



RIDGE

**FLOOD RISK ASSESSMENT
GREEN INFRASTRUCTURE
ONE HORTON HEATH**

EASTLEIGH BOROUGH COUNCIL
February 2024



FLOOD RISK ASSESSMENT ONE HORTON HEATH

February 2024

Prepared for

Eastleigh Borough Council

Prepared by

Ridge and Partners LLP
Partnership House
Moorside Road
Winchester
Hampshire
SO23 7RX
Tel: 01962 834400

Contact

Tom Clark
Senior Civil Engineer



VERSION CONTROL

PROJECT NAME: One Horton Heath – Eastleigh Borough Council – FRA- Green Infrastructure
PROJECT NUMBER: 5018551
DOCUMENT REFERENCE: 5018551 - RDG-XX-XX-DOC-C-9940
DOCUMENT STATUS: S2 – Suitable for Information

[illegible]

CONTENTS

1. INTRODUCTION	6
1.1. Appointment and Brief	6
1.2. Aims and Objectives	6
1.3. Limitations	7
2. PROJECT BACKGROUND	9
2.1. Site Location and Existing Land Use	9
2.2. Geology	10
2.3. Hydrology / Hydrological Features	12
3. FLOOD RISK STATEMENT	15
3.1. Sources of Information	15
3.2. Historic Flooding	15
3.3. Potential Sources of Flooding	15
4. CLIMATE CHANGE	23
4.1. Anticipated Development Lifecycle	23
4.2. Climate Change Allowances	23
4.3. Impacts on Flood Risk	24
4.4. Impacts on Proposed Surface Water Drainage Design	24
5. POLICY CONSTRAINTS AND IMPLICATIONS TO THE DEVELOPMENT	26
5.1. Sequential Test	26
5.2. Flood Risk Vulnerability	26
5.3. Flood Zone Compatibility	28
5.4. Functional Floodplain	28
5.5. Off-site Impact	28
5.6. Safe Access and Egress	29
5.7. Local Plan Requirements	29
5.8. Compliance Summary	29
6. PROPOSED FLOOD MITIGATION AND MANAGEMENT MEASURES	31
6.1. Siting of the Built Development	31
6.2. External Ground Levels	31
6.3. Fluvial Flood Storage Compensation	31
6.4. Overland Flow Routes	31
6.5. Ground water Mitigation	31
7. SURFACE WATER DRAINAGE	33
7.1. Context	33
7.2. SuDS Constraints	35
8. FOUL WATER DRAINAGE	38
9. CONCLUSION	40

SECTION 01

INTRODUCTION

1. INTRODUCTION

1.1. Appointment and Brief

Ridge & Partners prepared this Flood Risk Assessment on behalf of Eastleigh Borough Council. The proposed development has been designed in full accordance with the Development Plan and Outline Planning Application (OPA) O/20/89498, which has a resolution to grant consent subject to S106 negotiations relating to education. The application is for full planning consent due to the time for these negotiations to complete. Submitting details of the Green Infrastructure Landscaping (GI) as a full planning application will deliver the GI in accordance with, and as part of the OPA, but enable commencement more quickly than waiting for the resolution of the OPA S106 and the determination of an application for reserved Matters Approval of details of the GI. The site is located at One Horton Heath at approximately SO50 7BZ, Grid reference SU 48905 16935 (hereby referred to as the 'Application Site- reserved matters planning application).

This assessment has been prepared for the benefit of the Hampshire County Council Lead Local Flood Authority and assess the risk of flooding within the area of proposed green infrastructure and identify the mitigation measures.

The purpose of this document is:

- To determine and outline potential sources of flooding along the green infrastructure area, and;
- Establish how flood risk will be managed throughout the lifetime of the proposed green infrastructure area, taking into account the potential for climate change.
- Discuss the proposed outline surface water strategy for incorporation with the green infrastructure area at the application site including SuDS for surface water quantity, surface water quality, amenity, and biodiversity.

1.2. Aims and Objectives

It is intended to follow the procedures and guidance outlined within NPPF (Dec 23), BS 8533 (2017), BS 8582 (2013), CIRIA C624 (2004) and SuDS Manual (C753) (2015) in the preparation of this document.

The government's flood mapping service shows that the majority of the green infrastructure site is largely within flood zone 3. However, there are no plans for residential or commercial development within the green infrastructure area. It is therefore recommended that the proposal is split into steps. Step 1 and 2, outlined below, are required initially and will determine the risk of flooding. Steps 3 and 4 may be required and even step 5 should the site be in the highest risk category.

Step 1 - Consultation with Lead Local Flood Authority (LLFA)

- Obtain and review the most up-to-date local flood risk information including the any previous Preliminary Flood Risk Assessments (PFRA), Strategic Flood Risk Assessments (SFRA) or Surface Water Management Plans (SWMP) undertaken for the area of interest;
- Review Environment Agency's online flood risk maps.
- Review Planning Policy applicable to the site.
- Liaise with Thames Water to obtain flooding history information etc.
- Consult with the Local Flood Authority.
- Advise you on our findings (email or tech note format).

Step 2 - Outline Flood Risk Assessment:

- Undertake a desktop assessment of pre- and post-development flood risk at the Site from all possible sources (fluvial, tidal, groundwater, sewers, overland and artificial sources);

- Outline the Sequential and Exception Test requirements.
- Advise on matters to be addressed with the Environment Agency.
- Produce an outline Flood Risk Assessment and circulate to the Client for comment.
- Incorporate comments from the Client and issue the final version.

If stages 1 and 2 determine that the site is either wholly or partly within an area of flood zone 2 or 3 then stages 3 and 4 are required.

Step 3 - Sequential Test:

- The process identifies the flood risks and development vulnerability in order to assess the suitability of each development location and where possible, steers more vulnerable developments to areas of lowest flood risk, matching vulnerability of land use to flood risk.

Step 4 - Exception Test:

- The Exception Test allows consideration of the wider sustainability benefits of a development to be considered to justify development in a higher risk flood zone.
- To ensure that the proposed development meets the requirements of the Exception test (NPPF):
 - It must be demonstrated that the development provides wider sustainability benefits for the community that outweigh flood risk, informed by a Strategic Flood Risk Assessment where one has been prepared.
 - The site-specific Flood Risk Assessment must demonstrate that the development will be safe for its lifetime taking into account the vulnerability of its users, without decreasing flood risk elsewhere, and, where possible, will reduce flood risk overall.

Should completed steps 1-4 still show that the development is at a high risk of flooding, hydraulic modelling would be required, as follows:

Step 5 - Hydraulic Modelling

- Obtain Environment Agency flood model for the development area.
- Review flood model variables to ensure data and variables are current.
- Update model to take account of findings of review and to include proposal.
- Validate model to assess updated risk of flood to the development area.
- All the above is to be undertaken in conjunction with Environment Agency to ensure their acceptance.

1.3. Limitations

The purpose of this report as outlined in Section 1.2, together with those related matters specifically referred to therein and it is not intended to be used for any other purposes. The report is for the sole benefit and may only be relied upon by the addressee, to whom we will owe a duty of care. The report and any part of it is confidential to the addressee and should not be disclosed to any third party for any purpose, without the prior written consent of Ridge and Partners LLP as to the form and context of such disclosure. The granting of such consent shall not entitle the third party to place reliance on the report, nor shall it confer any third-party rights pursuant to the Contracts (Rights of Third Parties) Act. The report may not be assigned to any third party.

SECTION 02

PROJECT BACKGROUND

2. PROJECT BACKGROUND

2.1. Site Location and Existing Land Use

The site is located within the central two-thirds of One Horton Heath, Grid Reference SU 48931 17787, X (Easting) 448855 and Y (Northing) 117787. Latitude and Longitude (decimal), 50.949902, -1.3059010, Latitude and Longitude (degs, mins, secs), 50°57'00"N, 001°18'21"W. Postcode (nearest) is SO50 7BZ. The site is currently in agricultural use, mainly arable with some grassland. The area for green infrastructure site is shown below:



Figure 1: Green Infrastructure site Area

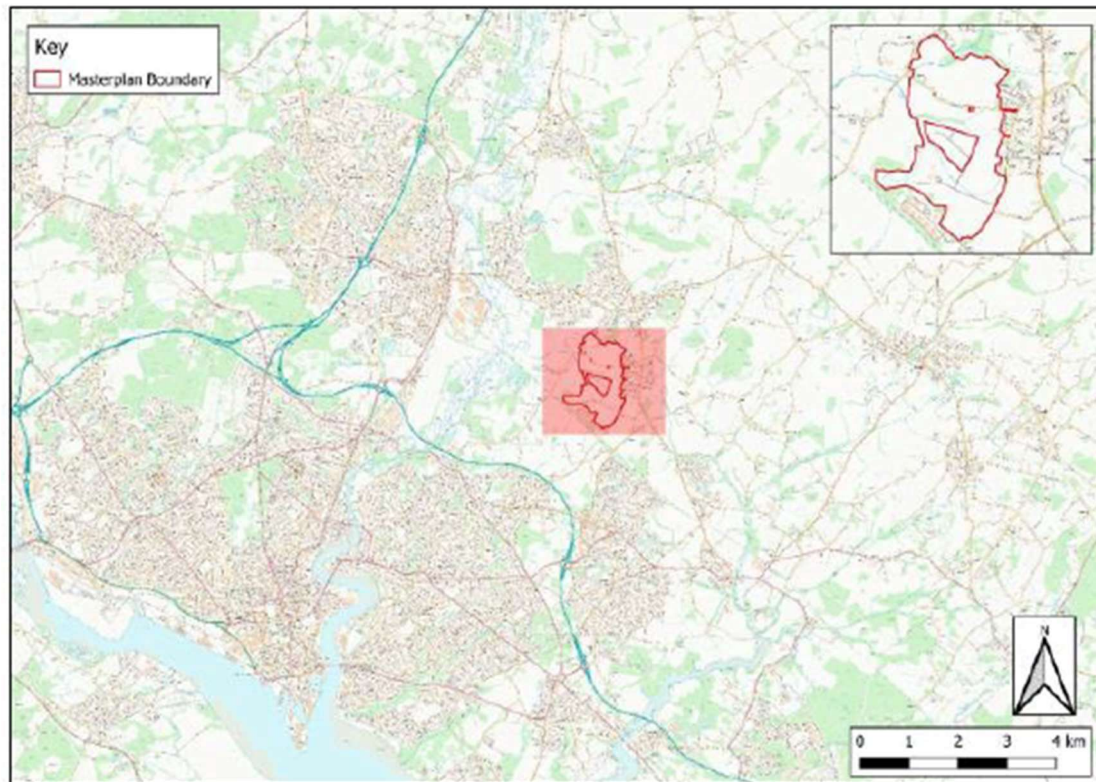


Figure 2: Area of Flood Risk Assessment and Site Extents Area Plan

2.2. Geology

The British Geological information is indicated below:

Bedrock geology: Wittering Formation - Bracklesham Group (BRB) are secondary or minor aquifers capable of supporting water supplies at a local rather than strategic level - Sand, silt and clay. Sedimentary bedrock formed between 56 and 41.2 million years ago during the Palaeogene period. Greyish brown laminated clay; wavy-to lenticular-bedded sand interbedded with clay in equal proportions; and fine-to medium-grained sparsely glauconitic sand. Bedrock Tertiary clays and sands which overlay Cretaceous Chalk at depth.

Definition of Lower Boundary: Rests on London Clay, a dark grey bioturbated clay below with marked lithological change to interbedded glauconitic fine-grained sand and very silty clay above.

Definition of Upper Boundary: Overlain by Earnley Sand Formation, well-marked by the transgressive basal surface of glauconitic silty sands with pebbles. Thickness: 40-53m.

Superficial deposits: Alluvium - Clay, silt, sand and gravel. Sedimentary superficial deposit formed between 11.8 thousand years ago and the present during the Quaternary period. Alluvium is a general term for clay, silt, sand and gravel. It is the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope. Synonym: alluvial deposits. Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present. A number of drainage features and watercourses are present within the site. The watercourses within the site are tributaries of the River Itchen which is located approximately 1.5km to the west of the site's boundary. The watercourse on the western boundary is classified as a 'Main River' and flows from south to north under Allington Lane and into the River Itchen to the south of Chickenhall Lane Wastewater Treatment Works (WwTW). All other onsite watercourses discharge into this unnamed 'Main River'. A number of ponds are also present within the site and in its immediate vicinity.

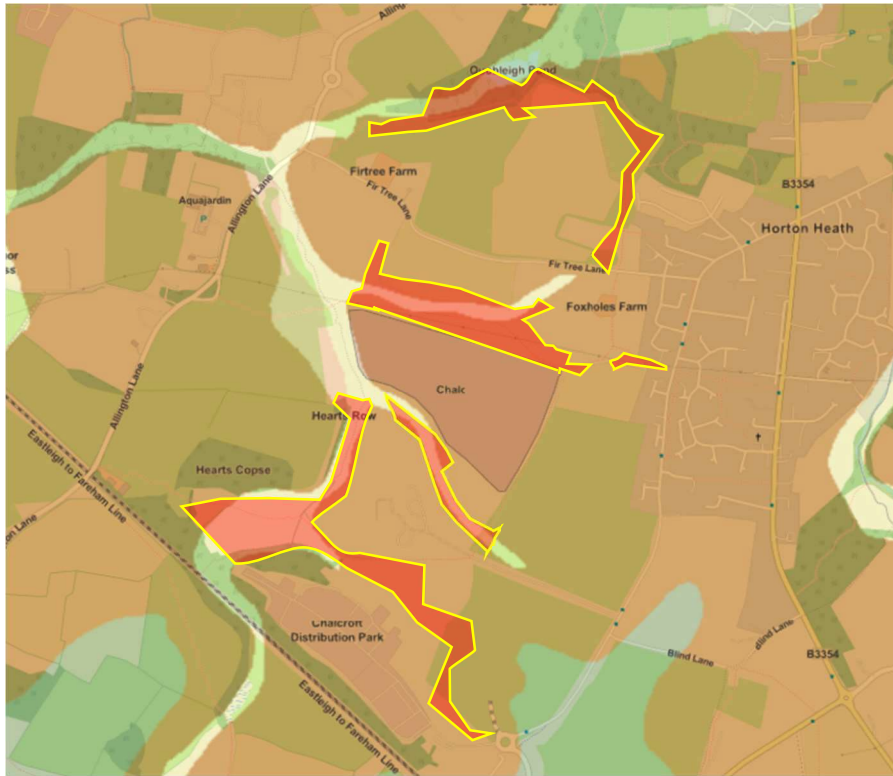


Figure 3: British Geological information map

The above British Geological information map indicates the Aquifer Classification is Secondary A. From an inspection of the Environment Agency's Source Protection Zones dataset the site does not fall into a Groundwater Source Protection Zone. With reference to the 'Environment Agency's approach to groundwater protection', the discharge of clean roof water to ground is acceptable both inside and outside SPZ1('inner zone') provided that all roof water down-pipes are sealed against pollutants entering the system from surface run-off, effluent disposal or other forms of discharge. If infiltration SuDS are to be used on any part of the site for surface run-off from roads, car parking and public or amenity areas, they would be suitably designed to ensure that the system does not pose an unacceptable risk to the source of supply.

In addition to the above information, Ridge has provided a report based on a visual site inspection and study of readily accessible referenced historical records, information supplied by those parties noted in the report and preliminary discussions with local and Statutory Authorities; reference Ridge *Geotechnical Investigation Report* (Ref: 5019962-RDG-XX-ST-DOC-C-00GIR01) dated 3 February 2023.

As part of the Geotechnical Investigation eleven boreholes were installed with 50mm diameter standpipes to circa 2.50mbgl to allow monitoring of groundwater levels across the site between 3 November 2022 and 30 March 2023. Following the completion of winter groundwater monitoring at land near Horton Heath, Hampshire, broadly centred on 448877 E 117310 N, the report provided commentary on groundwater gauging rounds conducted although it was unclear whether groundwater levels have peaked across the site, and therefore it recommends additional rounds to capture peak levels, and subsequent fall in groundwater level.

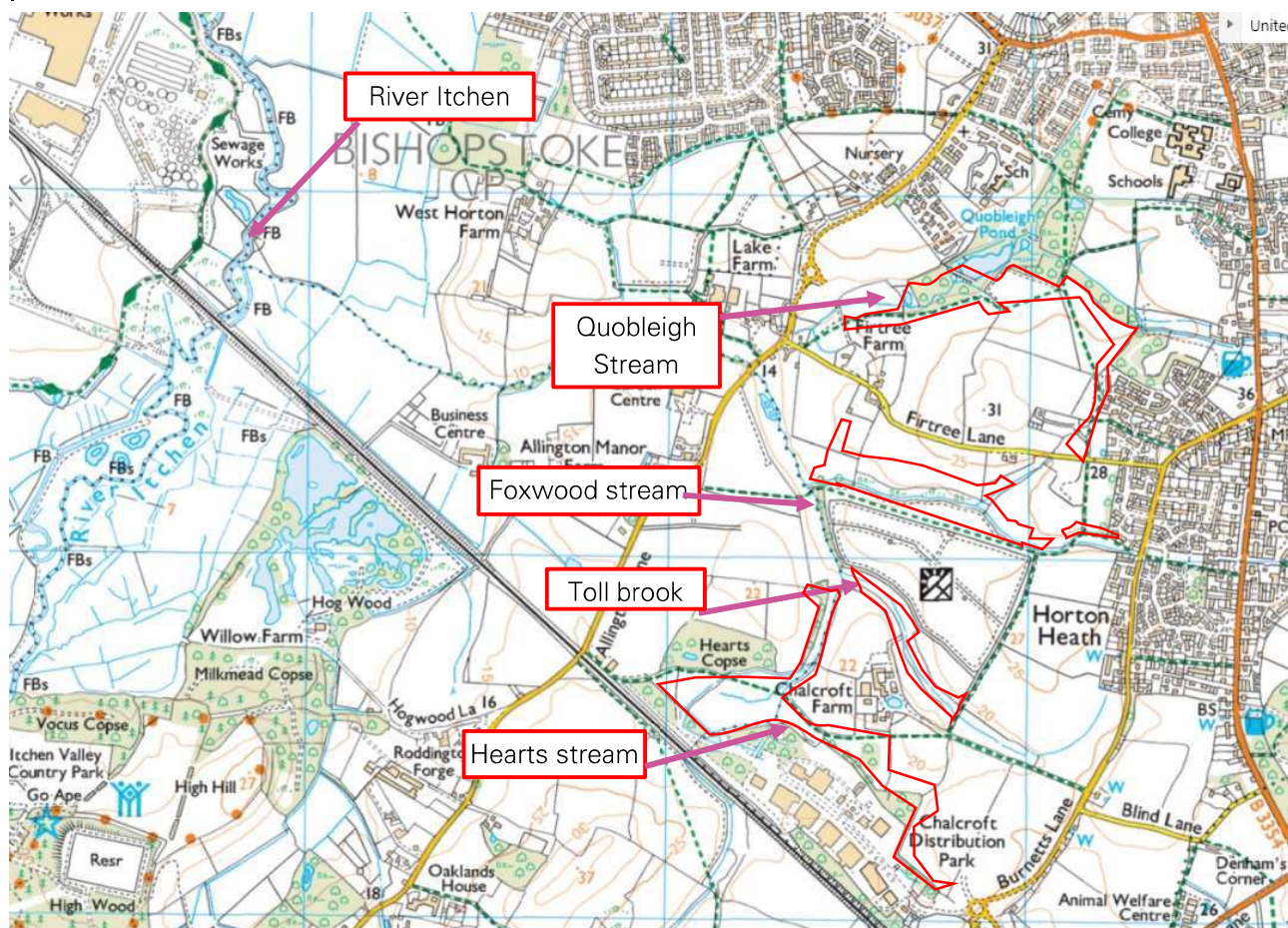


Figure 4: Location of River Itchen from the proposed site

The majority of the site geology is falling into HOST Class 25, which is defined as “Slowly permeable, seasonally waterlogged soils over impermeable clay substrates with no storage capacity”.

On the basis of the available modelled flood levels provided by the Environment Agency, the areas of the site where built development are unaffected by the floodplain associated with the watercourses except for the watercourse crossing points where culverts have been designed to ensure the watercourse flows are maintained with no flooding of the roads.

2.3. Hydrology / Hydrological Features

Hydrology is the study of the distribution and movement of water both on and below the Earth's surface, as well as the impact of human activity on water availability and conditions.

Hydrogeology is the study of groundwater – it is sometimes referred to as geohydrology or groundwater hydrology. Hydrogeology deals with how water gets into the ground (recharge), how it flows in the subsurface (through aquifers) and how groundwater interacts with the surrounding soil and rock (the geology).

The vadose zone is the variably saturated zone between the ground surface and the permanent water table of the groundwater. It is an important part of the water cycle and stores at least 8.5 times more water than is held by rivers. The vadose zone is the Earth's terrestrial subsurface that extends from the surface to the regional groundwater table. The vadose zone may be very shallow (less than 1 m) or very deep (extending hundreds of meters or more), depending on the depth to the water table. This zone is one of the underground

soil strata that are of considerable interest in terms of pollution and becomes the focus for SUDS via infiltrating surface water and rainwater below ground to alleviate surface flooding.

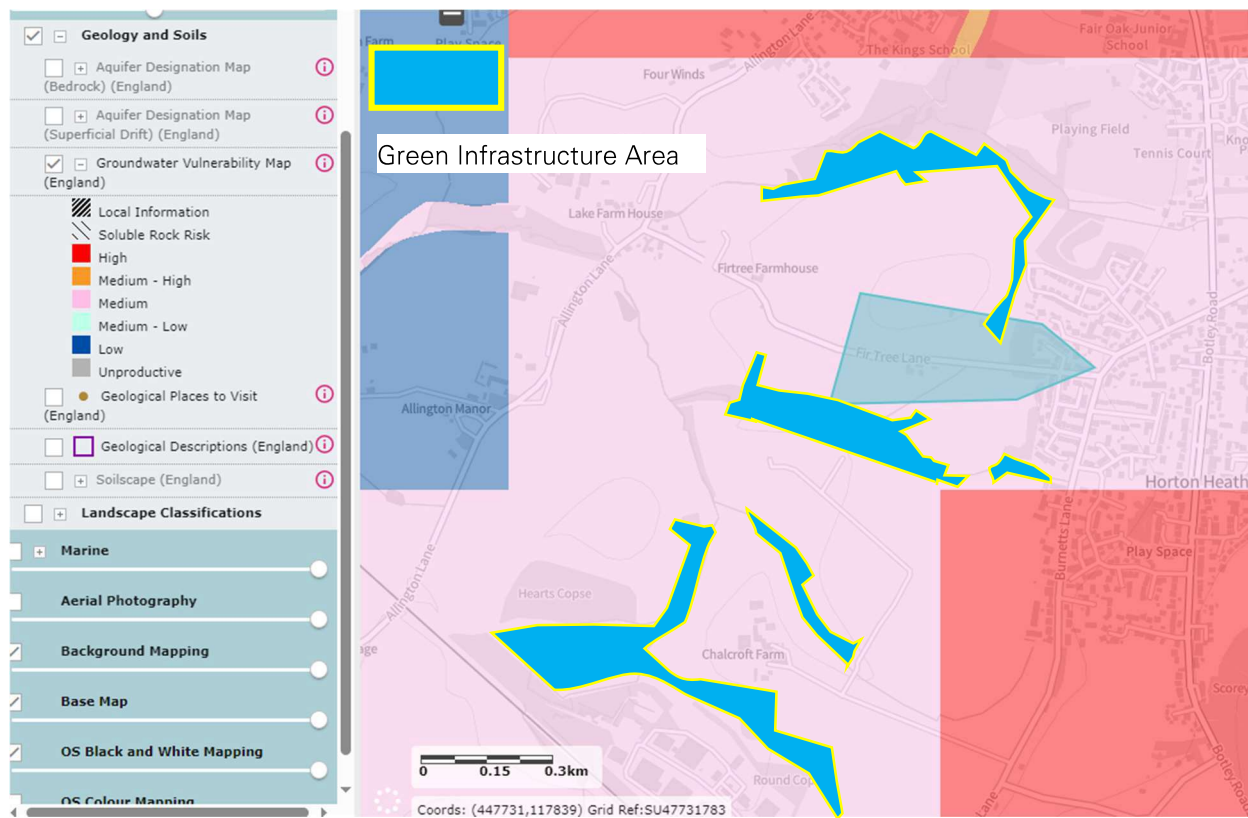


Figure 5: Defra Magic Portal and the BGS GeoIndex

The above base map by Defra Magic Portal and the BGS GeoIndex (<https://www.bgs.ac.uk/datasets/aquifer-designation-data/>), states the aquifer designation dataset has been created by the Environment Agency (EA), Natural Resources Wales (NRW) and the BGS, and identifies the different aquifers of England and Wales. Groundwater protection policy in England and Wales uses aquifer designations that are consistent with the Water Framework Directive. The above blue shading (watercourses) relates to "Priority Habitat Inventory - Coastal and Floodplain Grazing Marsh (England)". Groundwater Vulnerability Map (England) – Medium. However, towards eastern side of the site, the ground water vulnerability is High.

The map indicates the following: The borough of Eastleigh is dominated by two main river catchments; the River Itchen catchment covers the majority of the borough with the River Hamble catchment to the East.

- Geology and Soils: Groundwater Vulnerability Classification is Majority area is Medium.
- [Blue areas] Grassland: Priority Habitat Inventory - Coastal and Floodplain Grazing Marsh (England)
- [Green areas] Woodland: Ancient and Semi-Natural Woodland
- [Green areas] Woodland: Priority Habitat Inventory - Deciduous Woodland (England)

2.4. Proposed Development

The proposed development has been designed in full accordance with the Development Plan and Outline Planning Application (OPA) O/20/89498, which has a resolution to grant consent subject to S106 negotiations relating to education. The application is for full planning consent due to the time for these negotiations to complete. Submitting details of the Green Infrastructure Landscaping (GI) as a full planning application will deliver the GI in accordance with, and as part of the OPA, but enable commencement more quickly than waiting for the resolution of the OPA S106 and the determination of an application for reserved Matters Approval of details of the GI.

SECTION 03

FLOOD RISK STATEMENT

3. FLOOD RISK STATEMENT

3.1. Sources of Information

Information relating to the flood risk at the site at the time of writing has been obtained from, but not limited to:

- The Environment Agency (EA) website;
- Water Environment (Water Framework Directive (WFD) England and Wales) Regulations 2017
- Flood and Water Management Act 2010
- Flood Risk Regulations 2009
- Flood Risk Assessments: Climate Change Allowances (2021)
- Eastleigh Borough Local Plan (2016-2036) April 2022
- Hampshire County Council Surface Water Management Plan – Eastleigh
- Eastleigh Flood Risk Assessment Guidance Document 2016
- CIRIA C753 SuDS Manual November 2015
- Internet research.

3.2. Historic Flooding

According to the Strategic Flood Risk Assessment produced by the Eastern Solent Coastal Partnership for the Partnership for Urban South Hampshire, and the Environment Agency Flood Maps for Planning, the site has a natural main river running through its western flank. The watercourse has tributaries running into it from the east and lower also from the east.

3.3. Potential Sources of Flooding

An assessment of flood risk to the site from potential sources is set out as follows:

Fluvial Flooding

Based upon EA mapping, the majority of the site is situated within Flood Zone 1. However, the bank of the river is situated within Flood zone 3. There are no residential or commercial development within Flood zone 3. However, there is a footpath towards southwest of the proposed site which is within Flood zone 3.

The Environment Agency flood zoning map does shows surface water flooding from watercourse tributaries.

The definition of EA flood zones is provided within the National Planning Policy Framework (NPPF) and its associated Planning Practice Guidance (PPG) Table 1 (Flood Zones) and summarised below:

- **Flood Zone 1 (Low Probability)**
Land which could be at risk of flooding from fluvial or tidal flood events with less than 0.1 % (1:1000 year) annual probability of occurrence and therefore considered to be at 'low probability' of flooding.
- **Flood Zone 2 (Medium Probability)**
Land which could be at risk of flooding with an annual probability of occurrence between 1% (1:100 year) and 0.1% (1:1000 year) from fluvial sources and between 0.5% (1:200 year) and 0.1% (1:1000 year) from tidal sources and therefore considered to be at 'medium probability' of flooding.
- **Flood Zone 3A (High Probability)**
Land which could be at risk of flooding with an annual probability of occurrence greater than 1% (1:100 year) from fluvial sources and greater than 0.5% (1:200 year) from tidal sources and therefore considered to be at 'high probability' of flooding.

- **Flood Zone 3B (Functional Floodplain)**

Land where water has to flow or be stored in times of flood. Local Planning Authorities should identify in their Strategic Flood Risk Assessments areas of functional floodplain in agreement with the Environment Agency. However, in general it is defined as land that would flood with an annual probability of 5 % (1:20 year) or greater.

Footnote 50 in the NPPF states that a site-specific flood risk assessment should be provided for all development in Flood Zones 2 and 3. In Flood Zone 1, an assessment should accompany all proposals involving: sites of 1 hectare or more; land which has been identified by the Environment Agency as having critical drainage problems; land identified in a strategic flood risk assessment as being at increased flood risk in future; or land that may be subject to other sources of flooding, where its development would introduce a more vulnerable use. Furthermore, in assessing the flood zoning, the protection afforded by any flood defence structures or strategic flood management measures is not taken into account by the EA.

Paragraph 30 in the Flood Risk and Coastal Change Planning Practice Guidance (Reference ID: 7-030-20140306) advises that a site-specific flood risk assessment is carried out to assess the flood risk to and from a development site. The assessment should demonstrate how flood risk will be managed now and over the development's lifetime, taking climate change into account, and with regard to the vulnerability of its users.

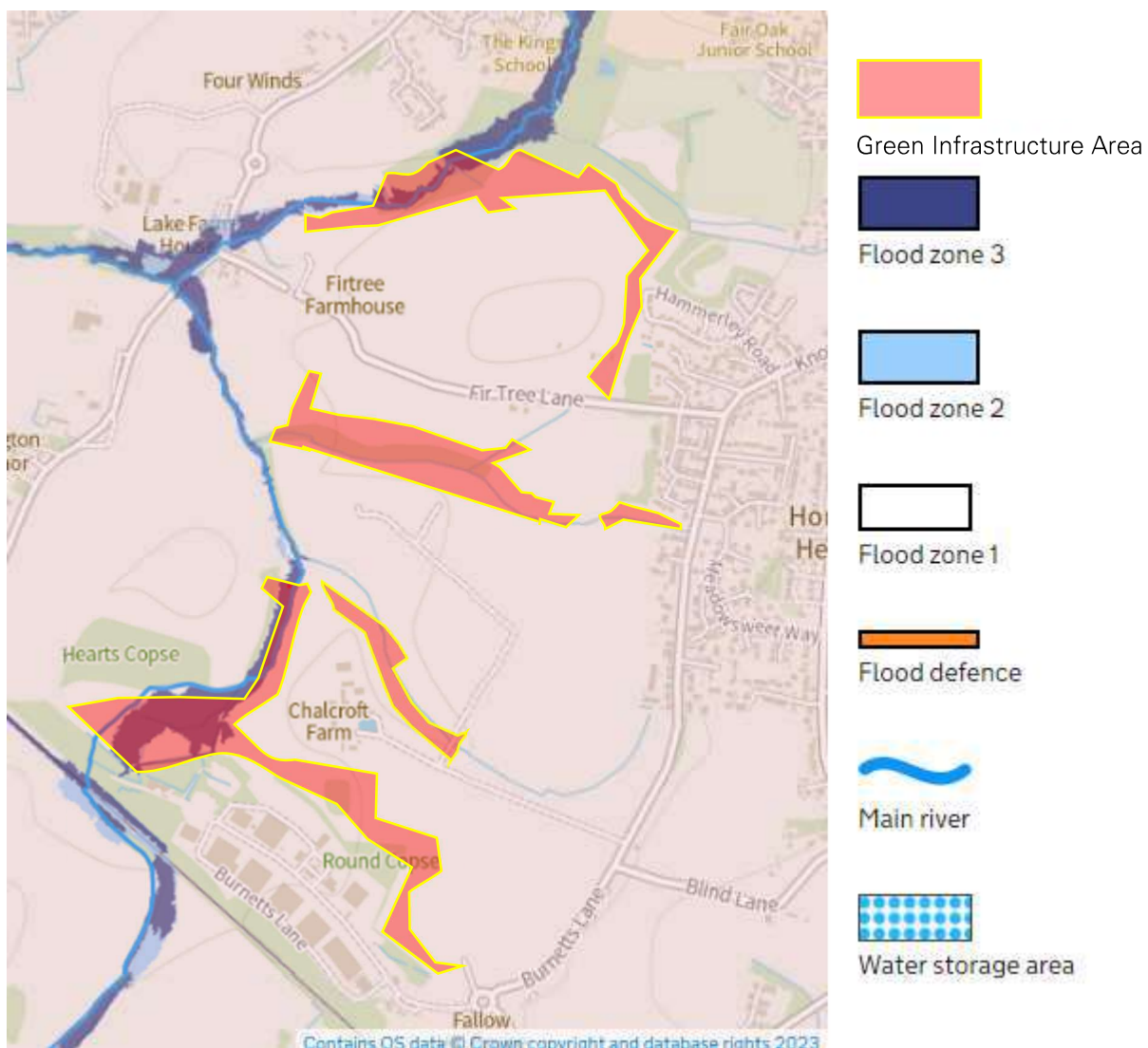
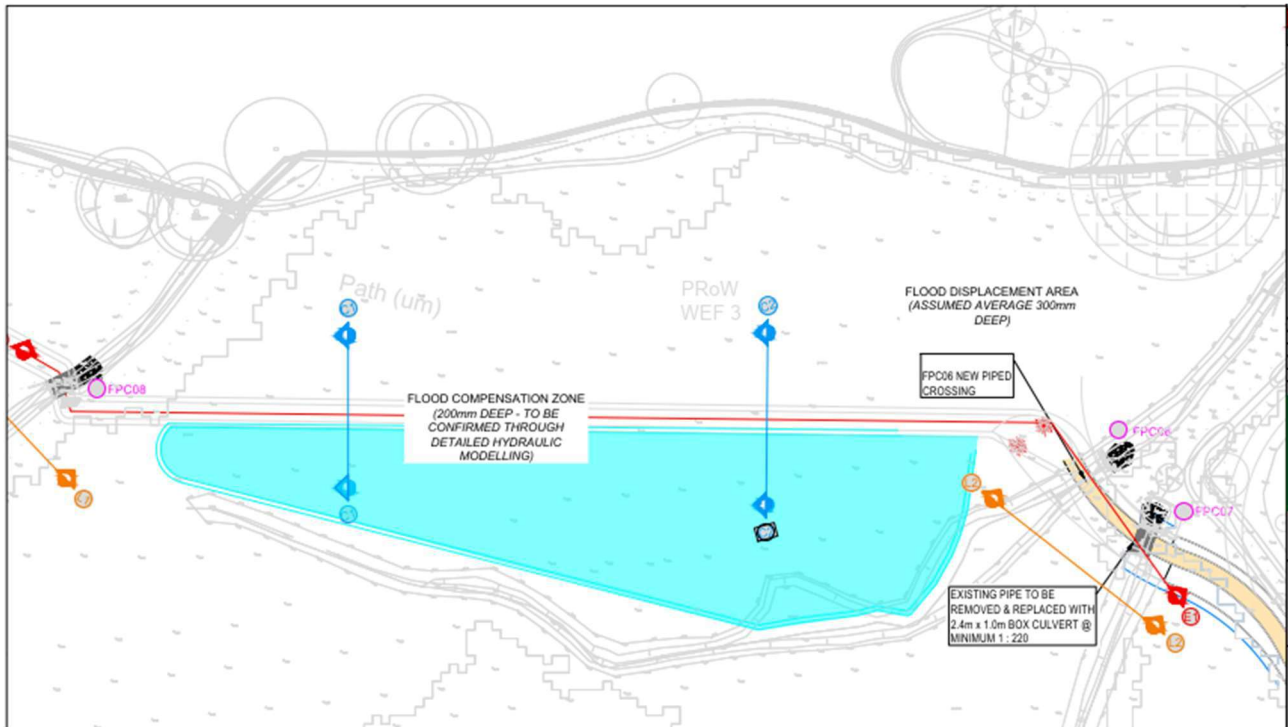
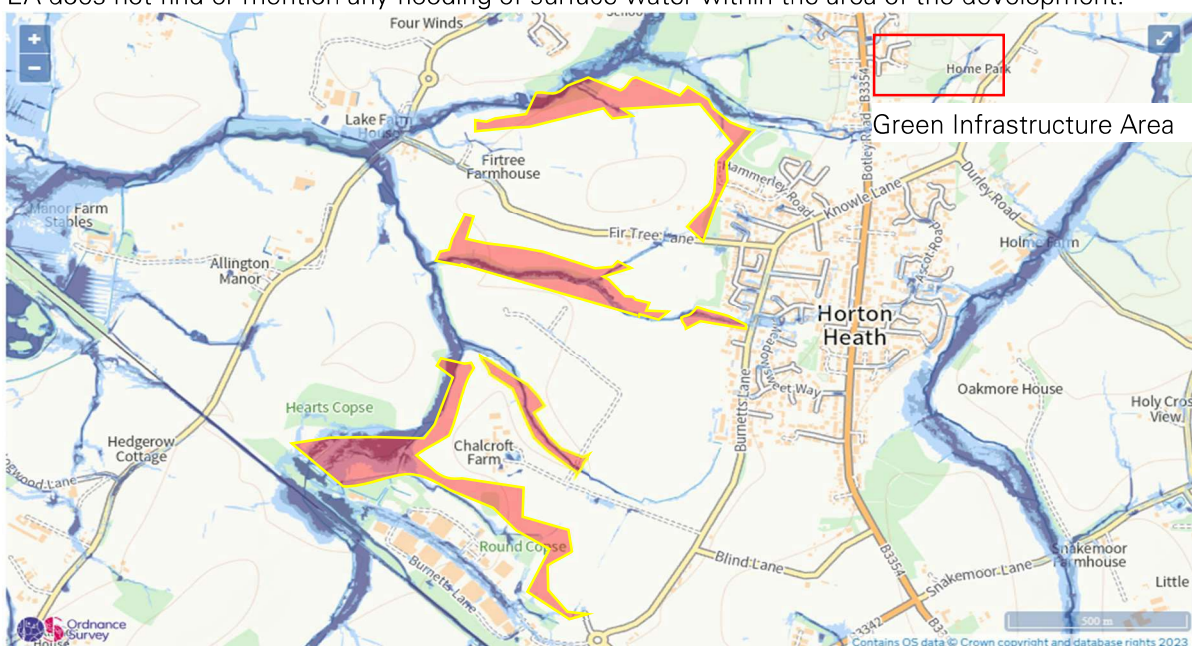


Figure 6: EA mapping extract showing flood zone classifications.

With the foregoing in consideration, majority of the site is within Flood zone 1. However, there are areas within the site which is categorised as Flood zone 3. Within those areas, there are no plan for residential or commercial development.



Surface Water Flooding



Project: 5018551

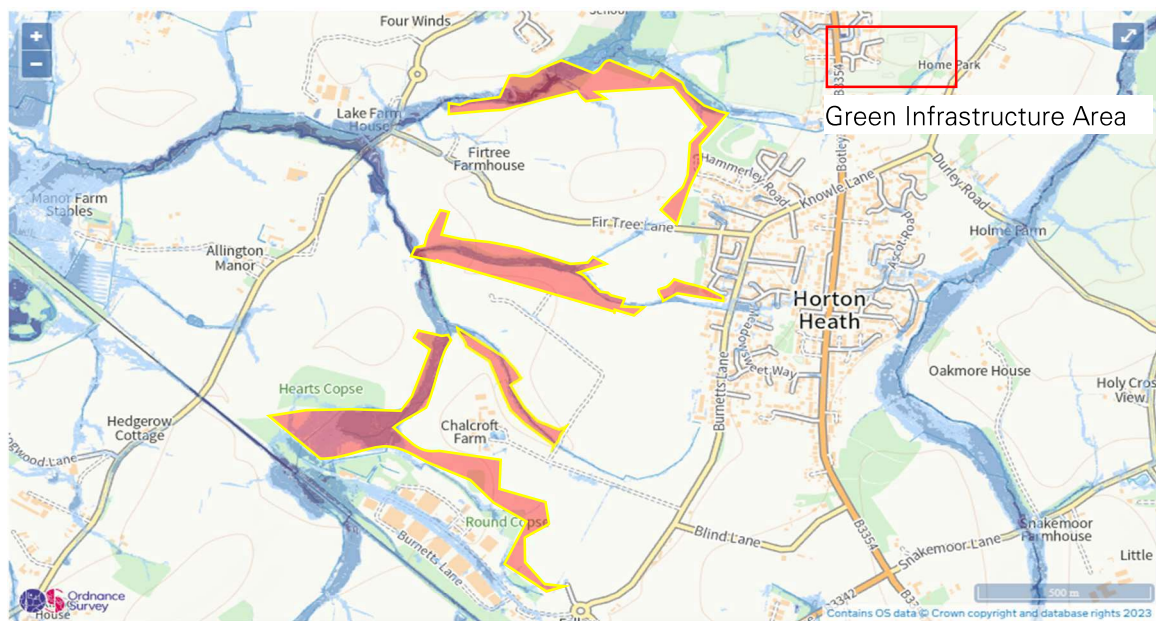


Figure 9: Environment Agency Surface Water Depth Low Risk Scenario

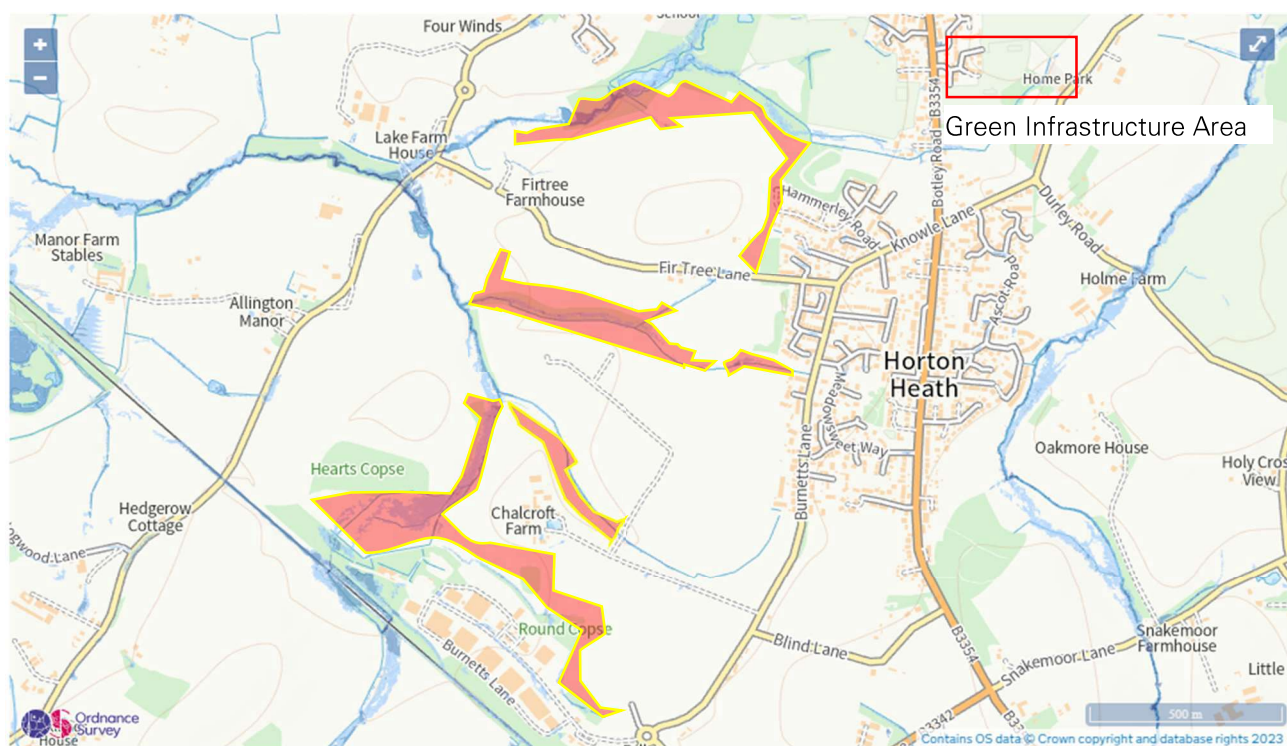


Figure 10: Environment Agency Surface Water Depth High Risk Scenario

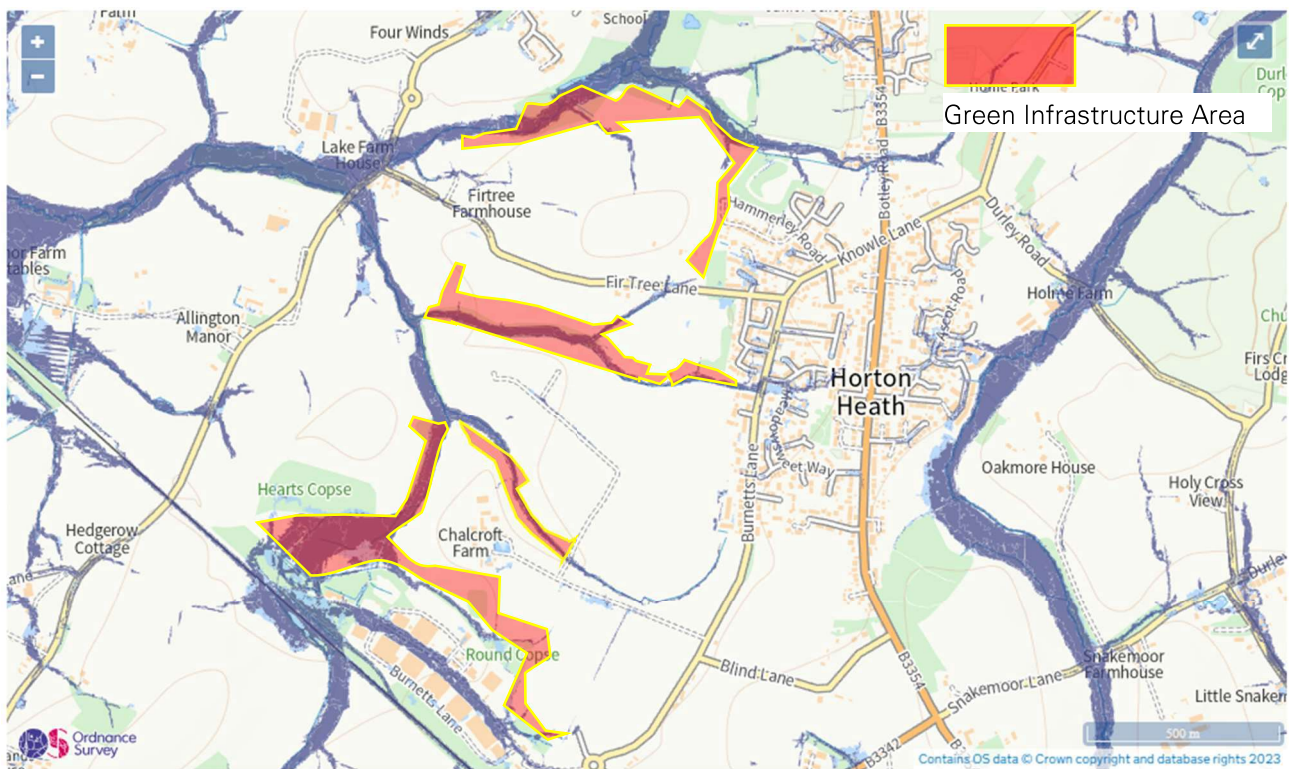


Figure 11: Environment Agency Surface Water Velocity Low Risk Scenario

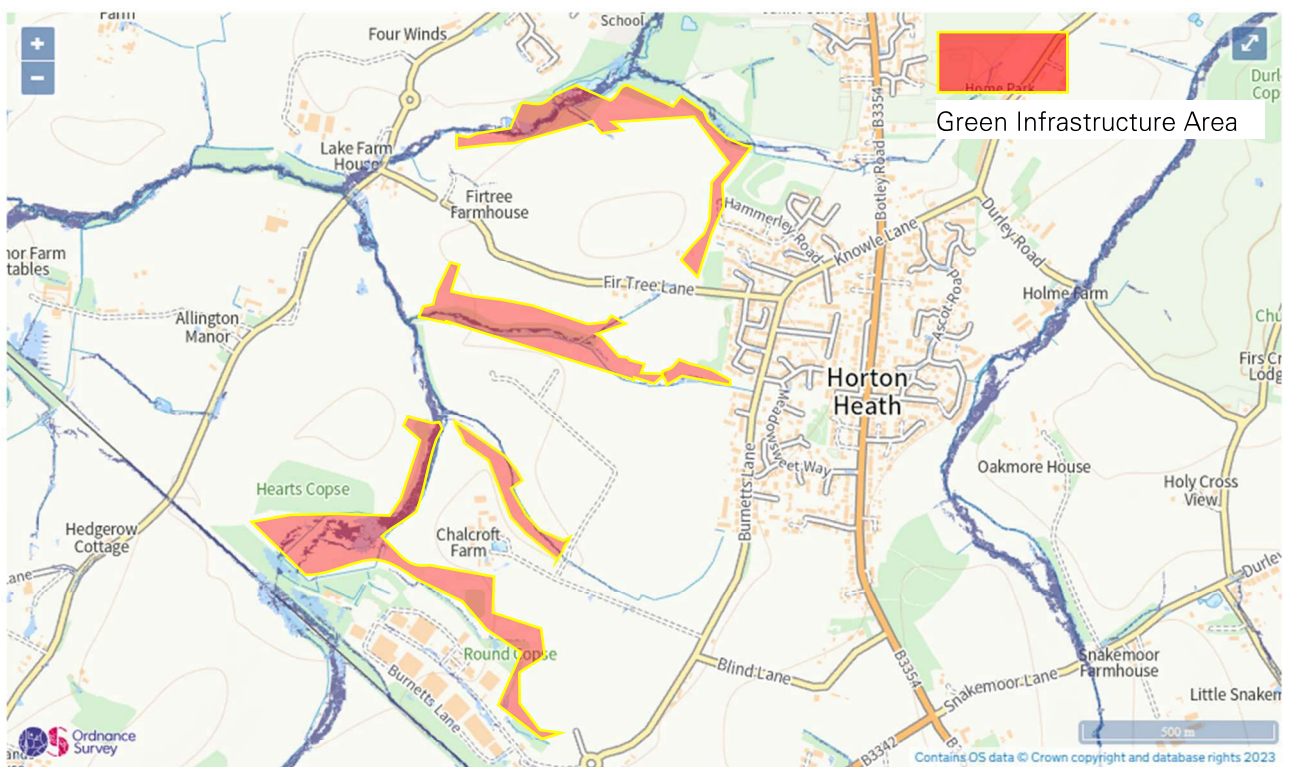


Figure 12: Environment Agency Surface Water Velocity High Risk Scenario

With this in consideration and information from maps suggests the site is deemed to be at negligible risk of flooding from surface water generated off-site and conveyed onto the site.

With the foregoing in consideration, the site is deemed to be at **medium risk of surface water flooding**.

Failure (Breaching) of Flood Defences and Management Measures

Based upon EA mapping, the site does not benefit from, nor rely upon, the presence of formal raised flood defences and therefore corresponding flood risk to the site due to defence failure (breach) is negligible. With the foregoing in consideration, the site is deemed to be at **low risk of flooding due to failure of flood defences and management measures**.

Reservoirs

Based upon EA mapping, the site does not lie within an area denoted as being at risk of flooding in the event of a significant breach (failure) of raised reservoir embankments. With the foregoing in consideration, the site is deemed to be at **low risk of flooding from Reservoirs**.

Canals and Artificial Water Bodies

There are no canals and other artificial water body in the site area apart from natural watercourses running across the site area and therefore this source poses no flood risk to the wider development area unaffected by flooding. With the foregoing in consideration, the site is deemed to be at **low risk of flooding from Canals and Artificial Water Bodies**.

Groundwater Flooding

Groundwater flooding is defined as flooding caused by the emergence of water originating from subsurface strata, with the most common forms being:

- A rise in groundwater from unconfined permeable soils (such as chalk), or shallow perched water tables after periods of heavy rainfall; or
-
- A rise in groundwater in unconsolidated permeable superficial deposits, which are in hydraulic continuity with local river levels and where the hydraulic gradient of the water table is low.

Based on the SFRA, the entire site is deemed to be at low risk of groundwater flooding except for the natural watercourses running along the western-south area, southern leg and north eastern area. It is considered that groundwater could be shallow on the site and shallowest in proximity to the onsite watercourses. With the foregoing in consideration, the site with the exception of the overland western-south area, southern leg and north eastern area watercourses flooding locally, the remaining site area is deemed to be at **medium risk of groundwater flooding**, unless further intrusive site investigation identifies evidence to the contrary, such as perched water or similar.

Sewers and Artificial Drainage Systems

No public sewers are identified on the site and there are no known instances of flooding from overwhelmed sewers affecting the site. The risk of flooding from overwhelmed sewers is therefore assessed as Low. The SFRA does not find or mention any flooding in the area surrounding the application site. With the foregoing in consideration, the site is deemed to be at **low risk of sewers flooding**.

Failure of Utilities Infrastructure

It should be noted that burst water mains and failure of sewerage infrastructure could inherently pose a residual risk to any site. Assuming an adequate provision of buffer zones to allow overland flow paths along proposed infrastructure routes to be safeguarded, and accommodation of any sewer and utility easements

within the future development layout, then utility and sewerage infrastructure are not deemed to pose a significant flood risk to the site. With the foregoing in consideration, the site is deemed to be at **low risk of flooding due to failure of utilities infrastructure**.

Tidal Flooding

Due to its inland location, the risk of tidal flooding to the site is considered negligible. With the foregoing in consideration, the site is deemed to be at **low risk of tidal flooding**.

Overland Flow

Based upon the topography of the site and surrounding area, there is limited potential for surface water from **off-site** areas to progress overland toward the road or built development proposals, which is reinforced by interrogation of EA mapping. With the foregoing in consideration, the site, with the exception of the watercourses flooding locally, the remaining area of the site is deemed to be at **low risk of flooding** due to overland surface water flows.

Summary

FLOODING SOURCE	RISK
Fluvial Flooding (excluding existing natural watercourse)	Medium
Surface Water Flooding	Medium
Failure (Breaching) of Flood Defences and Management Measures	Low
Reservoirs	Low
Canals and Artificial Water Bodies	Low
Groundwater Flooding	Medium
Sewers and Artificial Drainage Systems	Low
Failure of Utility Infrastructure	Low
Tidal Flooding	Low
Overland Flow from off-site areas (except for watercourse)	Low

SECTION 04

CLIMATE CHANGE

4. CLIMATE CHANGE

4.1. Anticipated Development Lifecycle

The NPPF requires development to take account of the impacts of climate change. The allowances to be made for climate change effects when assessing flood risk are related to the lifetime of the development. In accordance with the PPG, NPPF and best practice, a 100-year development lifecycle has been assumed for the proposed development of the site for predominantly residential end-use.

4.2. Climate Change Allowances

EA guidance “*Flood Risk Assessments: Climate Change Allowances*” (2022) outlines the required climate change allowances to be adopted when interrogating existing flood data and for use in the design of future surface water drainage systems.

Table 1 of ‘Flood risk assessments: climate change allowances’ gives the peak river flow allowances by river basin district for 3 categories: central, higher central and upper end, and 3-time frames. The appropriate allowance to use depends on the flood zone and the flood risk vulnerability classification of the development.

With reference to Table 1 of ‘Flood risk assessments: climate change allowances’ the appropriate allowances to use for the South East **river** basin district are the higher central and upper end allowances. The total potential change anticipated for 2070 to 2115 is given as 45% for the higher central category and 105% for the upper end category.

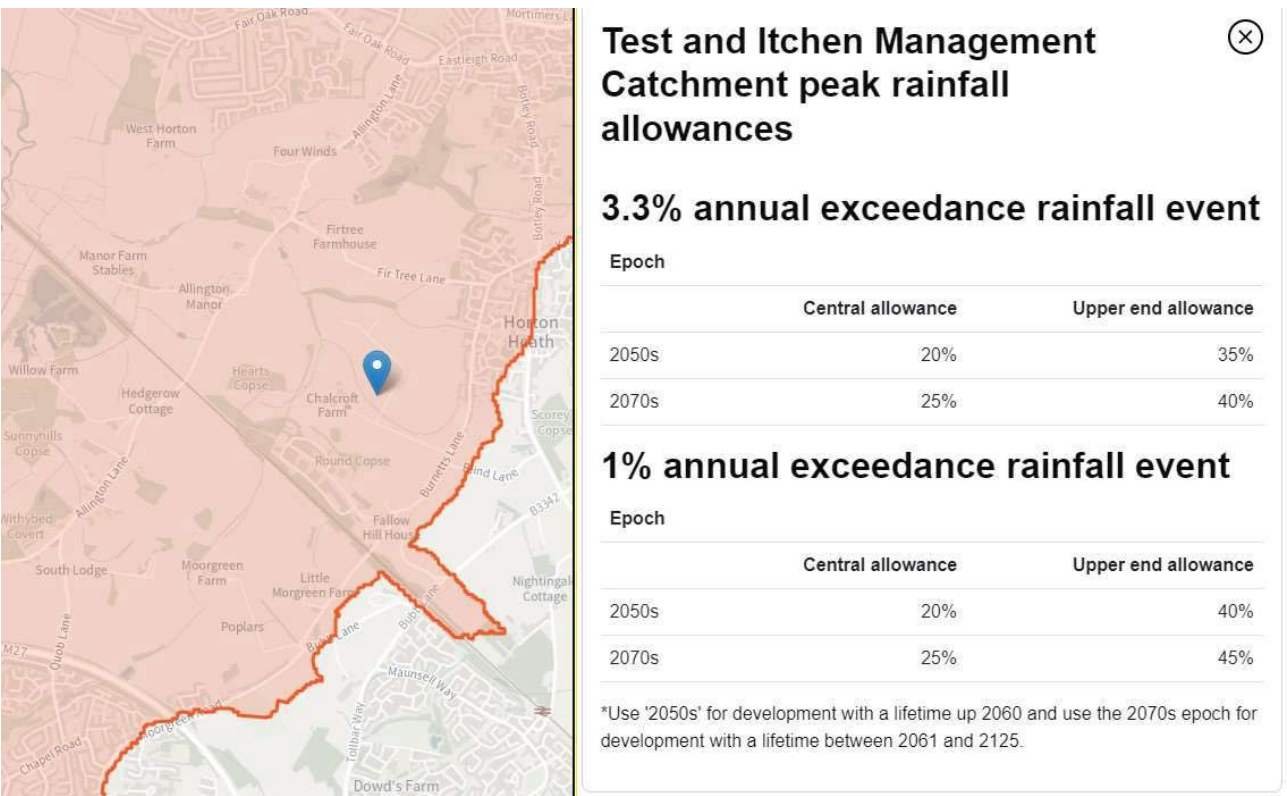


Figure 13: climate change allowance

Table 2 of the same document also outlines that an extra 40% climate change allowance should be adopted for all peak **rainfall** intensities for the purposes of new surface water drainage design. This again assumes the ‘upper end’ value and a 100-year development lifecycle.

Department for Environment Food & Rural Affairs data services platform for the River Test and Itchen Management Catchment peak rainfall allowances, 3.3% annual exceedance rainfall event provides Central allowance 2050s epoch of 20% and 2070s epoch of 25%, Upper end allowances are given as 35% and 40% respectively. It also provides for a 1% annual exceedance rainfall event at the Central allowance for 2050s epoch of 20% and 2070s epoch of 25%, Upper end allowances are given as 40% and 45% respectively.

In addition, a building development creep allowance of 10% should be adopted in the calculations for new surface water drainage design within new housing conurbations.

4.3. Impacts on Flood Risk

Therefore, in terms of providing an acceptable standard of protection against flooding for associated development, no flooding of the road or property should occur as a result of the 'design flood' corresponding to a 1 in 100-year fluvial flood event, or a 1 in 200-year tidal flood event, taking account of climate change and development creep. However, as this report primarily focuses on the construction of the road it is anticipated that this construction would not be considered appropriate to include 10% allowance for creep within separate modelling calculations.

SFRA and EA mapping confirms, apart from the existing natural watercourses, the site remains unaffected by fluvial or surface water flooding up to and including the 1% (1:100 year) AEP event, including an allowance for climate change and creep. Detailed EA mapping has also been interrogated with regard to the area of the site subject to Flood Zone 1 conditions, considering an appropriate climate change allowance.

The impact of climate change over the lifetime of the development must be taken into account within the assessment of post-development surface water runoff and subsequent design of surface water drainage systems for the proposed site.

4.4. Impacts on Proposed Surface Water Drainage Design

The impact of climate change over the lifetime of the development must be taken into account within the assessment of post-development surface water runoff and subsequent design of surface water drainage systems for the proposed site. SUDS systems will necessarily respect the Simple Index Approach for ensuring water quality is not impacted.

4.5. SuDS Management Train & Proposed SuDS Features

In accordance with the discharge hierarchy, the proposed development will discharge surface water to proposed ponds located within each catchment areas.

SECTION 05

POLICY CONSTRAINTS AND IMPLICATIONS TO THE DEVELOPMENT

5. POLICY CONSTRAINTS AND IMPLICATIONS TO THE DEVELOPMENT

5.1. Sequential Test

The Sequential Test as outlined within the NPPF gives preference to locating new development in areas at lowest risk of flooding (i.e. Flood Zone 1) and requires developers to:

"... demonstrate that there are no reasonably available sites in areas with a lower probability of flooding that would be appropriate to the type of development or land use proposed".

Paragraph 167 of the NPPF states:

'All plans should apply a sequential, risk-based approach to the location of development - taking into account the current and future impacts of climate change – so as to avoid, where possible, flood risk to people and property.'

Paragraph 168 of the NPPF goes on to state:

'The aim of the sequential test is to steer new development to areas with the lowest probability of flooding. Development should not be allocated or permitted if there are reasonably available sites appropriate for the proposed development in areas with a lower risk of flooding. The strategic flood risk assessment will provide the basis for applying the test. The sequential approach should be used in areas known to be at risk now or in the future from any form of flooding.'

Paragraph 170 of the NPPF states:

'The application of the exception test should be informed by a strategic or site-specific flood risk assessment, depending on whether it is being applied during plan production or at the application stage. For the exception test to be passed it should be demonstrated that:

- a) the development would provide wider sustainability benefits to the community that outweigh the flood risk; and
- b) 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.'

Paragraph 171 of the NPPF goes on to state:

'Both elements of the exception test should be satisfied for development to be allocated or permitted.'

Whilst it is ultimately the responsibility of the Local Planning Authority to undertake this test, the principle of siting residential development on this site has already been firmly established.

Similarly, redevelopment of a site which is wholly situated within Flood Zone 1 and where all future proposed built development can be sited within Flood Zone 1, will easily satisfy the requirements of the Sequential Test as no reasonably available alternative sites, at a lower risk of flooding, are expected to be identified. There will not be any residential or commercial development within the area of Flood zone 3.

With the foregoing in consideration, it is **likely** that the requirements of the sequential test would be satisfied.

5.2. Flood Risk Vulnerability

PPG Table 2: Flood Risk Vulnerability Classification (summarised below), identifies that transport infrastructure (including mass evacuation routes) which has to cross the area at risk are considered as a '**Less Vulnerable**' use. This area is mostly used for recreational purposes and none of the routes are essential escape routes.

CLASSIFICATION	EXAMPLES OF USE
Essential Infrastructure	▪ Essential transport infrastructure (including mass evacuation routes) which has to cross the area at risk. ▪ Essential utility infrastructure which has to be located within a flood risk area for operational reasons, including electricity generating power stations and grid and primary substations; and water treatment works that need to remain operation in times of flood. ▪ Wind turbines.
Highly Vulnerable	▪ Police and ambulance stations; fire stations and command centres; telecommunications installations required to be operational during flooding. ▪ Emergency dispersal points. ▪ Basement dwellings. ▪ Caravans, mobile homes and park homes intended for permanent residential use. ▪ Installations requiring hazardous substances consent.
More Vulnerable	▪ Hospitals. ▪ Residential institutions such as residential care homes, children's homes, social services homes, prisons and hostels. ▪ Buildings used for dwelling houses, student halls of residence, drinking establishments, nightclubs and hotels. ▪ Non-residential uses for health services, nurseries and educational establishments. ▪ Landfill and sites used for waste management facilities for hazardous waste. ▪ Sites used for holiday or short-let caravans and camping, subject to a specific warning and evacuation plan.
Less Vulnerable	▪ Police, ambulance and fire stations which are not required to be operational during flooding. ▪ Buildings used for shops, financial, professional and other services, restaurants, cafes and hot food takeaways, offices, general industry, storage and distribution, non-residential institutions not included in the 'more vulnerable' class and assembly and leisure. ▪ Land and buildings used for agriculture and forestry. ▪ Waste treatment (excl. landfill and hazardous waste facilities). ▪ Minerals working and processing (except for sand and gravel working). ▪ Water treatment works which do not need to remain operation during times of flood. ▪ Sewage treatment works, if adequate measures to control pollution and manage sewage during flooding events are in place.
Water-Compatible Development	▪ Flood control infrastructure. ▪ Water transmission infrastructure and pumping stations. ▪ Sewage transmission infrastructure and pumping stations. ▪ Sand and gravel working. ▪ Docks, marinas and wharves.

- Navigation facilities.
- Ministry of Defence installations.
- Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location.
- Water-based recreation (excluding sleeping accommodation).
- Lifeguard and coastguard stations.
- Amenity open space, nature conservation and biodiversity, outdoor sports and recreation and essential facilities such as changing rooms.
- Essential ancillary sleeping or residential accommodation for staff required by uses in this category, subject to a specific warning and evacuation plan.

5.3. Flood Zone Compatibility

PPG Table 3: Flood Risk Vulnerability and Flood Zone Compatibility (summarised below), confirms that the site is appropriate for 'Essential Infrastructure' and 'More Vulnerable' uses in Flood Zone 1 and Flood Zone 2 without the need for application of the Exception Test. In Flood Zone 3a the more vulnerable, which includes dwelling houses, and essential infrastructure, uses should only be permitted in this zone if the Exception Test is passed. In Flood Zone 3b new residential development should not be permitted but essential infrastructure is appropriate in this zone if the Exception Test is passed.

FLOOD ZONE	ESSENTIAL INFRASTRUCTURE	HIGHLY VULNERABLE	MORE VULNERABLE	LESS VULNERABLE	WATER COMPATIBLE
Zone 1	Permitted	Permitted	Permitted	Permitted	Permitted
Zone 2	Permitted	Exception Test Required	Permitted	Permitted	Permitted
Zone 3A	Exception Test Required	Not Permitted	Exception Test Required	Permitted	Permitted
Zone 3B	Exception Test Required	Not Permitted	Not Permitted	Not Permitted	Permitted

5.4. Functional Floodplain

The existing natural watercourses impose flood zones 2 and 3 to the immediate areas to the sides of the watercourse runs. However, the majority of the development site is not located within an area designated as functional floodplain Zone 2, 3A, 3B and therefore no constraints apply to the proposed development other than at watercourse crossing points where the design will cater for the flood risk and the watercourse.

5.5. Off-site Impact

If the site is redeveloped, roads or residential, there is the potential to exacerbate flood risk elsewhere (off-site).

This said, adequate site area is available within the application boundary to mitigate any loss of flood conveyance capacity that may result from the proposed development. SUDS and pond features are being designed to ensure adequate provisions.