



RIDGE

**SPINE ROAD DRAINAGE
STRATEGY**

ONE HORTON HEATH

EASTLEIGH BOROUGH COUNCIL

December 2023



SPINE ROAD DRAINAGE STRATEGY ONE HORTON HEATH

Prepared for

Eastleigh Borough Council
Eastleigh House,
Upper Market Street,
Eastleigh,
SO50 9YN

Prepared by

Ridge and Partners LLP
1 Royal Court
Kings Worthy
Winchester
Hampshire
SO23 7TW

Tel: 01962 834400

Contact

Tom Clark
Senior Civil Engineer
tomclark@ridge.co.uk
07392 283451

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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. This application is for full planning consent due to the time for these negotiations to complete. Submitting details of the Secondary Infrastructure Road (SIR) as a full planning application will deliver the SIR 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 SIR. 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).

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 the spine road.

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.

Unnumbered heading styles can be applied rather than numbered if required with contents page adapted to suit.

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

The application site is situated south of the Fir Tree Lane and north of the proposed Lower Acre development, adjacent to an existing solar farm.



Figure 1: Site Location Plan

The Ordnance Survey grid reference for the application site is SU 48807 17233, approximately 448807N, 117233E and the nearest postcode is SO50 7BZ. The total area of the proposed application site is 21.56ha.

2.2. Topography

The site predominantly slopes from east to west, with an elevation ranging from 28.14m to 20.59m with an approximate gradient of 1 in 12. However, it also has a north to south slope, descending from an elevation of 26.00m to 20.78m with an approximate gradient of 1 in 92. The application site falls towards Foxwood Stream and its tributaries.

2.3. Existing Drainage Infrastructure

Figure 2 shows that Catchment E will discharge surface water to SuDS feature E which will be constructed as part of Road 3 application prior to the development being built. The purpose of SuDS feature E is to manage and control surface water runoff. It is important to note that SuDS feature E will discharge the collected surface water into the Hearts Stream.



Figure 2: Location of catchment E and its discharge location, Suds Feature E

2.4. Geology and Hydrogeology

British Geological Survey (BGS) online mapping indicates that the Application Site is situated on a bedrock of Wittering Formation sand, silt and clay. This is overlain by superficial deposits of Alluvium around the watercourses that pass through the site.

The Environment Agency's online mapping suggests the underlying bedrock to be classified as a secondary A Aquifer and the site is located within a medium groundwater vulnerability zone.

2.5. Hydrological Settings

The nearest river is the River Itchen which is located 1.67km away from the proposed development. The tributary of Foxwood Stream runs between the solar farm and Fir Tree Lane and north of the proposed one Horton Heath Lower Acre site as shown in figure 3.

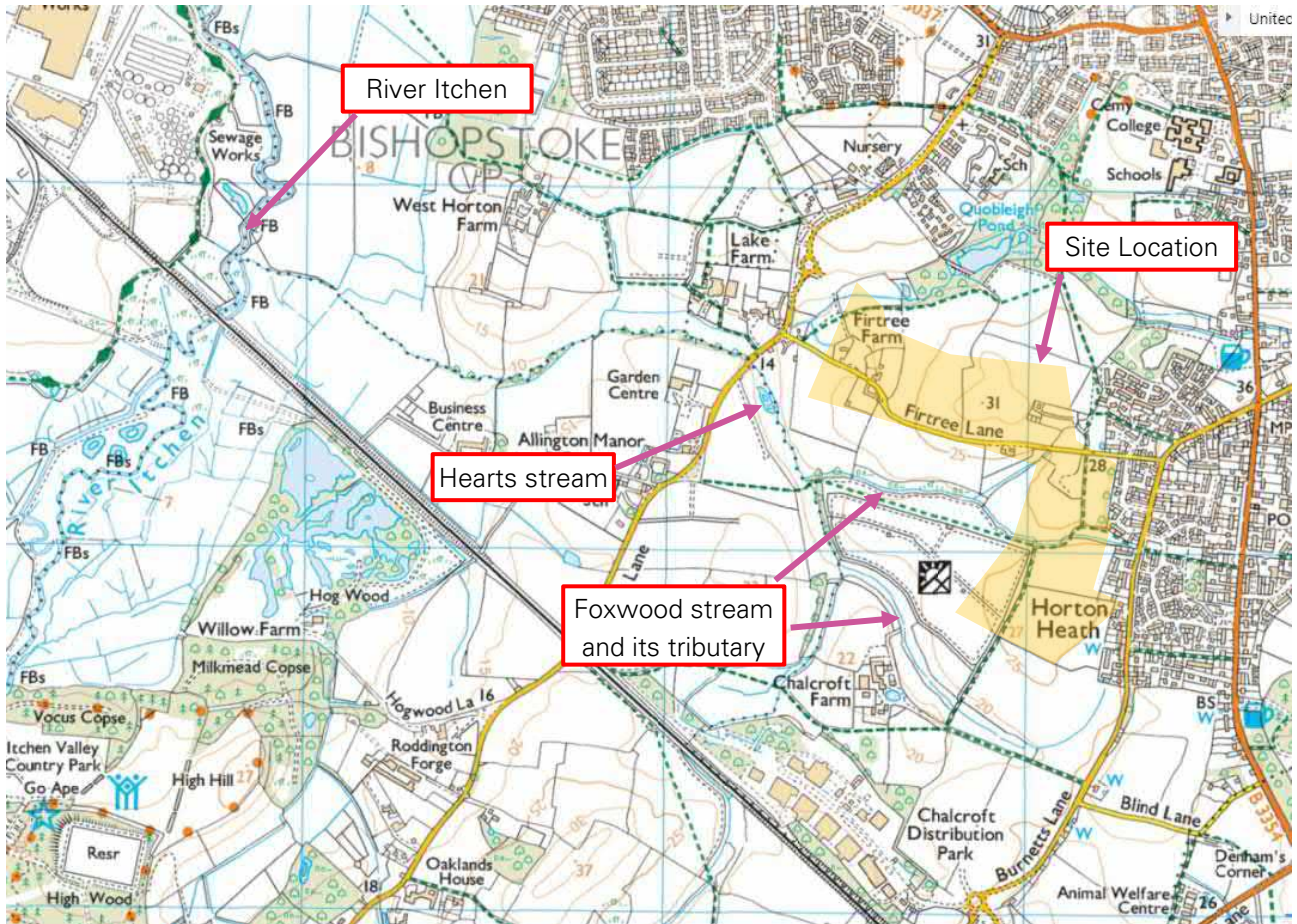


Figure 3: Location of River Itchen from the proposed site

2.6. Proposed Development

The proposed development is a part of the One Horton Heath Site Wide Infrastructure Delivery, which includes the construction of the roads, residential homes, local centres, school and its playground. However, this report primarily focuses on the spine road that spans between Fir Tree Lane and Foxwood stream, connecting the west and east portion of the development. This spine road crosses the Foxwood Stream and runs alongside the solar farm before linking to the northern section of the proposed Lower Acre site.

Refer to Appendix A for proposed site plan.

SECTION 3

PROPOSED SURFACE WATER DRAINAGE

3. PROPOSED SURFACE WATER DRAINAGE

3.1. Existing Site Location Data

The site location and hydrological data used within this assessment is summarised as follows:
is SU 48807 17233, approximately 448807N, 117233E.

- Grid Reference: SU488172_ (448807N, 117233E)
- 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:

ITEM	AREA (SQ. M)	AREA (HECTARES)
	215600	21.56
Totals:		21.56

Therefore, an existing permeable and impermeable percentages are calculated as follows:

	IMPERMEABLE	PERMEABLE
Area (Ha)	0	21.56
Percentage (%)	0	100%

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 3 catchments. The preliminary management strategy plan was carried out by PFA Consultant. The drawing highlights different catchment area within the proposed site. 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.

Each catchment area has been assigned a restricted flow rate before being discharged into the Foxwood Stream and its tributaries.

Catchment F:

RETURN PERIOD (1 IN X YEARS)	GREENFIELD RUN OFF RATE (L/S)
1 in 1	23.9
QMed	26.9
1 in 100+CC	26.9

The surface water from catchment area F, including the spine road that runs alongside it, is discharged into the strategic SuDS feature, Pond_F. The flow rate of surface water discharged from Pond_F to the Foxwood Stream is restricted to **26.9l/s**.

Catchment G:

RETURN PERIOD (1 IN X YEARS)	GREENFIELD RUN OFF RATE (L/S)
1 in 1	34.7
QMed	41.5
1 in 100+CC	41.5

The surface water from catchment area G, including the spine road that runs alongside it, is discharged into the strategic SuDS feature, Pond_G. The flow rate of surface water discharged from Pond_G to the Foxwood Stream is restricted to **41.5l/s**.

Catchment H:

RETURN PERIOD (1 IN X YEARS)	GREENFIELD RUN OFF RATE (L/S)
1 in 1	44.1
QMed	70.8
1 in 100+CC	70.8

The surface water from catchment area H, including the spine road that runs alongside it, is discharged into the strategic SuDS feature, Pond_H. The flow rate of surface water discharged from Pond_H to the Foxwood Stream is restricted to **70.8 l/s**.

3.4. Proposed Site Impermeable Area & Percentages

The total impermeable areas for the proposed site have been calculated as follows:

Catchment F:

The total area of catchment F is 4.28ha.

ITEM	AREA (SQ. M)	AREA (HECTARES)
Spine Road	7370	0.737
65% impermeable catchment	23040	2.304
Totals:	30410	3.041

Catchment G:

The total area of catchment G is 6.97ha.

ITEM	AREA (SQ. M)	AREA (HECTARES)
Spine Road	4930	0.493
65% impermeable catchment	22480	2.248
50% impermeable catchment	15070	1.507
Totals:	42480	4.248

Catchment H:

The total area of catchment G is 10.296ha.

ITEM	AREA (SQ. M)	AREA (HECTARES)
Spine Road	9230	0.923
30% impermeable catchment	4620	0.462
65% impermeable catchment	50910	5.091
Totals:	64764	6.476

Total area of impermeable throughout the site is as follows:

ITEM	AREA (SQ. M)	AREA (HECTARES)
Spine Road	21530	2.153
Total Impermeable Area	116120	11.61
Totals:	137650	13.765

Therefore, proposed permeable and impermeable percentages are calculated as follows:

	IMPERMEABLE	PERMEABLE
Area (Ha)	13.765	7.795
Percentage (%)	64	36
Change from Existing (%)	+64	-64

3.5. 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%.

3.6. Allowance for Creep

As this report primarily focuses on the construction of the spine road running between catchment F, G & H.- Therefore, it is anticipated that this construction would not be considered appropriate to include 10% allowance for creep within the calculations.

3.7. SuDS Management Train & Proposed SuDS Features

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

The presence of clay within the site makes it unsuitable for infiltration. Therefore, the discharge of surface via infiltration-based SuDS features (i.e., soakaways, infiltration basins) is not considered appropriate.

Resulting from this, the surface water discharged from the proposed development and its catchment will be discharged into an existing ditch, Foxwood Stream and its tributaries. The surface water will be stored within SuDS features like ponds and swale before being discharged into the ditch.

3.8. Proposed Design

The proposed development is mainly divided into 3 catchments (F, G & H) and each catchment has its own SuDs features from which the surface water will discharge into Foxwood stream as shown in figure 4.

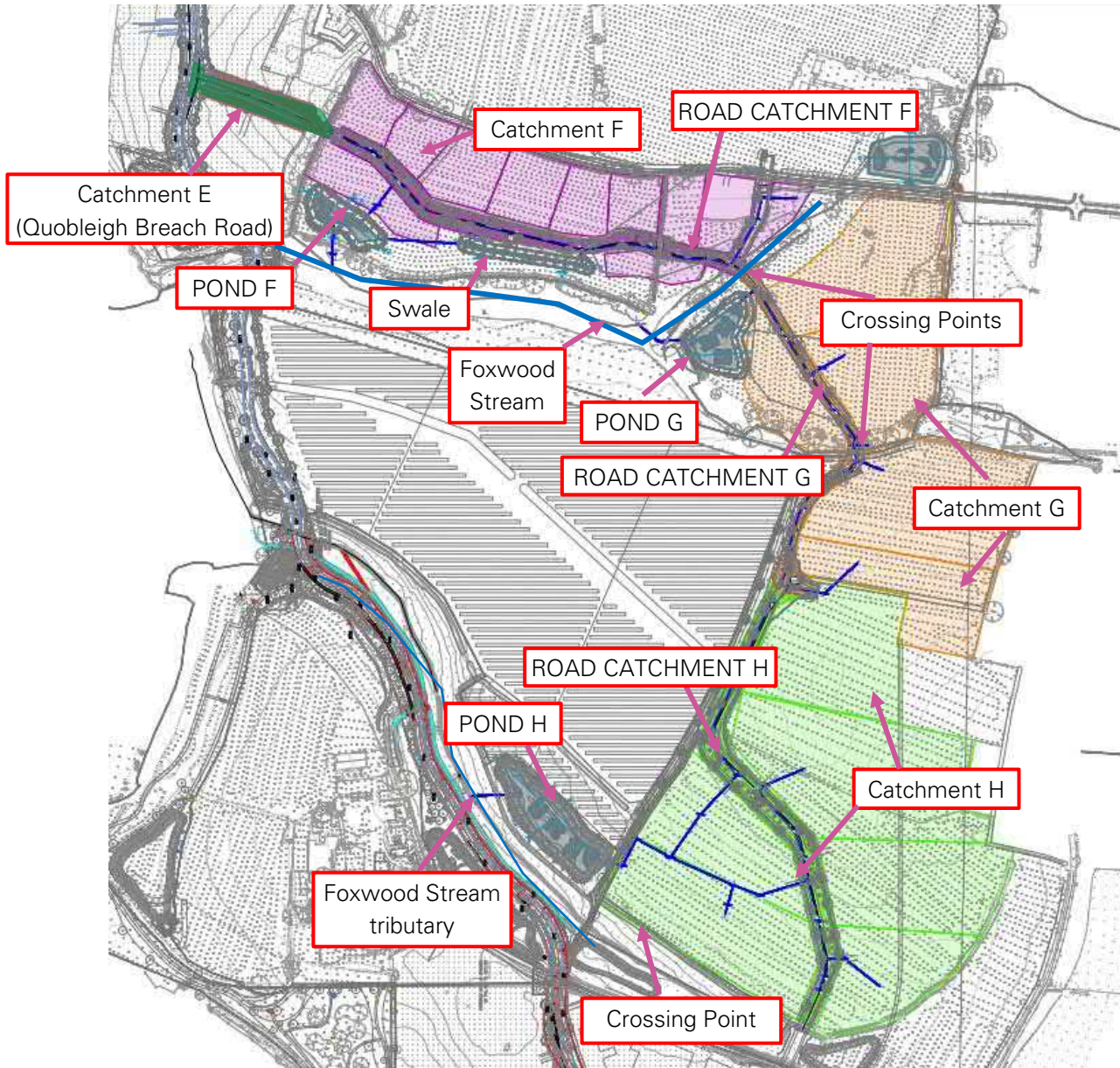


Figure 4: Location of catchments, ponds and swale

There are three watercourses crossing points within the extent of the spine road which have been taken into consideration during the hydraulic modelling.

Refer to Appendix C for overall plan with site plan.

Catchment F:

The catchment within F is divided into three catchments:

- Road catchments: 100% impermeable area- F_ROAD 1, 2, 3 & 4
- Assumed residential dwellings: 65% impermeable area- Catchment_F1, F2, F3, F4, F5, F6, F7, F8, F9, F10 & F11

Road catchments: 100% impermeable area:

The impermeable area for the road catchment F is 100%, 0.737ha. The surface water discharged from the road catchment, F_Road_1 is collected within the SuDs feature, Pond_F via manhole (MH_CF16). A petrol/oil inceptor is placed between the manhole (MH_CF18) and Pond_F to avoid any spillage and leakage into the pond and nearby watercourse.

The surface water collected from the road catchment, F_Road_2 is discharged into a swale via manhole (MH_CF12) whereas the surface water discharged from road catchment, F_Road_3 & F_Road_4 is also discharged into the swale via manhole (MH_CF9). A petrol/oil inceptor is placed between these manholes (MH_CF9 & MH_CF12) and swale to avoid any spillage and leakage into the pond and nearby watercourse.

Assumed residential dwellings: 65% impermeable area:

This catchment has an impermeable area of 65% of its total area (3.55ha). The surface water discharged from the catchment, catchment_F1, F2 & F10 is collected within the SuDs feature, Pond_F via manhole (MH_CF18). There are no hydro brakes placed within any of these catchments.

The surface water discharged from the catchment, Catchment_F3, F4 & F5 is discharged into the swale via manhole (MH_CF12). There is no hydrobrake within any of these catchments. Whereas the surface water discharged from catchment, Catchment_F6, F7, F8, F9 & F11 are discharged into swale via manhole (MH_CF9). However, the surface water discharged from the catchment, catchment_F9 is restricted to 1.0l/s at manhole (MH_CF1).

The surface water collected within the swale is discharged at the rate of 5.0l/s into the SuDs feature, POND_F which is then discharged into the nearby Foxwood Stream at the rate of 26.9l/s.

Catchment G:

The catchment within G is divided into three catchments:

- Road catchments: 100% impermeable area- G_ROAD 1 & 2
- Assumed local centres: 65% impermeable area- Catchment_G1, G2 & G3
- Assumed school building area: 50% impermeable area- Catchment_G4 & G5.

Road catchments: 100% impermeable area:

The impermeable area for the road catchment G is 100%, 0.493ha. The surface water discharged from the road catchment is collected within the Suds feature, Pond G via manhole (MH_CG35). A petrol/oil inceptor is placed between the manhole (MH_CG35) and pond G to avoid any spillage and leakage into the pond and nearby watercourse.

Assumed local centres: 65% impermeable area:

This catchment has an impermeable area of 65% of its total area (3.46ha). The surface water discharged from this catchment is collected within the Suds feature, Pond G via manholes (MH_CG35). A hydrobrake is placed within manhole (MH_CG33) and the flow from catchment Catchment_G2 is restricted to 7.70l/s.

Assumed school buildings 50% impermeable area:

This catchment has an impermeable area of 50% of its total area (3.01ha). The surface water discharged from the catchment_G4 is restricted to 25.37l/s at MH_CG29. Whereas the surface water discharged from the catchment_G5 is restricted to 15.01l/s at MH_CG19. The surface water collected from these catchments are discharged into the nearby suds feature, Pond_G via manhole (MH_CG35).

The surface water collected from nearby catchments within the Pond_G is discharged into the Foxwood Stream. The flow rate is restricted to 41.5l/s.

Catchment H:

The catchment within H is divided into three catchments:

- Road catchments: 100% impermeable area- H_ROAD 1, 2 & 3
- Assumed sports ground: 30% impermeable area- Catchment_H1
- Assumed residential dwellings: 65% impermeable area- Catchment_H2, H3, H4, H5 & H6

Road catchments: 100% impermeable area:

The impermeable area for the road catchment H is 100%, 0.923ha. The surface water discharged from the road catchment is collected within the Suds feature, Pond H via manholes. A petrol/oil inceptor is placed between the manhole (MH_CH50) and pond H to avoid any spillage and leakage into the pond and nearby watercourse.

Assume sports ground: 30% impermeable area:

This catchment has an impermeable area of 30% of its total area (1.54ha). The surface water discharged from this catchment is collected within the Suds feature, Pond H via manholes (MH_CH50). There are no hydro brakes placed within the catchments associated with 30% impermeable area.

Assumed Residential dwellings: 65% impermeable area:

This catchment has an impermeable area of 65% of its total area (7.83ha). The surface water discharged from the catchment_H2 is restricted to 18.25l/s at MH_CH36. Whereas the surface water discharged from the catchment_H4 is restricted to 7.73l/s at MH_CH41 and catchment catchment_H5 is restricted to 13.13l/s at MH_CH31. The surface water collected from these catchments are discharged into the nearby suds feature, Pond_H via manhole (MH_CH50).

The surface water collected from nearby catchments within the Pond_H is discharged into the Foxwood Stream. The flow rate is restricted to 70.8l/s.

Refer to appendix D & E for detailed drainage layout drawings and surface water calculations.

Catchment E:

The surface water discharged from the road catchment E will be collected via standard gully's and discharged via the surface water network built as part of the Road 3 network.

Bridleway Catchment:

The surface water from the proposed bridleway will discharge into the adjacent ditch that runs along the bridleway. Bridleway will be designed in line with Hampshire bridleway services standards.

SECTION 4

CONCLUSIONS

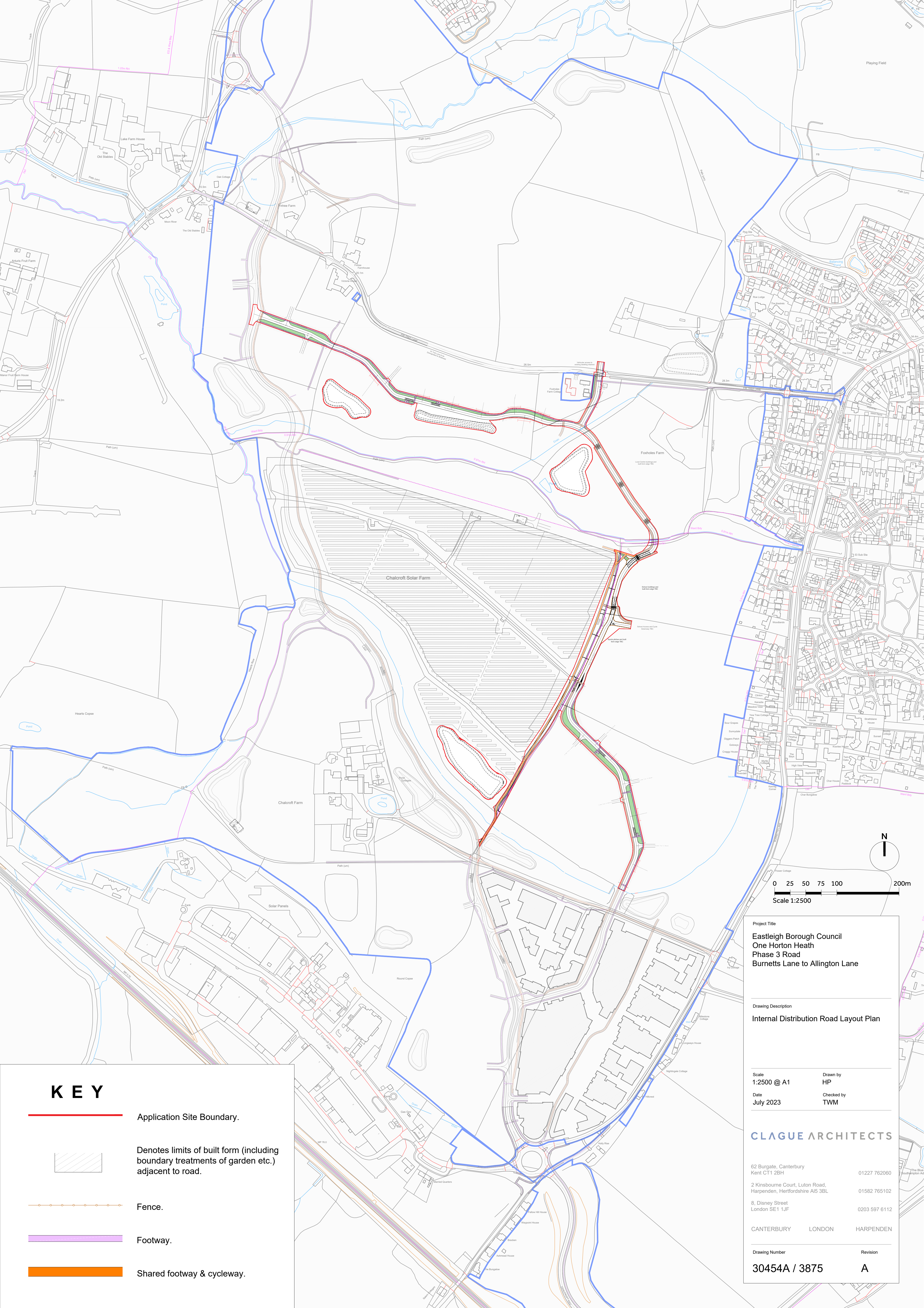
4. CONCLUSIONS

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. This application is for full planning consent due to the time for these negotiations to complete. Submitting details of the Secondary Infrastructure Road (SIR) as a full planning application will deliver the SIR 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 SIR.

- This report primarily focuses on the surface water strategy for the spine road.
- Surface Water generated from the proposed site will be managed in a sustainable manner in accordance with the guidance in the CIRIA SuDS Manual and at source as outlined within the accompanying drainage strategy drawings in Appendix C and Appendix D and in line with the strategy set out in the Outline planning application documents by PFA.
- There are three watercourse crossing points within the extent of the spine road which have been taken into consideration during the hydraulic modelling.
- The site is divided into three catchment areas, each catchment area has its own SuDs feature from which the surface water will be discharged into Foxwood Stream and its tributaries. Refer to appendix B for overall drainage layout.
- Catchment F, which consists of residential dwellings, has an impermeable area of 65% whereas the spine road that runs from east to west has an impermeable area of 100%. The surface water from this catchment is discharged into pond F via swale which is restricted to 5.0l/s.
- The surface water collected within pond F is discharged into Foxwood Stream at the rate of 26.9l/s.
- The catchment G, which consists of assumed local centre and school has an impermeable area of 65% and 50% respectively. Whereas the road catchment that runs north of catchment G towards south is 100% impermeable. The surface water from this catchment is discharged into pond G via manholes.
- The surface water collected within pond G is discharged into Foxwood Stream at the rate of 41.5l/s.
- The catchment H, which consists of assumed sports ground and residential dwellings has an impermeable area of 30% and 65% respectively. Whereas the spine road catchment which runs within catchment H is 100% impermeable. The surface water from this catchment is discharged into pond H via manholes.
- The surface water collected within pond H is discharged into Foxwood Stream at the rate of 70.8l/s.
- Additional hydrobrakes are added within the catchment F, G & H to restrict the flow within the catchment area as shown in Appendix C.
- Petrol/Oil inceptor are placed between the final manholes and SuDs features to treat the surface water prior to discharge to the nearby watercourse.

APPENDIX A

PROPOSED SITE PLAN



KEY

Application Site Boundary.

Denotes limits of built form (including boundary treatments of garden etc.) adjacent to road.

Fence.

Footway.

Shared footway & cycleway.

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

Drawing Description
Internal Distribution Road Layout Plan

Scale
1:2500 @ A1
Date
July 2023

Drawn by
HP
Checked by
TWM

CLAGUE ARCHITECTS

62 Burgate, Canterbury
Kent CT1 2BH
01227 762060
2 Kinsbourne Court, Luton Road,
Harpenden, Hertfordshire AL5 3BL
01582 765102
8, Disney Street
London SE1 1JF
0203 597 6112
CANTERBURY LONDON HARPENDEN

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30454A / 3875
Revision
A

APPENDIX B

OVERALL DRAINAGE LAYOUT