annual exceedance rainfall event	
	2050s	2070s	2050s	2070s
Upper end	35%	35%	40%	40%
Central	20%	25%	20%	25%

A method of investigating the run-off due to the proposed development can be calculated by multiplying the run-off per square metre by the impermeable area within the proposed development plan.

### Sustainable Drainage System (SuDS)

It is recommended that attenuation of run-off is undertaken on site to compensate for proposed increases in impermeable surface areas. Attenuation may comprise the provision of storage within a Sustainable Drainage System (SuDS). SuDS can deliver benefits from improving the management of water quantity, water quality, biodiversity and amenity.

GeoSmart have prepared a separate Sustainable Drainage Scheme (SuDS) strategy for the Site (ref: 72797.05) to ensure surface water runoff will be managed effectively over the lifespan of the proposed development.

## 6. Suitability of proposed development

The information below outlines the suitability of proposed development in relation to national and local planning policy.

### National policy and guidance

The aims of the national planning policies are achieved through application of the Sequential Test and in some cases the Exception Test.

#### Guidance

**Sequential test:** The aim of this test is to steer new development towards areas with the lowest risk of flooding (NPPF, 2023). Reasonably available sites located in Flood Zone 1 should be considered before those in Flood Zone 2 and only when there are no reasonably available sites in Flood Zones 1 and 2 should development in Flood Zone 3 be considered.

**Exception test:** In some cases, this may need to be applied once the Sequential Test has been considered. For the exception test to be passed it must be demonstrated that the development would provide wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Suitability of the proposed development, and whether the Sequential and Exception Tests are required, is based on the Flood Zone the Site is located within and the flood risk vulnerability classification of the existing and proposed development. Some developments may contain different elements of vulnerability and the highest vulnerability category should be used, unless the development is considered in its component parts.

This report has been produced to assess all development types, prior to any development. The vulnerability classification and Flood Zones are compared within the table overleaf (Table 2 of the NPPG (2022)).

As the Site is located within Flood Zone 2 and the proposed development is defined as More Vulnerable; the proposals would be acceptable subject to the Sequential Test, which has been prepared separately.

Where the Sequential Test is required it must normally be demonstrated that there are no alternative reasonably available Sites at lower risk of flooding within the College Town area. For a site to be considered to be reasonably available it must be 'deliverable' and 'developable' as defined by the NPPF (2023).

**Table 6: Flood risk vulnerability and flood zone 'compatibility (taken from NPPG, 2022)**

Flood risk vulnerability classification		Essential infrastructure	Water compatible	Highly vulnerable	More vulnerable	Less vulnerable
Flood Zone	Zone 1 – low probability	✓	✓	✓	✓	✓
	Zone 2 – medium probability	✓	✓	Exception test required	✓	✓
	Zone 3a – high probability	Exception test required	✓	X	Exception test required	✓
	Zone 3b – functional flood plain	Exception test required	✓	X	X	X

## EA Flood Risk Standing Advice for vulnerable developments located in Flood Zones 2 or 3

For all relevant vulnerable developments (i.e. more vulnerable, less vulnerable and water compatible), advice on the points should be followed:

- Surface water management;
- Access and evacuation; and
- Floor levels.

### Surface water management

Plans for the management of surface water need to meet the requirements set out in either the local authority's:

- Surface water management plan where available; OR
- Strategic flood risk assessment.

They also need to meet the requirements of the approved building regulations Part H: drainage and water disposal. Read section H3 rainwater drainage.

Planning permission is required to use a material that can't absorb water (e.g. impermeable concrete) in a front garden larger than 5 square metres.

### Access and evacuation

Details of emergency escape plans should be provided for any parts of a building that are below the estimated flood level:

Plans should show:



- Single storey buildings or ground floors that don't have access to higher floors can access a space above the estimated flood level, e.g. higher ground nearby;
- Basement rooms have clear internal access to an upper level, e.g. a staircase;
- Occupants can leave the building if there's a flood and there's enough time for them to leave after flood warnings.

### Floor levels

The following should be provided:

- Average ground level of the building; and
- Finished floor level of the lowest habitable room in the building.

Ground floor levels should be a minimum of whichever is higher of:

- 300 millimetres (mm) above the general ground level of the site; OR
- At least 600 mm above the estimated river or sea flood level<sup>3</sup>.

If you cannot raise floor levels above the estimated flood level, you need to consider extra flood resistance and resilience measures.

### Extra flood resistance and resilience measures

Follow the extra flood resistance and resilience requirements for developments in flood risk areas where ground floor levels are lower than the estimated flood level for the site.

#### **Water depth up to 300 mm**

The design of the building or development should keep water out as much as possible. You should use materials that have low permeability (materials that water cannot pass through, for example, impermeable concrete).

#### **Water depth from 300 mm to 600 mm**

The design of the building or development should keep water out (unless there are structural concerns) by:

- using materials with low permeability to at least 300mm
- using flood resilient materials (for example lime plaster) and design (for example raised electrical sockets)
- making sure there's access to all spaces to enable drying and cleaning

#### **Water depth above 600 mm**

The design of the building or development should allow water to pass through the property to avoid structural damage by:

- using materials with low permeability to at least 300 mm
- making it easy for water to drain away after flooding
- making sure there's access to all spaces to enable drying and cleaning.

---

<sup>3</sup> This is 600 mm above the 1 in 100 year fluvial or 1 in 200 year tidal flood events. The 600 mm is split into a 300 mm freeboard allowance for climate change and 300mm allowance for the inaccuracies in the EA's flood modelling. Where the climate change flood level is known, a 300 mm allowance should be added to the climate change flood level to allow for the inaccuracies in the EA's flood modelling.

## Local policy and guidance

For this report, the SFRA has been consulted for local policy and guidance and relevant information is outlined below:

### Bracknell Forest Council Level 1 Strategic Flood Risk Assessment (JBA Consulting, 2018):

- There are areas of Bracknell Forest where groundwater levels can be high, and in some locations there may be a risk of groundwater emergence during extremely wet winters.
- Bracknell Forest Flood Asset Register identifies 29 culverts in Bracknell Forest. Eleven are within the main urban area of Bracknell. There are many more small culverts that have not been identified on asset registers. Most of the registered culverts in Bracknell are owned and maintained by the Council, whilst a few are owned by the Highways Agency and private owners. The Council indicated that there was no history of these culverts being exceeded as determined by the flood incident data received.
- Finished Floor Levels (FFL) are usually recommended in line with the Environment Agency's Guidance on Flood Risk, which requires a minimum FFL of 300mm above the modelled 1 in 100-year (1%) AEP fluvial water level with allowance for climate change.

#### Guidance

Strategic Flood Risk Assessments are carried out by local authorities, in consultation with the Environment Agency, to assess the flood risk to the area from all sources both now and in the future due to climate change. They are used to inform planning decisions to ensure inappropriate development is avoided (NPPF, 2023).

## 7. Resilience and mitigation

Based on the flood risk identified at the Site, the national and local policies and guidance and proposed development, the mitigation measures outlined within this section of the report are likely to help protect the development from flooding.

### Sea (coastal/tidal) flood mitigation measures

As the Site is not identified as being at risk of flooding from the sea, mitigation measures are not required.

### Rivers (fluvial) flood mitigation measures

As the Site is partially located within an area which is affected by flooding from rivers (Cove Brook), the following table confirms the flood levels associated with the area proposed for development, using the Flood Zone 2 (1 in 1000 year) extent to calculate the flood level.

Due to there being no flooding in the 1 in 100-year flooding scenario the 1 in 1000 year has been used in proxy. This is a worst case scenario due to constraints in model data.

**Table 7: Flood levels compared to ground levels in the area proposed for development**

Site area	Estimated Modelled Flood Levels (mAOD)
	1 in 1000 year flood level, used as a proxy for the worst case 1 in 100 year plus CC event (mAOD)
Northern	62.79
Southern	62.43

### Raising minimum floor levels

The vulnerability classification of the Site and the Flood Zone means proposals for the Site fall under the EA's Flood Risk Standing Advice (FRSA) for more vulnerable developments.

In this instance, the recommended minimum Finished Floor Levels for some of the units will be set at least 0.3 m above the highest Flood Zone 2 extent ground elevations.

**Table 8: Recommended Minimum Finished Floor Level Required**

Site area	Flood Level (mAOD)	Freeboard above Flood Level (mm)	Recommended FFL (mAOD)
Northern (Units 7, 8 & 9)	62.79	300	63.09
Southern (Units 1, 2, 3 & 4)	62.43	300	62.73

### Additional Mitigation

Although FFL can be raised for the proposed development at this Site, the following avoidance and resistance measures could also be considered as part of the design plans:

- Passive flood door systems;
- Temporary flood barriers;
- Air brick covers (manual or automatic closing);
- Non-return flap valves on sewer outfalls.
- Flood resilient materials and designs:
  - Use of low permeability building materials up to 0.3 m such as engineering bricks (Classes A and B) or facing bricks;
  - Hard flooring and flood resilient metal staircases;
  - The use of internal lime plaster/render or where plasterboards are used these should be fitted horizontally instead of vertically and/or using moisture resistant plasterboard at lower levels;
  - Water, electricity and gas meters and electrical sockets should be located above the predicted flood level;
  - Communications wiring: wiring for telephone, TV, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage.

Based on the EA's Pre-App advice, it is likely that a permit will be required as the proposed development is likely to result in activities within 8m of a non-tidal main river or any flood defence structure or culvert on a main river (Cove Brook).

## Surface water (pluvial) flood mitigation measures

The mitigation measures detailed above for river and sea flood risk are likely to be suitable for the relatively shallow flood depths which could be experienced in a 1 in 1000 year pluvial flood event.

In addition, the regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk.

A Sustainable Drainage Strategy (SuDS) should be developed for the Site, for effective management of surface water runoff from the proposed development.

## Groundwater flood mitigation measures

It is likely the flood mitigation measures recommended for river/sea and surface water risk will be sufficient to reduce the groundwater flood risk at the development. However specific groundwater measures that may also be considered include:

- Waterproof tanking of the ground floor and basement;
- Interceptor drains;
- Automatic sump to extract flood water; and
- Non-return flap valves on the proposed foul and surface water sewer lines.

## Reservoir flood mitigation measures

According to EA information, the Site is not a risk of flooding from reservoirs; therefore, mitigation measures are not required.

## Other flood risk mitigation measures

As the Site is not identified as at risk from other sources, mitigation measures are not required.

## Further flood mitigation information

More information on flood resistance, resilience and water entry can be found here:

[http://www.planningportal.gov.uk/uploads/br/flood\\_performance.pdf](http://www.planningportal.gov.uk/uploads/br/flood_performance.pdf)

[www.knowyourfloodrisk.co.uk](http://www.knowyourfloodrisk.co.uk)

## Emergency evacuation – safe access / egress and safe refuge

Emergency evacuation to land outside of the floodplain should be provided if feasible. Where this is not possible, 'more vulnerable' developments and, where possible, development in general (including basements), should have internal stair access to an area of safe refuge within the building to a level higher than the maximum likely water level. An area of safe refuge should be sufficient in size for all potential users and be reasonably accessible to the emergency services.

Emergency evacuation from the development and the Site should only be undertaken in strict accordance with any evacuation plans produced for the Site, with an understanding of the flood risks at the Site including available mitigation, the vulnerability of occupants and preferred evacuation routes.

### Flood Warnings

The EA operates a flood warning service in all areas at risk of flooding; this is available on their website: <https://www.gov.uk/check-flood-risk>. Some areas of the Site are located within an EA Flood Alerts coverage area (ref: 173296) (Figure 9). All warnings are also available through the EA's 24 hour Floodline Service 0345 988 1188.

The EA aims to issue Flood Warnings 2 hours in advance of a flood event. Flood Warnings can provide adequate time to enable protection of property and evacuation from a Site, reducing risk to life and property.

### Emergency Evacuation

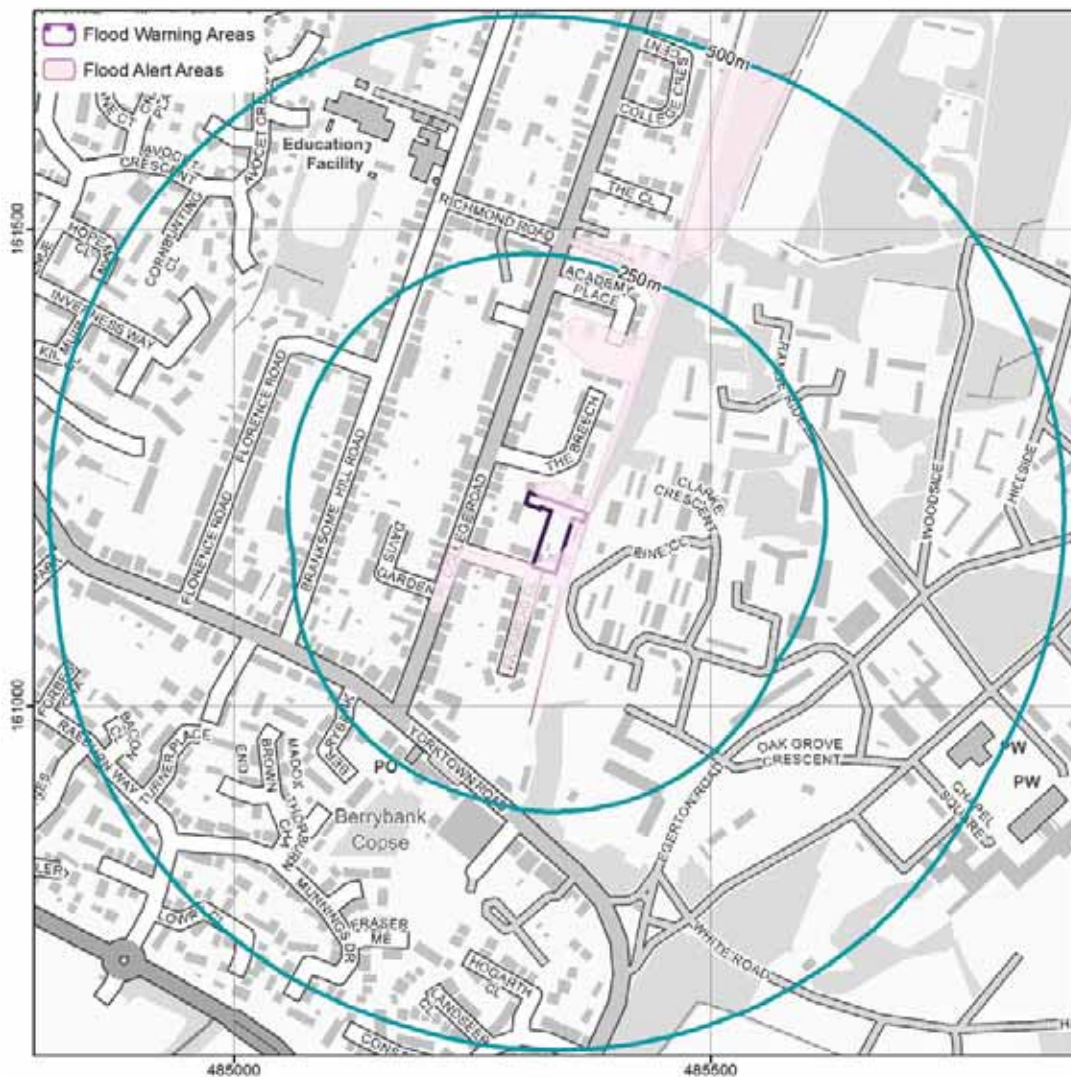
Where possible, a safe access and egress route with a 'very low' hazard rating from areas within the floodplain to an area wholly outside the 1 in 100 year flood event including an allowance for climate change should be demonstrated.

Based on the EA's Flood Zone Map the closest dry evacuation area within Flood Zone 1 is west along Westbourne Road and then south along College Road. It is advised that evacuation from the premises would be the preferred option in a flood event if safe to do so. It is recommended that residents prepare to evacuate as soon as an EA Flood Warning is issued in order to completely avoid flood waters.

### On-site refuge

Evacuation should be the primary action in preference, however safe refuge could be sought at first floor level in a worst-case scenario as the residential areas of the development are situated above ground level.

Figure 9 EA Flood Warning Coverage for the local area.



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### Other relevant information

A Flood Warning and Evacuation Plan (FWEP) is recommended, and occupants should be signed up to receive Eas Flood Alerts.

Registration to the Environment Agency's flood warning scheme can be done by following this link: <https://www.gov.uk/sign-up-for-flood-warnings>.

It is recommended that main communication lines required for contacting the emergency services, electricity sockets/meters, water supply and first aid stations and supplies are not compromised by flood waters. Where possible these should all be raised above the extreme flood level.

## 8. Conclusions and recommendations

**Table 9: Risk ratings following implementation and subsequent maintenance of mitigation measures**

Source of Flood Risk	Baseline	After Mitigation
River (fluvial) and Sea (coastal/tidal)	Very Low to Low	Very Low
Surface water (pluvial) flooding	Very Low to Low	Very Low to Low
Groundwater flooding	Negligible to Low	Negligible
Other flood risk factors present	No	N/A

N/A = mitigation not required

The table below provides a summary of where the responses to key questions are discussed in this report. Providing the recommended mitigation measures are put in place it is likely that flood risk to this Site will be reduced to an acceptable level.

**Table 10: Summary of responses to key questions in the report**

Key sources of flood risks identified	Fluvial, pluvial (see Section 3).
Are standard mitigation measures likely to provide protection from flooding to/from the Site?	Yes (see Section 7).
Is any further work recommended?	<p>Recommendations for flood mitigation are provided below, based upon the proposed development and the flood risk identified at the Site:</p> <ul style="list-style-type: none"> <li>As there is a risk of flooding from Cove Brook (fluvial sources), Finished Floor Levels (FFL) of Units 7, 8 and 9 in the northern area of the Site will be set to at least 63.09 mAOD<sup>4</sup>.</li> <li>Units 1, 2, 3 and 4 in the southern area of the Site will have FFL's set to at least 62.73 mAOD<sup>5</sup>.</li> </ul>

<sup>4</sup> 300 mm above the 1 in 100 year plus climate change estimated flood level of 62.79 mAOD.

<sup>5</sup> 300 mm above the 1 in 100 year plus climate change estimated flood level of 62.43 mAOD.

Although FFL can be raised for the proposed development at this Site, the following avoidance and resistance measures could also be considered as part of the design plans:

- Passive flood door systems;
- Temporary flood barriers;
- Air brick covers (manual or automatic closing);
- Non-return flap valves on sewer outfalls.
- Flood resilient materials and designs:
  - Use of low permeability building materials up to 0.3 m such as engineering bricks (Classes A and B) or facing bricks;
  - Hard flooring and flood resilient metal staircases;
  - The use of internal lime plaster/render or where plasterboards are used these should be fitted horizontally instead of vertically and/or using moisture resistant plasterboard at lower levels;
  - Water, electricity and gas meters and electrical sockets should be located above the predicted flood level;
  - Communications wiring: wiring for telephone, TV, Internet and other services should be protected by suitable insulation in the distribution ducts to prevent damage.

Compensatory floodplain storage may be required for the displacement of flooding, which would involve ground lowering in the raised areas of the Site. Alternatively, voids beneath the proposed dwellings could also be considered to prevent floodplain displacement.

The regular maintenance of any drains and culverts surrounding/on the Site should be undertaken to reduce the flood risk.

Specific groundwater measures that may also be considered include:

- Waterproof tanking of the ground floor and basement;
- Interceptor drains;
- Automatic sump to extract flood water; and
- Non-return flap valves on the proposed foul and surface water sewer lines.

A Flood Warning and Evacuation Plan (FWEP) is recommended, and occupants should be signed up to receive EAs Flood Alerts.

GeoSmart recommend the mitigation measures discussed within this report are considered as part of the proposed development where possible and evidence of this is provided to the Local Planning Authority as part of the planning application.



## 9. Further information

The following table includes a list of additional products by GeoSmart:

Additional GeoSmart Products		
	<p>Additional assessment:</p> <p><b>EnviroSmart Report</b></p> 	<p>Provides a robust desk-based assessment of potential contaminated land issues, taking into account the regulatory perspective.</p> <p>Our EnviroSmart reports are designed to be the most cost effective solution for planning conditions. Each report is individually prepared by a highly experienced consultant conversant with Local Authority requirements.</p> <p>Ideal for pre-planning or for addressing planning conditions for small developments. Can also be used for land transactions.</p> <p>Please contact <a href="mailto:info@geosmartinfo.co.uk">info@geosmartinfo.co.uk</a> for further information.</p>

## 10. References and glossary

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**Environment Agency [EA] (2022).** Flood risk assessments: climate change allowances. Accessed from: <https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances> on 29/11/2023.

**Environment Agency [EA] (2023).** MagicMap. Accessed from: <http://magic.defra.gov.uk/MagicMap.aspx> on 29/11/2023.

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**Ministry of Housing, Communities & Local Government (2022).** Planning Practice Guidance (NPPG). Flood Risk and Coastal Change. Accessed from <https://www.gov.uk/guidance/flood-risk-and-coastal-change> on 29/11/2023.

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# Glossary

## General terms

BGS	British Geological Survey
EA	Environment Agency
GeoSmart groundwater flood risk model	GeoSmart's national groundwater flood risk model takes advantage of all the available data and provides a preliminary indication of groundwater flood risk on a 50m grid covering England and Wales. The model indicates the risk of the water table coming within 1 m of the ground surface for an indicative 1 in 200 year return period scenario.
Dry-Island	An area considered at low risk of flooding (e.g. In a Flood Zone 1) that is entirely surrounded by areas at higher risk of flooding (e.g. Flood Zone 2 and 3)
Flood resilience	Flood resilience or wet-proofing accepts that water will enter the building, but through careful design will minimise damage and allow the re-occupancy of the building quickly. Mitigation measures that reduce the damage to a property caused by flooding can include water entry strategies, raising electrical sockets off the floor, hard flooring.
Flood resistance	Flood resistance, or dry-proofing, stops water entering a building. Mitigation measures that prevent or reduce the likelihood of water entering a property can include raising flood levels or installation of sandbags.
Flood Zone 1	This zone has less than a 0.1% annual probability of river flooding
Flood Zone 2	This zone has between 0.1 and 1% annual probability of river flooding and between 0.1% and 0.5 % annual probability sea flooding
Flood Zone 3	This zone has more than a 1% annual probability of river flooding and 0.5% annual probability of sea flooding
Functional Flood Plain	An area of land where water has to flow or be stored in times of flood.
Hydrologic model	A computer model that simulates surface run-off or fluvial flow. The typical accuracy of hydrologic models such as this is $\pm 0.25\text{m}$ for estimating flood levels at particular locations.
OS	Ordnance Survey
Residual Flood Risk	The flood risk remaining after taking mitigating actions.
SFRA	Strategic Flood Risk Assessment. This is a brief flood risk assessment provided by the local council
SuDS	A Sustainable drainage system (SuDS) is designed to replicate, as closely as possible, the natural drainage from the Site (before development) to ensure that the flood risk downstream of the Site does not increase as a result of the land being developed. SuDS also significantly improve the quality of water leaving the Site and can also improve the amenity and biodiversity that a site has to offer. There are a range of SuDS options available to provide effective surface water management that intercept and store excess run-off. Sites over 1 Ha will usually require a sustainable drainage assessment if planning permission is required. The current proposal is that from April 2014 for more than a single dwelling the drainage system will require approval from the SuDS Approval Board (SABs).

---

## Aquifer Types

Principal aquifer	These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
Secondary A aquifer	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.
Secondary B aquifer	Predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.
Secondary undifferentiated	Has been assigned in cases where it has not been possible to attribute either category A or B to a rock type due to the variable characteristics of the rock type.
Unproductive Strata	These are rock layers or drift deposits with low permeability that has negligible significance for water supply or river base flow.

---

## NPPF (2023) terms

Exception test	Applied once the sequential test has been passed. For the exception test to be passed it must be demonstrated that the development provides wider sustainability benefits to the community that outweigh flood risk and a site-specific FRA must demonstrate that the development will be safe for its lifetime taking account of the vulnerability of its users, without increasing flood risk elsewhere, and, where possible, will reduce flood risk overall.
Sequential test	Aims to steer new development to areas with the lowest probability of flooding.
Essential infrastructure	Essential infrastructure includes essential transport infrastructure, essential utility infrastructure and wind turbines.
Water compatible	Water compatible land uses include flood control infrastructure, water-based recreation and lifeguard/coastal stations.
Less vulnerable	Less vulnerable land uses include police/ambulance/fire stations which are not required to be operational during flooding and buildings used for shops/financial/professional/other services.
More vulnerable	More vulnerable land uses include hospitals, residential institutions, buildings used for dwelling houses/student halls/drinking establishments/hotels and sites used for holiday or short-let caravans and camping.
Highly vulnerable	Highly vulnerable land uses include police/ambulance/fire stations which are required to be operational during flooding, basement dwellings and caravans/mobile homes/park homes intended for permanent residential use.

## Data Sources

Aerial Photography	<p>Contains Ordnance Survey data © Crown copyright and database right 2023</p> <p>BlueSky copyright and database rights 2023</p>
Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/Flood Alert & Warning)	<p>Environment Agency copyright and database rights 2023</p> <p>Ordnance Survey data © Crown copyright and database right 2023</p>
Flood Risk (Groundwater)	<p>GeoSmart, BGS &amp; OS</p> <p>GW5 (v2.3) Map (GeoSmart, 2023)</p> <p>Contains British Geological Survey materials © NERC 2023</p> <p>Ordnance Survey data © Crown copyright and database right 2023</p>
Location Plan	<p>Contains Ordnance Survey data © Crown copyright and database right 2023</p>
Topographic Data	<p>OS LiDAR/EA</p> <p>Contains Ordnance Survey data © Crown copyright and database right 2023</p> <p>Environment Agency copyright and database rights 2023</p>

# Appendices

# Appendix A

## Site plans



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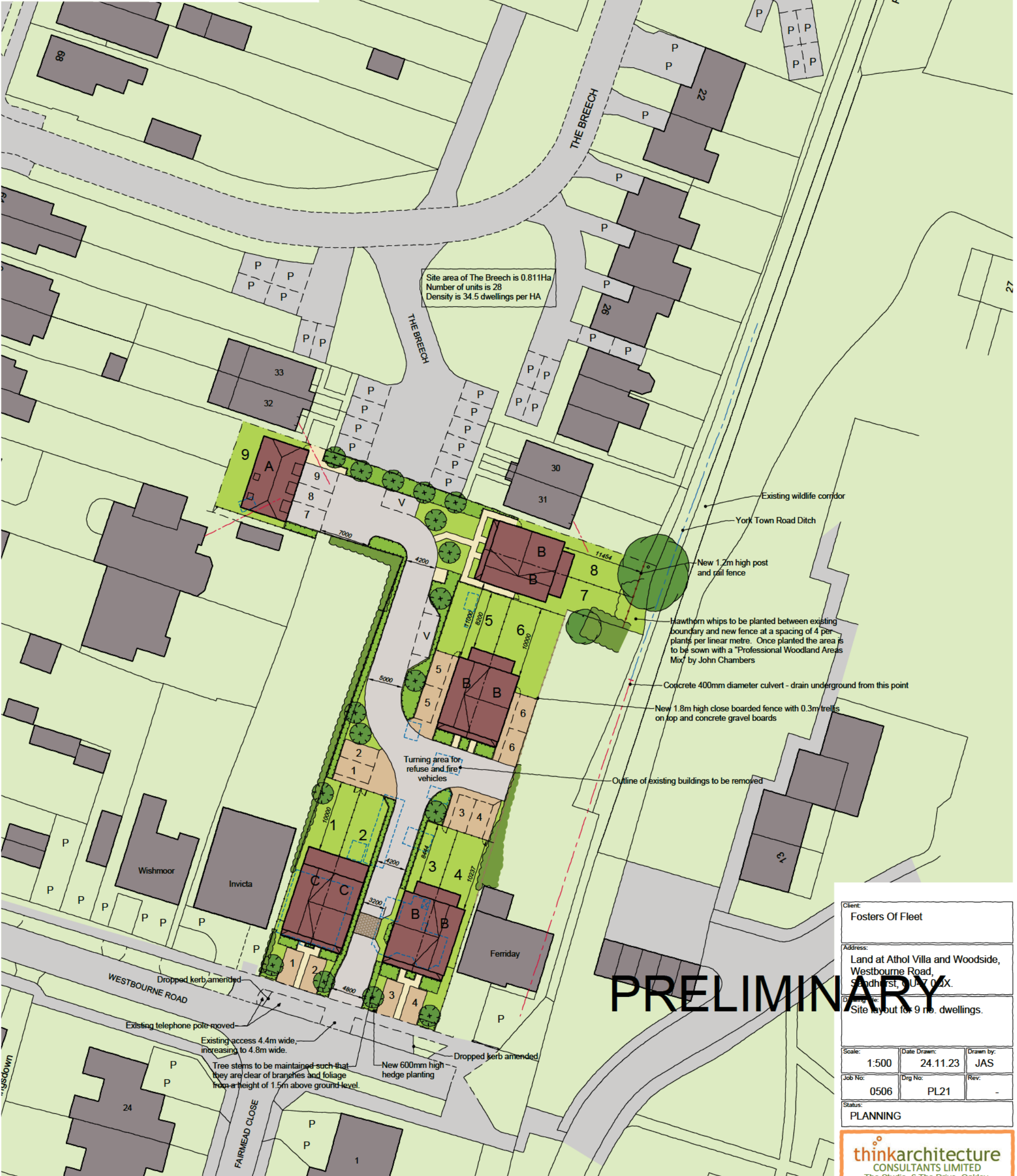
Rev	Comment	By	Date

**ACCOMMODATION SCHEDULE:**

TYPE A - 1B/2P COACH HOUSE @ 710sq.ft. -	1no.	710 sq.ft.
TYPE B - 2B/4P HOUSE @ 831sq.ft. -	6no.	4,986 sq.ft.
TYPE C - 2B/4P HOUSE @ 884sq.ft. -	2no.	1,768 sq.ft.
<b>TOTAL</b>	<b>9no.</b>	<b>7,464 sq.ft.</b>

**NOTE:-**

All parking spaces are a minimum of 2.5m wide and 5m long.  
 Bracknell Forest Council standard parking space size is 2.4m wide and 4.8m long.  
 Lay-by parking space is 2.4m wide and 6m long.  
 Bracknell Forest Council does not have a standard for a lay-by space.



**PRELIMINARY**

Client: Fosters Of Fleet		
Address: Land at Athol Villa and Woodside, Westbourne Road, Sandhurst, GU7 0DX.		
Drawing title: Site layout for 9 no. dwellings.		
Scale: 1:500	Date Drawn: 24.11.23	Drawn by: JAS
Job No: 0506	Dirg No: PL21	Rev: -
Status: PLANNING		

Scale 1:500  
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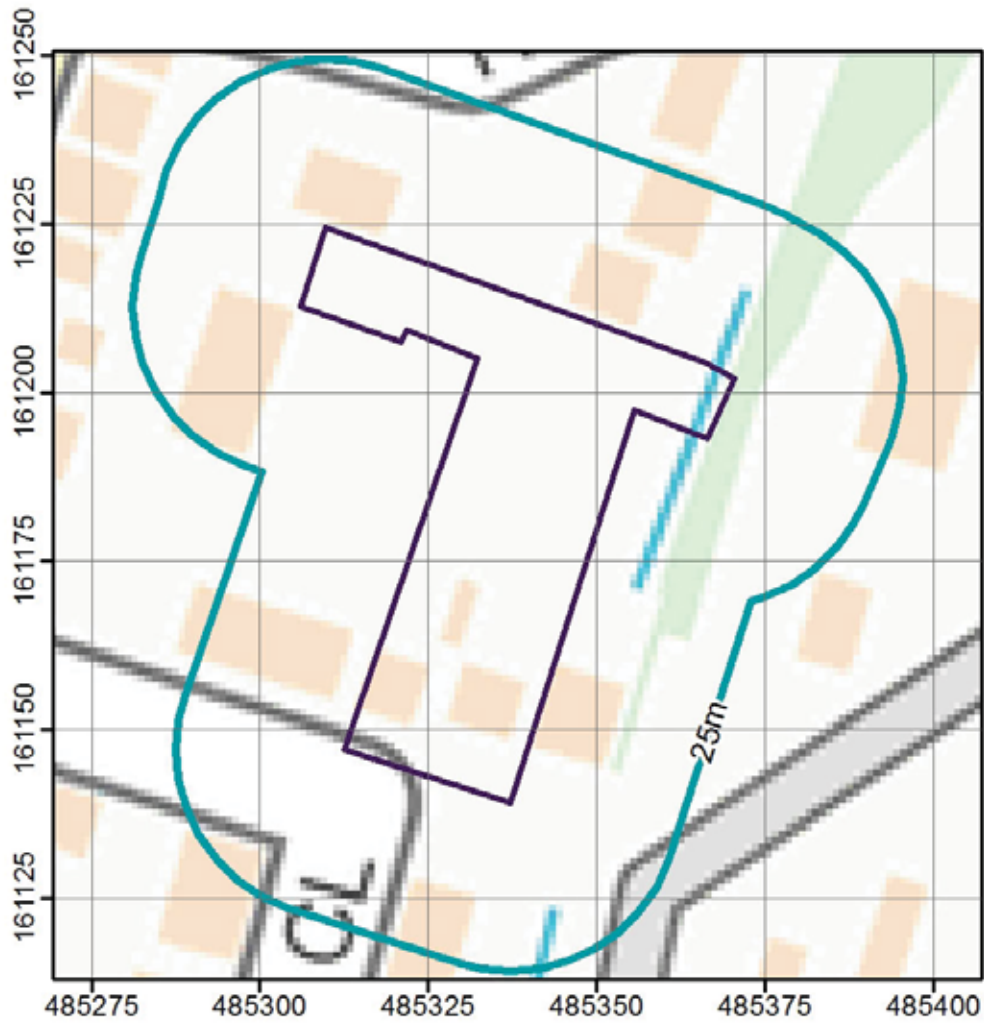
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 www.thinkarchitecture.biz



# Appendix B

## Commercial flood mapping

Site Location Plan (OS, 2020)



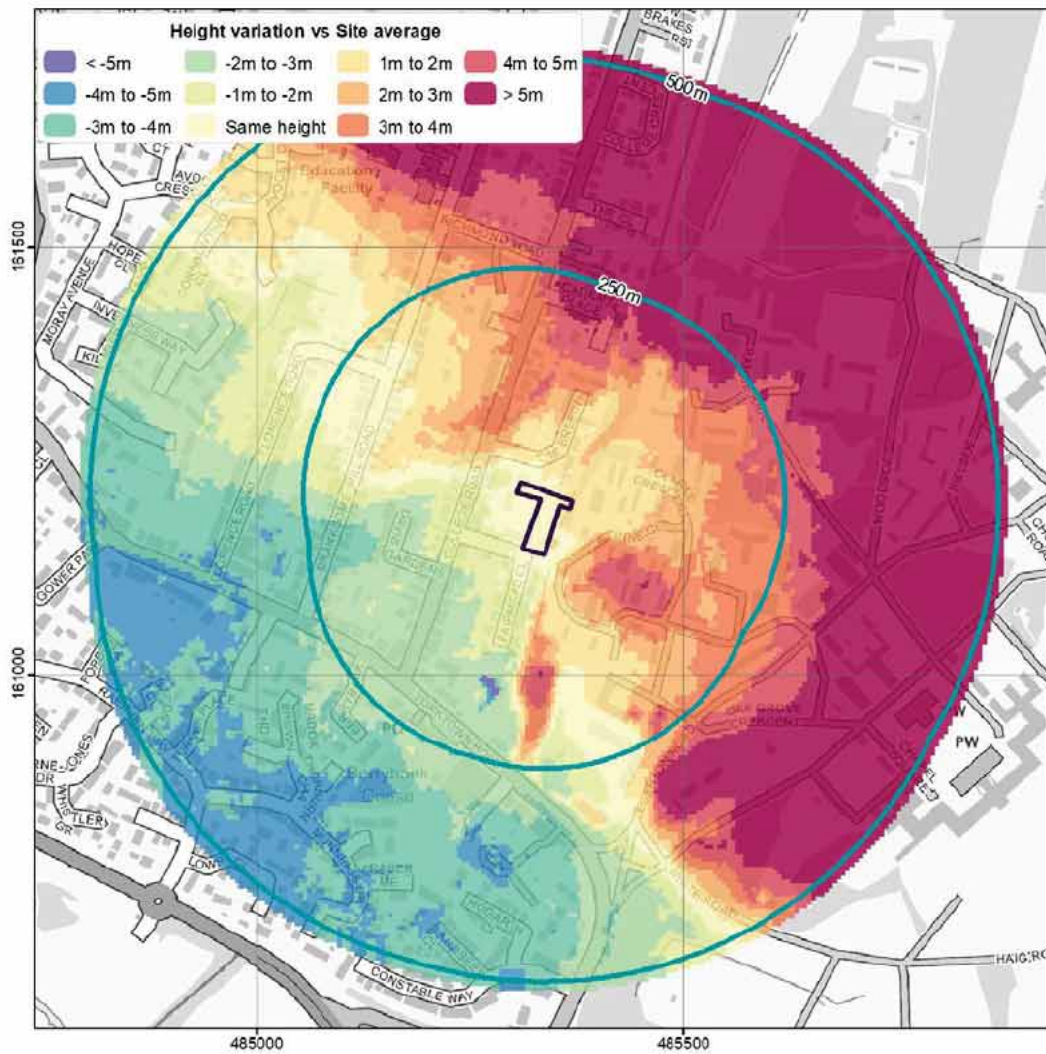
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Aerial Photograph (BlueSky, 2023)



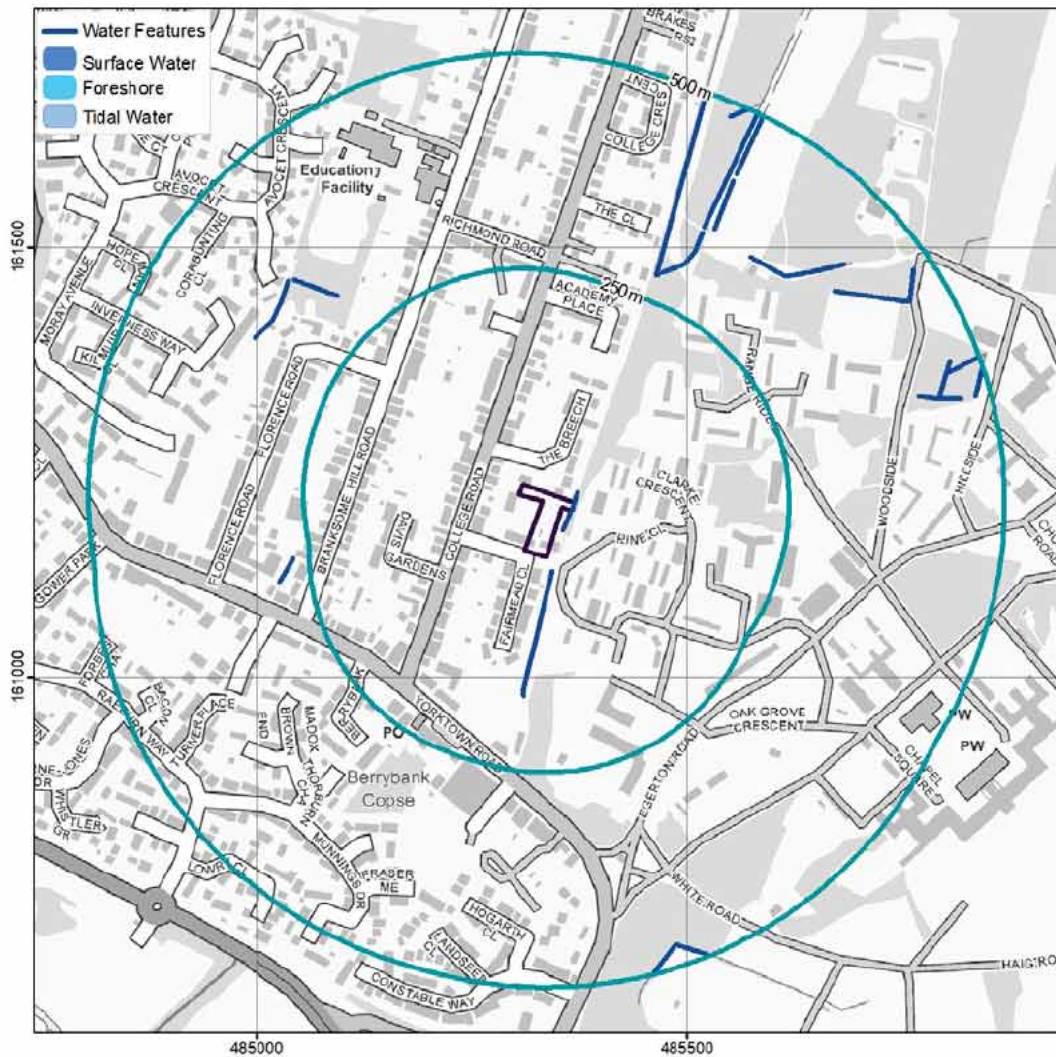
Contains Ordnance Survey data © Crown copyright and database right 2023  
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# GeoSmart DTM5 (5m) map (EA, 2023)



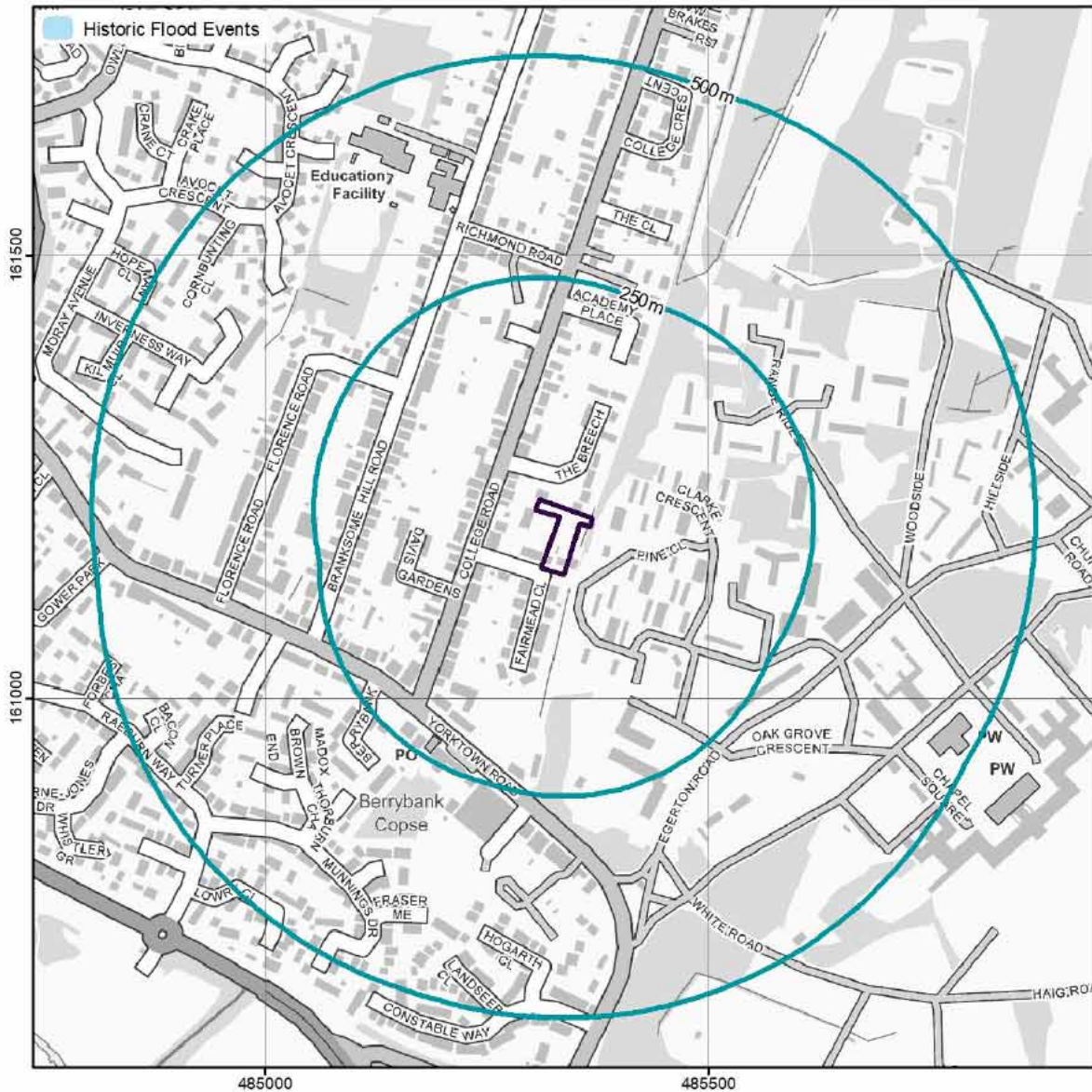
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# Ordnance Survey Surface Water Feature Vector Map (OS, 2023)



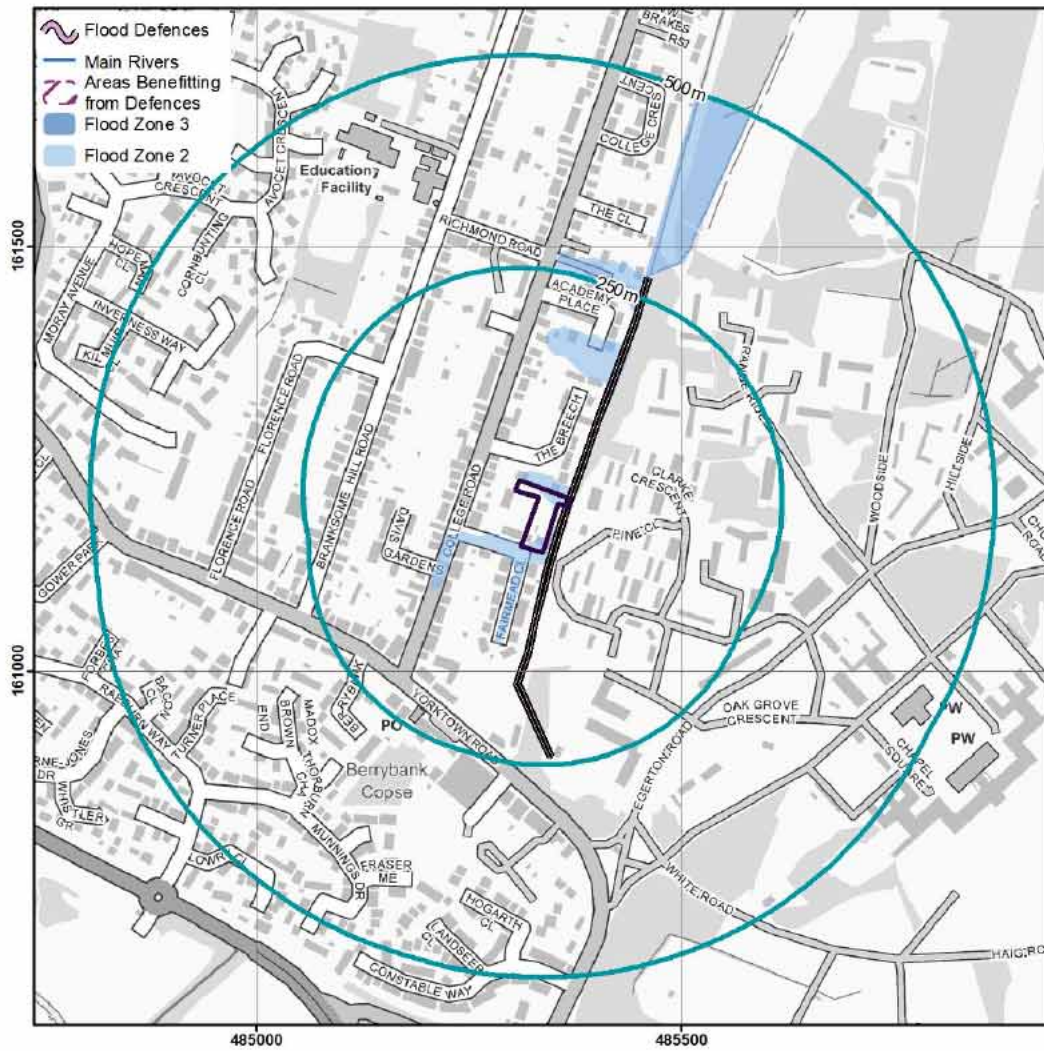
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# Environment Agency Historic Flood Map (EA, 2023)



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# Environment Agency's Flood Map for Planning Purposes (EA, 2023)



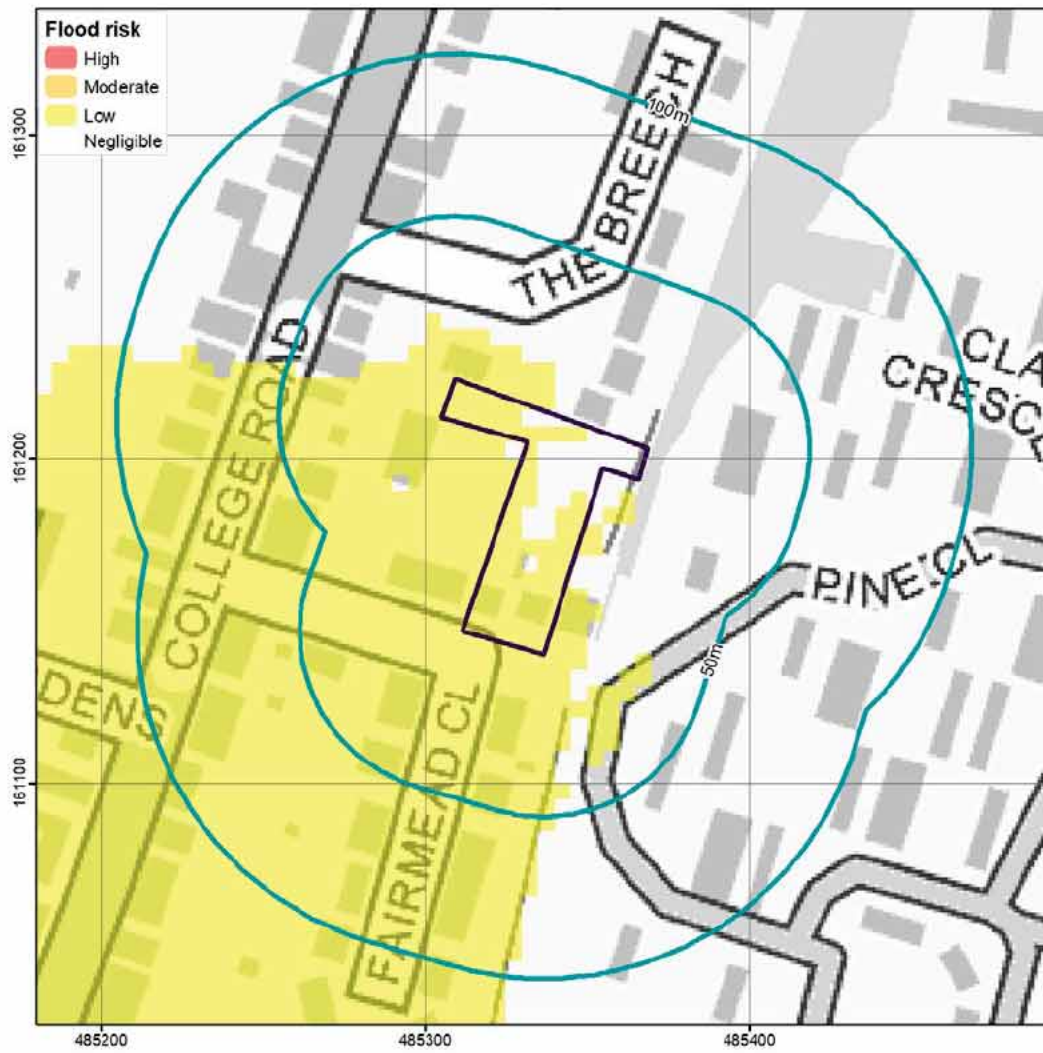
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Environment Agency's Flood Risk from Rivers and Sea map (EA, 2023)



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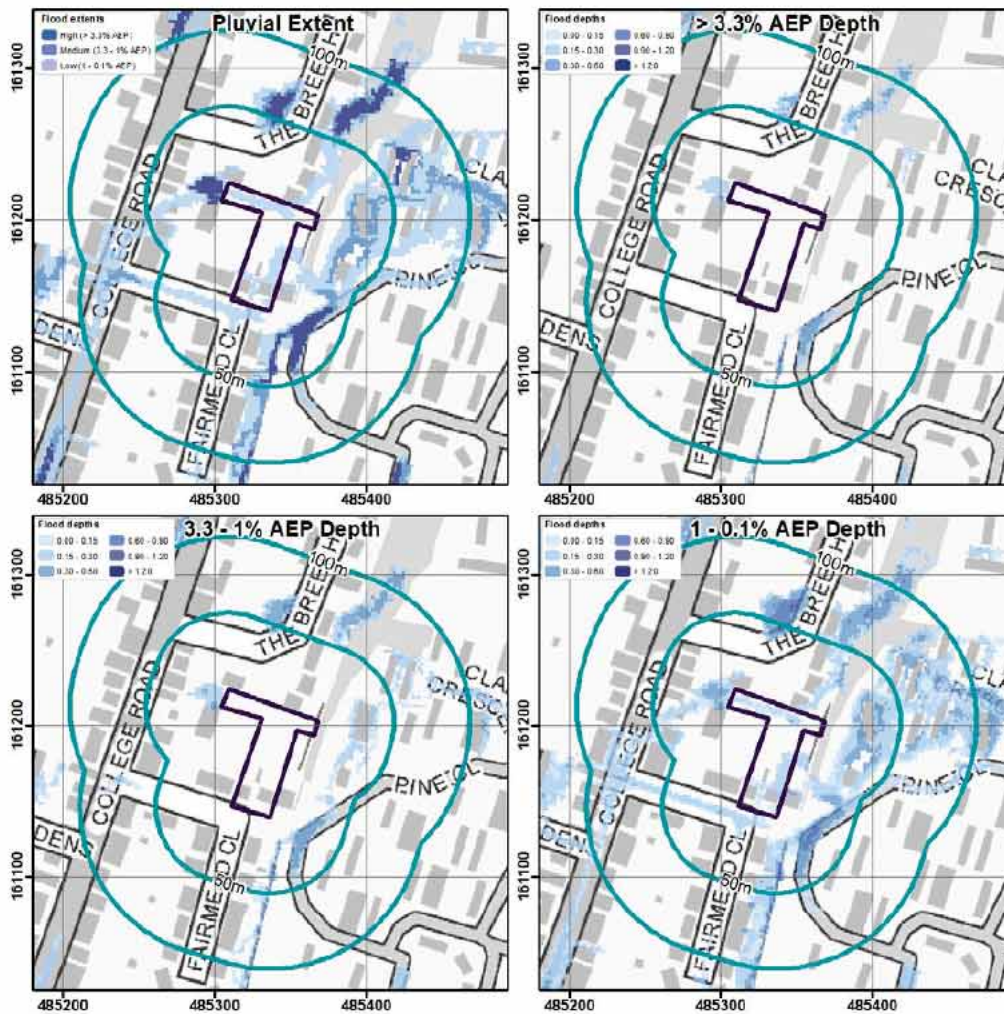
GeoSmart Groundwater Flood Risk (GW5, v2.3) Map (GeoSmart, 2023)



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Contains British Geological Survey materials © NERC 2023

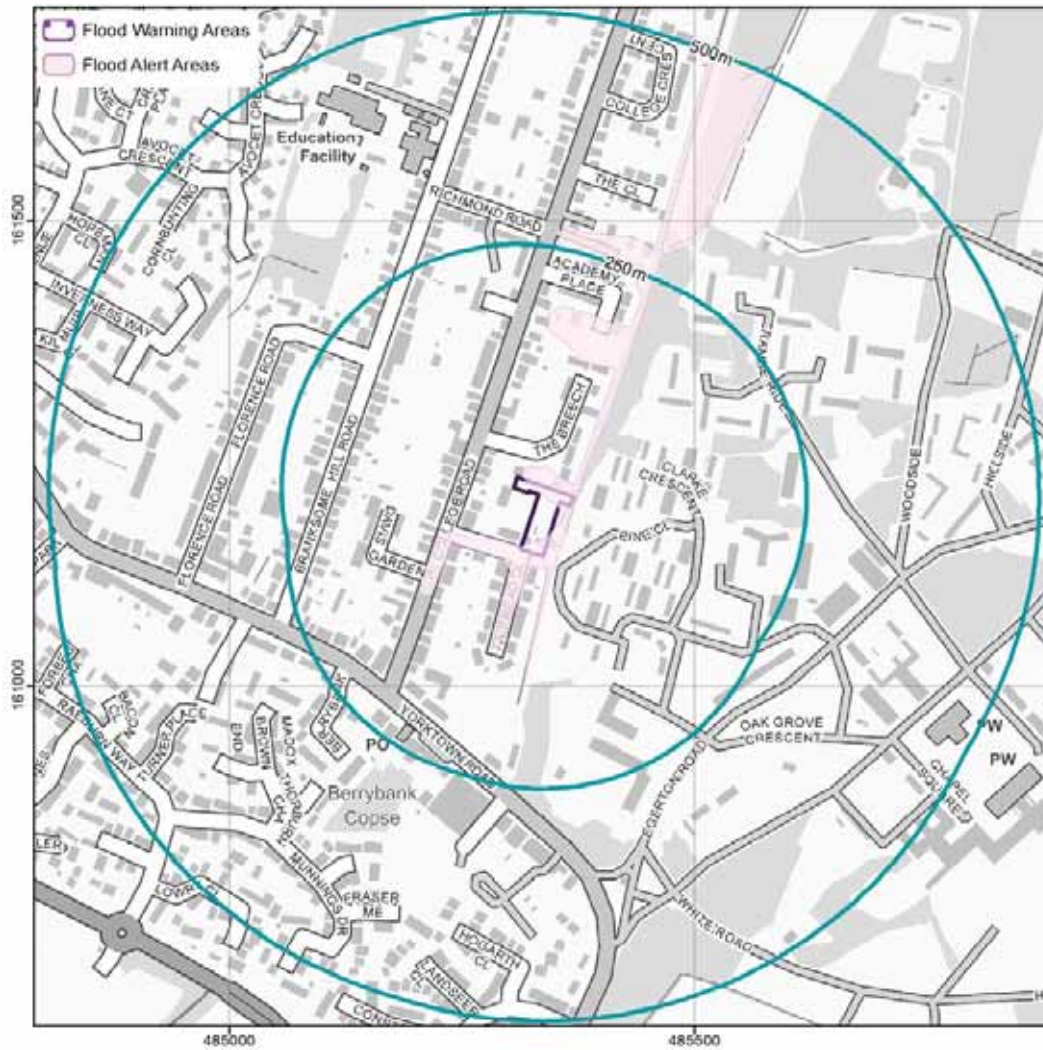


EA Risk of Flooding Surface Water (pluvial) Depth map 1 in 100 year (EA, 2023)



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## Environment Agency Flood Alert and Flood Warning Areas Map (EA, 2023)



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# Appendix C

## Environment Agency data

## Pre-Application Enquiry Form (Preliminary Opinion)

### Please read the following notes before completing this form:

This form should be used where you require preliminary advice from the Environment Agency relating to a specific plot of land. We will provide a free preliminary opinion on what environmental constraints may affect your proposed development and how to avoid or mitigate any identified environmental impacts. We may then offer a charged advice service for any further discussions you want about your proposed project.

Where you intend to submit a planning application to a Local Planning Authority (LPA) we recommend that you contact the relevant LPA to determine the likelihood of your proposed development receiving planning permission before submitting a pre-application enquiry to the Environment Agency. The LPA should also be able to advise you whether an Environmental Impact Assessment (EIA) will need to be submitted with your planning application.

Where you intend to apply to the Planning Inspectorate (PINS) for development consent for a Nationally Significant Infrastructure Project please use this form where you want a preliminary opinion from the Environment Agency. Please read the advice notes on the National Infrastructure Portal. Advice Note 11 Working with public bodies on national infrastructure before you contact us.

We will give you our preliminary opinion within 21 days of receiving your request in accordance with National Planning Policy Guidance. If we are unable to do this, we will contact you to request further time to respond.

### How to complete and submit this form

Section 1 of this form contains the minimum information required for us to deal with your pre-application enquiry. If this information is not provided we will not be able to deal with your enquiry and will return a standard response to this effect.

Section 2 contains additional questions that you are encouraged to complete, as this will enable us to provide you with more detailed and useful advice.

Section 3 contains a set of notes, which provide an explanation of the questions in section 2. You are advised to read these carefully before completing this form.

Please submit the completed form to your local Environment Agency office:

[Environment Agency offices](#)

Where you are unable to access documents electronically or find your local Environment Agency office address, please contact us on 03708 506 506.

# Preliminary Opinion Request Form

## SECTION 1

### 1. About you

Please provide the following details:

Contact Name:	Sarah Scully
Company Name:	GeoSmart Information
Your Ref:	72797
Address:	Suite 9-11, 1st floor
	Old Bank Buildings, Bellstone
	Shrewsbury, Shropshire
Postcode:	SY1 1HU
Phone:	[REDACTED]
Email:	[REDACTED]

### 2. About your proposed development

Site Address/Location of Site
Athol Villa, Westbourne Road, College Town, Camberley, Surrey GU47 0QX
Postcode GU47 0QX National Grid Map Reference SU 85337 61180

#### Submit a location plan

A location plan clearly showing the boundary of the proposed development must be submitted with your enquiry. This should be at a scale between 1:100 and 1:2500

If there are any watercourses or water features on or within the vicinity of your development site, you will need to identify these on your location plan.

### 3. Description of the Proposed Development

Please give a brief description of the type of development/change of use proposed:

Residential
-------------

**SECTION 2**

**4. Land Contamination**

Please identify whether land contamination is potentially an issue:

<b>Existing use of site</b>	
<b>Previous use(s) of site</b>	

**5. Flood Risk**

Please identify whether your development is at risk from flooding:

Is the proposal within Flood Zone 2 or 3?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
Have you contacted your Local Planning Authority to establish whether your site will need to be subject to the sequential test as required by the National Planning Policy Framework?  If the site will be subject to the sequential test—see notes on page 3.	Yes <input type="checkbox"/> No <input type="checkbox"/>

**6. Foul Drainage**

Please state the proposed method for dealing with foul drainage:

Main Sewer	
Package Treatment Plant	
Septic Tank	
Cesspool	
Other (please state)	

## SECTION 3: USER NOTES

### Q1: About You

Please provide your name, company name (if applicable) and full address in this section to enable us to respond to your enquiry. A phone number should also be provided, so we can contact you if we need to discuss your enquiry further or request more time to respond. If you would prefer a response to be sent via email rather than in a paper format, please also provide your full email address.

### Q2: About the site

Please provide us with as much information as possible to enable us to locate the proposed development site. This must include the full address of the site, a postcode (where available) and/or a National Grid Reference (NGR) for the site. The NGR should be a minimum of six figures. A location plan must also be provided to show the boundary of the proposed development, preferably to a scale of between 1:100 and 1:2500.

### Q3: Description of the proposed development

Please provide as full a description as possible of the proposed development.

### Q4: Land Contamination

Identifying the existing/previous use of the site will give an indication of the possibility of contamination. Developers should also assess the potential for contamination when the development represents a particularly sensitive end use, e.g. nurseries, schools, gardens, or allotments. Where contamination poses a risk of pollution to controlled waters, we will provide advice to the local planning authority (LPA) at the planning application stage. We would therefore strongly advise that you complete the questions in the above table as this will help us better advise you of the information you would need to submit with your planning application. Please note that we do not offer advice on the risks to human health arising from development on land affected by land contamination. If required, this advice should be sought from your Local Authority Environmental Health Department.

### Q5: Flood Risk

Where the development falls within Flood Zone 2 or 3, we will provide advice to the LPA on flood risk at the planning application stage either directly or on low risk development via our [Flood Risk Standing Advice](#).

**IMPORTANT:** If your site falls within Flood Zones 3 or 2 and has not been subjected by the LPA to the sequential test as set out in the National Planning Policy Framework (NPPF), any subsequent planning application may be refused if it fails this test. This will apply either to

- 'windfall' sites that have not been allocated via an adopted development plan or
- to sites that have been allocated via an adopted development plan which has not itself been subject to the sequential test

Applicants are advised to establish with the LPA at the pre-application stage whether their site will be acceptable in sequential test terms in order to avoid any unnecessary expenditure of time and resources at the planning application stage.

To determine whether your development is in a flood zone, refer to the [Flood Map](#) and put the postcode or place name in the Flood Map box.

### Q6: Foul Drainage

Where mains drainage is available this should be the first option for disposal of foul sewage from the proposed development. You may require an environmental permit from us if the proposed method of foul drainage is not to main sewer.

# Appendix D

## Thames Water sewer flooding report



# Sewer Flooding

History Enquiry



Property Searches

GeoSmart Information Ltd

**Search address supplied** Atholl Villa  
Westbourne Road  
College Town  
Sandhurst  
GU47 0QX

**Your reference** 72797

**Our reference** SFH/SFH Standard/2020\_4189008

**Received date** 14 May 2020

**Search date** 14 May 2020



Thames Water Utilities Ltd  
Property Searches, PO Box 3189, Slough SL1 4WW  
DX 151280 Slough 13



[searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)  
[www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)



0845 070 9148

# Sewer Flooding

History Enquiry



Property Searches

**Search address supplied:** Atholl Villa, Westbourne Road, College Town, Sandhurst, GU47 0QX

**This search is recommended to check for any sewer flooding in a specific address or area**

TWUL, trading as Property Searches, are responsible in respect of the following:-

- (i) any negligent or incorrect entry in the records searched;
- (ii) any negligent or incorrect interpretation of the records searched;
- (iii) and any negligent or incorrect recording of that interpretation in the search report
- (iv) compensation payments



Thames Water Utilities Ltd  
Property Searches, PO Box 3189, Slough SL1 4WW  
DX 151280 Slough 13



[searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)  
[www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)



0845 070 9148

### History of Sewer Flooding

#### **Is the requested address or area at risk of flooding due to overloaded public sewers?**

The flooding records held by Thames Water indicate that there have been no incidents of flooding in the requested area as a result of surcharging public sewers.

For your guidance:

- A sewer is “overloaded” when the flow from a storm is unable to pass through it due to a permanent problem (e.g. flat gradient, small diameter). Flooding as a result of temporary problems such as blockages, siltation, collapses and equipment or operational failures are excluded.
- “Internal flooding” from public sewers is defined as flooding, which enters a building or passes below a suspended floor. For reporting purposes, buildings are restricted to those normally occupied and used for residential, public, commercial, business or industrial purposes.
- “At Risk” properties are those that the water company is required to include in the Regulatory Register that is presented annually to the Director General of Water Services. These are defined as properties that have suffered, or are likely to suffer, internal flooding from public foul, combined or surface water sewers due to overloading of the sewerage system more frequently than the relevant reference period (either once or twice in ten years) as determined by the Company’s reporting procedure.
- Flooding as a result of storm events proven to be exceptional and beyond the reference period of one in ten years are not included on the At Risk Register.
- Properties may be at risk of flooding but not included on the Register where flooding incidents have not been reported to the Company.
- Public Sewers are defined as those for which the Company holds statutory responsibility under the Water Industry Act 1991.
- It should be noted that flooding can occur from private sewers and drains which are not the responsibility of the Company. This report excludes flooding from private sewers and drains and the Company makes no comment upon this matter.
- For further information please contact Thames Water on Tel: 0800 316 9800 or website [www.thameswater.co.uk](http://www.thameswater.co.uk)



Thames Water Utilities Ltd  
Property Searches, PO Box 3189, Slough SL1 4WW  
DX 151280 Slough 13



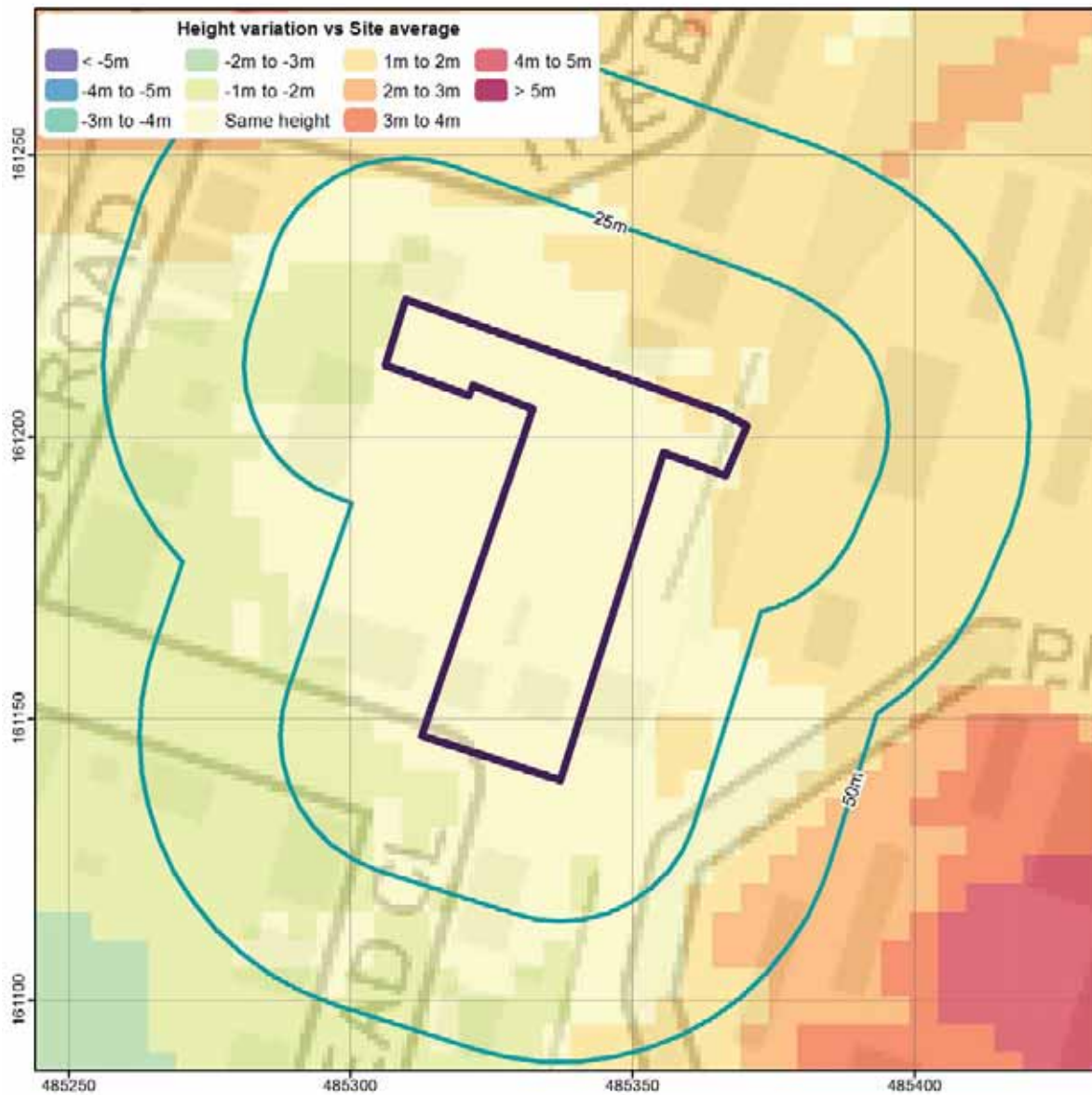
[searches@thameswater.co.uk](mailto:searches@thameswater.co.uk)  
[www.thameswater-propertysearches.co.uk](http://www.thameswater-propertysearches.co.uk)



0845 070 9148

# Appendix E

## Environment Agency LiDAR Ground Elevation Data



## Disclaimer

This report has been prepared by GeoSmart in its professional capacity as soil, groundwater, flood risk and drainage specialists, with reasonable skill, care and diligence within the agreed scope and terms of contract and taking account of the manpower and resources devoted to it by agreement with its client and is provided by GeoSmart solely for the internal use of its client.

The advice and opinions in this report should be read and relied on only in the context of the report as a whole, taking account of the terms of reference agreed with the client. The findings are based on the information made available to GeoSmart at the date of the report (and will have been assumed to be correct) and on current UK standards, codes, technology and practices as at that time. They do not purport to include any manner of legal advice or opinion. New information or changes in conditions and regulatory requirements may occur in future, which will change the conclusions presented here.

This report is confidential to the client. The client may submit the report to regulatory bodies, where appropriate. Should the client wish to release this report to any other third party for that party's reliance, GeoSmart may, by prior written agreement, agree to such release, provided that it is acknowledged that GeoSmart accepts no responsibility of any nature to any third party to whom this report or any part thereof is made known. GeoSmart accepts no responsibility for any loss or damage incurred as a result, and the third party does not acquire any rights whatsoever, contractual or otherwise, against GeoSmart except as expressly agreed with GeoSmart in writing.

For full T&Cs see <http://geosmartinfo.co.uk/terms-conditions>

## Important consumer protection information

This search has been produced by GeoSmart Information Limited, Suite 9-11, 1st Floor, Old Bank Buildings, Bellstone, Shrewsbury, SY1 1HU.

Tel: 01743 298 100

Email: [info@geosmartinfo.co.uk](mailto:info@geosmartinfo.co.uk)

GeoSmart Information Limited is registered with the Property Codes Compliance Board (PCCB) as a subscriber to the Search Code. The PCCB independently monitors how registered search firms maintain compliance with the Code.

### The Search Code:

- provides protection for homebuyers, sellers, estate agents, conveyancers and mortgage lenders who rely on the information included in property search reports undertaken by subscribers on residential and commercial property within the United Kingdom
- sets out minimum standards which firms compiling and selling search reports have to meet
- promotes the best practice and quality standards within the industry for the benefit of consumers and property professionals
- enables consumers and property professionals to have confidence in firms which subscribe to the code, their products and services.
- By giving you this information, the search firm is confirming that they keep to the principles of the Code. This provides important protection for you.

### The Code's core principles

Firms which subscribe to the Search Code will:

- display the Search Code logo prominently on their search reports
- act with integrity and carry out work with due skill, care and diligence
- at all times maintain adequate and appropriate insurance to protect consumers
- conduct business in an honest, fair and professional manner
- handle complaints speedily and fairly
- ensure that products and services comply with industry registration rules and standards and relevant laws
- monitor their compliance with the Code

### Complaints

If you have a query or complaint about your search, you should raise it directly with the search firm, and if appropriate ask for any complaint to be considered under their formal internal complaints procedure. If you remain dissatisfied with the firm's final response, after your complaint has been formally considered, or if the firm has exceeded the response timescales, you may refer your complaint for consideration under The Property Ombudsman scheme

(TPOs). The Ombudsman can award compensation of up to £5,000 to you if he finds that you have suffered actual loss as a result of your search provider failing to keep to the Code.

*Please note that all queries or complaints regarding your search should be directed to your search provider in the first instance, not to TPOs or to the PCCB.*

#### **TPOs contact details:**

The Property Ombudsman scheme

Milford House

43-55 Milford Street

Salisbury

Wiltshire SP1 2BP

Tel: 01722 333306

Fax: 01722 332296

Email: [admin@tpos.co.uk](mailto:admin@tpos.co.uk)

You can get more information about the PCCB from [www.propertycodes.org.uk](http://www.propertycodes.org.uk).

Please ask your search provider if you would like a copy of the search code.

#### **Complaints procedure**

GeoSmart Information Limited is registered with the Property Codes Compliance Board as a subscriber to the Search Code. A key commitment under the Code is that firms will handle any complaints both speedily and fairly. If you want to make a complaint, we will:

- Acknowledge it within 5 working days of receipt.
- Normally deal with it fully and provide a final response, in writing, within 20 working days of receipt.
- Keep you informed by letter, telephone or e-mail, as you prefer, if we need more time.
- Provide a final response, in writing, at the latest within 40 working days of receipt.
- Liaise, at your request, with anyone acting formally on your behalf.

If you are not satisfied with our final response, or if we exceed the response timescales, you may refer the complaint to The Property Ombudsman scheme (TPOs): Tel: 01722 333306, E-mail: [admin@tpos.co.uk](mailto:admin@tpos.co.uk).

We will co-operate fully with the Ombudsman during an investigation and comply with his final decision. Complaints should be sent to:

Martin Lucass

Commercial Director

GeoSmart Information Limited

Suite 9-11, 1st Floor,

Old Bank Buildings,

Bellstone, Shrewsbury, SY1 1HU

Tel: 01743 298 100

[martinlucass@geosmartinfo.co.uk](mailto:martinlucass@geosmartinfo.co.uk)



# Terms and conditions, CDM regulations and data limitations

Terms and conditions can be found on our website:

<http://geosmartinfo.co.uk/terms-conditions/>

CDM regulations can be found on our website:

<http://geosmartinfo.co.uk/knowledge-hub/cdm-2015/>

Data use and limitations can be found on our website:

<http://geosmartinfo.co.uk/data-limitations/>