

FloodSmart



Flood Risk Assessment

Site Address

The Exchange
Queens Street
Hitchin
North Hertfordshire
SG4 9SB

Date

05/03/2025

Report Status

FINAL

Site Area

1977 m²

Report Reference

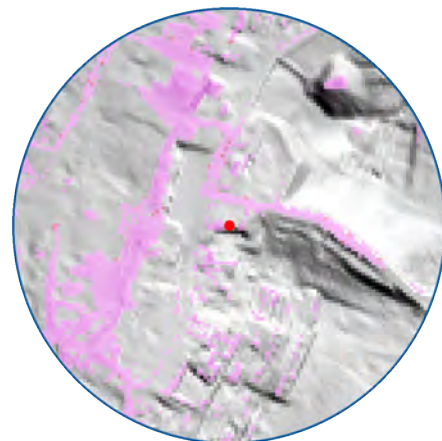
75991.00.02R1

Grid Reference

518661, 229039

Report Prepared for

Fairmead Limited
Knox House
16-18 Finch Road
Douglas
Isle of Man
IM1 2PT



RISK – Very Low to Moderate

The Site is mapped within the EA's fluvial and tidal Flood Zone 1 (Low Probability), with a Very Low risk of flooding from rivers and the sea. Surface water (pluvial) flood risks are Very Low to Moderate. Groundwater flood risks are Moderate and flooding risks from artificial sources (i.e. canals, reservoirs and sewers) are Very Low. Mitigation measures are recommended in this report to reduce the risks to an acceptable level over the lifetime of the development.

Following discussions with the client, mitigation measures are currently proposed for the lower ground floor / basement which include waterproof tanking and a sump and pump as part of the development which will reduce the groundwater risk to an acceptable level.

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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) (Published in 2014 and updated in August 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 ¹	After analysis ²	After Mitigation ³
River (fluvial) flooding	Very Low		N/A
Sea (coastal/tidal) flooding	Very Low		N/A
Surface water (pluvial) flooding	Very Low to High	Very Low to Moderate	Very Low to Low
Groundwater flooding	Negligible to Moderate	Moderate	Low
Other flood risk factors present	No	No	No
Is any other further work recommended?	Yes	Yes	Yes (see below)

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

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. Reasons for the change in classification are provided in the text.

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 used within a commercial capacity as a gym with associated access.

Development proposals comprise the change of use and conversion of the existing ground floor gym into 29 residential dwellings with associated parking and infrastructure as well as the addition of new windows to the ground floor and mezzanine floor levels.

There will be no additional built infrastructure on the Site; hence, the proposals are for internal reconfiguration works only. As such, there will not be an increase in the building footprint as a result of the proposed development.

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 Flood Zone 1 (Low 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 risk of flooding.

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:

- Flood depths in the area proposed for development are generally between 0.20 m and 0.60 m in the 1 in 100-year present day scenario event, however due to raised finished floor levels (c. 67.80mAOD) no internal flooding is anticipated in any present-day scenario.
- Flood depths in the area proposed for development could be up to 0.60 m in the 1 in 100 year plus climate change event; however, due to the raised finished floor levels, no internal flooding is anticipated during a future climate change (2050s epoch) event.

A SuDS strategy has been prepared separately (ref: 75991.01.02) to ensure surface water runoff from the Site is managed over the lifetime of the proposed development.

Baseline mapping indicates a Very Low to High risk, however a review of the flood model data, improved drainage and raised finished floor levels indicates the risk is likely to be Very Low to Moderate.

Groundwater flooding

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

Nearby boreholes (ref: TL12NE121 – TL12NE124) identified a groundwater table of between 57.90mAOD and 59.10mAOD in January 1985, subject to seasonal variations. The residential accommodation at basement level is 64.02mAOD.

Baseline mapping indicates a Negligible to Moderate risk, however a review of the nearby boreholes and development plans indicates the risk is likely to be Moderate due to the presence of residential accommodation on the lower ground floor.

No previous incidents of groundwater ingress was reported during the ownership of the Site in the existing basement / lower ground floor, and mitigation measures (waterproof tanking and installation of a sump and pump system) will be implemented as part of the proposed development which will reduce the risk to an acceptable level.

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. The potential for a breach of a reservoir to occur and flooding affecting the Site is low.
- Ordnance Survey (OS) data confirms there are no canals near to the Site.
- The Strategic Flood Risk Assessment (SFRA)(NHDC, 2016) (WSP, 2008) confirms no recorded instances of sewer flooding at or within the vicinity of the Site.

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

The risk to the development has been assessed over its expected 100-year lifetime, including appropriate allowances for the impacts of climate change which could increase the flood risk to the Site. Risks identified include increases in river flooding and or increased potential for surface water 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 agreed with the Client, the basement will incorporate waterproofing measures (full details TBC by the Client), and a sump and pump system will be installed prior to any residential accommodation being located on the lower ground floor.
- There is a risk of flooding from surface water sources, where flood depths could be up to 0.60 m in depth in the area which is currently proposed for development. Although finished floor levels are set c. 1.60m above ground levels (c. 67.80mAOD) and no internal flooding is anticipated, standard flood resilient design measures should be incorporated to maintain the reduced flood risk to the occupants.
- As there is a risk of flooding from groundwater sources, standard flood resilient design should be considered in addition to non-return valves on the sewer inlet. French drains may also be considered in addition to the **already proposed** waterproofing and sump and pump to minimise the groundwater risk to the basement dwellings.
- 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.
- Where feasible, the capacity of the existing drainage network in the courtyard could be improved (not currently proposed as part of the SuDS assessment) to intercept surface water and reduce the flood risk in these areas which may ease access and egress from the Site in the event of a flood.

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 (2024) and the source(s) of any flood risk present, guided by the NPPG (Published in 2014 and updated in August 2022). Finally, a preliminary assessment of the steps that can be taken to manage flood risk to the development was undertaken.

This report has been prepared with reference to the NPPF (2024) 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, 2024).

The NPPF (2024) 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.

"The 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. This means avoiding, so far as possible, development in current and future medium and high flood risk areas considering all sources of flooding including areas at risk of surface water flooding" (Paragraph: 023. 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: 021 Reference ID: 7-021-20220825), a thorough review of publicly and commercially available flood risk data 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 North Hertfordshire Strategic Flood Risk Assessment (SFRA) (NHDC, 2016) and the Surface Water Management Plan (NHDC, 2017) 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 risk 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	Utility provider	OS Data
Historical	X	X	X		
River (fluvial) / Sea (tidal/coastal)	X	X	X		
Surface water (pluvial)	X	X	X		

Source of flooding	Datasets consulted				
	Commercial Flood Maps	Local Policy & Guidance Documents*	Environment Agency	Utility provider	OS Data
Groundwater	X	X			
Sewer		X		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:

North Hertfordshire Local Plan (2011 – 2031)

Policy NE7: Reducing Flood Risk

Planning permission for development proposals will be granted provided that (as applicable):

- Development is located outside of medium and high-risk flood areas (flood zone 2 and 3) and other areas affected by other sources of flooding where possible;
- Where (a) is not possible, application of the sequential and exception tests is demonstrated where development is proposed in areas of flood risk using the Strategic Flood Risk Assessment (SFRA) and Environment Agency flood maps;
- An FRA has been prepared in accordance with national guidance that considers the lifetime of the development, climate change impacts and safe access and egress;
- It will be located, designed and laid out to ensure the risk of flooding is reduced whilst not increasing flood risk elsewhere;
- The impact of any residual flood risk will be minimised through flood resistant, resilient design and construction;
- Any flood protection and mitigation measures necessary will not cause harm to nature conservation, heritage assets, and/ or landscape and recreation and, where possible, will have a positive impact in these respects; and

g) Overland flow routes and functional floodplain areas are protected from all development other than that which is “water compatible” and this must be designed and constructed to remain operational and safe for users during flood events, resulting in no net loss of flood plain storage and not impeding water flows or increasing flood risk elsewhere.

Policy NE8: Sustainable drainage systems

Planning permission for development will be granted provided that:

- a) The most appropriate sustainable drainage solution is used taking into account technical, viability and design issues to reduce the risk of surface water flooding, enhance biodiversity, water quality and provide amenity benefits;
- b) It aims to mimic the natural drainage patterns and processes as far as possible; and
- c) Drainage solutions follow the SuDS hierarchy.

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).

3. Site analysis



Site information

The Site is located in Hitchin in a setting of commercial and residential land use at National Grid Reference TL 18661 29039.

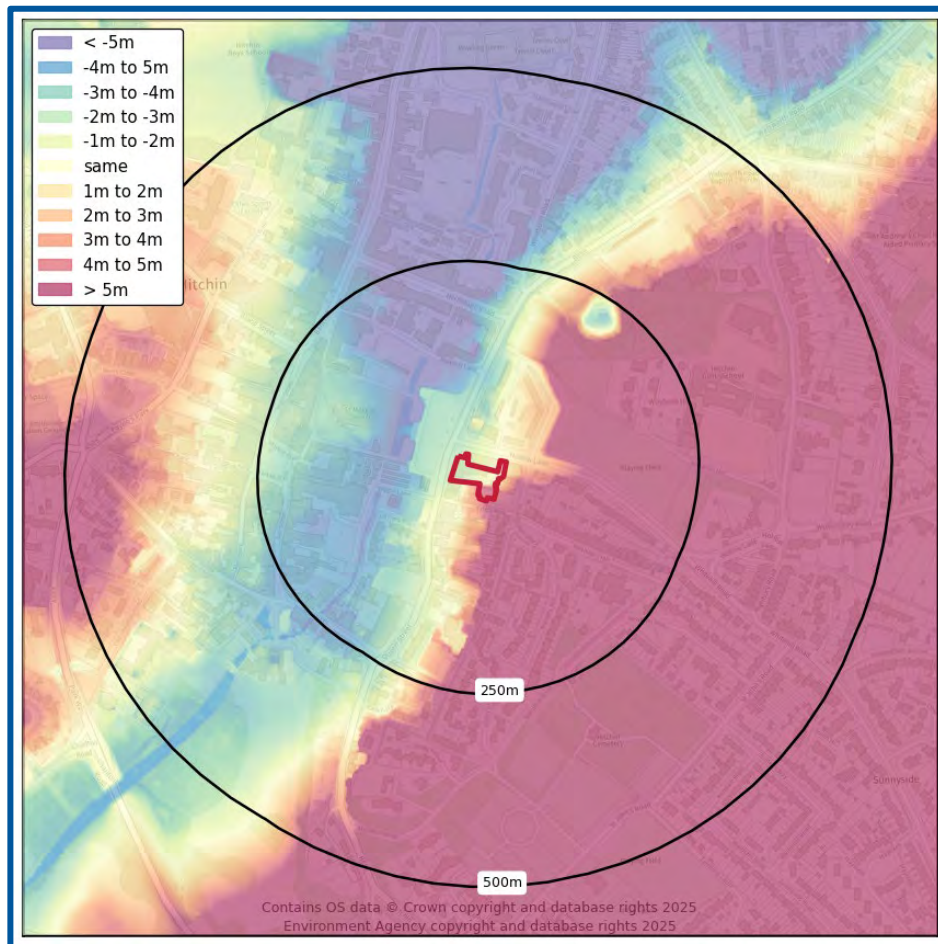
Figure 1. Aerial imagery of the Site (Bluesky, 2025)



Figure 2 overleaf indicates that the Site is located on a valley slope, with ground levels falling substantially to the west and rising to the east.

The general ground levels on the Site are between 66.21 and 68.15mAOD with the Site falling gradually in an easterly direction. This is based upon a Site specific topographic survey undertaken by Trail Architects (2021; Appendix A). Proposed finished floor levels of the Site are set at around 67.80mAOD.

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



Development

The Site is currently used within a commercial capacity as a gym with associated access.

Development proposals comprise the change of use and conversion of the existing lower ground floor and ground floor gym into 29 residential dwellings with associated parking and infrastructure as well as the addition of new windows to the ground floor and mezzanine floor levels.

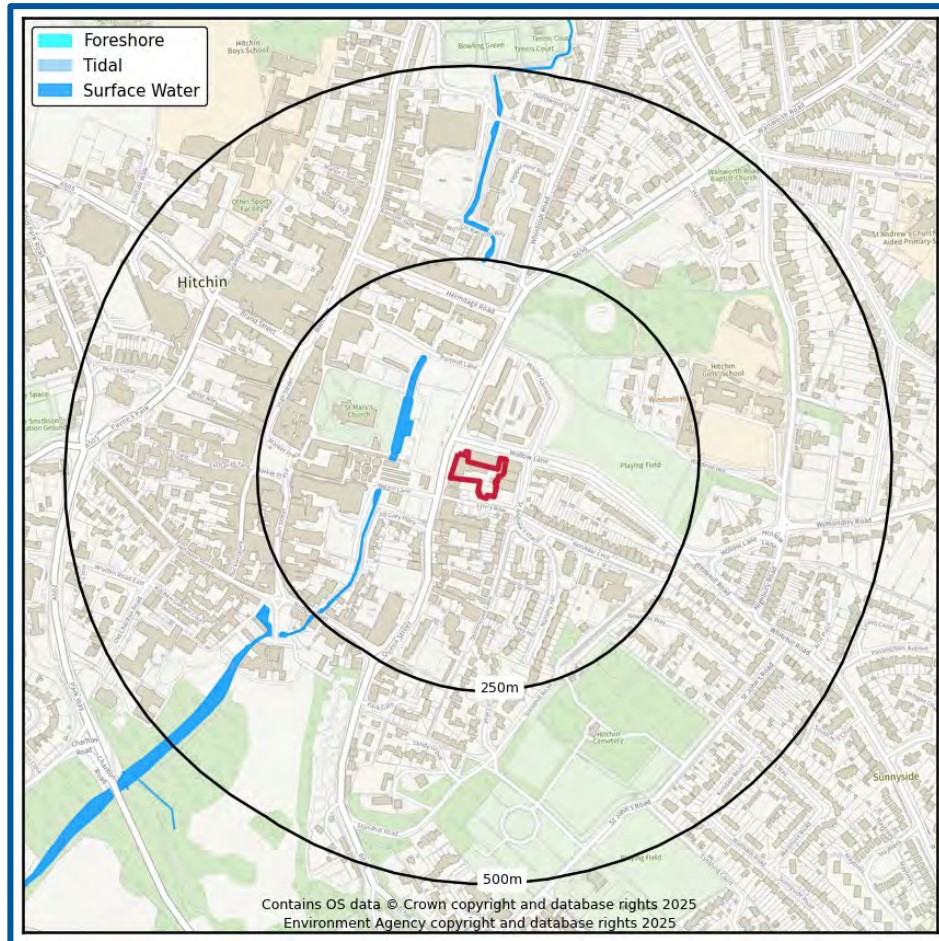
There will be no additional built infrastructure on the Site; hence, the proposals are for internal reconfiguration works only. As such, there will not be an increase in the building footprint as a result of the proposed development.

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 Annex 3 of the NPPG (2022), the vulnerability classification of the existing development is Less Vulnerable and proposed development is Highly Vulnerable (lower ground floor dwellings) / More Vulnerable. The estimated lifespan of the development is 100 years.

Hydrological features

According to Ordnance Survey (OS) mapping included in the following figure, a single surface water feature is located within 500 m of the Site.

Figure 3. Surface water features (EA, 2025)



The River Hiz is located c. 75m west of the Site, flowing in a northerly direction.

Proximity to relevant infrastructure

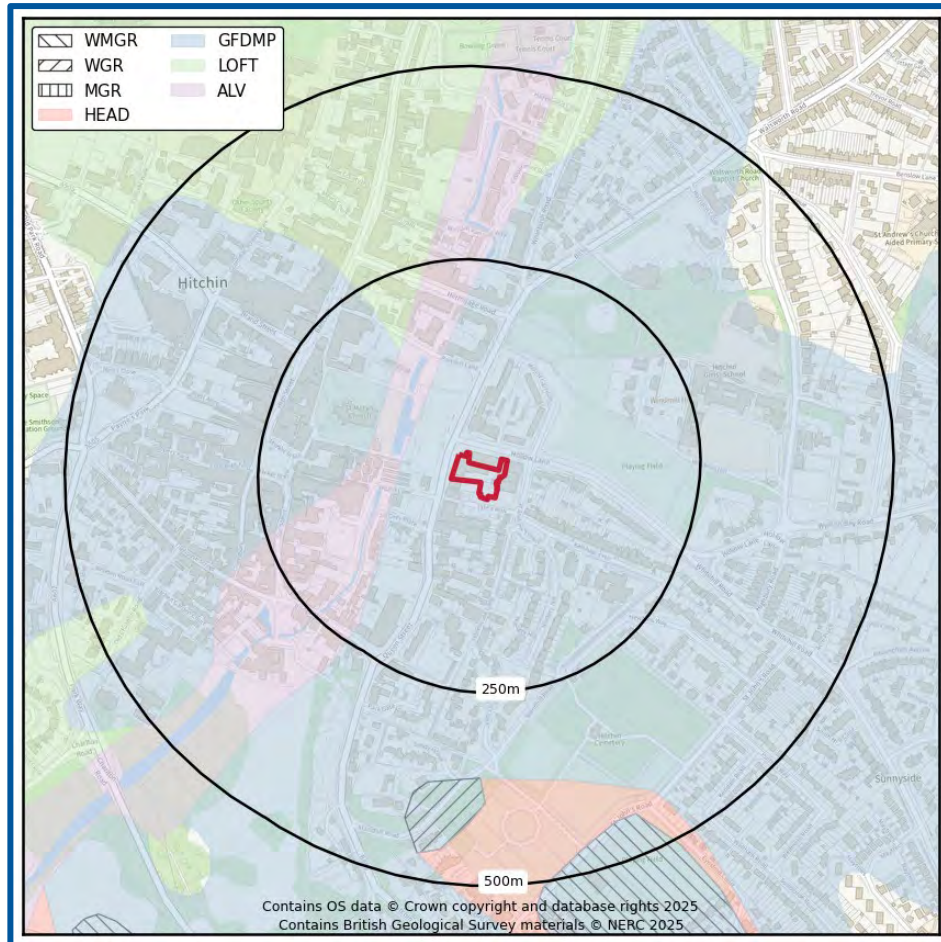
Infrastructure has been identified within relative proximity to the Site which could potentially influence the risks of flooding to existing or future users of the Site. This includes:

- The River Hiz is culverted in several locations, with the closest located approximately 80 m west of the Site and 130 m northwest of the Site, respectively.
- According to the Site Plans (Trail Architects, 2024) an electricity sub-station is located on-Site.

Hydrogeological features

British Geological Survey (BGS) mapping indicates the underlying superficial geology (Figure 4) consists of Glaciofluvial Deposits (Mid Pleistocene) (GFDMP) (BGS, 2025) and appears to be classified as a Secondary (A) aquifer (EA, 2025).

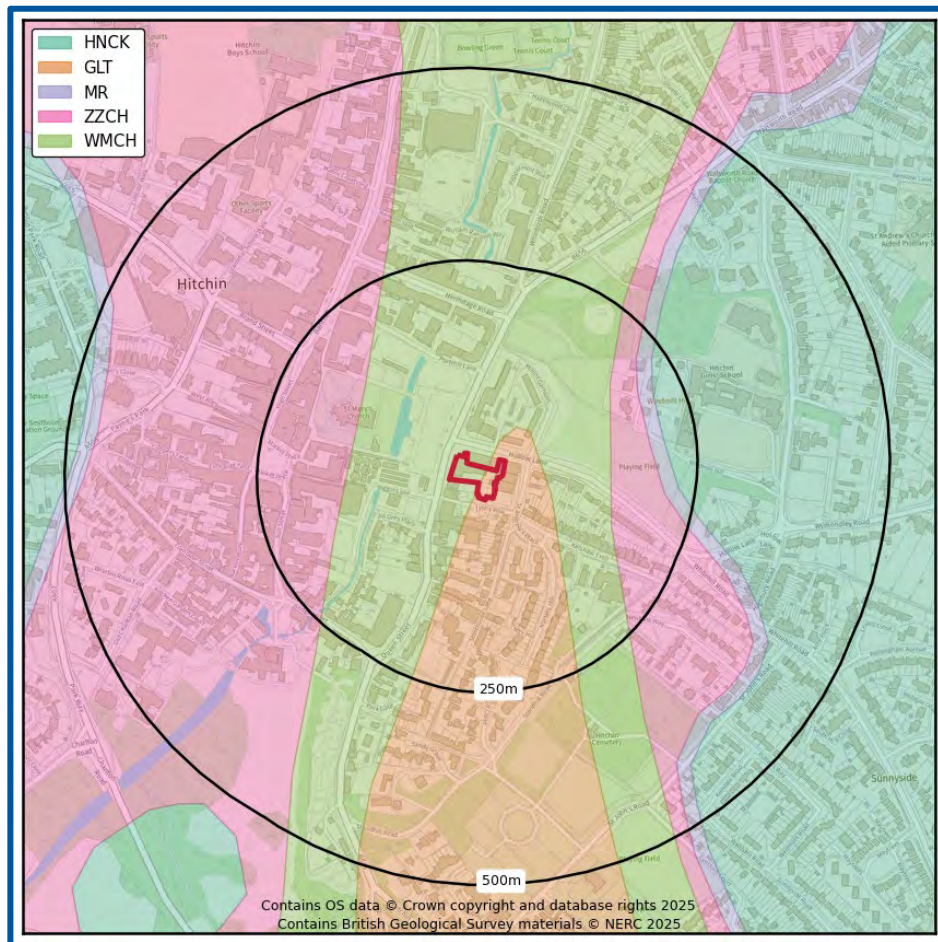
Figure 4. Superficial Geology (BGS, 2025)



BGS mapping indicates the underlying bedrock geology at the west of the Site (Figure 5) consists of the West Melbury Chalk Formation (WMCH) (BGS, 2025) and is classified as a Principal Aquifer (EA, 2025). The Melbury Chalk Formation covers approximately 60% of the Site.

BGS mapping indicates that the underlying geology (BGS, 2025) at the east of the Site is the Gault Formation (GLT) (mudstone), which is classified as Unproductive Strata (EA, 2025) and covers the remaining 40% of the Site.

Figure 5. Bedrock Geology (BGS, 2025)



Geological conditions

A review of the BGS borehole database (BGS, 2025) indicates that the nearest and most relevant borehole (ref: TL12NE123) is located c. 70 m to the north west of the Site boundary (at a lower elevation than the study Site – approximately 65.00 mAOD according to LiDAR data).

The corresponding borehole record confirms the underlying geology to comprise tarmac overlying dense brick rubble fill to a depth of 0.70 m below ground level (bgl), medium dense well-graded brown clayey silty sand with some firm gravel becoming more graded at the bottom to a depth of 11.20 m bgl, followed by dense becoming very dense uniformly graded brown silty sand to the base of the borehole at 15.0 m bgl.

Groundwater

The rest water level recorded at borehole TL12NE123 was 6.20 m bgl in January 1985 (no strike depth provided) which equates to a groundwater level of approximately 58.80 mAOD in comparison to Site ground levels of between 66.21 and 68.15 mAOD.

Due to the potential for an elevated groundwater risk to the Site, other boreholes within the vicinity were also investigated to confirm the depth to groundwater. The other nearby boreholes confirmed a groundwater depth of:

- TL12NE121 (c. 95m northwest, elevation c. 65.20mAOD) encountered groundwater at 6.10 m bgl.
- TL12NE122 (c. 110m northwest of the Site, elevation c. 64.10mAOD) encountered groundwater at 6.20 m bgl.
- TL12NE124 (c. 95m northwest, elevation c. 63.50mAOD) encountered groundwater at approximately 4.60 m bgl.

The nearby boreholes confirm the groundwater level is **generally between 57.90 to 59.10mAOD**. It should be noted that all boreholes surveyed are in close proximity to the River Hiz and are likely to experience shallower groundwater levels due to their likely increased hydraulic continuity with the watercourse, in comparison to the Site.

4. Flood risk to the development

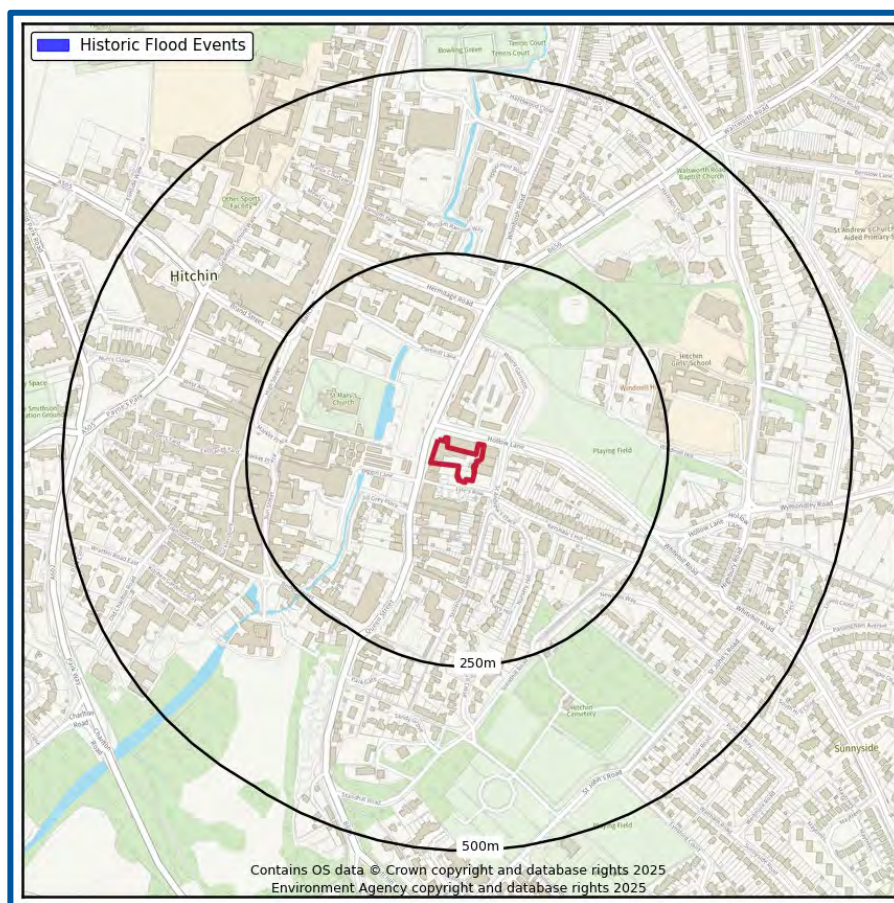


Historical flood events

According to the EA's Historical Flood Map, (Figure below) Figure 3 of the updated North Hertfordshire SFRA and the original 2008 SFRA (NHDC, 2016) (WSP, 2008), there have been no recorded flooding events that have affected the Site. Some historical flooding is mapped as part of the 2008 SFRA, however distance to the Site cannot be ascertained (Appendix C).

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.

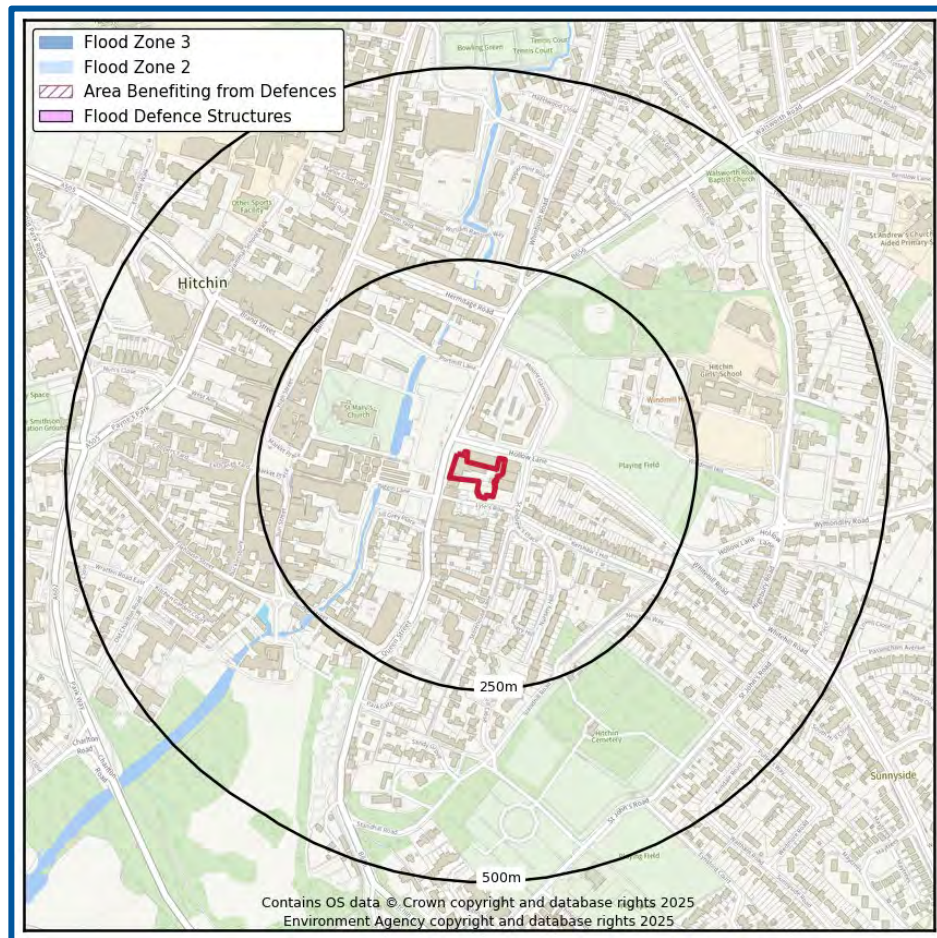
Figure 6. EA Historic Flood Map (EA, 2025)



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

According to the EA's Flood Map for Planning Purposes (Figure 7), the Site is located within fluvial Flood Zone 1 and is therefore classified as having a Low probability of fluvial flooding from the River Hiz.

Figure 7. EA Flood Map for Planning Purposes (EA, 2025)



Guidance

As defined in the NPPF (2024):

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).

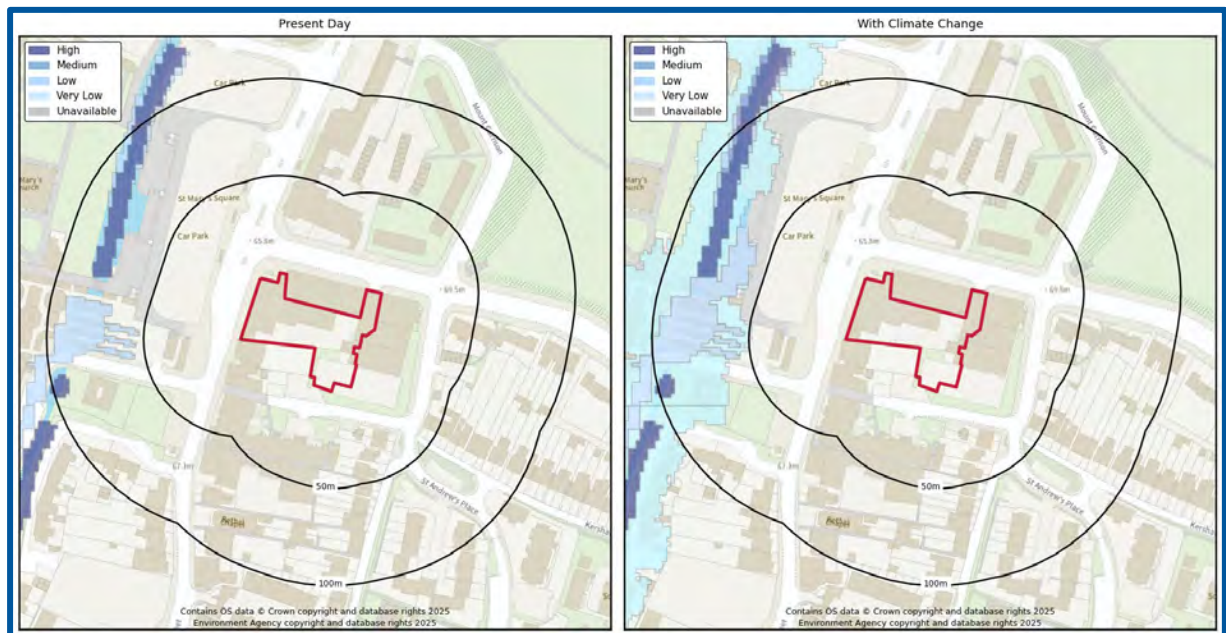
Flood risk including the benefit of defences

The type and condition of existing flood defences influence the 'actual' risk of fluvial flooding to the Site, albeit the long-term residual risk of flooding (ignoring the defences) should be considered when proposing new development.

- According to the EA's Asset Information and Maintenance System (AIMS) there are no formal flood defences within 250 m of the Site.

According to the EA's Risk of Flooding from Rivers and Sea (RoFRS) map (Figure 8), which considers the type, condition and crest height of flood defences, the Site has a Very Low risk of flooding from the nearby watercourse, the River Hiz during a present day and future climate change event (2050s epoch).

Figure 8. Risk of Flooding from Rivers and Sea map (EA, 2025)



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.

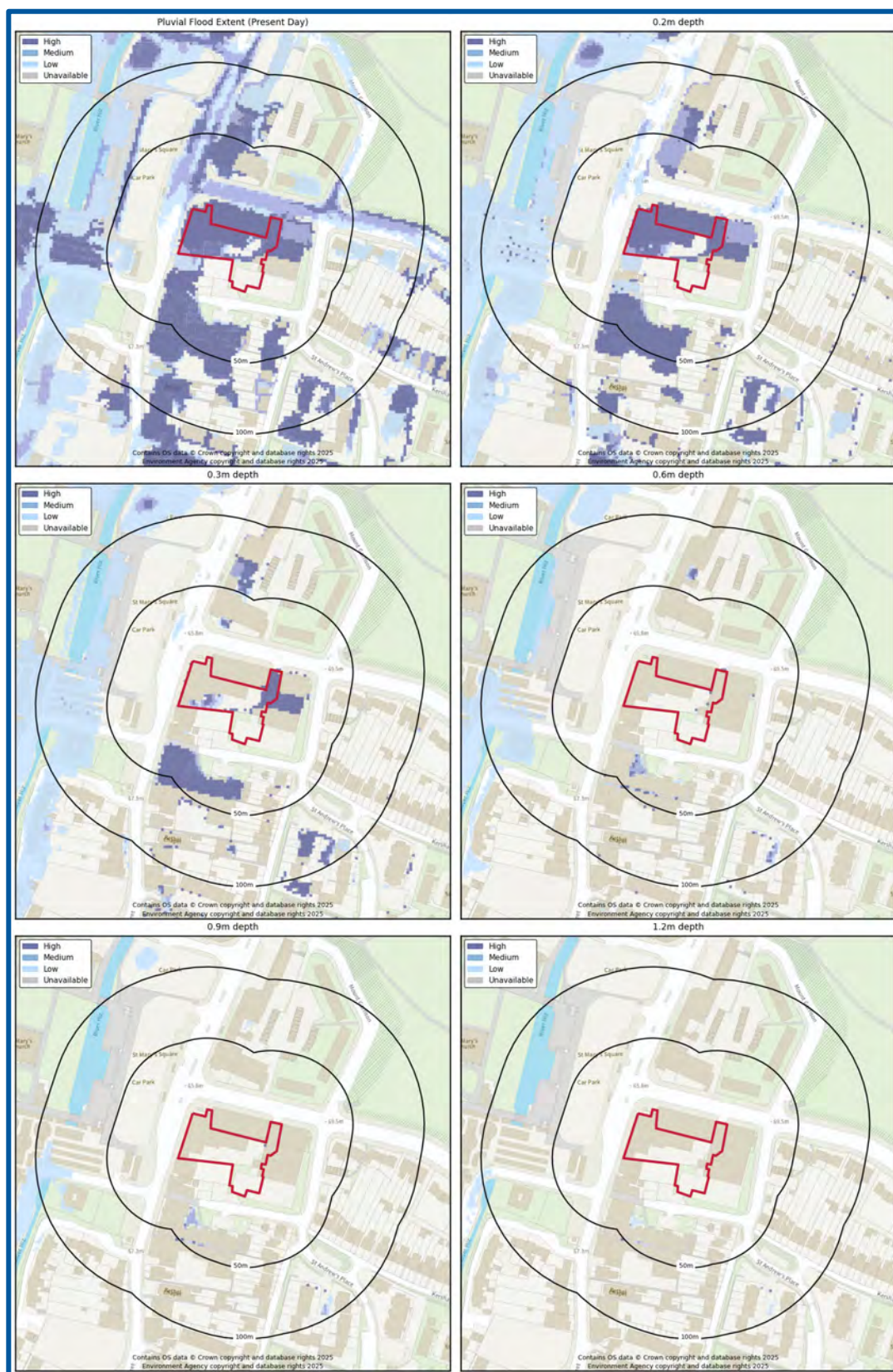
Figure 9 (overleaf) confirms the extent and depth of flooding in multiple modelled flood scenarios:

- During the High-risk event (>3.3% AEP), the Site is modelled to be affected by pluvial flooding. During the High-risk scenario, flood depths in the courtyard areas are generally between 0.20 m – 0.60 m, with some extremely isolated areas anticipated to flood greater than 0.60 m (isolated by a single pixel – see Figure 9). Most of the Site floods to a depth of between 0.20 m and 0.30 m depth.
- During the Medium-risk event (3.3 - 1% AEP), the Site is modelled to be affected by pluvial flooding, with the extent and depth of flooding appearing to be the same as modelled during the High-risk scenario.
- During the Low-risk event (1 - 0.1% AEP) the extent of flooding increases slightly, although flood depths are anticipated to remain between 0.20 m and 0.60 m on-Site.

Due to the heavily developed nature of the area, it is difficult to ascertain a flood level at the Site from the available LiDAR contours. However, given the finished floor levels of residential accommodation are set at c. 67.80mAOD at the Site (c. 1.60m above ground levels in the courtyard areas) no internal flooding of the units is expected during any scenario and hence the after analysis risk has been reduced to **Very Low / Moderate**.

Pluvial flooding is likely to impact access and egress during the High-risk event, with modelled flood depths of between 0.30 m and 0.60 m in the access road at the northeast of the Site.

Figure 9. EA surface water flood extent and depth map (EA, 2025)



Guidance

According to EA's surface water flood risk map the Site is at:

- Very Low risk - chance of flooding of less than 1 in 1000 (0.1%).
- Low risk - chance of flooding of between a 1 in 1000 & 1 in 100 (0.1% and 1%).
- Medium risk - chance of flooding of between a 1 in 100 and 1 in 30 (1% and 3.3%).
- High risk - chance of flooding of greater than 1 in 30 (3.3%).

The SFRA does not indicate any reported incidents of historical surface water flooding within 100 m of the Site, and the Surface Water Management Plan (SWMP) confirms the Site is located within a Critical Drainage Area (Hotspot 6 – Hitchin) (CDA)¹ (NHDC, 2017).

Guidance

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

Flood Depth

- 0.15 to 0.3 m - Flooding would: typically exceed kerb height, likely exceed the level of a damp-proof course, cause property flooding in some areas
- 0.3 to 0.9 m - Flooding is likely to exceed average property threshold levels and cause internal flooding. Resilience measures are typically effective up to a water depth of 0.6 m above floor level.

¹ A Critical Drainage Area (CDA) is an area that has critical drainage problems and which has been notified to the local planning authority as such by the Environment Agency in line with the National Planning Policy Framework (NPPF, 2024). CDA's are specific to Flood Zone 1, defined as areas where runoff can and may have historically contributed to flooding downstream, although they are not necessarily areas where flooding problems may occur. Where a Site is located in Flood Zone 1 and within a CDA, a Flood Risk Assessment (FRA) is required and the Council may also request Sustainable Drainage Scheme (SuDS) features to be included within the proposed development.

Surface water flooding flow routes

Analysis of OS mapping, ground elevation data and the EA's pluvial flow route mapping in the 1 in 1000-year (Low probability) event and Overland Flow Pathways mapping identifies the Site is located on a potential overland flow route.

During a 1 in 100-year event flows could potentially affect the buildings and/or access routes to the Site, although according to the existing site plan, drainage features (assumed to be linear drains) are mapped in the courtyard areas which are likely to intercept some surface water and reduce the overall risk (Trail Architects, 2021).

Climate change factors

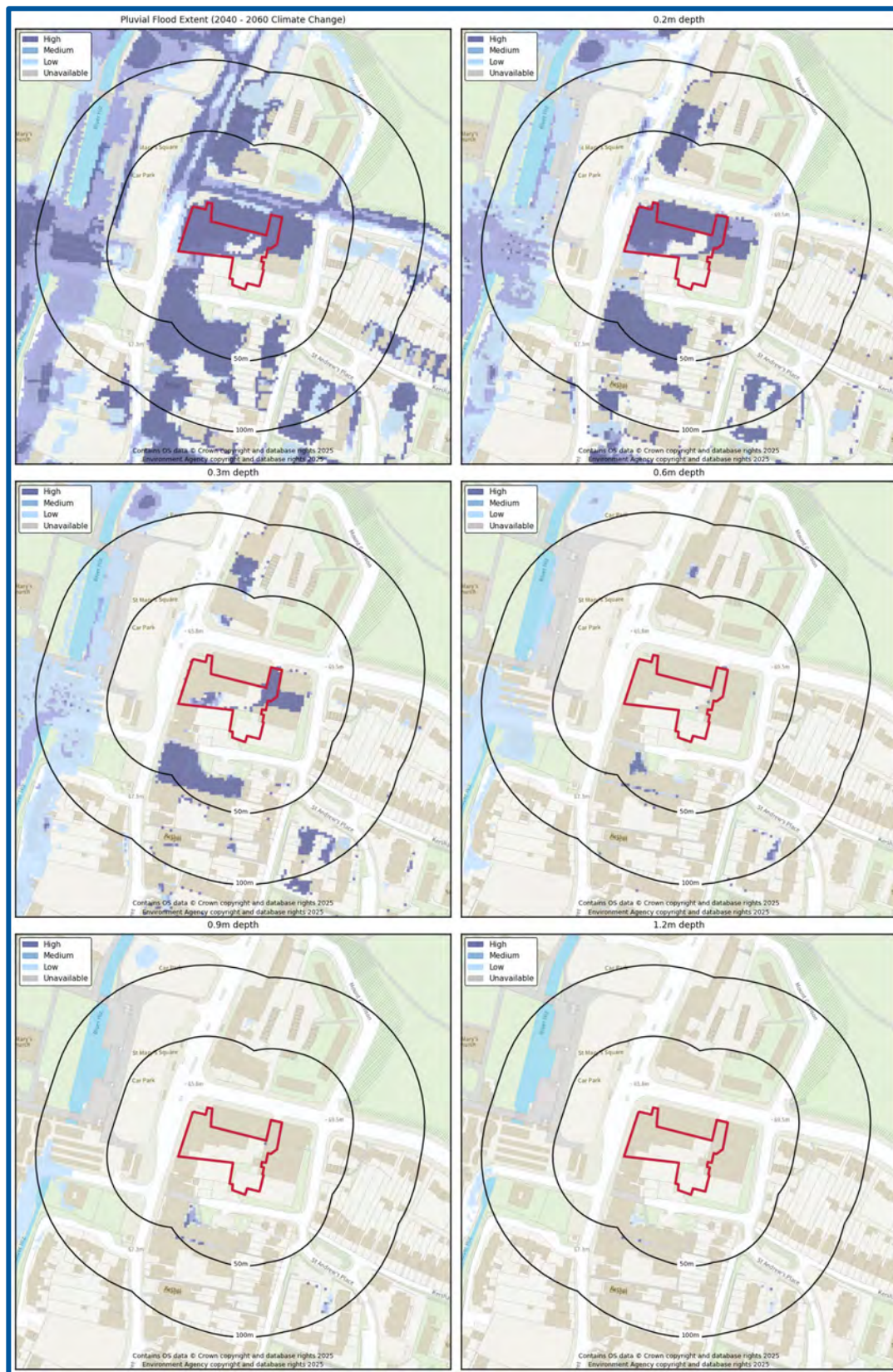
Paragraph 002 of the National Planning Practice Guidance (August, 2022) requires consideration of the 1% AP (1 in 100 year) event, including an appropriate allowance for climate change.

As the Site is located within the Upper and Bedford Ouse Management Catchment and the proposed development is classed as Highly / More Vulnerable, where the proposed lifespan is approximately 100 years, the Upper End (40%) allowance is required to determine a suitable climate change factor to apply to rainfall data.

As part of RoFSW mapping, climate change modelling has been applied exclusively for the central allowance up to the 2050s epoch. Whilst it should be noted that the risk of pluvial flooding is likely to be greater than this dataset indicates for the lifetime of the development, in the absence of more extensive modelling scenarios this data is considered the best resource at the time of writing.

- During the future High-risk event (>3.3% AEP), the Site is modelled to be affected by pluvial flooding. During the High-risk scenario, flood depths in the courtyard areas are generally between 0.20 m – 0.60 m, with an extent and depths similar to the present-day scenario.
- During the future Medium-risk event (>3.3% AEP), the Site is modelled to be affected by pluvial flooding, although the extent and depth of flooding appears to be the same as modelled during the High-risk scenario. Flood depths of up to 0.60 m (although generally 0.30 m in depth) are anticipated adjacent to the building in the southwest of the Site, although no internal flooding is anticipated during this scenario.
- During the future Low-risk event (1 - 0.1% AEP) the extent of flooding increases slightly, although flood depths are anticipated to remain between 0.30 m and 0.60 m on-Site similar to the present-day Low-risk extent.

Figure 10. Future climate change EA surface water flood extent and depth map (EA, 2025)

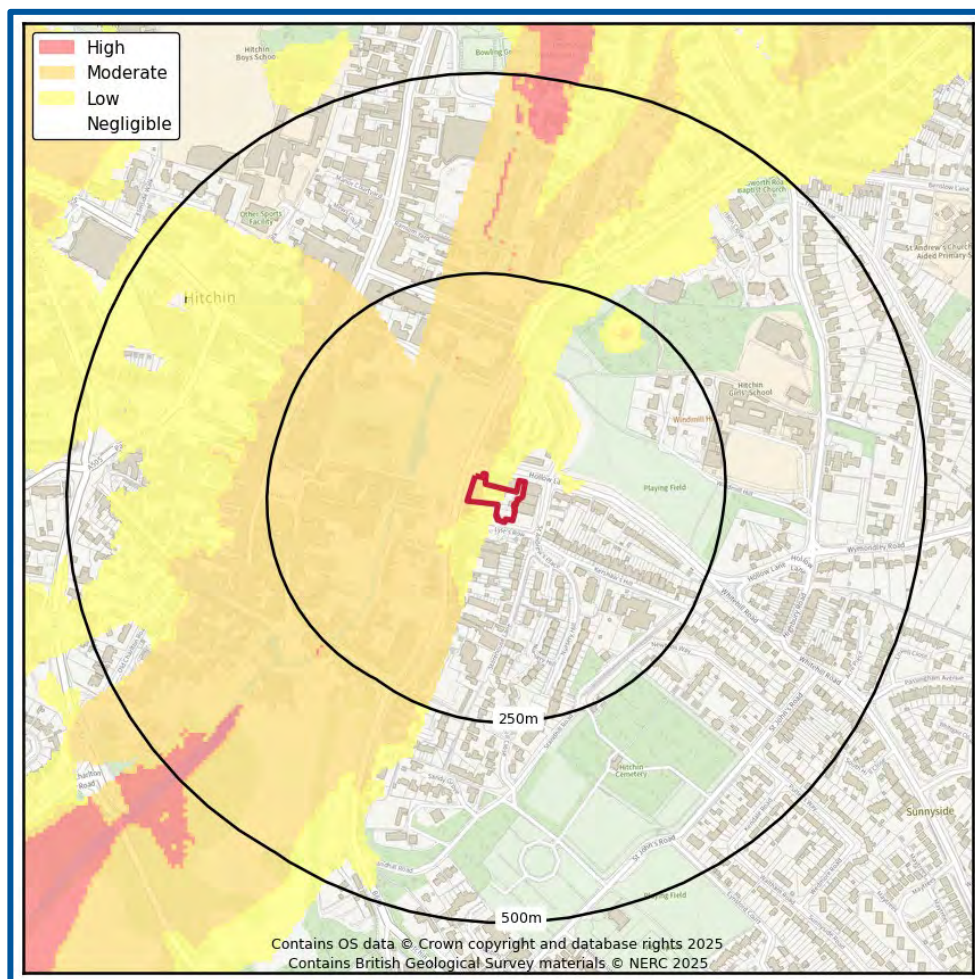


Groundwater flooding

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 below) indicates there is a Negligible to Moderate risk of groundwater flooding at surface in the vicinity from permeable bedrock and superficial deposits during a 1 in 100-year event.

Figure 11. GeoSmart GW5 Groundwater Flood Risk Map (GeoSmart, 2025)



Mapped classes within the screening map 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.

A site-specific assessment has been undertaken to refine the groundwater risk screening information on the basis of site-specific datasets (see Section 3) including BGS borehole data, and the EA's fluvial and tidal floodplain data (where available) to develop a conceptual groundwater model. The risk rating is refined further using the vulnerability of receptors including occupants and the existing and proposed Site layout, including the presence of basements and buried infrastructure. The presence of any nearby or on-Site surface water features such as drainage ditches, which could intercept groundwater have also been considered.

It is understood the Site contains an existing basement and lower ground floor, where residential sleeping accommodation is proposed. The existing basement / lower ground floor is set at **64.02mAOD**. The risks are higher for basements, buried infrastructure and soakaway systems which may be affected by high groundwater levels. Discussions with the client noted no reported incidents of groundwater ingress at the basement during the period of ownership.

As part of the development proposals, waterproof tanking of the basement and a sump and pump system will be installed at the Site to reduce the groundwater risk to the basement.

According to a review of the hydrogeology (Section 3), the Site is underlain by permeable superficial deposits (glaciofluvial deposits) partly lying above permeable chalk 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.

The Site is also underlain by low permeability mudstone (in the east of the Site) and a saturated zone may be present within the superficial deposits above the contact with the mudstone; however, it is noted that a reasonable thickness of the superficial aquifer is anticipated to be present beneath the lower ground floor level, which would reduce the potential for interaction with the underlying groundwater system.

Groundwater levels may also rise in the bedrock and superficial aquifer in response to high river events due to the potential hydraulic continuity with the nearby River Hiz.

It is noted groundwater flooding may occur in response to prolonged high-water levels, bypassing flood defences even if overtopping does not occur.

Despite the presence of an aquifer the Site would only be at risk of groundwater flooding if the water table reaches the base of the Site development or the ground surface when groundwater seepage could lead to overland flow and ponding.

According to a review of the hydrogeology (Section 3), the nearby boreholes (ref: TL12NE121 - TL12NE124) encountered groundwater between c. 57.90 and 59.10 mAOD in comparison to the basement level of 64.02 mAOD.

The SFRA does not indicate reported incidents of historical groundwater flooding within 50 m of the Site (NHDC, 2016)

Permeable material has been identified overlying low permeability material in the east of the Site which could give rise to a perched water table. Groundwater seepage, overland flow and the formation of a spring line may occur at the outcrop of the contact with underlying low permeability material. Spring lines have not been identified in close proximity to the Site.

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

The baseline groundwater flood risk rating is Negligible to Moderate, but on the basis of the site-specific assessment the groundwater flood risk is considered to be Moderate due to the presence of lower ground floor sleeping accommodation and the presence of a principal chalk bedrock aquifer.

Guidance

Moderate Risk - There will be a significant 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 linked to the predicted rise in both peak river levels and the variation in rainfall recharge which is uncertain.

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

The SFRA does not include any information regarding flooding events from sewers (NHDC, 2016) within the vicinity of the Site.

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 Anglian Water / Affinity Water.

Culverts and bridges

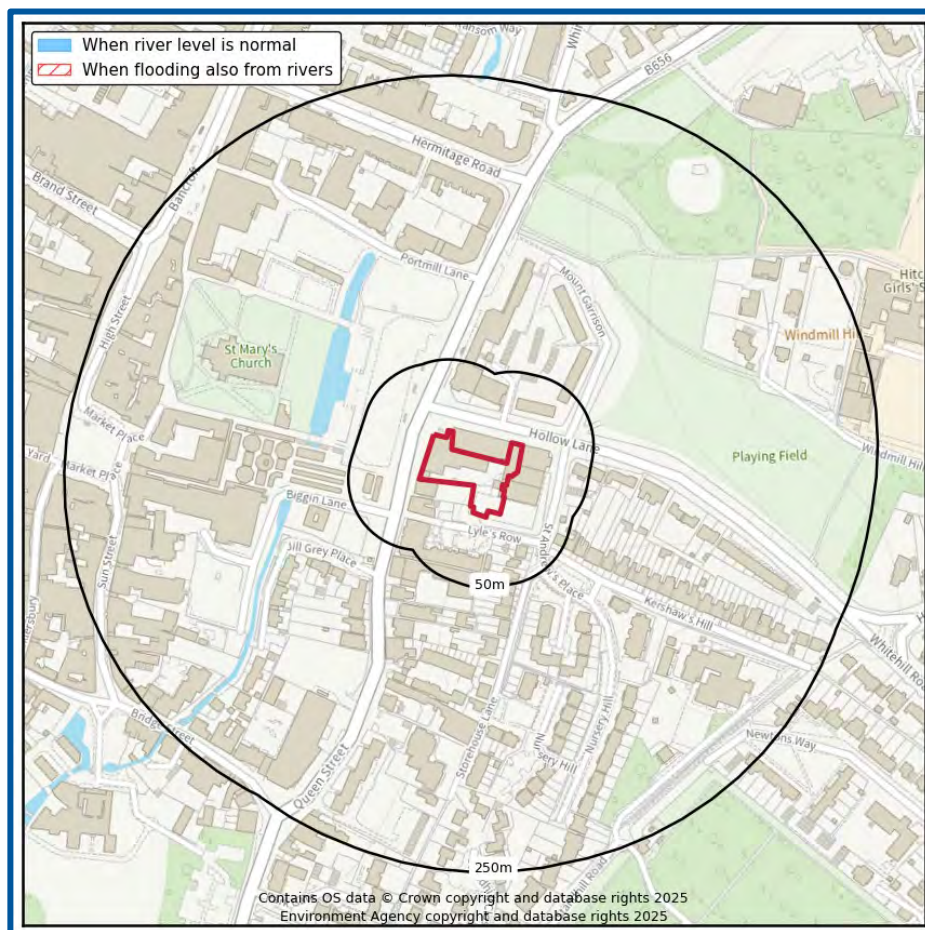
The blockage of watercourses or structures by debris (that is, any material moved by a flowing stream including vegetation, sediment and man-made materials or refuse) reduces flow capacity and raises water levels, potentially increasing the risk of flooding. High water levels can cause saturation, seepage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

Culverts and bridges have been identified within 100m of the Site, however, these are unlikely to cause a significant flood risk to the Site in the event of a blockage due to the distance from the Site.

Reservoir flooding

According to the EA's Risk of Flooding from Reservoir mapping the Site is not at risk of flooding from reservoirs (Figure 12) (EA, 2025).

Figure 12. EA Risk of Reservoir Flooding (EA, 2025)



Guidance

The risk of reservoir flooding is related to the failure of a large reservoir (holding over 25,000 m³ of water) and is based on the worst-case scenario. Reservoir flooding is extremely unlikely to occur (EA, 2024).

5. Flood risk from the development



Floodplain storage

Where flood storage from any source of flooding is to be lost as a result of development, on-site level-for-level compensatory storage, accounting for the predicted impacts of climate change over the lifetime of the development, should be provided. Where it is not possible to provide compensatory storage on site, it may be acceptable to provide it off-site if it is hydraulically and hydrologically linked.

The loss of floodplain storage is less likely to be a concern in areas benefitting from appropriate flood risk management infrastructure or where the source of flood risk is solely tidal.

The proposed development involves no increase in built footprint and hence compensatory storage is not considered to be necessary.

Drainage and run-off

Due to the presence of a mapped surface water risk at the Site, a Sustainable Drainage Strategy has been prepared separately by GeoSmart (ref: 75991.01.01) to manage surface water runoff safely on-Site.

6. Suitability of the 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, 2024). 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 1, all types of development listed within the Table overleaf are acceptable according to National Policy.

Table 2. Flood risk vulnerability and flood zone 'incompatibility' (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

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 sea (coastal/tidal) sources, mitigation measures are not required.

Rivers (fluvial) flood mitigation measures

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

Surface water (pluvial) flood mitigation measures

A Very Low to Moderate surface water (pluvial) flooding risk has been identified at the Site. In order to ensure the development includes sufficient flood mitigation measures to reduce the risk of pluvial flooding over its lifetime, the flood depths, levels and appropriate mitigation measures have been assessed.

Finished floor levels of the proposed development will be set significantly above any modelled flood depths and hence no internal flooding is anticipated during any present day or future scenario. As a precautionary measure, additional mitigation measures have been proposed below to reduce the overall surface water risk to the Site, including:

- Air brick covers (manual or automatic closing);
- Non-return flap valves on sewer outfalls.
- Construction of local bunds;
- Boundary walls/fencing

Avoidance and resistance measures are unlikely to completely prevent floodwater entering a property, particularly during longer duration flood events. Therefore, it is recommended that the following flood resilience measures are also considered as a precautionary measure.

- Flood resilient materials and designs:
 - Use of low permeability building materials up to 0.6 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;

- o Water, electricity and gas meters and electrical sockets should be located 600mm 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.

In addition, the regular maintenance of any drains and culverts surrounding/on the Site under the riparian ownership of the developer should be undertaken to reduce the flood risk. Where feasible, the existing drainage network in the courtyard areas could be improved to further reduce the risk of flooding and to intercept surface water.

A surface water drainage (SuDS) strategy has been prepared separately (ref: 75991.01.01) to ensure surface water runoff can be managed effectively over the lifetime of the proposed development.

If these mitigation measures are implemented this would reduce the flood risk to the development from Very Low / Moderate to Very Low / Low.

Groundwater flood mitigation measures

Specific groundwater measures that will reduce the Negligible to Moderate flood risk are **currently proposed** as part of the wider development including:

- Waterproof tanking of the lower ground floor and basement prior to development of the residential units;
- Installation of an automatic sump and pump system to extract flood water.

It is likely that the mitigation measures implemented below will reduce the risk of groundwater flooding to the basement/lower ground floor, however the following mitigation measures should also be considered to further reduce the risk of groundwater flooding.

- Interceptor drains;
- Non-return flap valves on the existing foul and surface water sewer lines.

Following the implementation of the proposed mitigation measures (waterproof tanking, sump and pump) this could reduce the flood risk to the development from Negligible / Moderate to Low.

Reservoir flood mitigation measures

The Site is not at 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.

Residual flood risk mitigation measures

The risk to the Site has been assessed from all sources of flooding and appropriate mitigation and management measures proposed to keep the users of the development safe over its lifetime. There is however a residual risk of flooding associated with the potential for failure of mitigation measures if regular maintenance and upkeep isn't undertaken. If mitigation measures are not implemented or maintained, the risk to the development will remain as the baseline risk.

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
www.knowyourfloodrisk.co.uk

Other relevant information

Occupants should be signed up to receive the MET Office Extreme weather warnings.

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 3. Risk ratings following Site analysis

Source of Flood Risk	Baseline ¹	After analysis ²	After Mitigation ³
River (fluvial) flooding	Very Low		N/A
Sea (coastal/tidal) flooding	Very Low		N/A
Surface water (pluvial) flooding	Very Low to High	Very Low to Moderate	Very Low to Low
Groundwater flooding	Negligible to Moderate	Moderate	Low
Other flood risk factors present	No	No	No
Is any other further work recommended?	Yes	Yes	Yes (see below)

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

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. Reasons for the change in classification are provided in the text.

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.

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.

Highly vulnerable developments in a Flood Zone 1 are acceptable according to the NPPF and providing the recommended mitigation measures are put in place (see previous sections) it is likely that flood risk to this Site will be reduced to an acceptable level.

Table 4. Summary of responses to key questions in the report

Key sources of flood risks identified	Surface water (pluvial), Groundwater (see Section 4).
Are standard mitigation measures likely to provide protection from flooding to/from the Site?	Yes (see Section 7).
Is any further work recommended?	Yes (See exec summary and section 7)

9. References and glossary



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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 100 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 (2024) 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	Contains Ordnance Survey data © Crown copyright and database right 2025 BlueSky copyright and database rights 2025
Bedrock & Superficial Geology	Contains British Geological Survey materials © NERC 2025 Ordnance Survey data © Crown copyright and database right 2025
Flood Risk (Flood Zone/RoFRS/Historic Flooding/Pluvial/Surface Water Features/Reservoir/ Flood Alert & Warning)	Environment Agency copyright and database rights 2025 Ordnance Survey data © Crown copyright and database right 2025
Flood Risk (Groundwater)	GeoSmart, BGS & OS GW5 (v2.4) Map (GeoSmart, 2025) Contains British Geological Survey materials © NERC 2025 Ordnance Survey data © Crown copyright and database right 2025
Location Plan	Contains Ordnance Survey data © Crown copyright and database right 2025

Topographic Data	OS LiDAR/EA Contains Ordnance Survey data © Crown copyright and database right 2025 Environment Agency copyright and database rights 2025
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10. Appendices

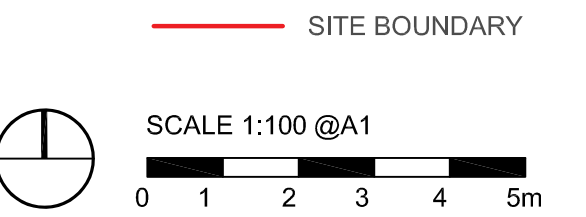


Appendix A



Site plans / Topographic Survey

REVISION



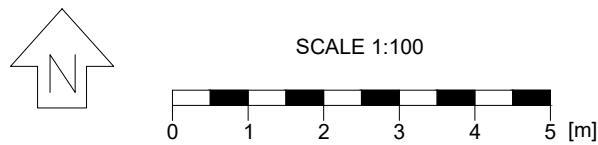
PROJECT
20018_Hitchin



DRAWING No.
20018_L(20)001



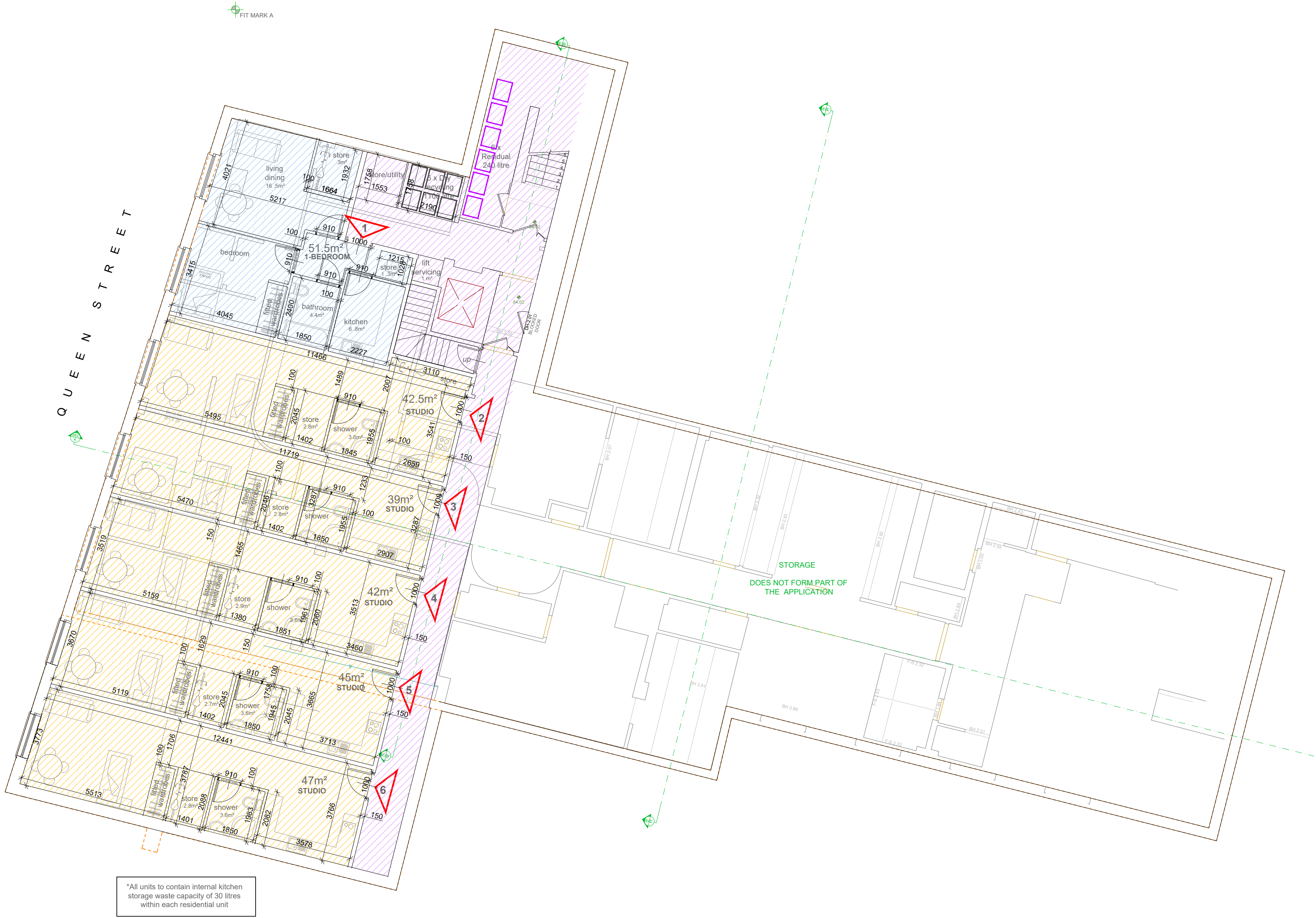
BASEMENT FLOOR PLAN



THE EXCHANGE, QUEEN STREET			
Hitchin, SG4 9TW			
CLIENT		Sonar Group Ltd	
EXISTING LOWER GROUND FLOOR			
SCALE	1: 100 (A1)	DATE	Dec 2024
DWG NO	EX.00	REVISION	-

Schedule : The Exchange, Queen Street, SG4 9TW

Unit	BEDROOMS	GIA (m²)
Lower Ground Floor		
1	Studio (1 person)	51.5m²
2	Studio (1 person)	42.5m²
3	Studio (1 person)	39m²
4	Studio (1 person)	42m²
5	Studio (1 person)	45m²
6	Studio (1 person)	47m²



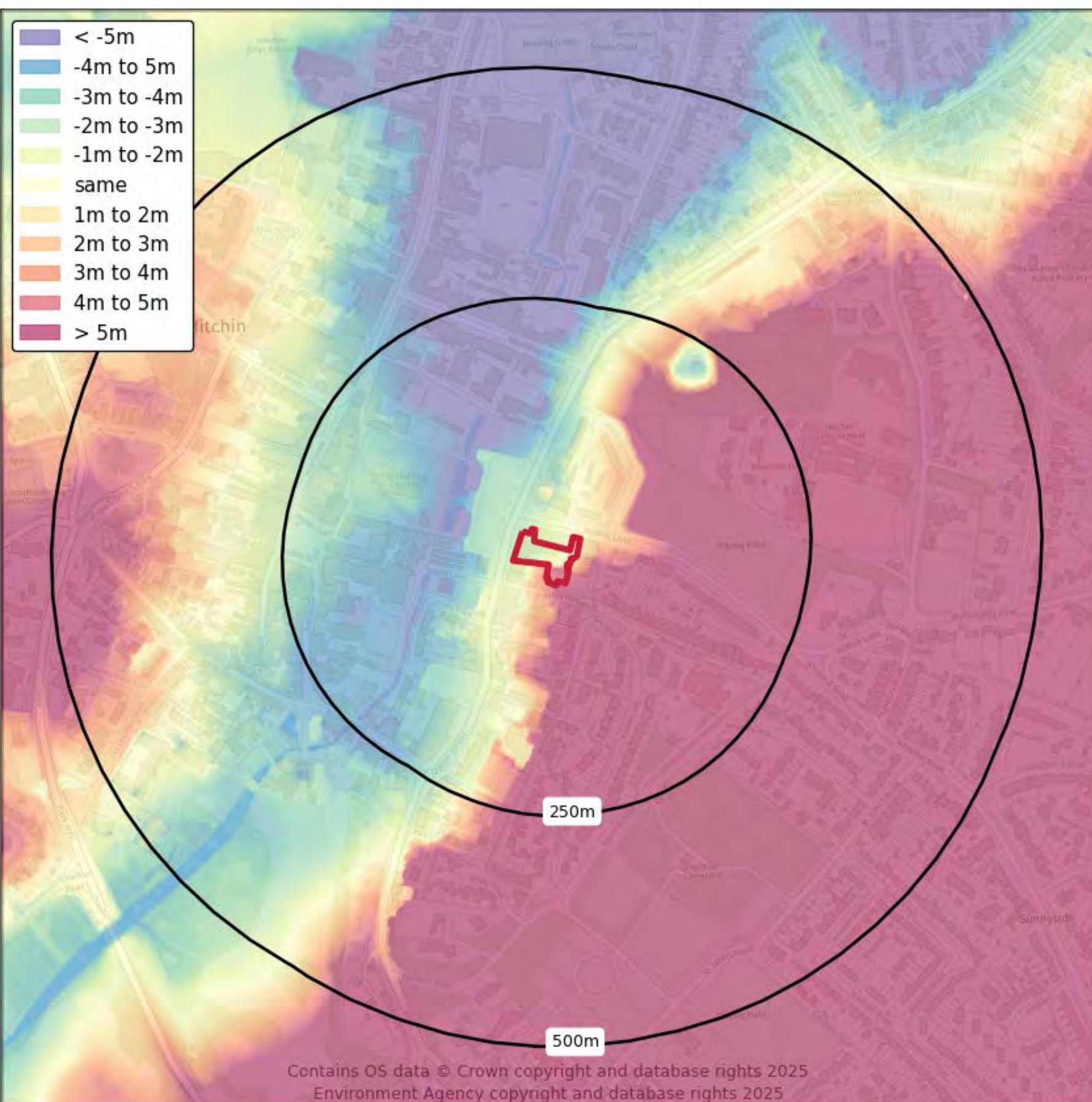
LOWER GROUND FLOOR PLAN

- Studio
- 1-Bedroom
- Circulation

Appendix B



Environment Agency LiDAR ground elevation data





North Hertfordshire SFRA Mapping (2008 / 2016)

NHDC SFRA Update 2016 Appendix C - Ordinary Watercourses (Central)

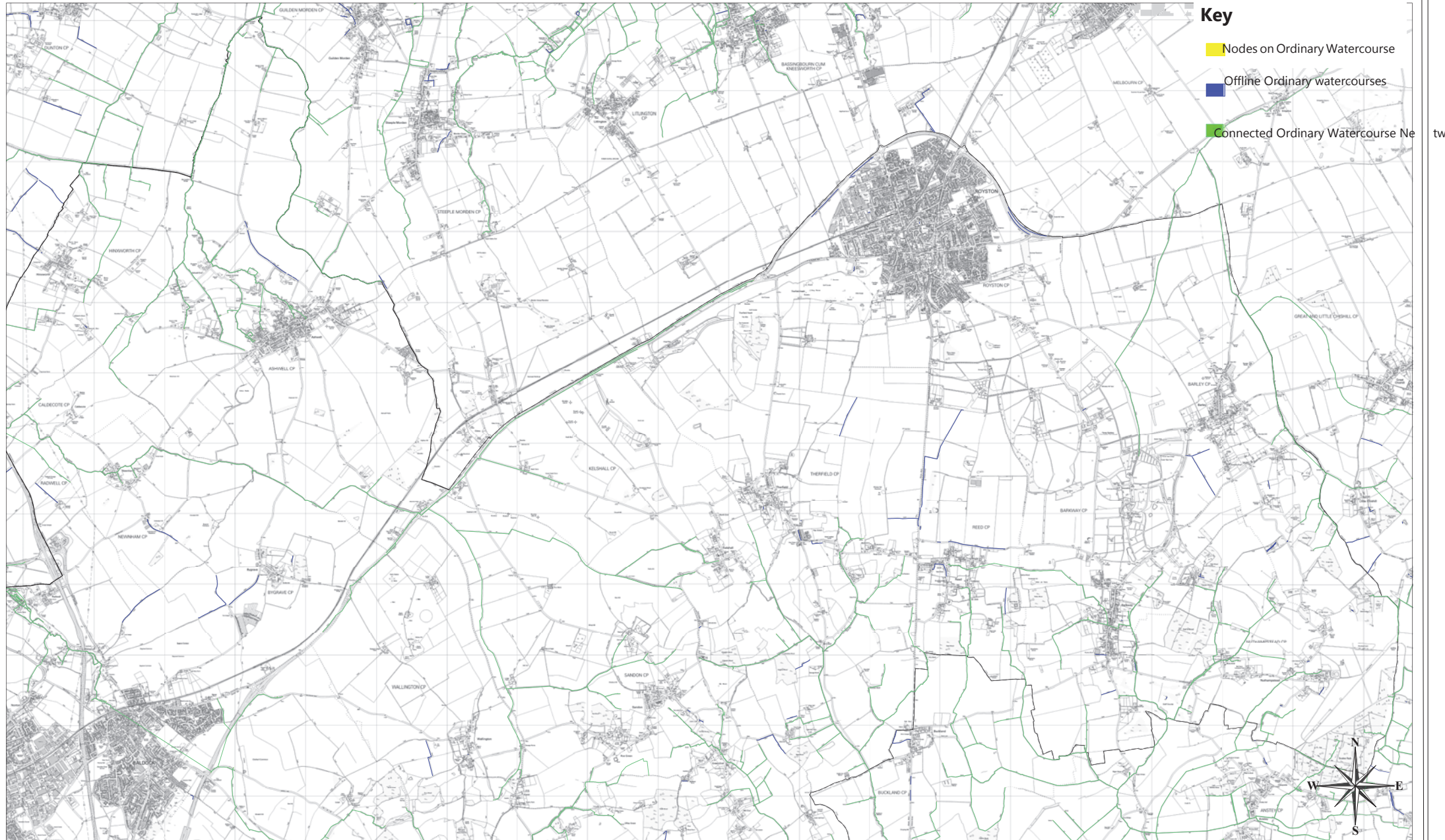


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NHDC SFRA Update 2016 Appendix C - Ordinary Watercourses (East)



Scale: 1:49999
Date: 16:02:16



NHDC SFRA Update2016 Appendix C - Ordinary Watercourses (Southern)



Scale: 1:49999
Date: 16:02:16



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43-55 Milford Street
Salisbury
Wiltshire SP1 2BP
Tel: 01722 333306
Fax: 01722 332296
Email: admin@tpos.co.uk

You can get more information about the PCCB from 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.

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

11. 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/>