



RIDGE

**GREEN INFRASTRUCTURE
DRAINAGE STRATEGY**

ONE HORTON HEATH

EASTLEIGH BOROUGH COUNCIL

February 2024



GREEN INFRASTRUCTURE DRAINAGE STRATEGY ONE HORTON HEATH

Prepared for

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CONTENTS

1. INTRODUCTION	4
1.1. Appointment and Brief	4
1.2. Aims and Objectives	4
1.3. Limitations	4
1.4. Reference Information	5
2. PROJECT BACKGROUND	7
2.1. Site Location and Existing Land Use	7
2.2. Geology	8
2.3. Hydrology / Hydrological Features	10
2.4. Proposed Development	11
3. SURFACE WATER DRAINAGE STATEMENT	13
3.1. Existing Site Location Data	13
3.2. Existing Total Site Area	13
3.3. Calculation of Greenfield	13
3.4. SuDS Management Train & Proposed SuDS Features	13
3.5. Proposed Design	13
3.6. Allowance for Creep	17
3.7. Allowance for Climate Change	18
3.8. Required Maintenance Schedule	19
4. FOUL WATER DRAINAGE	21
5. CONCLUSIONS	23

Appendices:

Appendix A- Overall Green Infrastructure Plan.
Appendix B- Overall Catchment Plan.
Appendix C- SuDS feature cross-section drawings.
Appendix D- Proposed Footway long-section drawing.
Appendix E- Preliminary Management Strategy plan

1. INTRODUCTION

1.1. Appointment and Brief

Ridge & Partners prepared this Drainage Strategy 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 (hereby referred to as the 'Application Site- reserved matters planning application').

The purpose of this document is to outline the development of the proposed DS, providing sufficient detail to enable both a thorough review of the design principles adopted and further refinement of the design as part of the ongoing development of the project.

The document aims to demonstrate the surface water management at the Application Site as follows:

- Provide an analysis of the impact of the proposed development on surrounding foul water infrastructure and identify the constraints present on the site in terms of suitability of conventional gravity drainage.
- Demonstrate the principles of surface water management in terms of limiting post development discharge rates and providing the necessary attenuation.

The proposed DS outlined herein is subject to further detailed analysis at the design stage. This report only focuses on the surface water strategy for green infrastructure area.

1.2. Aims and Objectives

The DS has been prepared with reference to the following requirements:

- The DS must:
 - Ensure that flood risk to the Application Site and surrounding area is not increased over the lifetime of the Proposed Development;
 - Conform with all relevant National, Hampshire County Council and Local flood risk policies;
 - Adopt current design standards; and
 - Consider long-term maintenance with respect to practicality, ownership and funding.
- The DS should:
 - Mimic the existing drainage characteristics of the Application Site as far as is practical;
 - Look for opportunities to provide a reduction in flood risk to the Application Site and the surrounding area;
 - Adhere to current best practice guidance;
 - Contribute to the enhanced amenity and aesthetic value of the Application Site; and
 - Propose opportunities for biological enhancement and provide habitats for wildlife in urban areas.

1.3. Limitations

The purpose of this report is 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.

1.4. Reference Information

The following documents have been consulted:

- Hampshire County Council (2011) Preliminary Flood Risk Assessment.
- Eastleigh Borough Council JBA Consulting (2018) Eastleigh Hydrological Sensitivity Study Conceptual Surface Water Drainage Strategy.
- Partnership for Urban South Hampshire (2016) – Strategic Flood Risk Assessment 2016 Update.
- Partnership for Urban South Hampshire (2019) – Green Infrastructure Implementation Plan.
- Environment Agency JBA Consulting (2019) Itchen Tributaries Modelling Study.
- Communities and Local Government Document. (2021). The National Planning Policy Framework.
- Environment Agency. (2022). Flood Risk Assessments: Climate Change Allowances.
- Environment Agency. (2013). Rainfall Runoff Management for Developments.
- CIRIA. (2015). C753 – The SuDS Manual.
- Secretary of State. (2015). Building Regulations Approved Document H.
- Butler & Davies. (2018). 4th Ed. Urban Drainage.
- British Geological Survey Online Mapping Tool.
- DEFRA / EA Interactive online mapping (magic.defra.gov.uk).
- Department for Environment, Food and Rural Affairs. (2015). Non-Statutory Technical Standards for Sustainable Drainage Systems.
- Department for Environment, Food and Rural Affairs & Environment Agency. (2017). Flood Risk Assessment for Planning Applications.
- Environment Agency (2019) Flood risk mapping information.
- Preliminary Water Management Strategy Plan (Sheet 1 of 2 and Sheet 2 of 2)

SECTION 2

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. The nearest postcode 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

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.

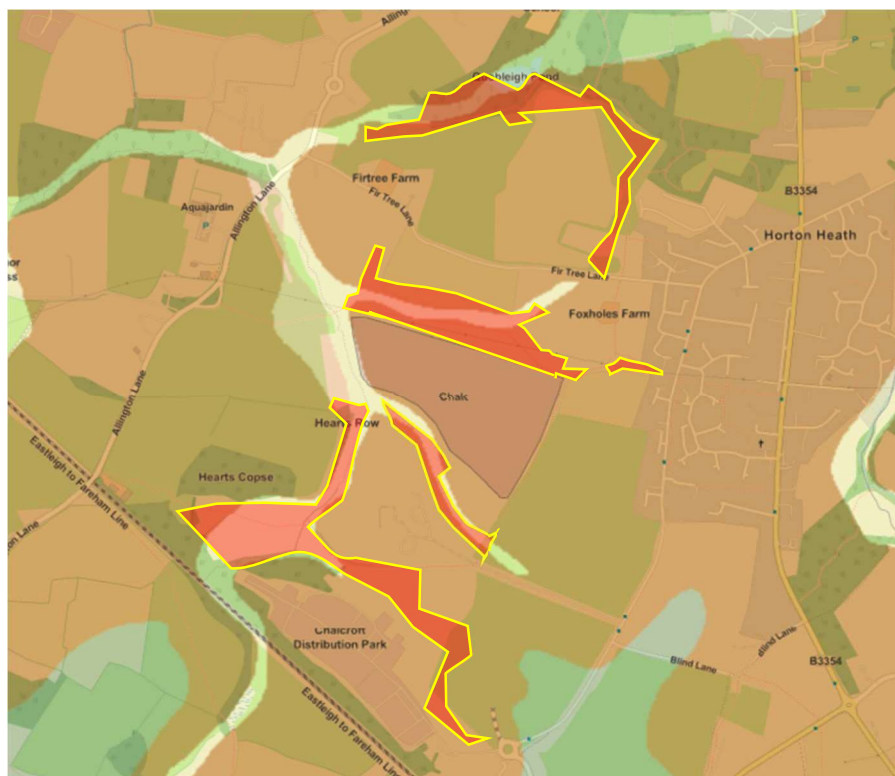


Figure 2: British Geological information map

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,

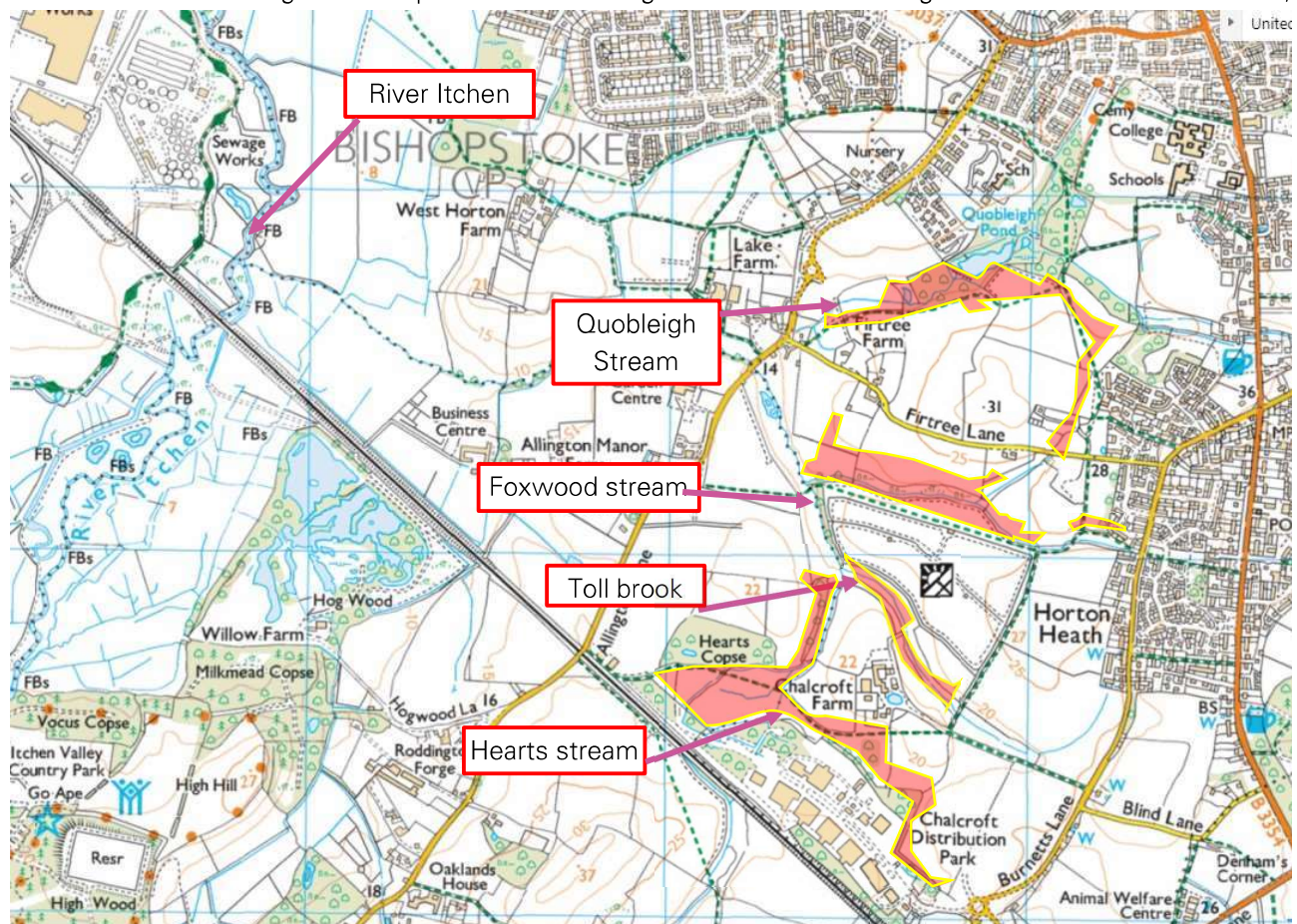


Figure 3: Location of River Itchen from the proposed site

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. Reference *One Horton Heath – Winter Groundwater Monitoring*, Letter Reference: 5019962-WGM/MS/T-815 dated 3 April 2023.

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.

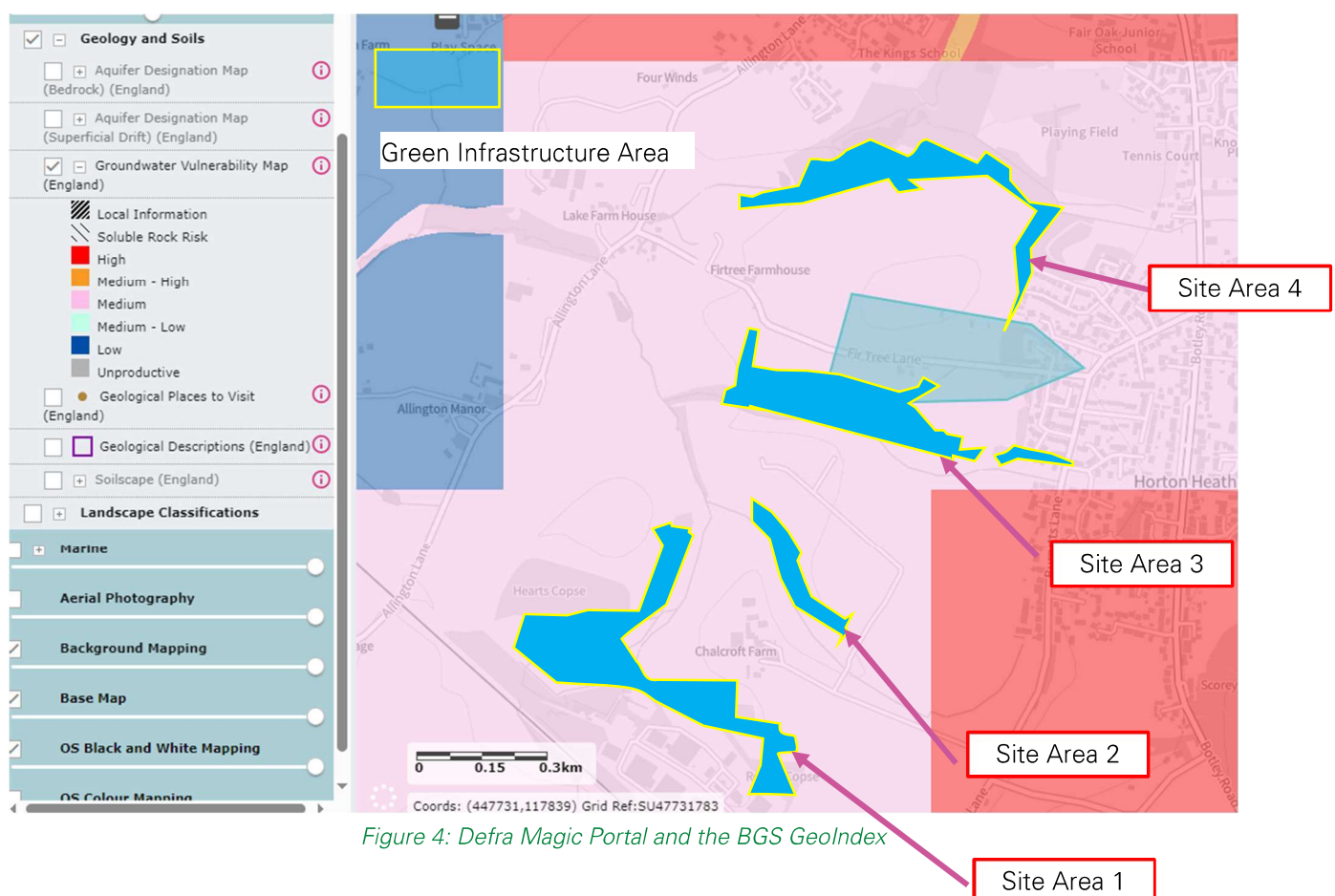


Figure 4: Defra Magic Portal and the BGS GeolIndex

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 3

SURFACE WATER DRAINAGE STATEMENT

3. SURFACE WATER DRAINAGE STATEMENT

3.1. Existing Site Location Data

The site location and hydrological data used within this assessment is summarised as follows:
is SU 48855 17787 approximately 448855N, 117787E.

- Grid Reference: *SU488177*
- Return Period: 100 Years
- Average Annual Rainfall (SAAR): 800 mm/year
- Soil Index: 0.300
- UK Hydrological Region: Region 7

3.2. Existing Total Site Area

The existing site is currently an empty greenfield area. The total area of the existing site is as follows:

3.3. Calculation of Greenfield

Greenfield runoff rates have been estimated for the site using the methodology outlined in the Institute of Hydrology Report 124 method as set out within the Interim Code of Practice for SuDS (ICP) and Environment Agency guidance for catchment areas of 50 hectares or less.

This method of assessment is widely recognised as current best practice for estimation of catchment release rates for small catchments.

In line with outline planning application, as shown in Preliminary Water Management Strategy Plan drawing-G277/21 rev C (sheet 1 and sheet 2), the proposed development site has been divided into 4 green infrastructure area. The preliminary management strategy plan was carried out by PFA Consultant. The drawing also provides information such as % of impermeability for each catchment area and their runoff rates and volume storages for the year 1 in 1, 1 in 100+40%cc and Qmed.

The surface water discharged from each green infrastructure area will be discharged into the pond nearby.

3.4. SuDS Management Train & Proposed SuDS Features

In accordance with the discharge hierarchy identified in Section 3, the surface water generated by the proposed green infrastructure should be discharged to the ground via infiltration, where practicable to do so.

Resulting from this, the surface water discharged from each proposed green infrastructure will drain into the ground. Whereas the surface water from nearby catchment diverted towards pond within green infrastructure area and discharges into nearby stream.

3.5. Proposed Design

There are 4 green infrastructure area planned as shown in figure 4. Site area 1 discharges surface water into Hearts Stream. Site area 2 discharges surface water into Toll Brook whereas site area 3 discharges surface water into Foxwood stream. Site area 4 discharges surface water into Quobleigh Stream.

Refer to Appendix B for overall catchment plan.

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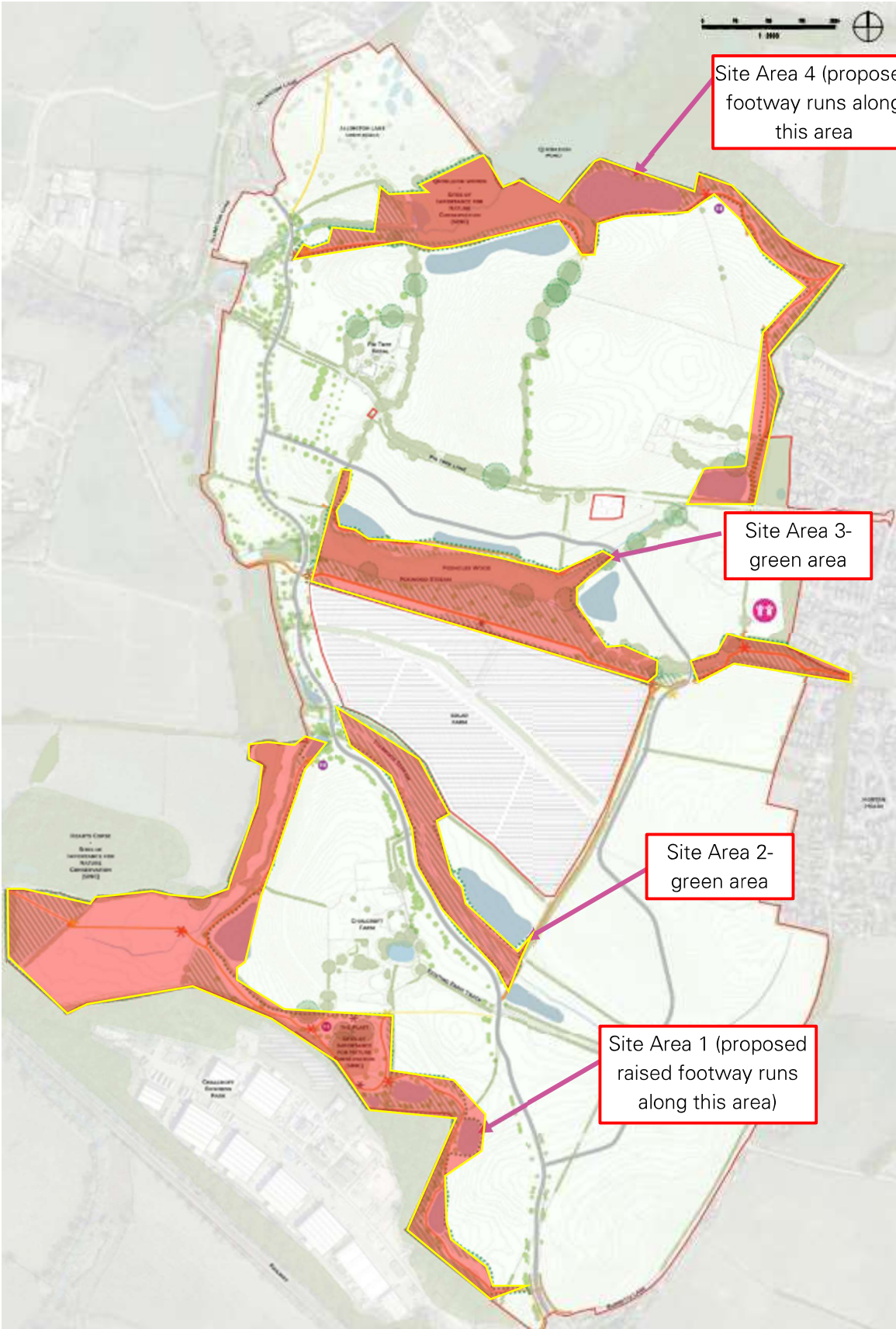


Figure 5: Green Infrastructure Areas

Site Area 1:

There is no residential or commercial development planned within this area of green infrastructure. However, a raised footway is proposed to be built along the causeway. The surface water collected from green infrastructure in Site Area 1 infiltrates into the ground and discharges into Hearts Stream.

Surface water collected from the nearby catchments (Catchment M and EM) is discharged into SuDS features M and EM, located within the green infrastructure (Site Area 1). The proposed development of Catchment M & EM will be carried out at a later stage.

The surface water collected within SuDS features M & EM is discharged into Hearts stream at a rate of 17.7l/s and 16.3l/s respectively. The required volume for Pond M is 966.84m³ and pond EM is 1211.39 respectively.

There are three SuDS features within this site area in total. However, one of the SuDS features serves Southern Access as part of the infrastructure works with planning permission X/19/86475: O/14/75735 and is not included within this report.

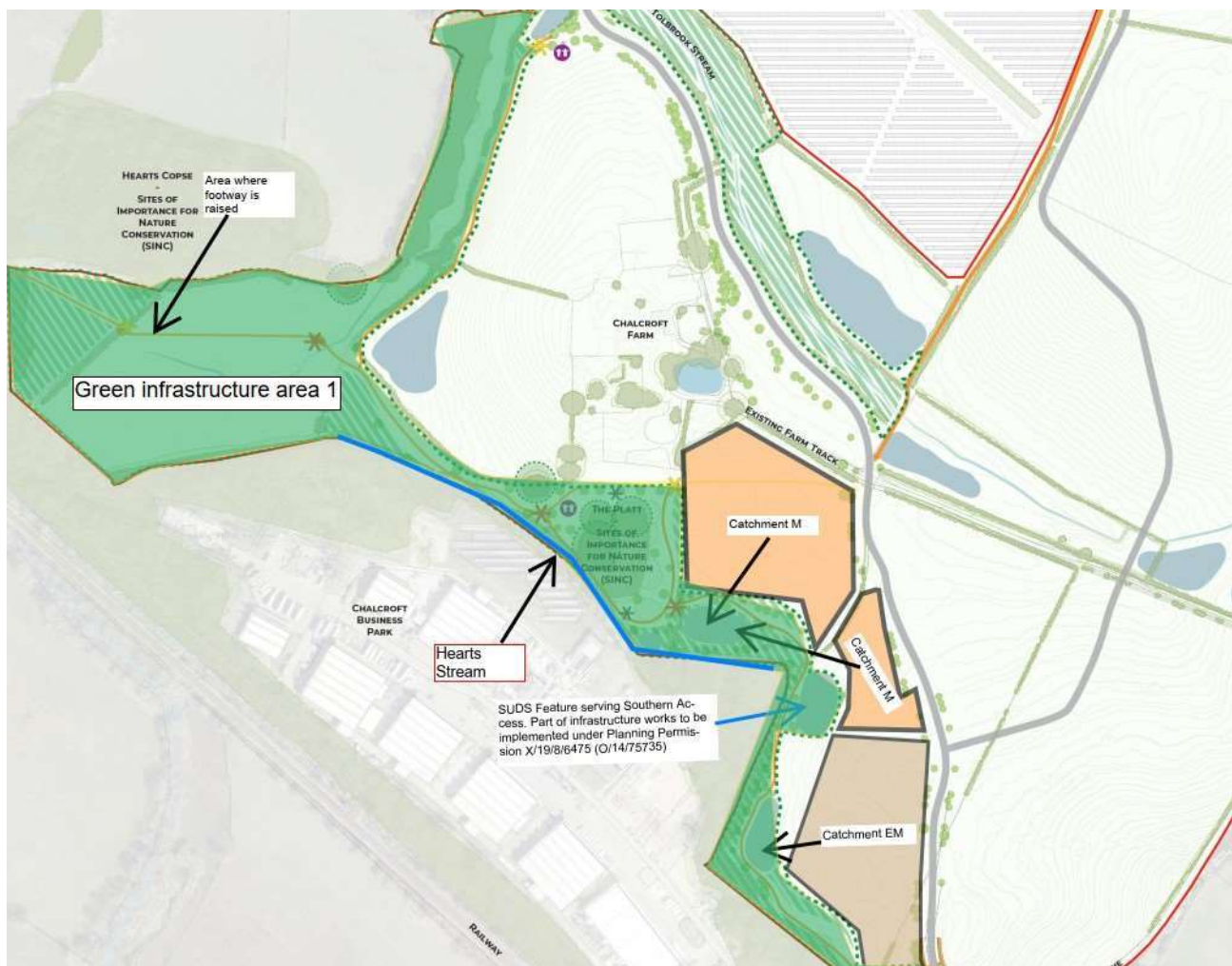


Figure 5: Green Infrastructure Site Area 1

Site Area 2:

The surface water collected from green infrastructure site area 2 infiltrates to the ground and discharges into nearby toll brook ditch. There are no residential or commercial developments planned within this area.



Figure 6: Green Infrastructure Site Area 2

Site Area 3:

The surface water collected from green infrastructure site area 3 infiltrates to the ground and discharges into nearby Foxwood Stream. There are no residential or commercial developments planned within this area. However, there is a proposed footway that runs along the green infrastructure site area 3.

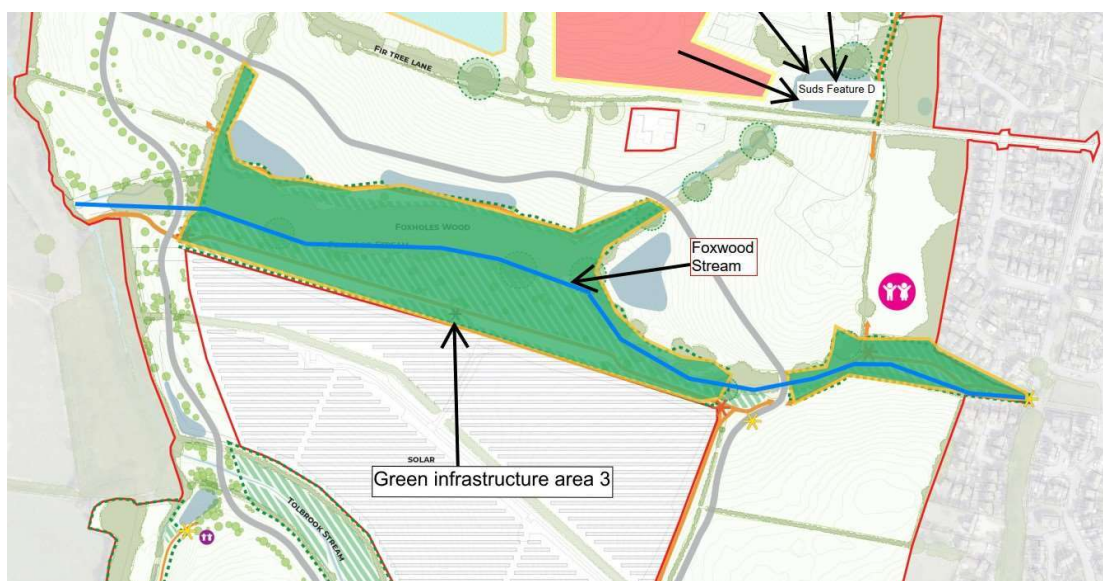


Figure 7: Green Infrastructure Site Area 3

Site Area 4:

There is no residential or commercial development planned within this area of green infrastructure. However, a footway is proposed to be built along this site area. The surface water discharged from green infrastructure Site Area 4 infiltrates into the ground and discharges into Quobleigh Stream.

The surface water from the nearby catchments (Catchment C and D) is discharged into the SuDS features C and D located within the green infrastructure (Site Area 4). The attenuated surface water within suds feature C and D is discharged into Quobleigh stream at a restricted of 54.5/l/s and 27.1l/s respectively. The proposed development of these catchments will be carried out at a later stage. The required volume for Pond C is 966.84m³ and pond D is 1211.39 respectively.

The surface water from Catchment B will be discharged into SuDS feature B, the attenuated surface water within SuDS feature B is then discharged into the Quobleigh stream located within green infrastructure Site Area 4 at a rate of 30.0l/s.

The required volume for Pond B is 966.84m³

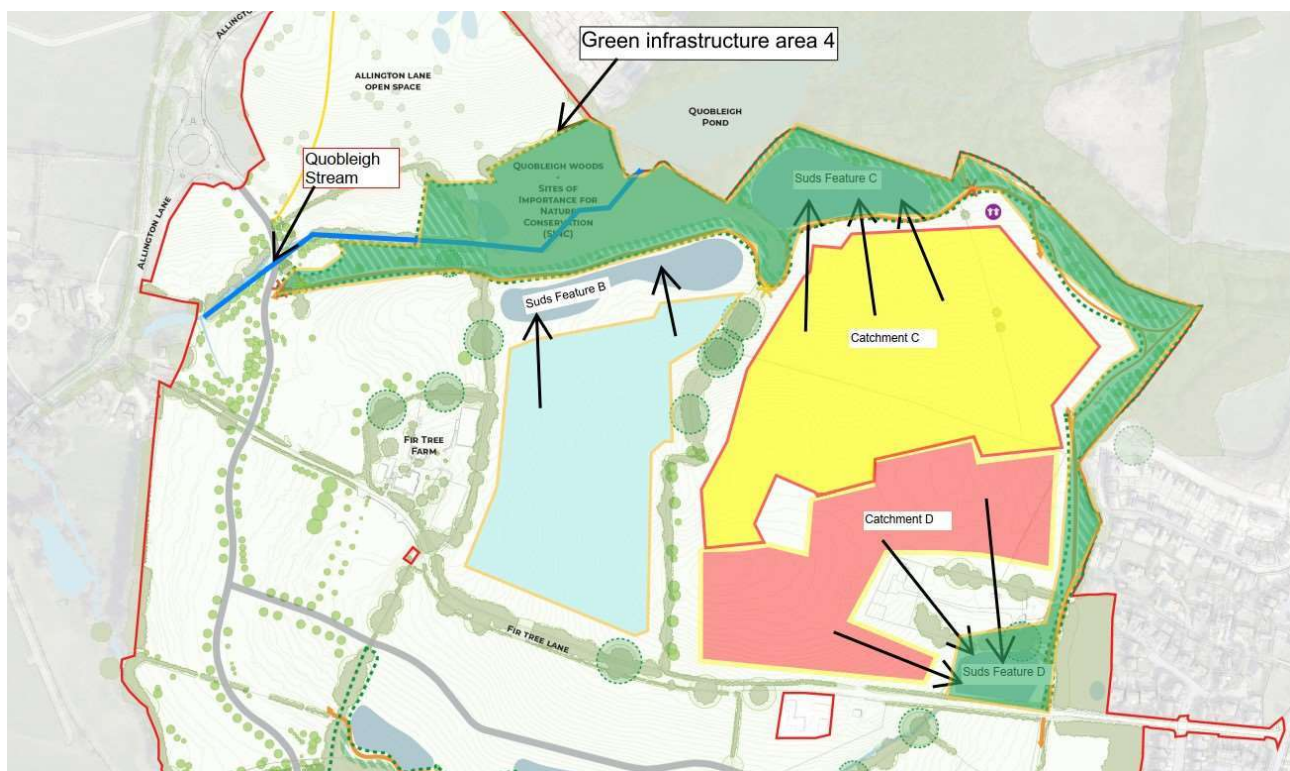


Figure 8: Green Infrastructure Site Area 4

3.6. Allowance for Creep

As this report primarily focuses on the green infrastructure areas. Therefore, allowance for creep is not included within the calculations.

3.7. Allowance for Climate Change

Table 2 (Peak Rainfall Intensity Allowance in Small and Urban Catchments) of Environment Agency. (2019). Flood Risk Assessments: Climate Change Allowance confirms that the climate change allowance of **45%** should be adopted for the Application Site, assuming a lifespan of 100 years for development as recommended within the NPPF.

The storage volume has been designed based on the updated climate change allowance of 45%.

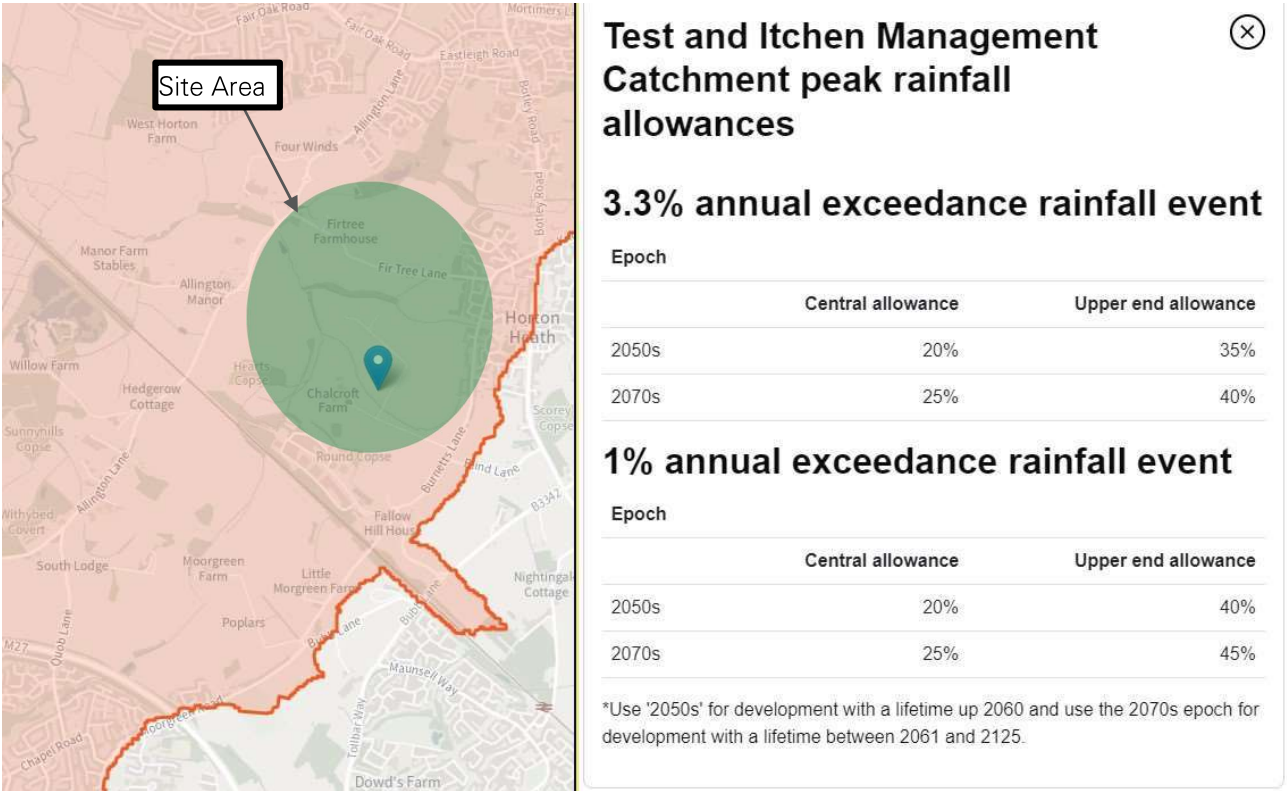


Figure 9: climate change allowance

3.8. Required Maintenance Schedule

To ensure the long-term performance of the proposed DS, the onsite drainage system will be owned and maintained by the site operator or a maintenance company (MC) in accordance with the indicative schedule below, in the alternative the local authority may wish to adopt such features. However, at the detailed drainage design stage a full management and maintenance plan detailing best practice system maintenance regimes and proprietary manufacturer requirements and lifecycle management, in accordance with the CIRIA SuDS Manual will need to be produced. In the absence of local authority adoptions, maintenance of the overall drainage network will be the responsibility of an appointed management company.

ELEMENT / DRAINAGE COMPONENT		OWNERSHIP ADOPTION	/ MAINTENANCE REQUIREMENTS
Flow Restriction Device & Chamber	Site Operator / MC	To be monitored for silt build-up and cleaned as required using suction methods. Check function of flow restriction componentry to suit manufacturer's guidance. Inspection annually and before / after extreme storm events.	
Catchpit Manholes	Site Operator / MC	To be monitored for silt build-up and cleaned as required using suction methods. Inspection annually and before / after extreme storm events.	
Gullies (Internal & External)	Site Operator / MC	To be monitored for silt build-up and cleaned as required. Where provided, ensure air traps are primed and sealed to prevent smells. Inspection quarterly.	
Ponds	Site Operator / MC	To be monitored for litter and debris. Careful strimming to remove overgrown vegetation twice yearly. Removal of self-seeded saplings to prevent new tree growth. Monitor for silt build up and remove and spread locally outside design profile as required. Inspection quarterly and before / after extreme storm events.	
Petro/Oil Inceptor	Site Operator / MC	To be monitored for silt build-up, remove grim, dirt, oil and clean as required. Check function of flow restriction componentry to suit manufacturer's guidance. Inspection quarterly and before / after extreme storm events	

SECTION 4

FOUL WATER MANAGEMENT

4. FOUL WATER DRAINAGE

The existing development site area is not crossed by any public foul sewers. Where appropriate it should be proposed to connect to an existing Public Foul Sewer network operated by Southern Water supplying foul and surface water sewerage systems.

The Foul sewers built as part of any new development must be constructed in accordance with Building Regulations Part H and where offered for adoption, to the local water company, in accordance with the latest technical guidance for the Design And Construction Guidance (DCG) April 2020.

SECTION 5

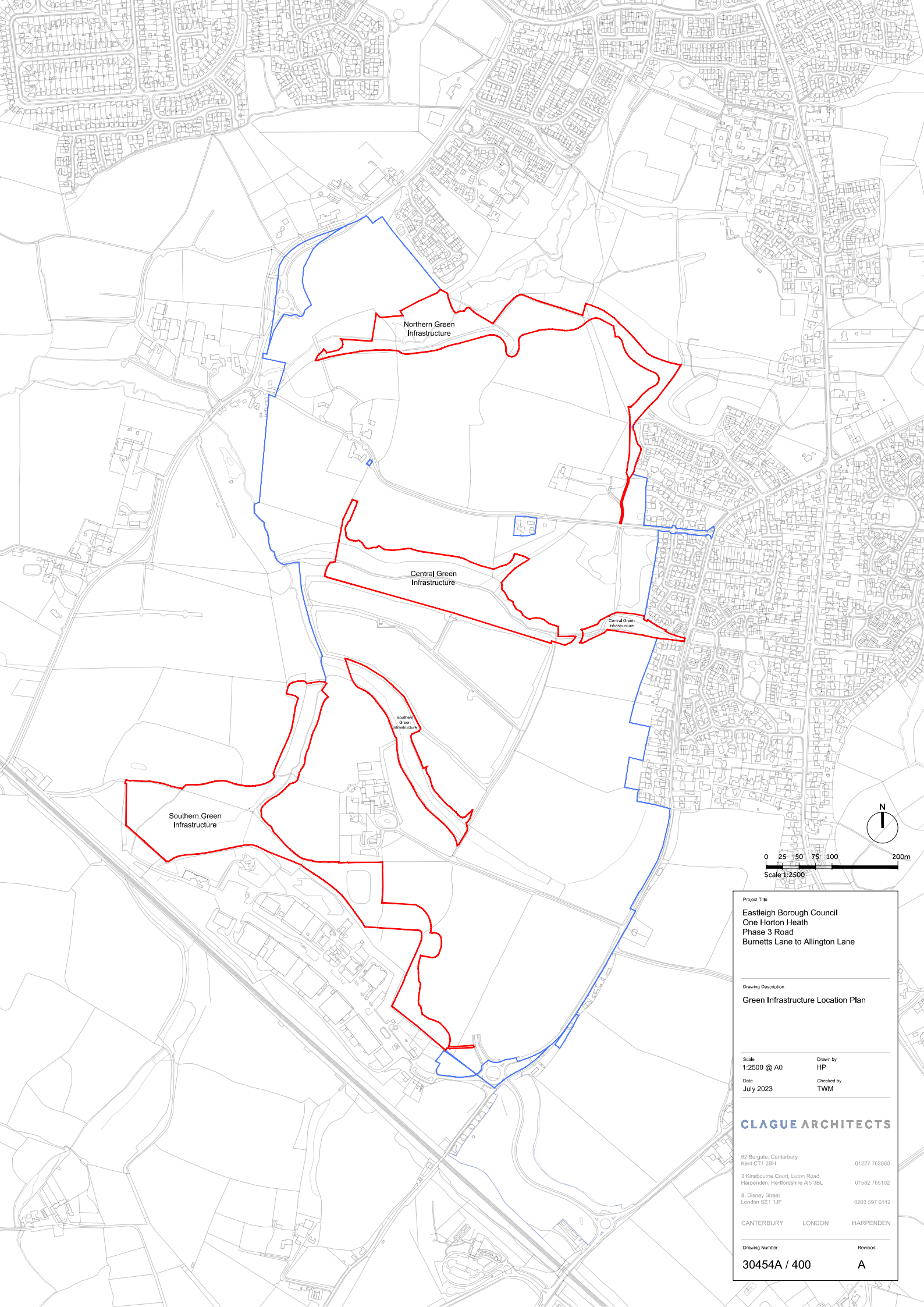
CONCLUSIONS

5. CONCLUSIONS

- Ridge & Partners prepared this Drainage Strategy 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.
- This report primarily focuses on the surface water strategy for green infrastructure.
- Surface Water generated from the proposed green infrastructure will be managed in a sustainable manner in accordance with the guidance in the CIRIA SuDS Manual and at source as outlined within the drainage strategy in line with the strategy set out in the Outline planning application documents by PFA.
- The surface water from the green infrastructure area is discharged directly into the ground, subsequently flowing into the nearby stream.
- The surface water from the nearby catchment is discharged into the pond. The surface water attenuated within the pond is discharged into the nearby stream at a restricted rate. The flow rates have been agreed as part of the outline application.
- A footway is proposed within the floodplain area. In that area, the raised footway will be constructed along the causeway.
- Foul sewage from all new development should be connected to an existing public foul sewer system, subject to permission to connect or alternatively to new sewerage provisions with appropriate management and maintenance.

APPENDIX A

OVERALL GREEN INFRASTRUCTURE PLAN



Project Title

Eastleigh Borough Council
One Horton Heath
Phase 3 Road
Burnetts Lane to Allington Lane

Drawing Description

Green Infrastructure Location Plan

Scale

1:2500 @ A0

Drawn by

HP

Date

July 2023

Checked by

TWM

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CANTERBURY

LONDON

HARPENDEN

Drawing Number

30454A / 400

Revision

A

APPENDIX B

OVERALL CATCHMENT PLAN