

FloodSmart Plus



Flood Risk Assessment

Site Address

25 River Road
Littlehampton
BN17 5BZ

Date Updated

2025-11-21

Originally Issued

2022-08-05

Grid Reference

502427, 102102

Report Status

FINAL

Report Prepared for

Hall Homes
1 Rooks Acre Cottages
West Street Sompting
Lancing
Sussex
BN15 0AX

Site Area

321 m²

Report Reference

74499.01.01R1



RISK – Very Low to Medium

The Site is located within a tidal Flood Zone 1, 2 and 3 (Low to High probability). Taking into consideration the presence of defences, as well as prevailing flood model data, the risk of flooding from rivers and sea (RoFRS) is classed as Medium.

Following analysis of the baseline data the Site is considered to be at a Very Low to High risk of surface water flooding, a Low risk of groundwater flooding and a Low risk of flooding from artificial sources (reservoirs, canals and sewers).

Mitigation measures are recommended in this report to reduce the risks to an acceptable level over the lifetime of the development.

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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) (2024) and National Planning Practice Guidance (NPPG) (2025). 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 Analysis	After Mitigation
Sea (coastal/tidal) and River (fluvial) flooding	Very Low to Low	Medium	Low
Surface water (pluvial) flooding	Very Low to High		Very Low to Low
Groundwater flooding	Moderate	Low	Negligible
Other flood risk factors present	Yes (sewers)		Yes
Is any other further work recommended?	Yes		No

1 BASELINE risks assigned for the whole Site, using national risk maps, including the benefit of EA flood defences and the impacts of climate change.

2 AFTER ANALYSIS modification of risk assessment based on detailed site specific analysis including some or all of the following: flood model data, high resolution mapping, building location, access routes, topographic and CCTV surveys.

3 AFTER MITIGATION risks include risks to proposed development / asset and occupants if mitigation measures recommended in this report are implemented, including the impacts of climate change.

*N/A indicates where mitigation is not required.

Summary of existing and proposed development

The Site is currently comprised of a single-storey garage and workshop, including tarmac/concrete forecourts in the south and east of the Site.

Development proposals comprise the demolition of on-Site structures and the erection of 2 two-storey, three bedroom dwellings at the northern and southern ends of the Site. Associated parking with minor landscaped areas are proposed in the north east of the Site,

and the remainder of the Site is proposed comprise of paved surfaces. Site plans are included within Appendix A.

Summary of flood risks

The flood risks from all sources have been assessed as part of this report and are as follows:

River (fluvial) and Sea (Estuarine/Coastal) flooding

According to the Environment Agency's (EA) Flood Map for Planning Purposes, the Site is located within a fluvial and coastal Flood Zone 1, 2 and 3 (Low to High Probability).

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 Very Low to Low risk of flooding from Rivers and the Sea.

The Site is located 50 m from The River Arun, a tidally affected river (the English Channel is situated 900 m to the south east of the Site).

Formal flood defences are mapped approximately 50 m to the south of the Site, designed to provide protection up to a 1 in 75 year event.

- The Beachy Head to Selsey Bill Shoreline Management Plan (SMP2) (South Downs Coastal Group, 2006) designation for defence lines at Littlehampton (Unit 18) is to "Hold the Line" over the long term period to 2105 which means that the proposals will remain protected by flood defences currently and over the lifetime of the development.

Modelled flood data obtained from the EA has been analysed in line with the most up to date guidance on climate change (EA, 2020), to confirm a maximum "design" flood level at the Site.

- This confirms during the 1 in 200 year (0.5% AP) (2125 defended Higher Central scenario) coastal flood event over the projected 100 year lifespan of the development, the flood level at the Site would be 4.68 mAOD.
- This confirms during the 1 in 200 year (0.5% AP) (2125 undefended Upper End scenario) coastal flood event over the projected 100 year lifespan of the development, the flood level at the Site would be 5.06 mAOD.

In the event of a flood, safe refuge can be taken on the ground and 1st floor levels, but emergency evacuation routes (to be used in preference) are available along Terminus Place to the north.

Baseline mapping indicates a Very Low to Low risk. However, a review of the flood model data, local topography and proposed development plans indicates the risk is likely to be higher; as such, a Medium risk classification has been adopted.

Surface water (pluvial) flooding

According to the EA's Risk of Flooding from Surface Water (pluvial) flood mapping, the Site has a Very Low to High risk of pluvial flooding. The majority of the Site is modelled to remain flood free, with flooding largely restricted to the Site boundaries.

Present day

Flood depths on Site could be up to 0.29 m in the 1 in 100 year present day scenario event.

Future Climate Change

Flood depths on Site could be up to 0.29 m in the 1 in 100 year plus climate change event.

Groundwater flooding

Groundwater Flood Risk screening data indicates there is a Moderate risk of groundwater flooding at the surface in the vicinity of the Site during a 1 in 100 year event.

- According to a review of the hydrogeology (Section 3), the Site is underlain by permeable superficial deposits above permeable bedrock. Groundwater levels may rise in the bedrock and superficial aquifers in a seasonal response to prolonged rainfall recharge which may cause an unusually high peak in groundwater levels during some years.
- Groundwater levels may rise in the bedrock and superficial aquifer in response to high river and coastal events due to the potential hydraulic continuity with the tidal River Arun.

A site-specific assessment confirms that as impermeable coverage at the Site and surrounding area will limit the emergence potential at the Site and along evacuation routes, the groundwater risk to future occupants is therefore considered to be Low.

Artificial sources of flooding

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 using the Strategic Flood Risk Assessment (JBA Consulting, 2016). This confirms 22 incidences or modelled incidences of flooding as a result of surcharging sewers within the BN17 5 postcode, although this covers a wide area and is not specific to the Site.

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

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 sea level rise. Site specific assessment indicates risk to the Site will increase significantly and appropriate mitigation measures are proposed.

Recommendations

Further recommendations are provided below, based upon the proposed development and the flood risk identified at the Site.

- As there is a risk of flooding from both fluvial and coastal sources, Finished Floor Levels (FFL) of the proposed ground floor of the development will be set to 5.28 mAOD¹. Standard flood resilient design measures should be incorporated.
 - In line with recommendations by the local council for similar developments within the surrounding area, where it is not feasible to raise FFLs to the recommended elevation, as a minimum the proposed sleeping accommodation at the Site should be set above the 1 in 200 year undefended 2125 tidal (Upper End) event flood level of 5.06 mAOD.
- As there is a risk of flooding from surface water (pluvial) sources, alongside the mitigation measures proposed for fluvial and tidal flooding, ground levels should aim to slope away from buildings and should be designed to channel any overland flows from off-Site (to the south) away from the development and Site drainage systems.
- The ongoing management and maintenance of existing and any proposed drainage networks, under the riparian ownership of the developer, should be undertaken in perpetuity with the development.
- As there is a risk of flooding from groundwater sources, as above, surrounding ground levels should slope away from buildings. Risk to buried infrastructure should be considered along with standard flood resilient design and non-return valves on the sewer outlet.
- A Flood Warning and Evacuation Plan (FWEP) is recommended to ensure persons using the Site can evacuate safely on receipt of a Flood Warning.
- Occupants of the Site should be signed up to receive EA Flood Alerts and Flood Warnings.
- A Sustainable Drainage Strategy (SuDS) should be developed for the Site, for effective management of surface water runoff over the lifetime of the proposed development.

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.

¹ 0.6 m above the 1 in 200 year plus climate change defended Higher Central flood level of 4.68 mAOD in line with mitigation requirements set out within the SFRA (2016).

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 (2024) 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 (2024) and NPPG (2025).

"The National Planning Policy Framework set out the Government's planning policies for England and how these are expected to be applied" (NPPF, 2024).

The NPPF (2024) and NPPG (2025) 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, 2025).

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 2025 (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 Arun District Council Strategic Flood Risk Assessment (SFRA) (JBA Consulting, 2016) and the Beachy Head to Selsey Bill Shoreline Management Plan (South Downs Coastal Group, 2006) 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 (2024).

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	Local Policy & Guidance Documents*	Environment Agency (Appendix B)	OS Data
Historical	X	X	X	
River (fluvial) / Sea (tidal/coastal)	X	X	X	
Surface water (pluvial)	X	X	X	
Groundwater	X	X		
Sewer		X		
Culvert/bridges		X		X
Reservoir		X	X	

*Local guidance and policy, referenced below, has been consulted to determine local flood conditions and requirements for flood mitigation measures.

Local policy and guidance

For this report, several documents have been consulted for local policy and guidance and relevant information is outlined below:

Arun District Council Level 1 Strategic Flood Risk Assessment (JBA Consulting, 2016):

5.3 Fluvial flood risk

The primary fluvial flood risk to Arun District is associated with the River Arun, Aldingbourne Rife and Ferring Rife. The Main Rivers watercourses in the Arun District, recorded within the Environment Agency's Statutory (Sealed) Main River dataset are detailed in Table 5-1 and a figure of their locations is provided in Appendix A. Numerous other watercourses are present within the district, some of which are listed in section 5.2.3.

The catchment of the River Arun is predominately rural, with the exception of two main urban areas of Arundel and Littlehampton. There is a long history of fluvial flooding from the River Arun. Arundel has the highest number of properties at risk from fluvial flooding along the River Arun, followed by Littlehampton. Two significant events of fluvial flooding have occurred in 1974/1974 and 2000³⁰. In the 1975 flood event more than 10 properties in Arundel were flooded. Water levels in the downstream reaches of the River Arun channel are heavily influenced by tide levels."

6.3 Fluvial defences in Arun District

6.3.1 Raised defences

River Arun

Water levels in the River Arun from Arundel to Littlehampton through the Arun District are influenced by tides and river flows and the risk of flooding is determined by the height and condition of the raised flood defences adjacent to the channel banks. The location of these, and the authority which maintains them, is shown in Figure 6-1. As the river flows closer to the coast, it is normally expected that fluvial flows may have less influence on flood risk as tidal mechanisms begin to predominate.

In Arundel and on the western side of the channel at Littlehampton, the defences along the River Arun are primarily raised walls, whose maintenance is the responsibility of the private land owner. The east bank defences in Littlehampton were constructed by the Environment Agency, and post-construction these are privately maintained. Although the Environment Agency and Arun District Council have permissive powers to maintain defences, they do not hold responsibility to carry out maintenance or improvement works. Downstream of Arundel, the River Arun is defended by embankments that run along the stretch of the channel to Littlehampton. The maintenance of these embankments are the responsibility of the Environment Agency.

The defences which line the River Arun primarily have the standard of protection of 0.33% annual probability (1 in 300 chance in each and every year of experiencing an event of this magnitude) or lower (Figure 6-3) downstream of Arundel until Littlehampton.

A Flood Management Scheme for defences along the eastern bank of the River Arun adjacent to Littlehampton has recently been completed. The new defences, which extend from the coastal frontage of Littlehampton to approximately 500m beyond the A259, are reported by the Environment Agency to have been constructed to a 1 in 300 annual exceedance probability standard of protection. The new defences are under the responsibility of the private owners to maintain⁵⁵.

It is understood that there is an approximately 17m gap in the new defences close to 'Riverside Autos' in Littlehampton (NGR: 502397,102097) which is currently not to the 1 in 300-year standard

of protection (represented by the yellow star in Figure 6-1). Arun District Council understand that the Environment Agency have arrangements in place to deploy temporary barriers at this gap in the defence should it be necessary, until the defence line has been completed. If influential for development, the current status of this defence should be determined.

The condition grade for the embankment defences along the River Arun is generally 'Very Good', 'Good' or 'Fair' (Figure 6-2). However, a section of wall (circa 115m length) on the north bank south of River Road at Arundel has a condition grade of 'Poor', a condition grade also assigned to circa 350m of the River Arun west bank at the southern extent of Rope Walk."

7.4.3 Raised floor levels

*The raising of floor levels within a development avoids damage occurring to the interior, furnishings and electrics in times of flood. If it has been agreed with the Environment Agency that, in a particular instance, the raising of floor levels is acceptable, the developer should be **raised to a minimum of 600mm above the maximum water level caused by a 1 in 100-year fluvial flood event including an appropriate allowance for climate change or 1 in 200-year tidal/coastal flood event plus an appropriate allowance for climate change** However, if raised floor levels are proposed these should be agreed with Arun District Council. The minimum Finished Floor Level (FFL) may change depended on the vulnerability and flood risk of the development. Reference to the latest climate change guidance will be made when considering the FFL.*

Many areas currently situated within Flood Zone 2 may become part of Flood Zone 3a in the future due to the effects of climate change, therefore it is essential that the potential risk of flooding in the future is considered when planning development.

Allocating the ground floor of a building for less vulnerable, non-residential, use is an effective way of raising living space above flood levels.

*Single storey buildings such as ground floor flats or bungalows are especially vulnerable to rapid rise of water (such as that experienced during a breach). This risk can be reduced by use of multiple storey construction and raised areas that provide an escape route. However, access and egress would still be an issue, particularly when flood duration covers many days. **All sleeping accommodation in Flood Zone 2 and 3a should be located above the recommended flood level.** No sleeping accommodation should be located in Flood Zone 3b.*

Similarly, the use of basements should be avoided. Habitable uses of basements within Flood Zone 3 should not be permitted, whilst basement dwellings in Flood Zone will be required to pass the Exception Test."

7.4.5 Modification of ground levels

Modifying ground levels to raise the land above the required flood level is an effective way of reducing flood risk to a particular site in circumstances where the land does not act as conveyance for flood waters. However, care must be taken at locations where raising ground levels could adversely affect existing communities and property.

In most areas of fluvial flood risk, raising land above the floodplain would reduce conveyance or flood storage in flood the floodplain and could adversely impact flood risk downstream or on neighbouring land.

Compensatory flood storage should be provided, and would normally be on a level for level, volume for volume basis on land that does not currently flood but is adjacent to the floodplain (in order for it to fill and drain). It should be in the vicinity of the site and within the red line of the planning application boundary (unless the site is strategically allocated).

Raising ground levels can also deflect flood flows, so analyses should be performed to demonstrate that there are no adverse effects on third party land or property.

Raising levels can also create areas where surface water might pond during significant rainfall events.

Any proposals to raise ground levels should be tested to ensure that it would not cause increased ponding or build-up of surface runoff on third party land. Any proposal for modification of ground levels will need to be assessed as part of a detailed flood risk assessment."

Beachy Head to Selsey Bill Shoreline Management Plan (South Downs Coastal Group, 2006):

*"The coast between Brighton and Littlehampton is low lying, with limited sediment input and linkage along the frontage, and is susceptible to significant flood risk. The main defence along this section is the shingle beach which if not maintained will be susceptible to breaches, increasing in frequency, particularly in the longer term. This will lead to loss of properties and important historical assets, and flood damage to many more. **Thus, there is justification, economically, to maintain defences and hold the line.** However, to maintain this Hold the Line policy in the longer term, linear hard defences would need to be maintained along the frontage with significant lengths of new defences constructed where at present only a beach offers protection from flood damage and erosion losses. Given the nature of sea level rise, these defences will become significantly large structures associated with narrower beaches, which would have an impact on the tourist and coastal industries in this area."*

Adoption Arun Local Plan 2011-2031 (Arun District Council, 2018):

18.1 Water

... 18.1.2 Climate change is also likely to increase the risk of flooding in the District from rivers and the sea. Development must adapt to this by being suitably located away from areas at risk from flooding and by incorporating measures to mitigate against the impact of flooding such as sustainable drainage systems which reduce the volume of surface water rapidly entering groundwater flows which can result in surface water flooding and water pollution."

18.3 Flooding

18.3.1 All of Arun District is at some level of risk from flooding, with large areas within Zones 2 or 3 of the Environment Agency's Flood Map. Much of the coastline, including the towns of Bognor Regis and Littlehampton, is currently low lying and protected against erosion and tidal inundation by coastal defences. Parts of the coastal plain are at risk of flooding from watercourses or groundwater due to a high water table .

Policy WDM2

Flood risk

Development in areas at risk from flooding, identified on the latest Environment Agency flood risk maps and the Council's Strategic Flood Risk Assessment (SFRA), will only be permitted where all of the following criteria have been satisfied:

- a. The sequential test in accordance with the National Planning Policy Guidance has been met.*
- b. A site specific Flood Risk Assessment demonstrates that the development will be safe, including access and egress, without increasing flood risk elsewhere and reduce flood risk overall.*
- c. The sustainability benefits to the wider community are clearly identified.*
- d. The scheme identifies adaptation and mitigation measures.*
- e. Appropriate flood warning and evacuation plans are in place; and*
- f. New site drainage systems are designed to take account of events which exceed the normal design standard i.e. consideration of flood flow routing and utilising temporary storage areas.”*

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, 2024).



Site information

The Site is located in Littlehampton in a setting of commercial and residential land use at National Grid Reference TQ 02427 02102.

Figure 1. Aerial imagery of the Site (Bluesky, 2025)



Figure 2 indicates that ground levels within the Site locality typically slope to the south west. It is noted that to the north land rises to c. 5.7 m above Ordnance Datum (AOD). To the west the land falls to c. 2.0 m AOD, to the east land rises to c. 3.7 m AOD and to the south falls to c. 1.9 m AOD.

Figure 3 (overleaf) indicates that the general ground levels on-Site are between 3.26 m AOD and 4.31 m AOD with levels generally falling towards the south. This is based on EA elevation data obtained for the Site to a 1 m resolution with a vertical accuracy of ± 0.15 m.

Figure 2. Site Location and Relative Elevations (GeoSmart, 2025)

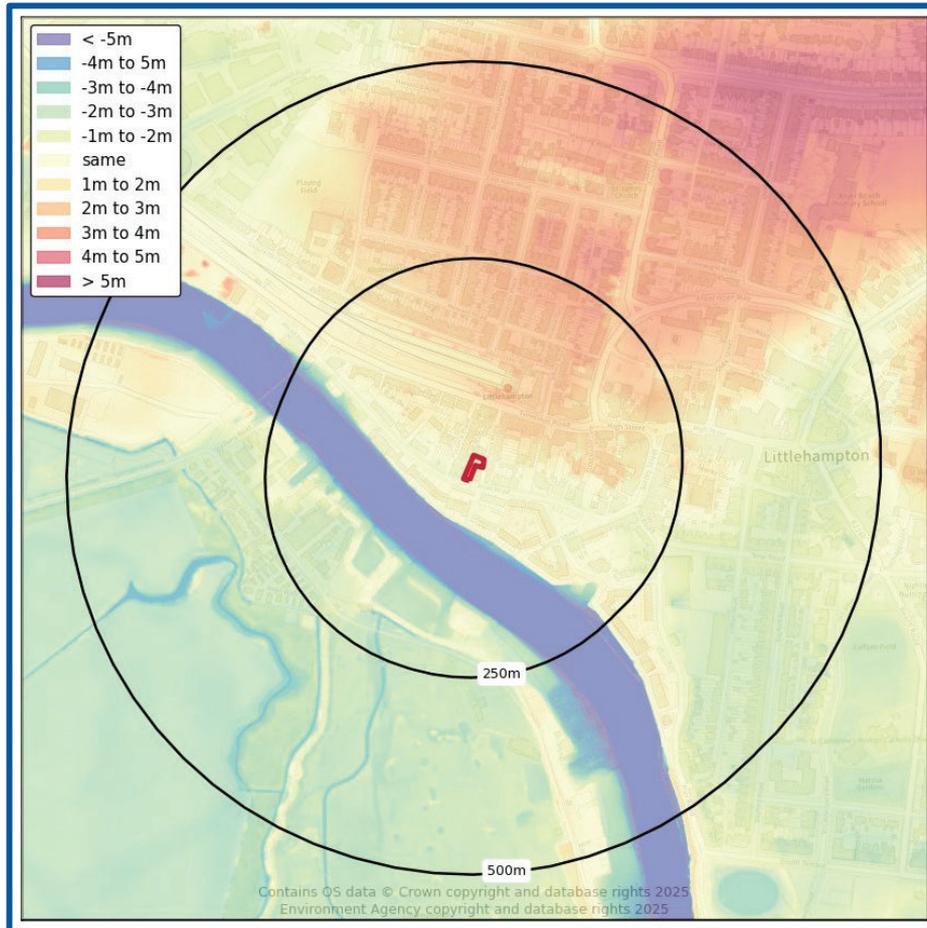


Figure 3. Environment Agency LiDAR ground elevation data (GeoSmart, 2025)



Development

The Site is currently comprised of a single-storey garage and workshop, including tarmac/concrete forecourts in the south and east of the Site.

Development proposals comprise the demolition of the existing on-Site structures and the erection of 2 two-storey, three bedroom dwellings at the northern and southern ends of the Site. Associated parking and minor landscaped areas are proposed in the north east of the Site, with the remainder of the Site proposed to comprise of paved surfaces. 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 and will result in the change of use, nature or times of occupation. According to Table 2 of the NPPG (2025), the vulnerability classification of the existing development is Less Vulnerable and proposed development is More Vulnerable. The estimated lifespan of the development is 100 years.

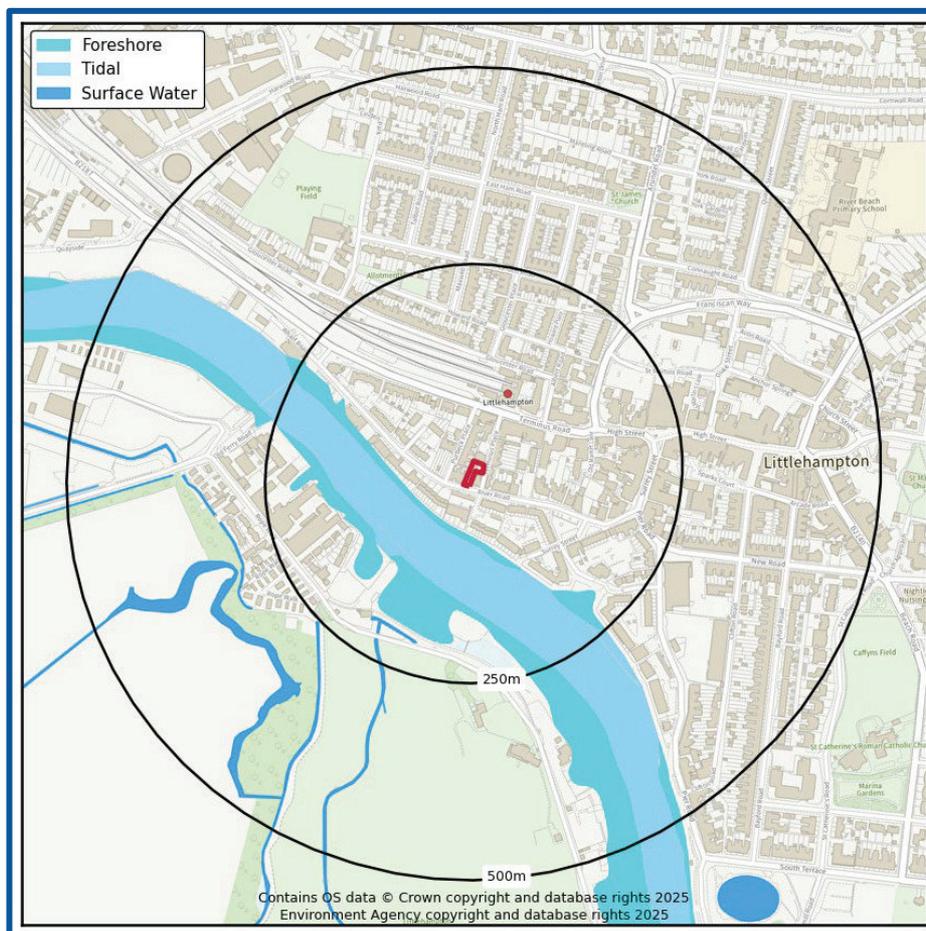
Hydrological features

According to Ordnance Survey (OS) mapping included in Figure 4, there are numerous surface water features within 500 m of the Site:

- The River Arun is located approximately 50 m to the south, at a lower elevation than the Site; and
- Multiple drainage ditches are located to the south west of the Site (beyond the River Arun), the closest of which is approximately 200 m from the Site boundary.

Note: the English Channel is located 900 m to the south east of the Site.

Figure 4. Surface water features (EA, 2025)



Proximity to relevant infrastructure

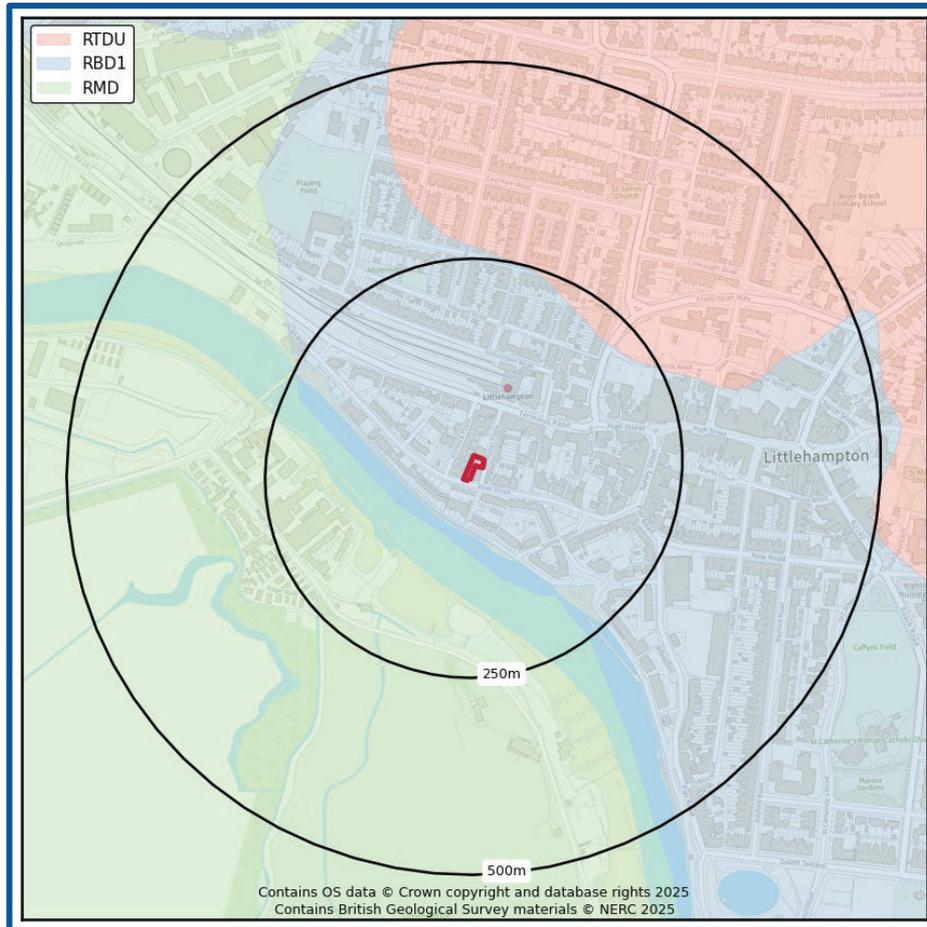
Infrastructure has been identified within proximity of the Site which could influence the risks of flooding to existing or future occupants. These include:

- A tributary of the River Arun is culverted c. 345 m to the south west, as well as c. 230 m and c. 250 m to the south.

Hydrogeological features

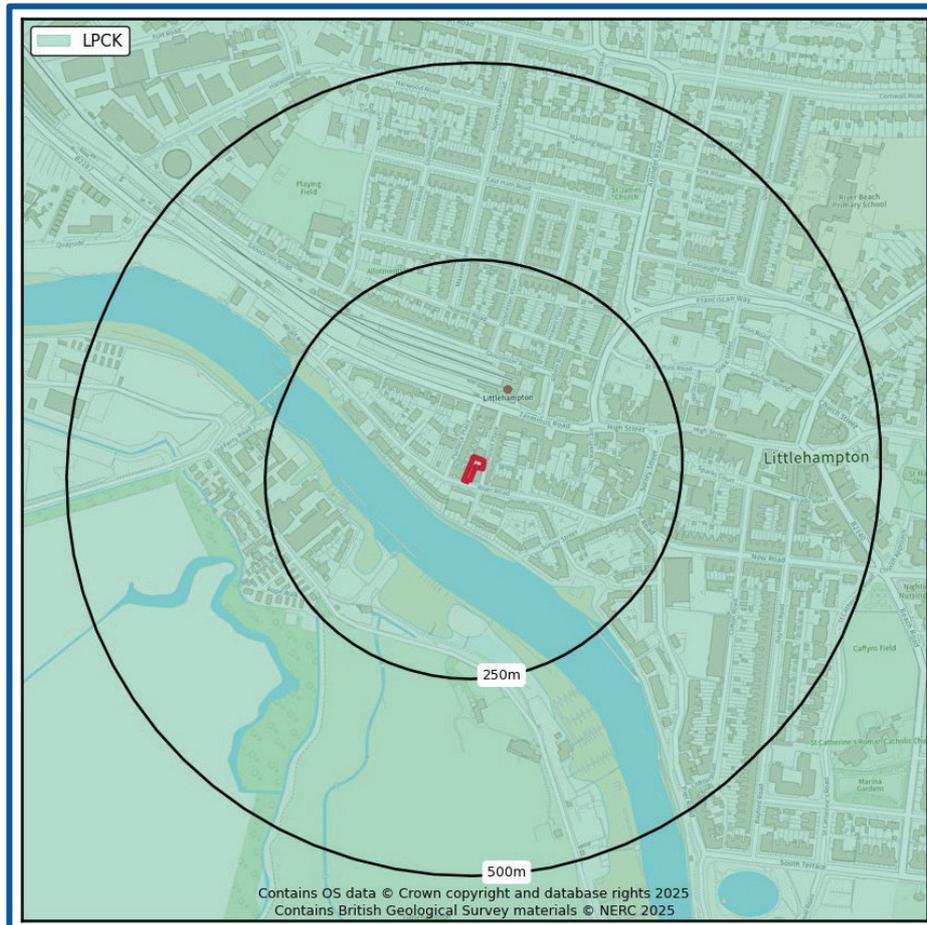
British Geological Survey (BGS) mapping indicates that the underlying superficial geology (Figure 5) consists of Raised Beach Deposits (RBD1) (sand and gravel) (BGS, 2025) which are classified as a Secondary (A) Aquifer (EA, 2025).

Figure 5. Superficial Geology (BGS, 2025)



BGS mapping indicates that the underlying bedrock geology (Figure 6) consists of the Lewes Nodular Chalk Formation, Seaford Chalk Formation, Newhaven Chalk Formation, Culver Chalk Formation and Portsdown Chalk Formation (undifferentiated) (LPCK) (chalk) (BGS, 2025) which are classified as a Principal Aquifer (EA, 2025).

Figure 6. Bedrock Geology (BGS, 2025)



Geological conditions

A review of the BGS borehole database (BGS, 2025) indicates that the nearest and most relevant borehole (ref: TQ00SW270) is located c. 140 m to the west of the Site boundary at an elevation 3.27 mAOD; the corresponding borehole record indicates the presence of Made Ground to 2 m below ground level (bgl), underlain by chalk to 20 m bgl, where the borehole terminated.

Groundwater

Borehole ref: TQ00SW270 struck groundwater at 4.5 m bgl within chalk strata, which then rose to 4.25 m bgl after 20 minutes in September/October 2012.