

**LAND TO THE REAR OF
No.3 HEATHERVIEW COTTAGES
COPTHORNE COMMON ROAD
COPTHORNE, CRAWLEY RH10 3LG**

**FLOOD RISK ASSESSMENT &
DRAINAGE STRATEGY**

Reference: 26-0474

Revision: Issue 1.0

Date: 13/10/2026

DRAINAGE

- Drainage Strategies
- S104 Drainage Design
- SUDS
- Flood Risk Assessments
- CSH SUR1

HIGHWAYS

- Transportation Assessments
- S38/278 Highway Design
- Junction Modelling
- Traffic & Parking Surveys
- Remedial Assessments

STRUCTURAL ENGINEERING

- All Structural Design
- Temporary Works
- Specialist Foundations
- Multi Storey & Basements
- RC Detailing

SPECIALIST SERVICES

- Site Assessments
- CDM 2015 Support
- TEKLA - Steelwork
Fabrication drawings
- Expert Witness

Document Control Sheet

Issue	Status	Prepared / Revised by	Verified By	Date
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1.0 Introduction

- 1.1 BdR has been appointed by Steadfast Homes Design Ltd (the Client) to undertake a Flood Risk Assessment and Drainage Strategy for the proposed residential development comprising 3 no. detached residential dwellings on Land to the rear of No.3 Heatherview Cottages, Copthorne Common Road, Copthorne, Crawley RH10 3LG .
- 1.2 This assessment has been prepared in accordance with the provisions of the National Planning Policy Framework (NPPF) August 2026, The National Standards For Sustainable Drainage Systems June 2025, Practice Guide, BS8582:2013 Code of Practice for Surface Water Management for Development Sites, BS 8533:2011 Assessing and Managing Flood Risk in Development Code of Practice, CIRIA C753 The SuDS Manual 2015 and West Sussex County Council's SuDS Design Guide – Water, People, Places, prepared by the Lead Local Flood Authorities [LLFA] of South East England.
- 1.3 The NPPF sets out the criteria for development and flood risk by stating that inappropriate development in areas at risk of flooding should be avoided by directing development away from areas at highest risk, but where development is necessary, making it safe without increasing flood risk elsewhere. The key definitions are:
- “Areas at risk of flooding” means land within Flood Zones 2 and 3; or land within Flood Zone 1 which has critical drainage problems, and which has been notified to the local planning authority by the Environment Agency;
 - “Flood risk” means risk from all sources of flooding - including from rivers and the sea, directly from rainfall on the ground surface and rising groundwater, overwhelmed sewers and drainage systems, and from reservoirs, canals and lakes and other artificial sources.
- 1.4 The objectives of this assessment are;
- Identify and assess the risks of all forms of flooding to and from the development.
 - Demonstrate how these flood risks will be managed so that the development and elsewhere remains safe throughout its lifetime, taking climate change into account.
 - Meeting the requirements of the key stakeholders.

2.0 Existing Site

2.1 Location

2.1.1 The site is located on the south east side of Copthorne Common Road, Copthorne, approximately 2km east of J10 of the M23 and sits outside of the defined settlement confines of Copthorne. The northern boundary adjoins the A264. The eastern, southern and western boundaries adjoin private garden / woodland. Access to the site is off the A264.

2.1.2 The site is centered at National Grid Reference 533102, 139137.

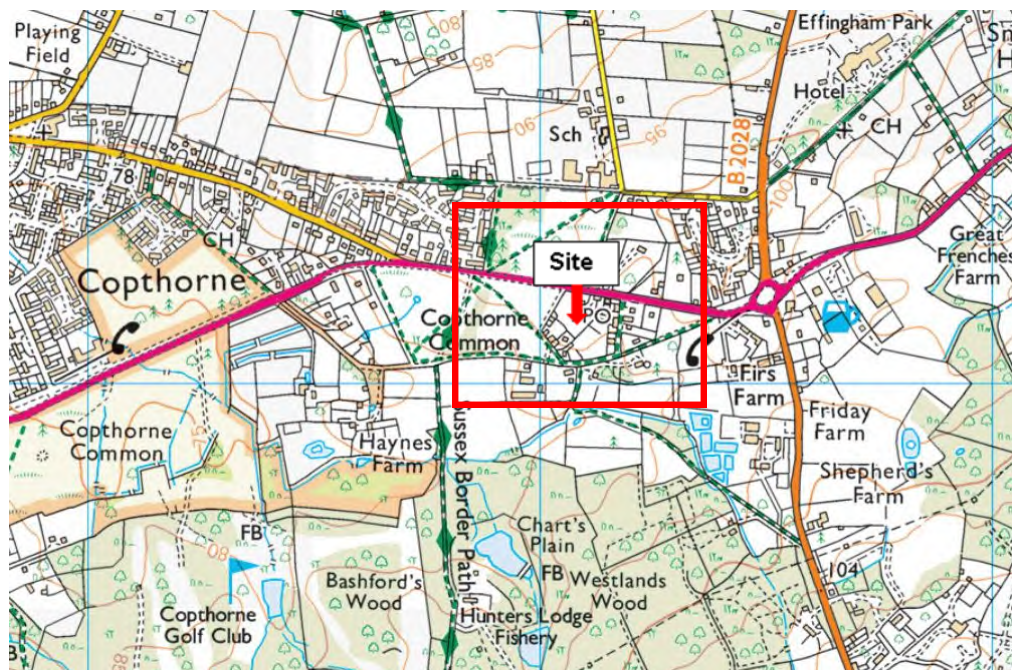


Fig.2.1 Site Identification



Fig 2.2 Aerial View

2.2 Existing Development

2.2.1 The site is a greenfield site currently used as a private garden / field.

2.2.2 The existing areas are;

- Total site area = 0.2195 ha
- Roof Areas = 0 ha
- External Hardstanding Areas = 0 ha
- Soft Landscaped Area = 0.2195 ha
- Site Impermeability = 0 %.

2.3 Topography

2.3.1 The site slopes gently to the south. Levels range between 93.78m above ordnance datum [AOD] in the north end to 91.59m AOD in the far south east corner. Average gradient is approximately 1 in 44.

2.3.2 A copy of the topographical survey is included in Appendix 1.

2.4 Geology

2.4.1 No intrusive Geotechnical Investigation has been undertaken to date. Reference to the British Geological Survey (BGS) Map indicates the site to be underlain by Upper Tunbridge Wells Sand - Sandstone and siltstone, interbedded - Sedimentary Bedrock.

2.5 Soils

2.5.1 Soil type provides a generic description of the drainage characteristics of the soil i.e. susceptibility to water logging or capacity of soil to freely drain. Reference to the Land Information System [LandIS] Soils Scapes Viewer describes the soils in this area as "slightly acid loamy and clayey soils with impeded drainage".

2.6 Hydrology

2.6.1 The nearest water feature is an unnamed stream approximately 175m to the south.

2.7 Hydrogeology

2.7.1 The Department of Food & Rural Affairs [DEFRA] Multi-Agency Geographic Information for the Countryside [MAGIC] map indicates the site is not within a Source Protection Zone.

2.7.2 The Aquifer Map – Superficial & Bedrock designation indicates a Secondary A Aquifer (Bedrock) underlying the site. Secondary A Aquifers are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

2.7.3 Extracts from the BGS, LandIS & MAGIC websites are included within Appendix 2.

2.8 **Surface Water Site Drainage**

2.8.1 The site is a greenfield site and surface water drainage is via natural infiltration / evaporation / evapotranspiration and natural runoff.

2.9 **Foul Water Site Drainage**

2.9.1 There is a 100 dia. gravity foul sewer crossing the site.

2.10 **Public Sewerage Network**

2.10.1 The sewer records show the following public sewers close to the site;

- Unknown dia. foul water sewer approximately 0.9m deep heading west within Copthorne Common Road.
- 225mm dia. foul water sewer approximately 2.8m deep heading west within Pembley Green.
- 375mm dia. foul water sewer approximately 1.1m deep heading west within Pembley Green.

2.10.2 It should be noted that whilst the sewer records show the Sewerage Company's recorded assets, there may be other adopted sewers in the vicinity which are not shown on the records. These assets were automatically transferred to the Sewerage Company in October 2014 as part of the first phase of sewer asset transfers.

2.10.3 A copy of the sewer record is included in Appendix 2.

3.0 Proposed Development

3.1 The proposed development comprises 3 no. detached residential dwellings with associated access drive, parking and landscaped areas.

3.1.1 The proposed development areas are;

- Total site area = 0.2195 ha
- Roof Area = 0.0370 ha
- External Hardstanding Areas = 0.0640 ha
- Soft Landscaped areas = 0.1185 ha
- Site Impermeability = 46%.

3.1.2 Details of the proposed development are included in Appendix 3.

3.2 Vulnerability Classification

3.2.1 The development is classed as residential. The Vulnerability Classification in accordance with Annex 3 of the NPPF is 'More Vulnerable'.

3.3 Sequential Test

3.3.1 As set out in the NPPF, the aim of the Sequential Test is to steer new development to areas with the lowest probability of flooding. The flood zones are the starting point for this sequential approach. Zones 2 and 3 are shown on the Environment Agency flood map with Flood Zone 1 being all the land falling outside Zones 2 and 3. These flood zones refer to the probability of flooding from any source, ignoring the presence of existing defenses.

Zone 1 – Low Probability

This Zone comprises land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).

Zone 2 – Medium Probability

This Zone comprises land assessed as having between a 1 in 100 and 1 in 1,000 annual probability of river flooding (1%-0.1%) or between a 1 in 200 and 1 in 1,000 annual probability of sea flooding (0.5%-0.1%) in any year.

Zone 3a – High Probability

This Zone comprises land assessed as having a 1 in 100 or greater annual probability of river flooding (>1%) or a 1 in 200 or greater annual probability of flooding from the sea (0.5%) in any year.

Zone 3b – The Functional Floodplain

This Zone comprises land where water has to flow or be stored in times of flood. Generally, this is land which would flood with a annual probability of 1 in 20 (5%) or greater in any year, or is designed to flood in an extreme (0.1%) flood.

- 3.3.2 Reference to the EA Flood Map for Planning indicates the site is located in Zone 1 – Low Probability. In accordance with Table 3 of the Technical Guidance to the NPPF (August 2022) all development in Flood Zone 1 is appropriate.

Flood Zones	Flood Risk Vulnerability Classification				
	Essential Infrastructure	Highly Vulnerable	More Vulnerable	Less Vulnerable	Water Comparable
Zone 1	✓	✓	✓	✓	✓
Zone 2	✓	Exception Test Required	✓	✓	✓
Zone 3a	Exception Test Required	✗	Exception Test Required	✓	✓
Zone 3b	Exception Test Required	✗	✗	✗	✓

Table 3.1: Flood Risk Vulnerability and Flood Zone ‘Compatibility’

4.0 Climate Change

- 4.1 The EA published updated guidance on climate change allowances on the 10th May 2022. Table 4.1 below shows the updated allowances. The predicted flood levels and surface water management strategy for the proposed development takes account potential increases in rainfall intensities and flood flows/levels predicted to occur in the future over the lifetime of the development.

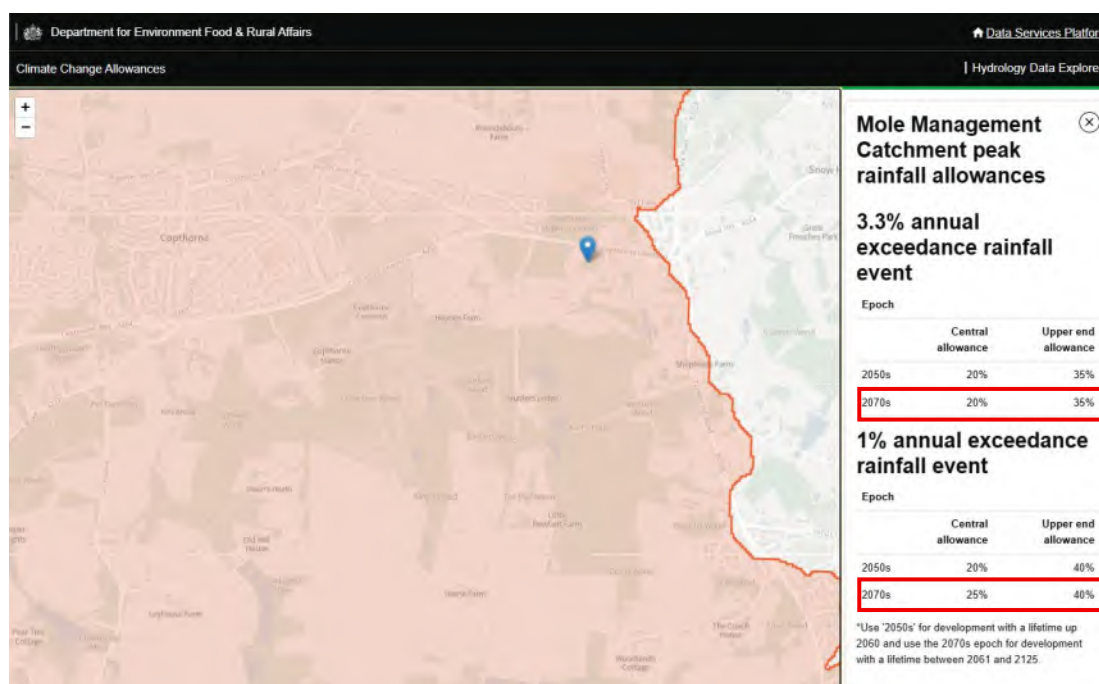


Table 4.1: Peak Rainfall Allowances

5.0 Flood Risk

5.1 Potential Sources of Flooding

5.1.1 The main sources of flooding which could potentially affect the development site are listed below. An assessment of how these forms of flooding may affect the site and details on how they will be managed safely within the development proposal are also considered.

5.1.2 The main sources of flooding and the level of risk associated with each are;

- | | |
|---|------------|
| ➤ Flooding from Rivers [Fluvial] | - None |
| ➤ Flooding from the Sea [Tidal] | - None |
| ➤ Flooding from Land [Surface Water] | - None |
| ➤ Flooding from Groundwater | - None |
| ➤ Flooding from Sewers | - None |
| ➤ Flooding from Other Artificial Sources [Infrastructure] | - Unlikely |

5.2 Flooding from Rivers [Fluvial]

5.2.1 The site is located within Flood Zone 1 – Low Probability There is consequently no risk of flooding from rivers.

5.3 Flooding from the Sea [Tidal]

5.3.1 The site is located within Flood Zone 1 – Low Probability There is consequently no risk of flooding from the sea.

5.4 Flooding from Land [Surface Water]

5.4.1 Surface water flooding is the term used to describe flooding which occurs when intense, often short duration rainfall is unable to soak into the ground or to enter drainage systems and therefore runs over the land surface causing flooding. It is most likely to occur when soils are saturated and unable to infiltrate any additional water or in urban areas where buildings tarmac and concrete prevent water soaking into the ground. The excess water can pond (collect) in low points and result in the development of flow pathways often along roads but also through built up areas and open spaces. This type of flooding is usually short lived and associated with heavy downpours of rain.

5.4.2 There are four levels of surface water flood risk;

Very Low Risk

Each year, the area has a chance of flooding of less than 1 in 1000 (0.1%).

Low Risk

Each year, the area has a chance of flooding of between 1 in 1000 (0.1%) and 1 in 100 (1%).

Medium Risk

Each year, the area has a chance of flooding of between 1 in 100 (1%) and 1 in 30 (3.3%).

High Risk

Each year, the area has a chance of flooding of greater than 1 in 30 (3.3%).

- 5.4.3 Reference to the Governments Long Term Flood Risk Map for Surface Water shows the site is at no risk of surface water flooding

5.5 Flooding from Groundwater

- 5.5.1 Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low-lying areas underlain by permeable rocks (aquifers). Water levels below the ground rise during the wet winter months and fall again in the summer as water flows out into rivers. In very wet winters, rising groundwater levels may lead to flooding of normally dry land, as well as reactivating flow in “bournes” (streams that only flow for part of the time). Groundwater floods tend to be long in duration developing over weeks or months and prevailing for days or weeks.

- 5.5.2 Reference to the Governments Long Term Flood Risk Map for Surface Water shows the risk of flooding from groundwater is unlikely in this area.

5.6 Flooding from Sewers

- 5.6.1 In urban areas, rainwater is frequently drained into surface water sewers or sewers containing both surface water and wastewater known as combined sewers. Flooding can result when the sewer is overwhelmed by heavy rainfall, becomes blocked or is of inadequate capacity and will continue until the water drains away.
- 5.6.2 Reference to the Mid Sussex County Council SFRA indicates there have been no reported incidents of foul or surface water flooding in the immediate area. Due to the local topography the risk of flooding from sewers is considered very low.

5.7 Flooding from Artificial Sources

- 5.7.1 Non-natural or artificial sources of flooding can include reservoirs, canals and lakes where water is retained above natural ground level, operation and redundant industrial processes including mining, quarrying and sand and gravel extraction, as they may increase floodwater depths and velocities in adjacent areas.
- 5.7.2 Reference to the Governments Long Term Flood Risk Map for Surface Water shows the risk of flooding from artificial sources is unlikely in this area.

6.0 Flood Risk Management

- 6.1 In view of the inherent uncertainties in predicting flooding from surface water and sewers the following flood risk management measures are proposed to safeguard the development and to ensure no increase in flood risk to surrounding areas;
- Ground floor finished floor levels will be set a minimum 150mm above existing ground levels.
 - On-site surface water drainage design will meet the design standards required of Approved Document H of the Building Regulations, The National Standards For Sustainable Drainage Systems June 2025 and best practice guidance given in C753 the SUDS Manual 2015.

7.0 Off-Site Impacts

- 7.1 The proposed development will have no impact on flood risk elsewhere.
- 7.2 Refer to Section 10.0 and 11.0 for details of the proposed drainage strategy for the development.

8.0 Residual Risks

- 8.1 Flooding as a result of extreme storm events which overwhelm on-site/off site drainage systems is the only residual risks which could result in flooding on the development site.

9.0 Access & Egress

- 9.1 A safe dry access route is available to and from the site during the 100 year event.

10.0 Proposed Surface Water Drainage

10.1 Runoff Rates & Volumes

10.1.1 The peak surface water runoff rates and volumes generated for the pre and post development conditions have been calculated using the Causeway Flow design and analysis suite for a variety of storm events of critical duration including for a 40% increase in rainfall intensity to account for climate change in line with EA guidance.

10.1.2 The method currently adopted for determining greenfield runoff rates for sites between 0-50 ha is the Institute of Hydrology Report 124 'Flood Estimation for Small Catchments'. This determines the mean annual flood flow for Greenfield sites (Qbar). Greenfield peak flow rates for other probabilities can be estimated using the appropriate growth curve contained in the Flood Studies Supplementary Report (FSSR) 14.

10.1.3 The runoff volume for the 100 year storm has been calculated based on a 6 hour event in line with CIRIA C753 The SuDS Manual 2015 guidance and BS8582:2013 Code of Practice for Surface Water Management for Development Sites. A summary of the results is given in the table below;

RP (Years)	Pre Dev [Greenfield] Rate (l/s)	Post Dev (l/s) (no mitigation)	Pre Dev [Greenfield] Vol (m ³)	Post Dev Vol (m ³) (no mitigation)
1	0.8	11.8		
Qbar (2yr)	0.9	18		
30	2.3	63.5		
100	3.0	83.7	75	96.3

Table 10.1

10.1.4 Copies of the Causeway Flow results are included in Appendix 4.

10.2 Surface Water Management

10.2.1 The surface water drainage arrangements for any development site need to be such that the peak flow rates and volumes of surface water leaving the developed site are no greater than the rates and volumes prior to the proposed development. Runoff rates and volumes should also be reduced wherever possible using infiltration and attenuation techniques.

10.2.2 The NPPF requires the use of Sustainable Drainage Systems (SuDS) on all new developments wherever possible. This requirement is supported by Building Regulations Part H and The National Standards For Sustainable Drainage Systems June 2025, which sets out a hierarchy for surface water disposal listed in order of priority;

- Collected for non-portable use.

- An infiltration system, or where that is not reasonably practicable,
- A watercourse, or where that is not reasonably practicable,
- A surface water sewer or where that is not reasonably practicable,
- A combined sewer.

10.2.3 From the figures shown in Table 10.1 it can be seen that the proposed development will significantly increase peak flow rates and runoff volumes for the 1, Qbar, 30 and 100 year events if no surface water management is incorporated.

10.3 Sustainable Drainage Systems

10.3.1 SuDS are a varied collection of techniques designed to manage storm water in a sustainable manner. SuDS achieve this by seeking to manage surface water from new developments as close to its source as possible and by mimicking the surface water flow regime present on the site prior to development. The key objectives of SuDS are;

- To minimise the impacts from the development on the quantity of runoff.
- To minimise the impacts from the development on the quality of runoff.
- Maximise amenity and biodiversity opportunities.

10.3.2 There are several processes that can be used to manage and control the runoff from development areas. These can be defined as;

- Water harvesting – This is the direct capture and use of runoff on site.
- Infiltration – This is the soaking of water into the ground.
- Detention/attenuation – Detention or attenuation is the slowing down of surface water flows before transfer downstream.
- Conveyance – This is the transfer of surface water runoff from one place to another.

10.3.3 The effectiveness of SuDS utilising infiltration relies on the suitability of the underlying soils to receive and disperse the runoff rates. Reference to the British Geological Survey (BGS) Map indicates the site to be underlain by Upper Tunbridge Wells Sand - Sandstone and siltstone, interbedded - Sedimentary Bedrock. This geology may be suitable for incorporating infiltration SuDS subject to satisfactory BRE DG365 soakage test results.

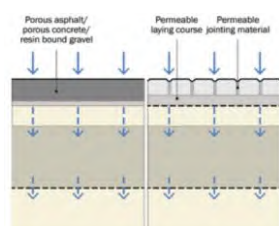
10.3.4 For the purposes of this drainage strategy a conservative infiltration rate of 3×10^{-6} m/s has been adopted. BRE DG365 soakage tests will be undertaken at the start of the detail design stage and compared to the assumed rate with the necessary adjustments made.

10.3.5 SuDS techniques which are considered appropriate for this development are listed below. An operation and maintenance sheet for each SuDS component is included in Appendix 5.

SuDS Component	Area Served
Rainwater Harvesting - Basic	Roofs

Rainwater Harvesting - Complex	Roofs
Rain Gardens / Planters	Roofs
Pervious Pavement – Type A (Full Infiltration)	Roads / Private Drives / Parking Areas
Soakaway	Roofs

Table 10.2

SUDS Component	Description	Examples
Rainwater Harvesting - Basic	Includes simple water butts	
Rainwater Harvesting - Complex	High capacity rainwater harvesting where runoff from roof areas is captured and stored for reuse in the garden or within the property.	
Rain Gardens / Planters	A planted basin designed to collect and clean runoff.	 
Pervious Pavement – Type A – Full Infiltration	Pervious surfaces allow rainwater to infiltrate through the surface into an underlying storage layer, where water is stored before infiltration to the ground, reuse, or release to surface water	

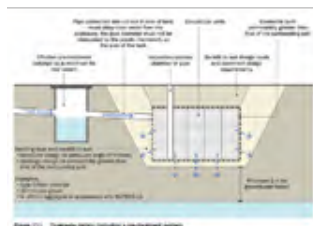
Soakaway	Infiltration devices temporarily store runoff from a development and allow it to percolate into the ground	
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Table 10.3

- 10.3.6 The following SuDS techniques were considered for this development but have been discounted for the following reasons;

SuDS Component	Reasons for not implementing
Green roofs	Traditional pitched roof construction.
Blue roofs	Traditional pitched roof construction.
Swales	Insufficient space.
Infiltration Basin	Insufficient space.
Filter Strip	Insufficient space.
Pond	Insufficient space.
Detention Basin	Insufficient space.
Bio-Retention	Insufficient space.

Table 10.4

- 10.3.7 SuDS components will be designed in accordance with CIRIA C753 The SuDS Manual 2015.
- 10.3.8 Detailed Causeway Flow SuDS analysis has been undertaken to determine the size of the proposed SuDS components for the 1 in 100 year return period event including an allowance of 40% for climate change in line with NPPF.
- 10.3.9 The volume of on-site storage resulting from the 100 year event + 40% CC can be accommodated within the following SuDS components;

SuDS Component	Size
Plot Soakaways	2 no. Geocellular structures 7.5m x 2m x 1.6m effective depth 1 no. Geocellular structures 16m x 4m x 1.6m effective depth
Pervious Pavement Type A – Full Infiltration	80 block\50 laying course\200mm Type 4/20 OGCR Sub-base [based on a CBR 5%].

Table 10.5

- 10.3.10 Surface Water runoff from roofs will discharge to rainwater harvesting tanks / rain gardens which will overflow to the soakaways. Runoff from the shared access drives / private drives will infiltrate through the permeable pavements.
- 10.3.11 A 10% urban creep uplift factor has been applied to the impermeable area within the property curtilages.
- 10.3.12 Copies of the SuDS hydraulic analysis are included in Appendix 5.
- 10.3.13 A Conceptual Drainage Layout is included in Appendix 6.

10.4 Water Quality Management

- 10.4.1 Managing the quality of surface water runoff so that receiving surface waters and / or groundwater are protected is strongly linked to the hydraulic control of runoff. The risk posed by surface water runoff to groundwater is often low because of the protection afforded by the layers of unsaturated soils that lie between the infiltration surface and the groundwater receptor. The risk posed is a function of;

- The pollution hazard at a particular site (i.e the pollutant source)
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels, and / or the effectiveness of underlying soil layers in protecting the receiving groundwater (i.e the pollutant pathway)
- The sensitivity of the receiving environment (i.e the environmental receptor)

The effect of the proposed development on local water quality has been assessed using the simple qualitative method as set out in Ciria Report C753 The SuDS Manual 2015 (Chapter 26).

Box 26.2. Steps of the Simple Index Approach

Step 1	Allocate suitable pollution hazard indices for the proposed land use
Step 2	Select SuDS with a total pollution mitigation index that equals or exceeds the pollution hazard index
Step 3	Where the discharge is to protected ¹ surface waters or groundwater, consider the need for more precautionary approach

¹ Designated as those for the supply drinking water (table 4.3)

Table 10.6 - Extract from CIRIA Report C753 – Steps of the simple index approach.

TABLE 26.2. Pollution Hazard Indices for Different Land Use Classifications

Land Use	Pollution Hazard Level	Total Suspended Solids (TSS)	Metals	Hydro-carbons
Residential Roofs	Very Low	0.2	0.2	0.05
Other Roofs (Typically Commercial/Industrial Roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for	0.05

			metals to leach from the roof)	
Individual Property Driveways, Residential Car Parks, Low Traffic Roads (eg Cul de Sac, Homezones and General Access Roads) and Non-residential Car Parking with Infrequent Change (eg Schools) ie<300 Traffic Movements/Day	Low	0.5	0.4	0.4

Table 10.7 - Extract from CIRIA Report C753 – Pollution hazard indices for different land use classifications.

TABLE 26.4. Indicative SuDS Mitigation Indices for Discharges to Groundwater

Characteristics of the Materials Overlaying the Proposed Infiltration Surface, through which the Runoff Percolates¹	TSS	Metals	Hydro-carbons
A Layer of Dense Vegetation Underlain by a Soil with Good Contaminant Attenuation Potential² of at Least 300 mm in Depth³	0.6 ⁴	0.5	0.6
A Soil with Good Contaminant Attenuation Potential² of at Least 300 mm in Depth³	0.4 ⁴	0.3	0.3
Infiltration Trench (Where a Suitable Depth of Infiltration Material is Included that Provides Treatment, ie Graded Gravel with Sufficient Smaller Particles but not Single Coarse Aggregate such as 20 mm Gravel) Underlain by a Soil with Good Contaminant Attenuation Potential² of at Least 300 mm in Depth³	0.4 ⁴	0.4	0.4
Constructed Permeable Pavement (Where a Suitable Filtration Layer is Included that Provides Treatment, and Including a Geotextile at the Base Separating the Foundation from the Subgrade) Underlain by a soil with Good Contaminant Attenuation Potential² of at least 300 mm in Depth³	0.7	0.6	0.7
Bioretention Underlain by a Soil with Good Contaminant Attenuation Potential² of at Least 300 mm in Depth³	0.8 ⁴	0.8	0.8
Proprietary Treatment Systems ^{5,6}	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area.		

Table 10.8 - Extract from CIRIA Report C753 – Indicative SuDS mitigation indices for discharge to groundwater

- 10.4.2 Based on the incorporation of permeable paving it can be seen that the total pollution mitigation index for this SuDS component exceeds the pollution hazard index from access

road / private parking areas.

10.5 Management of Runoff from Construction

- 10.5.1 During the stages of site preparation, earthworks, and construction there is the potential for contaminants and/or suspended sediments in surface water runoff entering the surrounding watercourses and existing drainage.
- 10.5.2 The extent of sediment/contaminant runoff will vary across the construction cycle, and a strategy should be developed to encompass potential pollution from all stages of construction.
- 10.5.3 A strategy for managing surface water runoff during the construction phase, including specific measures tailored to the level of risk at the site should be developed and agreed with West Sussex County Council during the detailed design and should be implemented prior to the commencement of any enabling and/or construction works onsite.
- 10.5.4 The strategy should include details of how during the earthworks and site preparation stages the contracting engineer will employ the approaches outlined in CIRIA C532 Control of Water Pollution from Construction Sites. This will require a proper understanding of the sensitivity of the downstream watercourses in terms of existing water quality and the potential impact of change. It is expected potential mitigation measures will include;
- Avoiding mass overburden stripping at the site; exposing only that part of the site essential for operation.
 - Placing silt fences of geo-fabric or similar material around open or exposed ground and stockpiles.
 - Re-seeding any exposed ground and stockpiles to stabilise the ground and reduce erosion and gullyng of such features.

10.6 Private & Adopted Sewers

- 10.6.1 Private surface water drainage will be designed in accordance with BS EN 752:2008 'Drain & Sewer Systems Outside Buildings' and Building Regulations Part H.
- 10.6.2 There are no on-site surface water networks being offered for adoption.
- 10.6.3 A Conceptual Drainage Layout is included in Appendix 6.

10.7 Exceedance Flood Routing

- 10.7.1 During extreme rainfall events i.e (in excess of the 1 in 100 year event plus climate change) when the design performance criteria for the drainage system is likely to be exceeded, the surface water drainage network capacity may become overwhelmed resulting in surface flooding and overland flows. These flood flows are referred to as exceedance flows. Flooding of properties can occur if these flows are not managed or controlled effectively.

-
- 10.7.2 An assessment of the exceedance flood routes has been undertaken and in the event of overland flood flows occurring, these will be routed away from the proposed dwellings and directed towards the southern boundary.
- 10.7.3 The exceedance flood routes are shown on the Conceptual Drainage Layout included in Appendix 6.

11.0 Proposed Foul Water Drainage

11.1 Flow Rates

- 11.1.1 Foul flows from the development site have been calculated based on the hydraulic design requirements set out in the current national design and construction guidance document November 2023.

Development Type	No. of units	Peak Loading (l/unit/day)	Peak Flow (l/s)
Residential	3	4000	0.14
Total	3		0.14

Table 11.1

11.2 Private & Adopted Systems

- 11.2.1 Private foul water drainage will be designed in accordance with BS EN 752:2008 'Drain & Sewer Systems Outside Buildings' and Building Regulations Part H.
- 11.2.2 There are no on-site foul water networks being offered for adoption.
- 11.2.3 Foul water from the proposed development will connect by gravity to the existing foul sewer crossing the site.
- 11.2.4 An application under Section 106 of the WIA 1991 – Connection to Public Sewer, will be submitted to Southern Water prior to works commencing.
- 11.2.5 A Conceptual Drainage Layout is included in Appendix 6.

12.0 Operation and Maintenance

- 12.1 The operation and maintenance of the development's drainage infrastructure needs to be agreed with the various parties early in the planning and design stage to ensure all elements of the system work effectively to achieve the design standards over the lifetime of the development. The following stakeholders are considered most appropriate to undertake this task;

System	Responsibility
Private Foul/SW drains within plots	Property Owner
Private SuDS systems within plots	Property Owner
Private Foul/SW sewers	Management Company
Private SuDS systems [shared]	Management Company

Table12.1

- 12.2 The Management Company will receive annual contributions from all Owners / Tenants for maintenance of private foul and surface water drainage systems, including SuDS. A part of these contributions will go towards a "sinking fund" for future works.
- 12.3 SuDS operational and maintenance requirements are included in Appendix 5.

13.0 Conclusions

- 13.1 This Flood Risk Assessment and Drainage Strategy has concluded the following;
- The site lies within Flood Zone 1 – Low Probability.
 - There is no risk of flooding from other sources.
 - Surface water runoff from the proposed development will be managed utilising SuDS infiltration techniques to reduce runoff rates and volumes.
 - Foul water will connect by gravity to the existing foul sewer crossing the site.
 - The development does not increase flood risk either on site or elsewhere.
 - The drainage strategy meets with the Government, County Council and District Council's Policy Objectives concerning development and flood risk within its district.
- 13.2 The flood risk assessment and drainage strategy has established that appropriate surface water management arrangements can be incorporated within the proposed development such that there will be no increase in flood risk either on or off site for a range of storm events up to the 1 in 100 year event (1% annual probability) including an allowance of 40% for climate change. The proposals are consistent with the Government's National Planning Policy Framework and it has been demonstrated that the occupants and buildings will remain safe for the lifetime of the development.

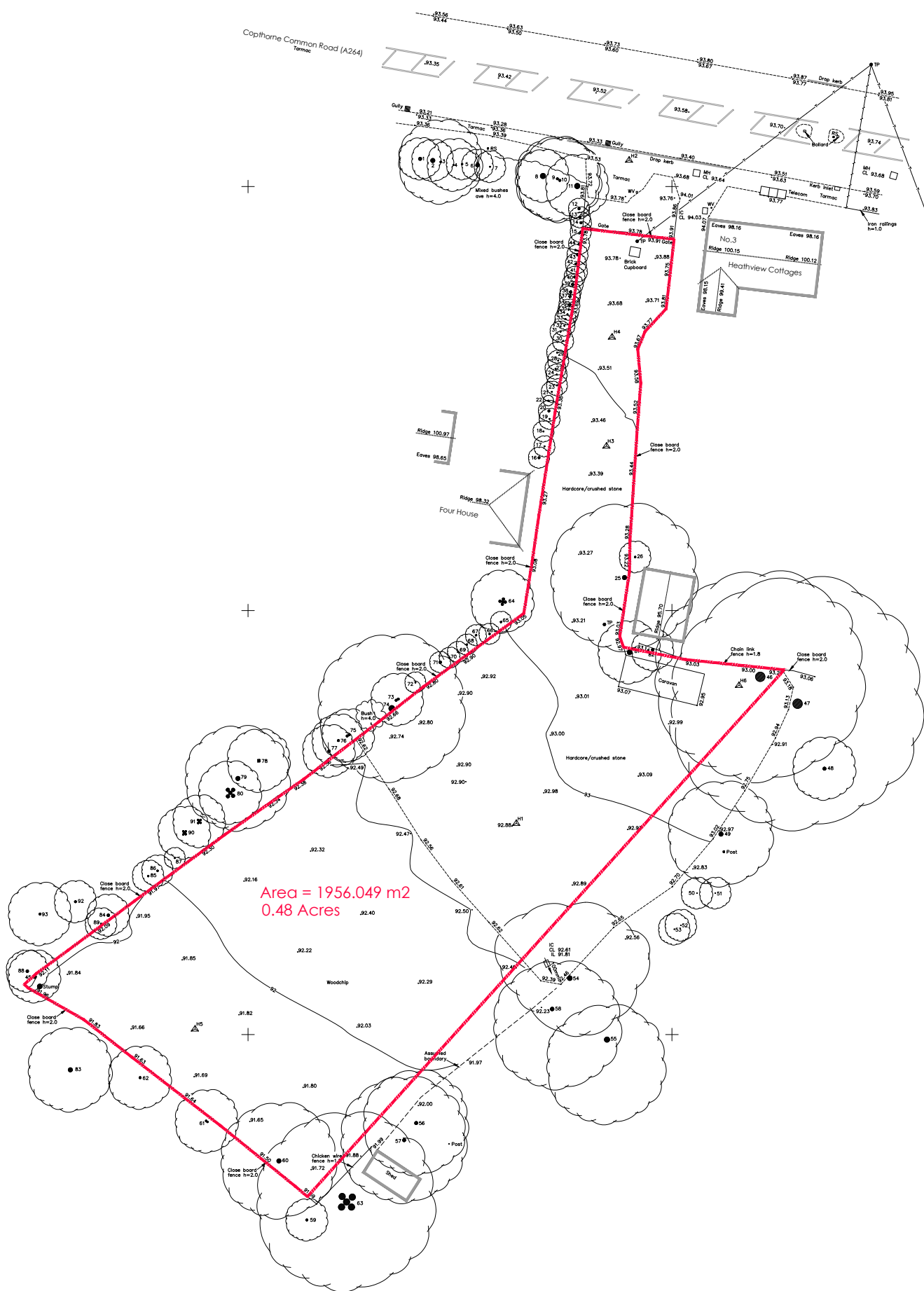
Appendix 1

Topographical Survey

1392200mN

1391900mN

1391200mN

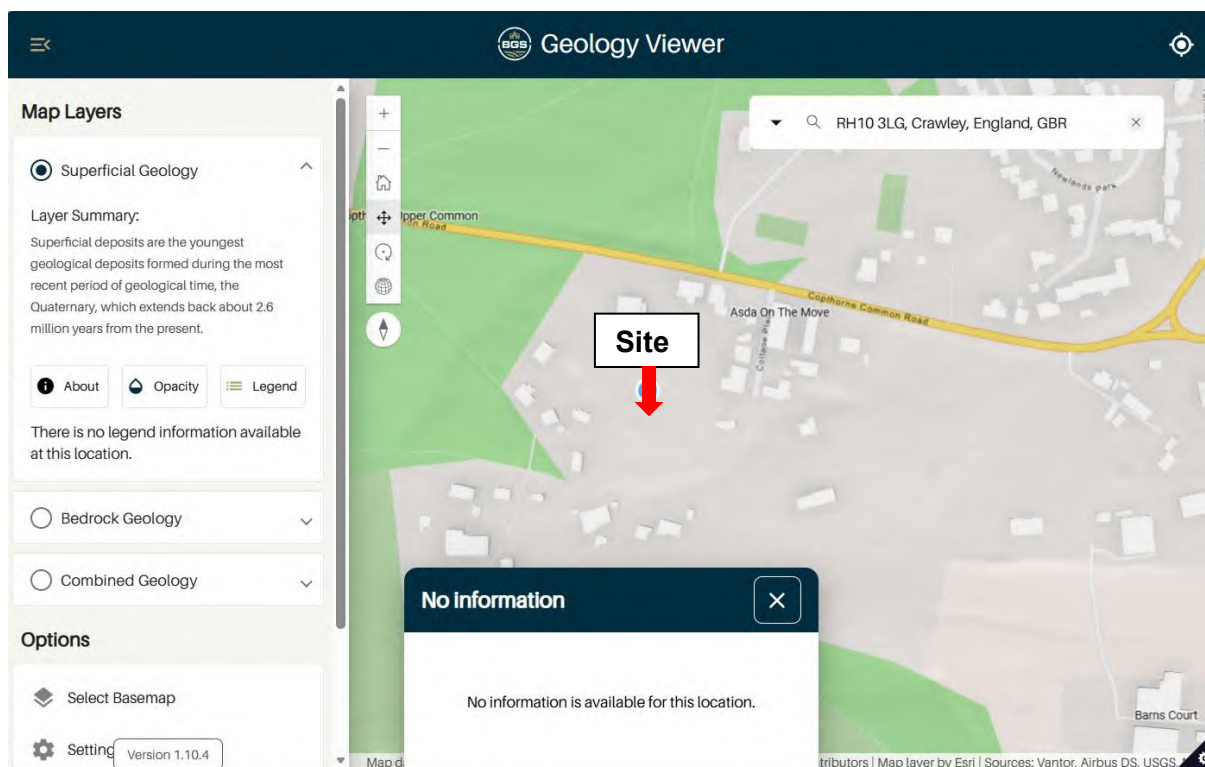


Tree Schedule			
		d=	h=
1	Maple	0.3	5
2	Hawthorn	multibole	7
3	Maple	0.15	10
4	Hawthorn	0.1	6
5	Holly	multibole	5
6	Hawthorn	multibole	5
7	Hawthorn	0.1	4
8	Hawthorn	multibole	6
9	Maple	0.2	10
10	Maple	0.2	10
11	Hawthorn	multibole	8
12	Yew	0.2	4
13	Yew	0.2	4
14	Yew	0.2	4
15	Yew	0.2	4
16	Yew	0.2	4
17	Yew	0.1	4
18	Yew	0.1	4
19	Yew	0.1	4
20	Yew	0.2	4
21	Yew	0.1	4
22	Yew	0.1	3
23	Yew	0.1	4
24	Yew	0.1	4
25	Maple	0.4	13
26	Laurel	0.15	3
27	Yew	0.1	4
28	Yew	0.1	4
29	Yew	0.1	4
30	Yew	0.1	4
31	Yew	0.1	4
32	Yew	0.1	4
33	Yew	0.1	4
34	Yew	0.1	4
35	Yew	0.1	4
36	Yew	multibole	5
37	Yew	multibole	5
38	Yew	multibole	5
39	Yew	multibole	5
40	Yew	0.2	5
41	Yew	multibole	5
42	Yew	multibole	5
43	Yew	multibole	5
44	Yew	multibole	5
45	Cypress	0.35	13
46	Oak	0.9	18
47	Oak	0.9	18
48	Laurel	0.3	5
49	Oak	0.4	10
50	Maple	0.05	8
51	Maple	0.05	8
52	Maple	0.05	8
53	Maple	0.05	8
54	Maple	0.45	12
55	Fir	0.5	13
56	Maple	0.3	12
57	Maple	0.3	12
58	Maple	0.35	12
59	Holly	0.2	5
60	Cypress	0.4	10
61	Laurel	0.3	5
62	Unknown	0.2	5
63	Lime	multibole	18
64	Laurel	multibole	6
65	Yew	multibole	4
66	Yew	multibole	4
67	Yew	multibole	4
68	Yew	multibole	4
69	Yew	0.1	3
70	Yew	0.1	3
71	Yew	0.25	4
72	Unknown	0.1	3
73	Cypress	2x0.2	12
74	Eucalyptus	0.55	18
75	Cypress	2x0.2	12
76	Cypress	0.2	12
77	Cypress	0.25	12
78	Hazel	multibole	5
79	Oak	0.4	10
80	Laurel	multibole	6
81	Cypress	0.45	12
82	Holly	0.25	7
83	Yew	0.4	10
84	Cypress	0.25	10
85	Yew	0.15	5
86	Yew	0.15	5
87	Laurel	0.1	4
88	Cypress	0.25	8
89	Laurel	0.1	4
90	Laurel	multibole	8
91	Laurel	multibole	8
92	Unknown	0.2	12
93	Silver birch	0.2	15

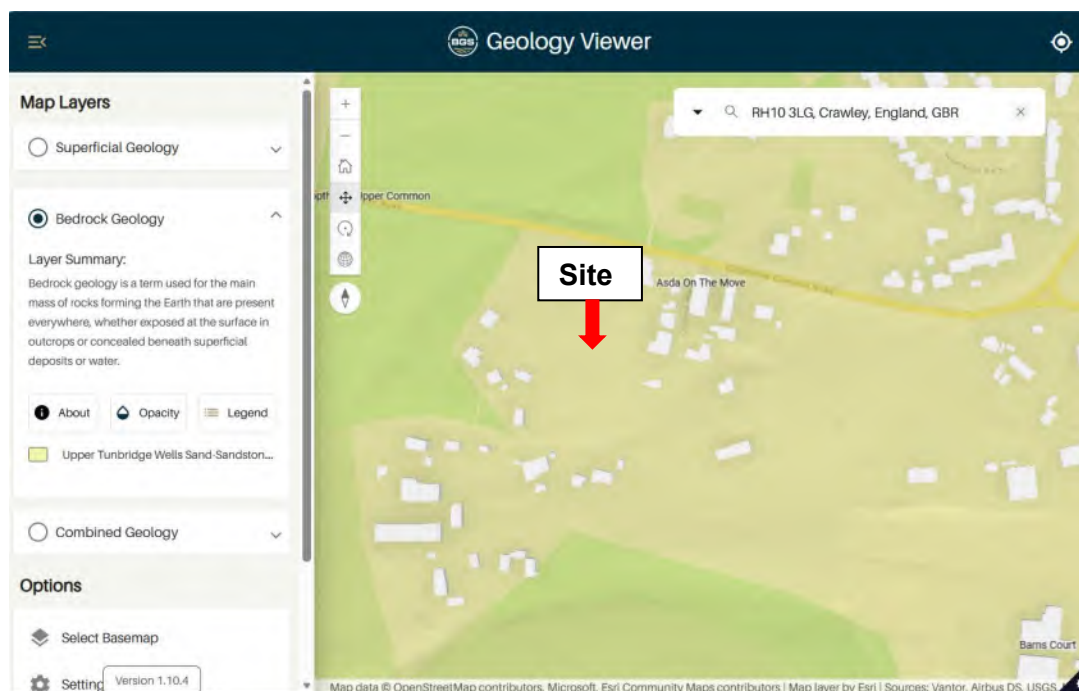
Survey control			
Stn	Easting	Northing	Height
H1	533105.324	139139.932	92.900
H2	533115.966	139202.406	93.536
H3	533113.828	139175.522	93.406
H4	533114.354	139185.807	93.613
H5	533075.003	139120.531	91.741
H6	533126.337	139152.948	93.027

Any setting-out should be undertaken using these control stations and any setting-out using GPS should be transformed to this control.

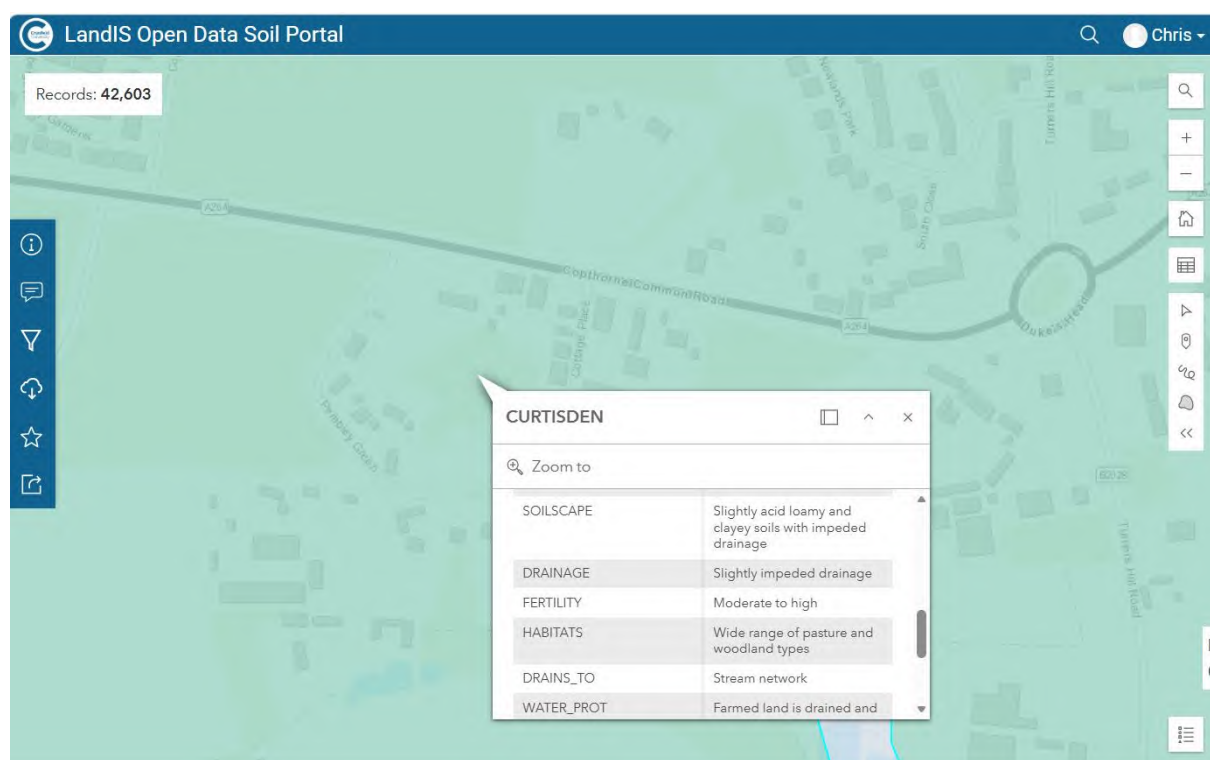
Appendix 2
Extracts from the BGS, CSAI & EA websites
Sewer Record



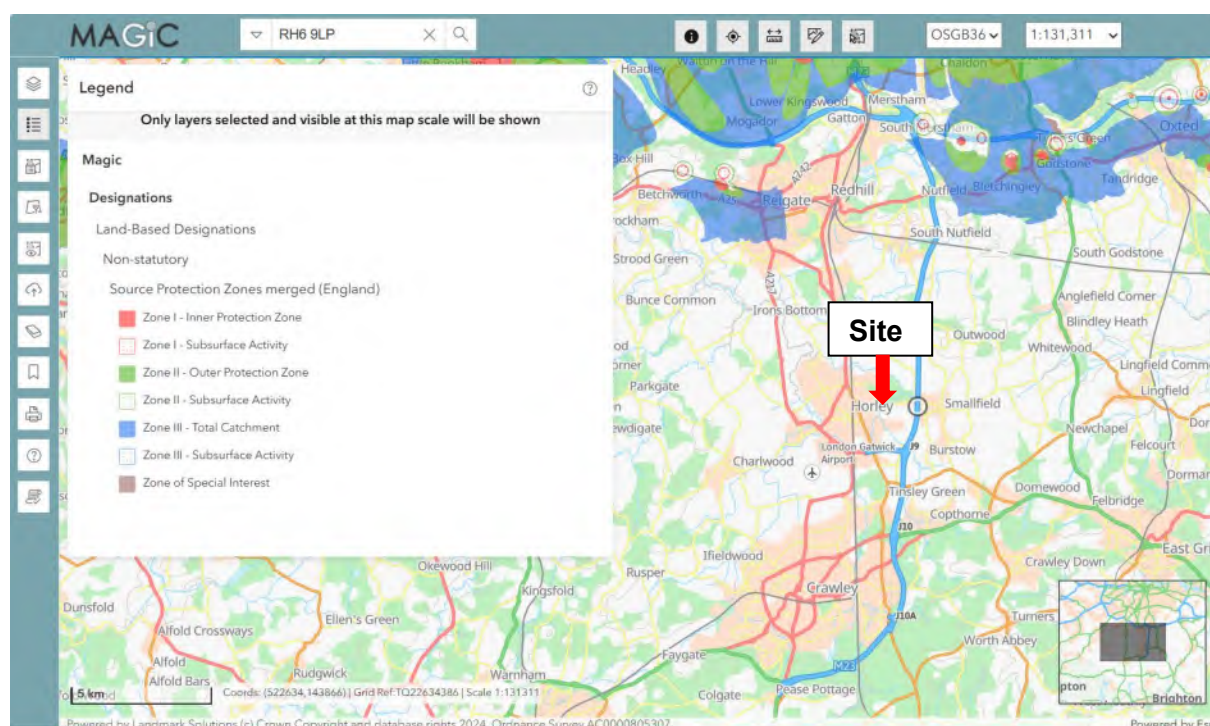
Extract from BGS Geology Viewer (Superficial).



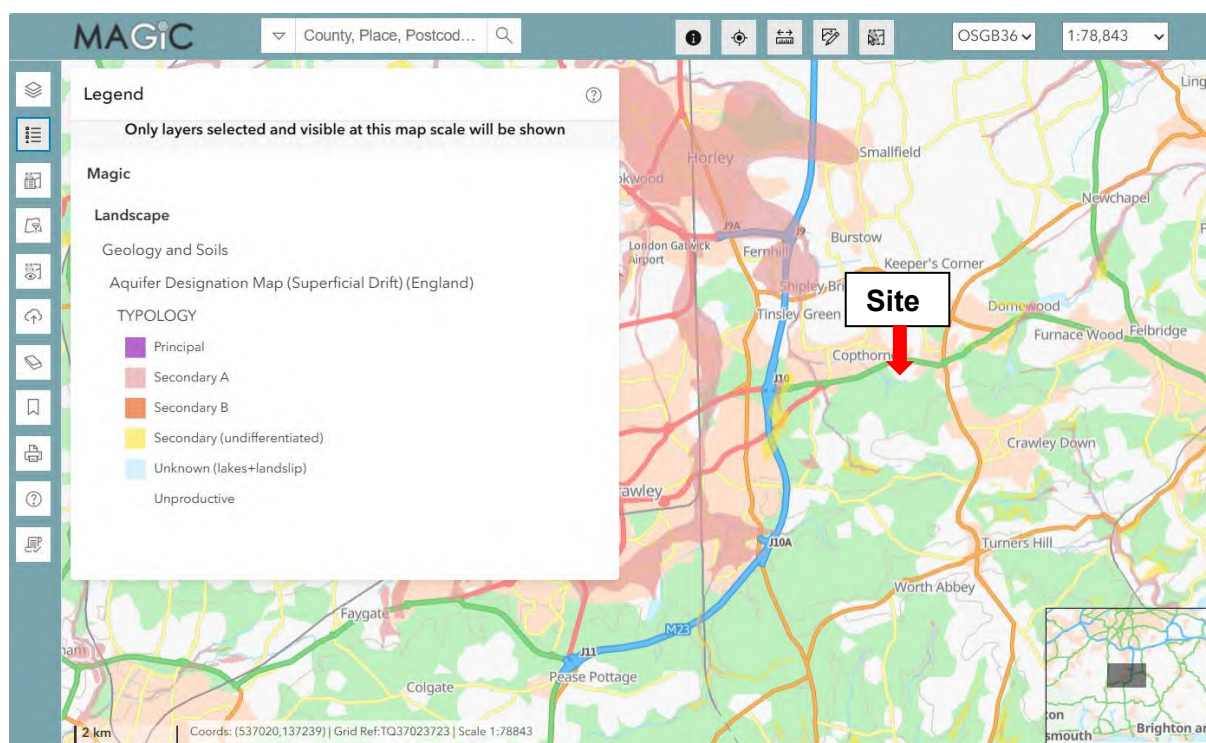
Extract from BGS Geology Viewer (Bedrock).



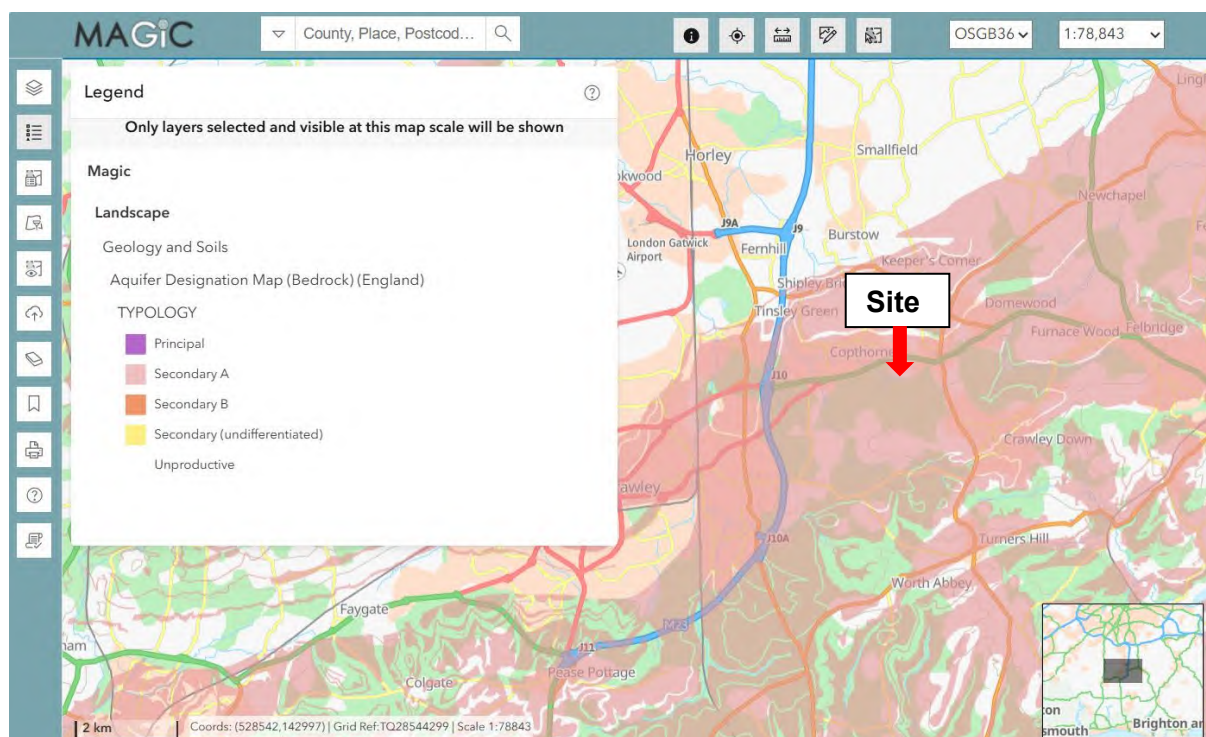
Extract from LandIS Soilscape Map



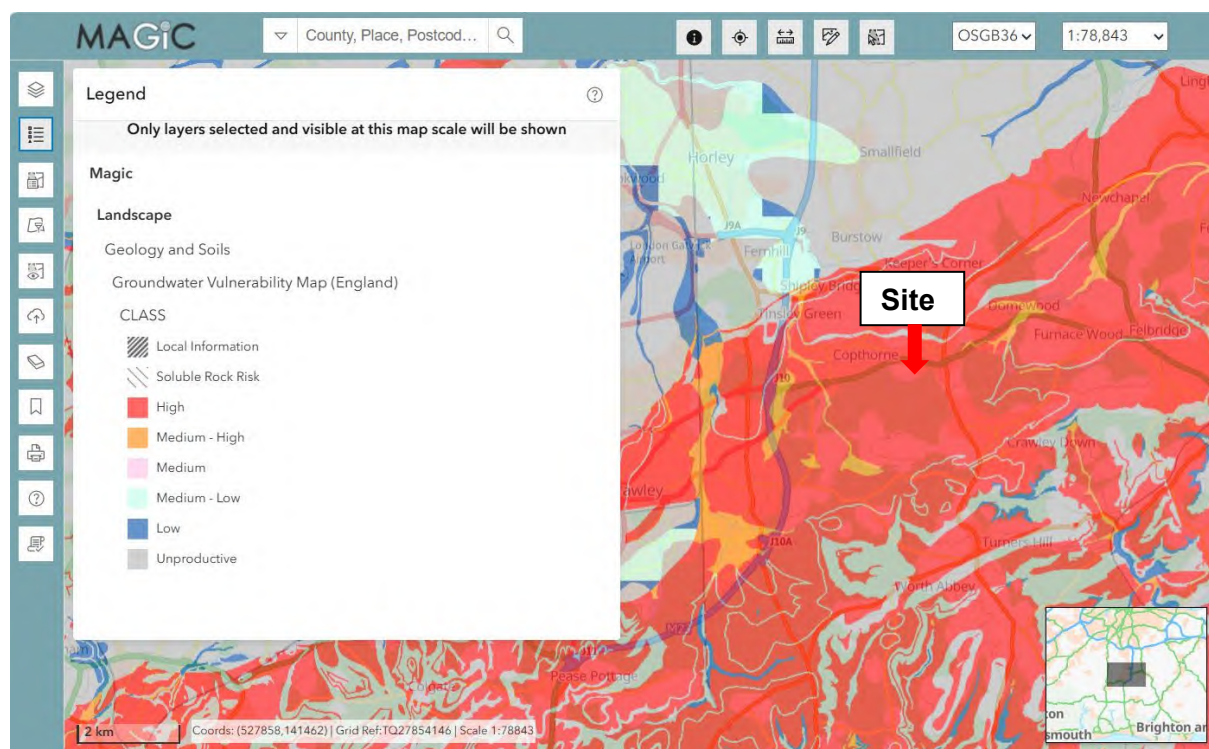
Extract from Magic Maps - Groundwater Source Protection Zones



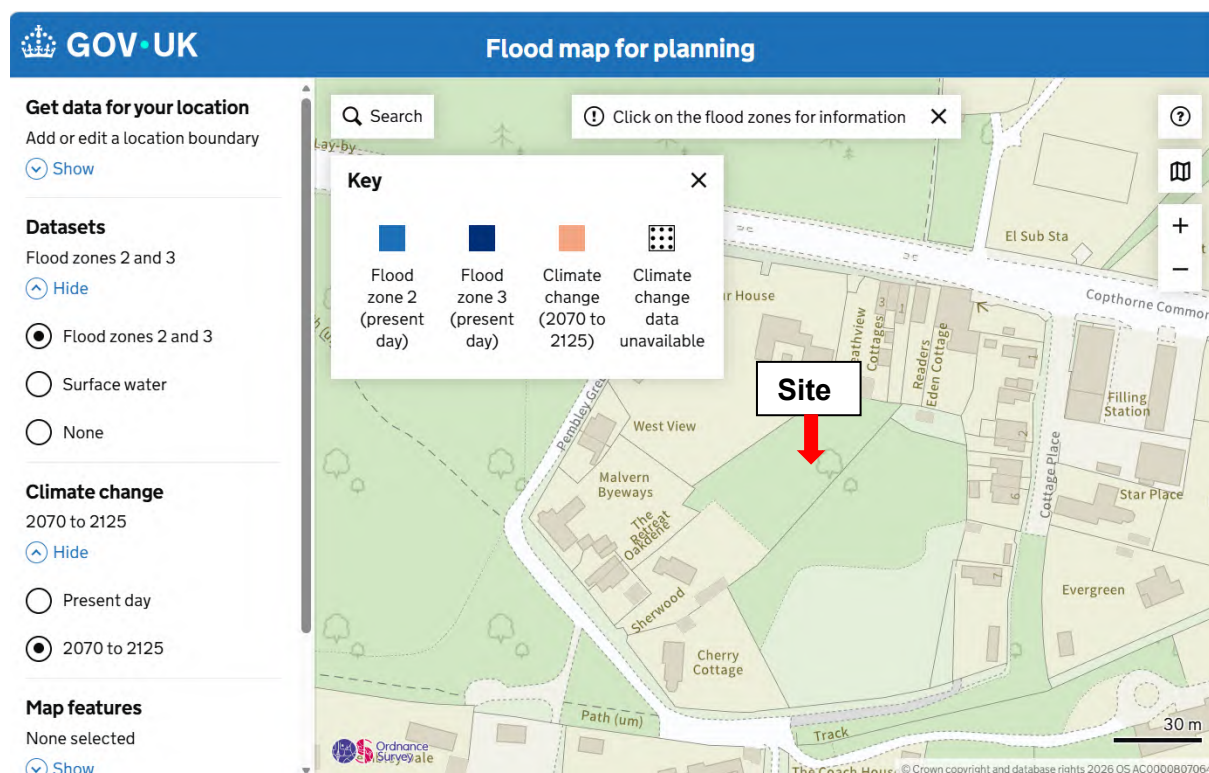
Extract from Magic Maps – Aquifer Designation [Superficial]



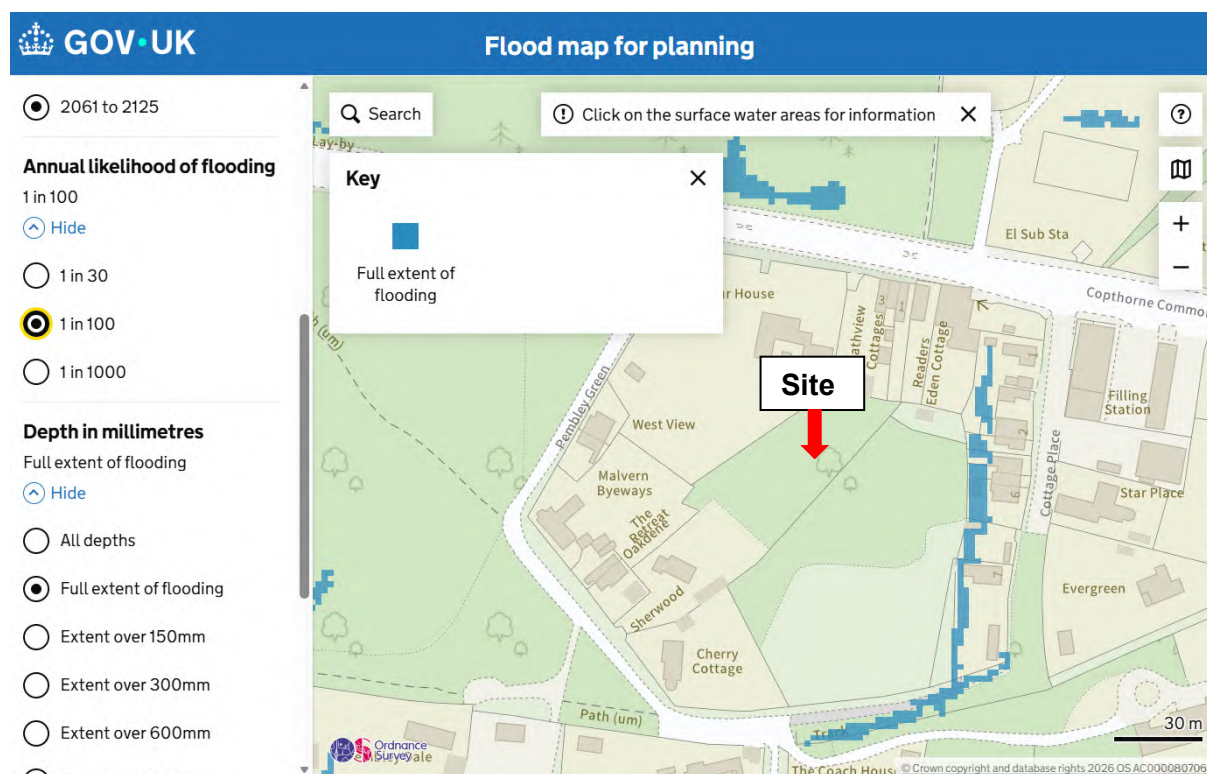
Extract from Magic Maps – Aquifer Designation [Bedrock]



Extract from Magic Maps -Groundwater Vulnerability



Extract from EA Flood Map for Planning (Rivers & Sea)



Extract from EA Flood Map for Planning [Surface Water] Full Extent.

Extract from EA Flood Map for Planning [Surface Water] Extent over 300mm.

Groundwater: understand your flood risk

Your selected location: 1 South View Cottages, Copthorne Common, Copthorne, Crawley, RH10 3LG

This information tells you the flood risk of the land around a building, not the building itself.

This location is outside of a groundwater flood alert area.

Reservoirs: understand your flood risk

Your selected location: 1 South View Cottages, Copthorne Common,
Copthorne, Crawley, RH10 3LG

This information tells you the flood risk of the land around a building, not the building itself.

Flooding from reservoirs is unlikely in this area.

BdR Civil and Structural Engineering Ltd
UNIT 1 THE OLD ENGINE HOUSE, G
TONBRIDGE
TN11 0DP

Search address supplied 3 HEATHERVIEW COTTAGES
HEATHERVIEW COTTAGES
3
COPTHORNE COMMON ROAD
COPTHORNE
SURREY
RH10 3LG

Your reference 26-0474

Our reference ALS/ALS/24/2026_5390684

Search date 1 October 2026

Keeping you up-to-date

Price Changes from 1 June 2026

With inflation continuing to influence costs, our prices for all searches will increase by around **4.3%** from **1 June 2026**. We've based this increase on **Retail Price Index (RPI)**.

You can view the new prices here: thameswater.co.uk/property-searches

If you have any questions, our customer experience team is here to help on **0800 009 4540**.



Thames Water Utilities Ltd
Property Searches,
Clearwater Court, Vastern Road, Reading RG1 8DB



property.searches@thameswater.co.uk
thameswater.co.uk/propertysearches



0800 009 4540

Search address supplied: 3 HEATHERVIEW COTTAGES, HEATHERVIEW COTTAGES, 3, COPTHORNE COMMON ROAD, COPTHORNE, SURREY, RH10 3LG

Dear Sir / Madam

An Asset Location Search is recommended when undertaking a site development. It is essential to obtain information on the size and location of clean water and sewerage assets to safeguard against expensive damage and allow cost-effective service design.

The following records were searched in compiling this report: - the map of public sewers & the map of waterworks. Thames Water Utilities Ltd (TWUL) holds all of these.

This search provides maps showing the position and size of Thames Water assets close to the proposed development and also manhole cover and invert levels, where available.

Please note that none of the charges made for this report relate to the provision of Ordnance Survey mapping information. The replies contained in this letter are given following inspection of the public service records available to this company. No responsibility can be accepted for any error or omission in the replies.

You should be aware that the information contained on these plans is current only on the day that the plans are issued. The plans should only be used for the duration of the work that is being carried out at the present time. Under no circumstances should this data be copied or transmitted to parties other than those for whom the current work is being carried out.

Thames Water do update these service plans on a regular basis and failure to observe the above conditions could lead to damage arising to new or diverted services at a later date.

Contact Us

If you have any further queries regarding this enquiry please feel free to contact a member of the team on 0800 009 4540, or use the contact details below:

Thames Water Utilities Ltd
Property Searches
Clearwater Court
Vastern Road
Reading
RG1 8DB

Email: property.searches@thameswater.co.uk

Web: thameswater.co.uk/propertysearches

Waste Water Services

Please provide a copy extract from the public sewer map.

Enclosed is a map showing the approximate lines of our sewers. Our plans do not show sewer connections from individual properties or any sewers not owned by Thames Water unless specifically annotated otherwise. Records such as "private" pipework are in some cases available from the Building Control Department of the relevant Local Authority. Where the Local Authority does not hold such plans it might be advisable to consult the property deeds for the site or contact neighbouring landowners. The public sewer map relates only to sewerage apparatus of Thames Water Utilities Ltd, it does not disclose details of cables and or communications equipment that may be running through or around such apparatus. The sewer level information contained in this response represents all of the level data available in our existing records. Should you require any further Information, please refer to the relevant section within the 'Further Contacts' page found later in this document.

For your guidance:

- The Company is not generally responsible for rivers, watercourses, ponds, culverts or highway drains. If any of these are shown on the copy extract they are shown for information only.
- Any private sewers or lateral drains which are indicated on the extract of the public sewer map as being subject to an agreement under Section 104 of the Water Industry Act 1991 are not an 'as constructed' record. It is recommended these details be checked with the developer.

Clean Water Services

Please provide a copy extract from the public water main map.

With regard to the fresh water supply, this site falls within the boundary of another water company. For more information, please redirect your enquiry to the following address:

South East Water

Asset Location Search



Property Searches

Rocfort Road
Snodland
Kent
ME6 5AH

Tel: 0845 301 0845

www.southeastwater.co.uk.

For your guidance:

- Assets other than vested water mains may be shown on the plan, for information only.
- If an extract of the public water main record is enclosed, this will show known public water mains in the vicinity of the property. It should be possible to estimate the likely length and route of any private water supply pipe connecting the property to the public water network.

Further contacts:

Waste Water queries

Should you require verification of the invert levels of public sewers, by site measurement, you will need to approach the relevant Thames Water Area Network Office for permission to lift the appropriate covers. This permission will usually involve you completing a TWOSA form. You can do this by emailing customer.feedback@thameswater.co.uk with the email subject header 'Enquiry – TWOSA', along with details of the request.

If you have any questions regarding sewer connections, budget estimates, diversions or building over issues please direct them to our service desk which can be contacted by writing to:

Developer Services (Waste Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

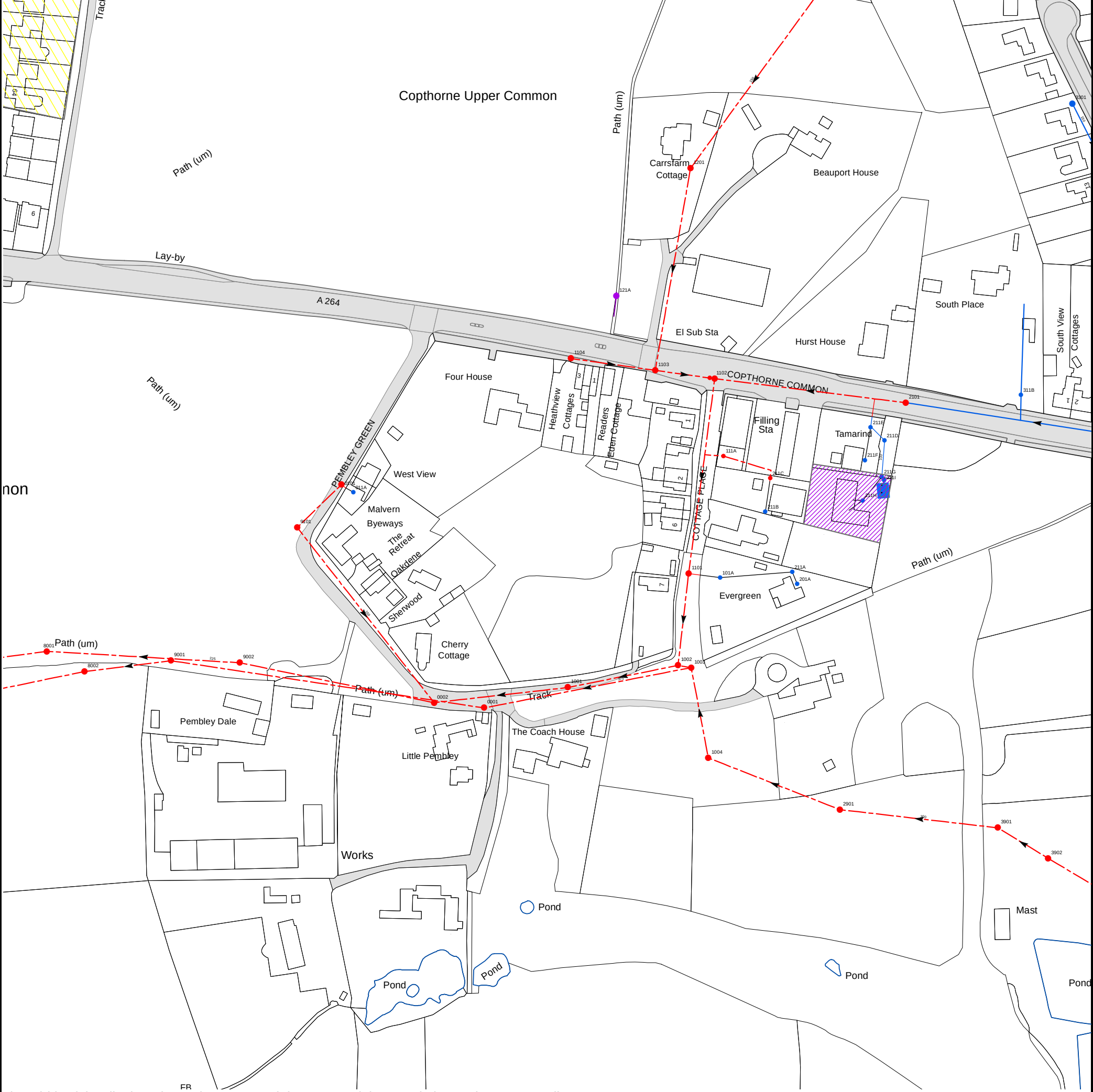
Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk

Clean Water queries

Should you require any advice concerning clean water connections, please contact:

Developer Services (Clean Water)
Thames Water
Clearwater Court
Vastern Road
Reading
RG1 8DB

Tel: 0800 009 3921
Email: developer.services@thameswater.co.uk



The width of the displayed area is 500 m and the centre of the map is located at OS coordinates 533111,139115
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.

Based on the Ordnance Survey Map (2024) with the Sanction of the controller of H.M. Stationery Office, License no. AC0000849556 Crown Copyright Reserved.

NB. Levels quoted in metres Ordnance Newlyn Datum. The value -9999.00 indicates that no survey information is available

Manhole Reference	Manhole Cover Level	Manhole Invert Level
311B	n/a	n/a
3301	101.02	99.47
211C	n/a	n/a
211G	9.85	8.89
211D	9.85	8.64
1004	88.77	87.44
8002	85.45	83.84
211F	9.85	8.95
011A	n/a	n/a
211A	n/a	n/a
121A	n/a	n/a
1002	89.41	87.09
9001	86.48	85.27
8001	86.13	83.94
101A	n/a	n/a
9101	n/a	n/a
211B	n/a	n/a
111A	n/a	n/a
211H	9.85	9.30
211I	9.85	8.92
211E	9.85	8.17
201A	n/a	n/a
3901	90.94	88.95
1003	90.16	87.34
0001	88.07	86.94
2901	89.42	87.69
1103	93.86	91.99
0101	91.16	89.68
1104	93.62	92.54
9002	86.99	84.61
1001	88.78	86.00
2101	95.94	90.32
1201	95.52	93.77
0002	88.01	85.66
1101	91.05	88.10
3902	91.28	89.44
1102	94.25	90.12
The position of the apparatus shown on this plan is given without obligation and warranty, and the accuracy cannot be guaranteed. Service pipes are not shown but their presence should be anticipated. No liability of any kind whatsoever is accepted by Thames Water for any error or omission. The actual position of mains and services must be verified and established on site before any works are undertaken.		



Asset Location Search Sewer Key

Public Sewer Types

(Operated and maintained by Thames Water)

- Foul Sewer:** A sewer designed to convey waste water from domestic and industrial sources to a treatment works.
- Surface Water Sewer:** A sewer designed to convey surface water (eg. rain water from roofs, driveways and car parks) to rivers or watercourses.
- Combined Sewer:** A sewer designed to convey both waste water and surface water from domestic and industrial sources to a treatment works.
- Trunk Sewer:** A strategic sewer which collects either foul or surface water flow from a number of subsidiary catchments and transfers this flow to a pumping station, river outfall or treatment works.
- Storm Sewer**
- Sludge Sewer**
- Foul Trunk Sewer**
- Surface Trunk Sewer**
- Combined Trunk Sewer**
- Foul Rising Main**
- Surface Water Rising Main**
- Combined Rising Main**
- Vacuum**
- Thames Water Proposed**
- Vent Pipe**
- Gallery**

Other Sewer Types

(Not operated and maintained by Thames Water)

- Sewer**
- Culverted Watercourse**
- Proposed**
- Decommissioned Sewer**
- Content of this drainage network is currently unknown**
- Ownership of this drainage network is currently unknown**
- Gulley:** These sewers are generally maintained by the relevant highway authority.

Sewer Fittings

A feature in a sewer that does not affect the flow in the pipe. eg. a vent is a fitting as the function of a vent is to release excess gas.

- Air Valve**
- Dam Chase**
- Fitting**
- Meter**
- Vent**

Operational Controls

A feature in a sewer that changes or diverts the flow in the sewer.

- Ancillary**
- Drop Pipe**
- Control Valve**
- Weir**

End Items

End symbols appear at the start or end of the sewer pipe. eg. An Undefined End at the start of a sewer indicates that Thames Water has no knowledge of the position of the sewer upstream of that symbol. Outfall on a surface water sewer indicates that the pipe discharges into a stream or river.

- Inlet**
- Undefined End**
- Outfall**

0800 009 4540

property.searches@thameswater.co.uk

thameswater.co.uk/propertysearches

Other Symbols

Symbols used on maps that do not fall under other general categories.

- Change of characteristic indicator**
- Public/Private Pumping Station**
- Invert Level**
- Summit**

Areas

Lines denoting areas of underground surveys and agreements etc.

- Agreement/Adoption**
- Operational Site**
- Chamber**
- Awaiting Ordnance Survey data**

Ducts or Crossings

Ducts may contain high voltage cables. Please check with Thames Water.

- Casement**
- Subway**
- Conduit Bridge**
- Tunnel**

Notes

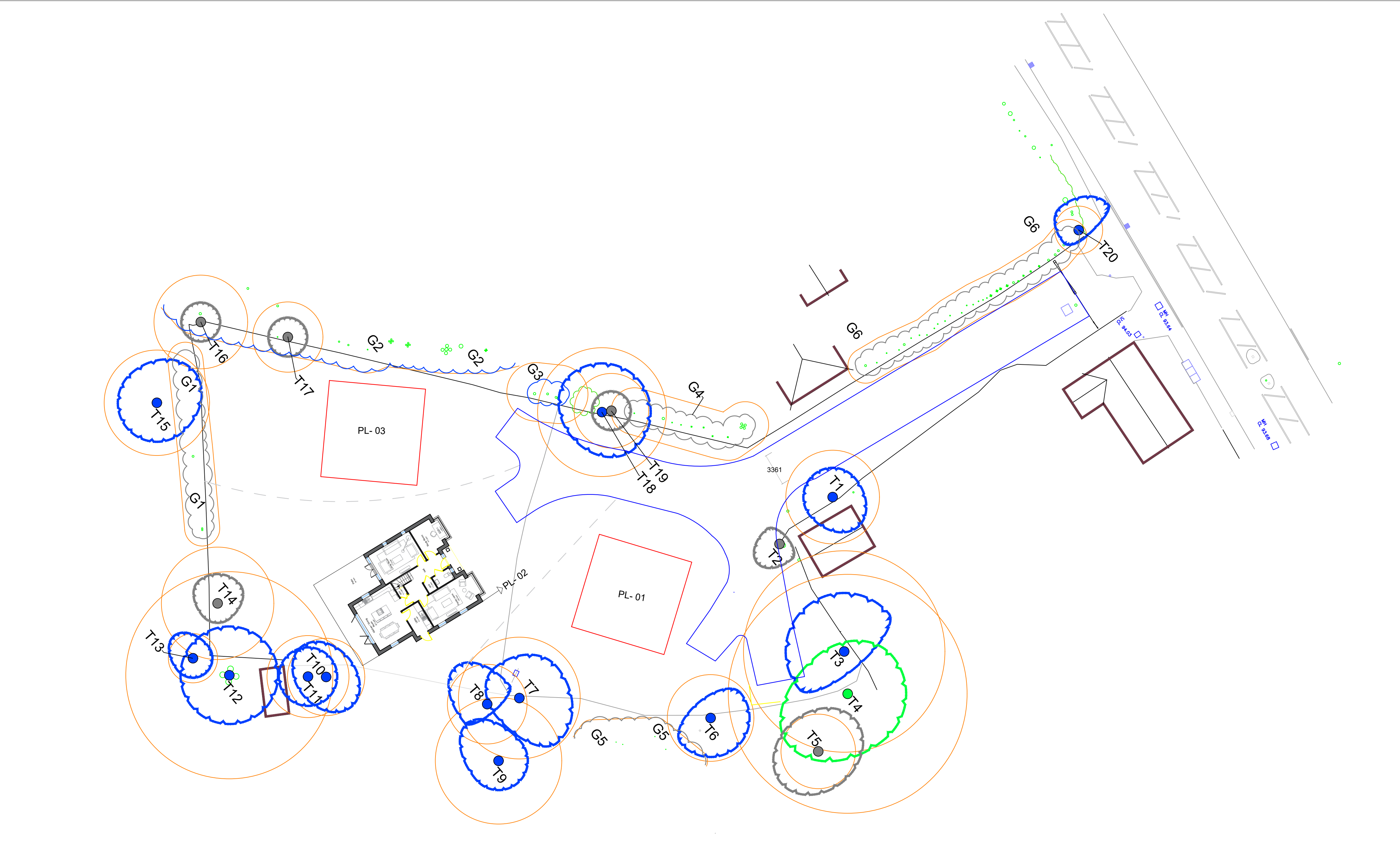
- 1 All levels associated with the plans are to Ordnance Datum Newlyn
- 2 All measurements on the plan are metric
- 3 Arrows (on gravity fed sewers) or flecks (on rising mains) indicate the direction of flow
- 4 Most private pipes are not shown on our plans, as in the past, this information has not been recorded.
- 5 'na' or '0' on a manhole indicates that data is unavailable
- 6 The text appearing alongside a sewer line indicates the internal diameter of the pipe in millimeters. Text next to a manhole indicates the manhole reference number and should not be taken as a measurement.

If you are unsure about any text or symbology, please contact Property Searches.

16129 - 12/25

Appendix 3

Details of Proposed Development



DRAWING:
PLANNING

PROJECT :
Land at Copthorne Common,
Crawley RH10 3LF

DRAWING NO: PL07

DATE: 22/09/2026

SHEET SIZE: A2

SCALE: 1:250

Proposed Plan



Appendix 4

Runoff Rates & Volumes

Appendix 4/1

Greenfield Runoff Rates & Volumes

Simulation Settings

Rainfall Methodology	FEH-22	Drain Down Time (mins)	2880	30 year (l/s)	2.3
Rainfall Events	Singular	Additional Storage (m³/ha)	20.0	100 year (l/s)	3.0
Summer CV	1.000	Starting Level (m)		Check Discharge Volume	✓
Winter CV	1.000	Check Discharge Rate(s)	✓	100 year 360 minute (m³)	75
Analysis Speed	Detailed	1 year (l/s)	0.8		
Skip Steady State	x	2 year (l/s)	0.8		

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	40	0	0	100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	QBar/QMed conversion factor	1.136	QBar	0.9
Greenfield Method	FEH	Growth Factor 1 year	0.85	Q 1 year (l/s)	0.8
Positively Drained Area (ha)	0.220	Growth Factor 2 year	0.88	Q 2 year (l/s)	0.8
SAAR (mm)	793	Growth Factor 30 year	2.40	Q 30 year (l/s)	2.3
Host	1	Growth Factor 100 year	3.19	Q 100 year (l/s)	3.0
BFIHost	0.520	Betterment (%)	0		
Region	6	QMed	0.8		

Pre-development Discharge Volume

Site Makeup	Greenfield	SPR	0.47	Storm Duration (mins)	360
Greenfield Method	FSR/FEH	CWI	118.963	Betterment (%)	0
Positively Drained Area (ha)	0.220	Return Period (years)	100	PR	0.502
Soil Index	4	Climate Change (%)	0	Runoff Volume (m³)	75

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	200.0		

Appendix 4/2

Post-Development Runoff Rates & Volumes [No Mitigation]

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations

15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1		0	0	30	35	0	0
2		0	0	100	40	0	0

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	200.0		

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
NM1	0.025	93.795	1350	533116.661	139191.938	1.500	92.295
NM2	0.025	93.011	1350	533113.003	139155.634	1.500	91.511
NM3	0.025	92.849	1350	533097.469	139145.337	1.500	91.349
NM4	0.026	92.297	1350	533085.348	139136.217	1.500	90.797
OUT NM		91.693	1350	533070.630	139121.197	1.500	90.193

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)
1.000	NM1	NM2	36.488	92.295	91.511	0.784	46.5
1.001	NM2	NM3	18.636	91.511	91.349	0.162	115.0
1.002	NM3	NM4	15.169	91.349	90.797	0.552	27.5
1.003	NM4	OUT NM	21.030	90.797	90.193	0.604	34.8

Name	US Node	DS Node	US Depth (m)	DS Depth (m)	Σ Area (ha)
1.000	NM1	NM2	1.200	1.200	0.025
1.001	NM2	NM3	1.200	1.200	0.050
1.002	NM3	NM4	1.200	1.200	0.075
1.003	NM4	OUT NM	1.200	1.200	0.101

Pipeline Schedule

Length (m)	Slope (1:X)	Dia (mm)	US CL (m)	US IL (m)	DS CL (m)	DS IL (m)
36.488	46.5	300	93.795	92.295	93.011	91.511
18.636	115.0	300	93.011	91.511	92.849	91.349
15.169	27.5	300	92.849	91.349	92.297	90.797
21.030	34.8	300	92.297	90.797	91.693	90.193

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 15 minute summer	74.620	21.115	1 year 240 minute winter	11.307	4.498
1 year 15 minute winter	52.365	21.115	1 year 360 minute summer	13.638	3.510
1 year 30 minute summer	48.062	13.600	1 year 360 minute winter	8.865	3.510
1 year 30 minute winter	33.728	13.600	1 year 480 minute summer	10.999	2.907
1 year 60 minute summer	32.840	8.679	1 year 480 minute winter	7.308	2.907
1 year 60 minute winter	21.818	8.679	1 year 600 minute summer	9.138	2.500
1 year 120 minute summer	24.579	6.496	1 year 600 minute winter	6.244	2.500
1 year 120 minute winter	16.330	6.496	1 year 720 minute summer	8.224	2.204
1 year 180 minute summer	20.533	5.284	1 year 720 minute winter	5.527	2.204
1 year 180 minute winter	13.347	5.284	1 year 960 minute summer	6.841	1.801
1 year 240 minute summer	17.019	4.498	1 year 960 minute winter	4.531	1.801

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
1 year 1440 minute summer	5.057	1.355	30 year +35% CC 240 minute winter	42.359	16.849
1 year 1440 minute winter	3.399	1.355	30 year +35% CC 360 minute summer	47.986	12.348
2 year 15 minute summer	111.975	31.685	30 year +35% CC 360 minute winter	31.192	12.348
2 year 15 minute winter	78.579	31.685	30 year +35% CC 480 minute summer	37.389	9.881
2 year 30 minute summer	73.507	20.800	30 year +35% CC 480 minute winter	24.841	9.881
2 year 30 minute winter	51.584	20.800	30 year +35% CC 600 minute summer	30.380	8.310
2 year 60 minute summer	49.868	13.179	30 year +35% CC 600 minute winter	20.758	8.310
2 year 60 minute winter	33.131	13.179	30 year +35% CC 720 minute summer	26.919	7.214
2 year 120 minute summer	34.457	9.106	30 year +35% CC 720 minute winter	18.091	7.214
2 year 120 minute winter	22.893	9.106	30 year +35% CC 960 minute summer	21.957	5.782
2 year 180 minute summer	27.828	7.161	30 year +35% CC 960 minute winter	14.545	5.782
2 year 180 minute winter	18.089	7.161	30 year +35% CC 1440 minute summer	15.844	4.246
2 year 240 minute summer	22.601	5.973	30 year +35% CC 1440 minute winter	10.648	4.246
2 year 240 minute winter	15.015	5.973	100 year +40% CC 15 minute summer	518.930	146.839
2 year 360 minute summer	17.667	4.546	100 year +40% CC 15 minute winter	364.161	146.839
2 year 360 minute winter	11.484	4.546	100 year +40% CC 30 minute summer	347.863	98.433
2 year 480 minute summer	14.071	3.718	100 year +40% CC 30 minute winter	244.114	98.433
2 year 480 minute winter	9.348	3.718	100 year +40% CC 60 minute summer	238.728	63.089
2 year 600 minute summer	11.593	3.171	100 year +40% CC 60 minute winter	158.605	63.089
2 year 600 minute winter	7.921	3.171	100 year +40% CC 120 minute summer	140.344	37.089
2 year 720 minute summer	10.369	2.779	100 year +40% CC 120 minute winter	93.241	37.089
2 year 720 minute winter	6.969	2.779	100 year +40% CC 180 minute summer	105.512	27.152
2 year 960 minute summer	8.545	2.250	100 year +40% CC 180 minute winter	68.586	27.152
2 year 960 minute winter	5.660	2.250	100 year +40% CC 240 minute summer	82.356	21.764
2 year 1440 minute summer	6.227	1.669	100 year +40% CC 240 minute winter	54.715	21.764
2 year 1440 minute winter	4.185	1.669	100 year +40% CC 360 minute summer	61.986	15.951
30 year +35% CC 15 minute summer	394.459	111.618	100 year +40% CC 360 minute winter	40.293	15.951
30 year +35% CC 15 minute winter	276.814	111.618	100 year +40% CC 480 minute summer	48.525	12.824
30 year +35% CC 30 minute summer	262.429	74.258	100 year +40% CC 480 minute winter	32.239	12.824
30 year +35% CC 30 minute winter	184.161	74.258	100 year +40% CC 600 minute summer	39.648	10.845
30 year +35% CC 60 minute summer	178.659	47.214	100 year +40% CC 600 minute winter	27.090	10.845
30 year +35% CC 60 minute winter	118.697	47.214	100 year +40% CC 720 minute summer	35.326	9.468
30 year +35% CC 120 minute summer	107.256	28.345	100 year +40% CC 720 minute winter	23.741	9.468
30 year +35% CC 120 minute winter	71.259	28.345	100 year +40% CC 960 minute summer	29.106	7.664
30 year +35% CC 180 minute summer	81.369	20.939	100 year +40% CC 960 minute winter	19.281	7.664
30 year +35% CC 180 minute winter	52.892	20.939	100 year +40% CC 1440 minute summer	21.291	5.706
30 year +35% CC 240 minute summer	63.757	16.849	100 year +40% CC 1440 minute winter	14.309	5.706

Results for 1 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	NM1	10	92.323	0.028	3.0	0.0493	0.0000	OK
15 minute summer	NM2	11	91.561	0.050	5.9	0.0889	0.0000	OK
15 minute summer	NM3	11	91.390	0.041	8.8	0.0730	0.0000	OK
15 minute summer	NM4	11	90.849	0.052	11.8	0.0925	0.0000	OK
15 minute summer	OUT NM	11	90.244	0.051	11.8	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	NM1	1.000	NM2	2.9	0.554	0.018	0.2014	
15 minute summer	NM2	1.001	NM3	5.9	0.866	0.057	0.1269	
15 minute summer	NM3	1.002	NM4	8.8	1.263	0.041	0.1061	
15 minute summer	NM4	1.003	OUT NM	11.8	1.482	0.063	0.1680	5.3

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	NM1	10	92.329	0.034	4.6	0.0604	0.0000	OK
15 minute summer	NM2	11	91.573	0.062	9.1	0.1098	0.0000	OK
15 minute summer	NM3	11	91.400	0.051	13.4	0.0897	0.0000	OK
15 minute summer	NM4	11	90.861	0.064	18.0	0.1145	0.0000	OK
15 minute summer	OUT NM	11	90.255	0.062	18.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	NM1	1.000	NM2	4.5	0.623	0.028	0.2720	
15 minute summer	NM2	1.001	NM3	9.0	0.979	0.087	0.1716	
15 minute summer	NM3	1.002	NM4	13.4	1.425	0.063	0.1437	
15 minute summer	NM4	1.003	OUT NM	18.0	1.671	0.096	0.2271	8.0

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	NM1	10	92.358	0.063	16.1	0.1109	0.0000	OK
15 minute summer	NM2	10	91.632	0.121	32.0	0.2133	0.0000	OK
15 minute summer	NM3	10	91.448	0.099	47.6	0.1742	0.0000	OK
15 minute summer	NM4	10	90.925	0.128	64.0	0.2284	0.0000	OK
15 minute summer	OUT NM	10	90.312	0.119	63.5	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	NM1	1.000	NM2	15.9	0.873	0.098	0.6796	
15 minute summer	NM2	1.001	NM3	31.5	1.359	0.304	0.4354	
15 minute summer	NM3	1.002	NM4	47.3	1.942	0.222	0.3713	
15 minute summer	NM4	1.003	OUT NM	63.5	2.328	0.336	0.5754	28.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	NM1	10	92.367	0.072	21.2	0.1273	0.0000	OK
15 minute summer	NM2	10	91.653	0.142	42.2	0.2498	0.0000	OK
15 minute summer	NM3	10	91.465	0.116	62.7	0.2045	0.0000	OK
15 minute summer	NM4	10	90.949	0.152	84.3	0.2702	0.0000	OK
15 minute summer	OUT NM	10	90.331	0.138	83.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	NM1	1.000	NM2	21.0	0.934	0.129	0.8334	
15 minute summer	NM2	1.001	NM3	41.5	1.447	0.401	0.5383	
15 minute summer	NM3	1.002	NM4	62.3	2.054	0.293	0.4619	
15 minute summer	NM4	1.003	OUT NM	83.7	2.483	0.443	0.7105	37.0

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

Storm Durations
360

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
100	40	0	0

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	200.0		

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
NM1	0.025	93.795	1350	533116.661	139191.938	1.500	92.295
NM2	0.025	93.011	1350	533113.003	139155.634	1.500	91.511
NM3	0.025	92.849	1350	533097.469	139145.337	1.500	91.349
NM4	0.026	92.297	1350	533085.348	139136.217	1.500	90.797
OUT NM		91.693	1350	533070.630	139121.197	1.500	90.193

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)
1.000	NM1	NM2	36.488	92.295	91.511	0.784	46.5
1.001	NM2	NM3	18.636	91.511	91.349	0.162	115.0
1.002	NM3	NM4	15.169	91.349	90.797	0.552	27.5
1.003	NM4	OUT NM	21.030	90.797	90.193	0.604	34.8

Name	US Node	DS Node	US Depth (m)	DS Depth (m)	Σ Area (ha)
1.000	NM1	NM2	1.200	1.200	0.025
1.001	NM2	NM3	1.200	1.200	0.050
1.002	NM3	NM4	1.200	1.200	0.075
1.003	NM4	OUT NM	1.200	1.200	0.101

Pipeline Schedule

Length (m)	Slope (1:X)	Dia (mm)	US CL (m)	US IL (m)	DS CL (m)	DS IL (m)
36.488	46.5	300	93.795	92.295	93.011	91.511
18.636	115.0	300	93.011	91.511	92.849	91.349
15.169	27.5	300	92.849	91.349	92.297	90.797
21.030	34.8	300	92.297	90.797	91.693	90.193

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 360 minute summer	61.986	15.951	100 year +40% CC 360 minute winter	40.293	15.951

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	NM1	184	92.328	0.033	4.3	0.0589	0.0000	OK
360 minute summer	NM2	184	91.572	0.061	8.6	0.1069	0.0000	OK
360 minute summer	NM3	184	91.399	0.050	12.8	0.0875	0.0000	OK
360 minute summer	NM4	184	90.860	0.063	17.3	0.1118	0.0000	OK
360 minute summer	OUT NM	184	90.254	0.061	17.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	NM1	1.000	NM2	4.3	0.609	0.026	0.2626	
360 minute summer	NM2	1.001	NM3	8.5	0.961	0.082	0.1653	
360 minute summer	NM3	1.002	NM4	12.8	1.400	0.060	0.1388	
360 minute summer	NM4	1.003	OUT NM	17.2	1.647	0.091	0.2196	96.3

Appendix 5

SuDS Design, SuDS O&M Requirements

Rainfall Methodology	FEH-22	Analysis Speed	Detailed	Starting Level (m)	
Rainfall Events	Singular	Skip Steady State	x	Check Discharge Rate(s)	x
Summer CV	1.000	Drain Down Time (mins)	1440	Check Discharge Volume	x
Winter CV	1.000	Additional Storage (m³/ha)	20.0		

				Storm Durations											
				15	30	60	120	180	240	360	480	600	720	960	1440
Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)												
2	0	0	0												
30	0	0	0												
30	35	0	0												

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	200.0		

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S1.2	0.007	92.262	450	533086.099	139128.845	0.600	91.662
S1.4		91.784	450	533077.552	139120.841	0.600	91.184
S1.0	0.006	92.311	450	533080.326	139139.555	0.600	91.711
S1.1	0.004	91.984	450	533069.439	139128.622	0.600	91.384
RWH1		91.859	450	533071.076	139126.128	0.731	91.128
OUT 1		91.805	1	533069.434	139124.151	0.694	91.111

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)
1.000	S1.2	S1.4	11.709	91.662	91.184	0.478	24.5
1.001	S1.4	RWH1	8.360	91.184	91.128	0.056	149.3
2.000	S1.0	S1.1	15.429	91.711	91.384	0.327	47.2
2.001	S1.1	RWH1	2.983	91.384	91.128	0.256	11.7
1.002	RWH1	OUT 1	2.570	91.128	91.111	0.017	151.2

Name	US Node	DS Node	US Depth (m)	DS Depth (m)	Σ Area (ha)
1.000	S1.2	S1.4	0.450	0.450	0.007
1.001	S1.4	RWH1	0.450	0.581	0.007
2.000	S1.0	S1.1	0.450	0.450	0.006
2.001	S1.1	RWH1	0.450	0.581	0.009
1.002	RWH1	OUT 1	0.581	0.544	0.016

Pipeline Schedule

Length (m)	Slope (1:X)	Dia (mm)	US CL (m)	US IL (m)	DS CL (m)	DS IL (m)
11.709	24.5	150	92.262	91.662	91.784	91.184
8.360	149.3	150	91.784	91.184	91.859	91.128
15.429	47.2	150	92.311	91.711	91.984	91.384
2.983	11.7	150	91.984	91.384	91.859	91.128
2.570	151.2	150	91.859	91.128	91.805	91.111

Node OUT 1 Online Head/Flow Control

Flap Valve	x	Replaces Downstream Link	x	Invert Level (m)	91.111
Head (m)		Flow (l/s)			
0.001		0.000			

Node OUT 1 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.01296	Safety Factor	2.0	Invert Level (m)	89.650
Side Inf Coefficient (m/hr)	0.01296	Porosity	0.95	Time to half empty (mins)	930

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	13.0	13.0	1.600	13.0	39.4	1.601	0.0	39.4

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	111.975	31.685	30 year +35% CC 120 minute summer	107.256	28.345
2 year 15 minute winter	78.579	31.685	30 year +35% CC 120 minute winter	71.259	28.345
2 year 30 minute summer	73.507	20.800	30 year +35% CC 180 minute summer	81.369	20.939
2 year 30 minute winter	51.584	20.800	30 year +35% CC 180 minute winter	52.892	20.939
2 year 60 minute summer	49.868	13.179	30 year +35% CC 240 minute summer	63.757	16.849
2 year 60 minute winter	33.131	13.179	30 year +35% CC 240 minute winter	42.359	16.849
2 year 120 minute summer	34.457	9.106	30 year +35% CC 360 minute summer	47.986	12.348
2 year 120 minute winter	22.893	9.106	30 year +35% CC 360 minute winter	31.192	12.348
2 year 180 minute summer	27.828	7.161	30 year +35% CC 480 minute summer	37.389	9.881
2 year 180 minute winter	18.089	7.161	30 year +35% CC 480 minute winter	24.841	9.881
2 year 240 minute summer	22.601	5.973	30 year +35% CC 600 minute summer	30.380	8.310
2 year 240 minute winter	15.015	5.973	30 year +35% CC 600 minute winter	20.758	8.310
2 year 360 minute summer	17.667	4.546	30 year +35% CC 720 minute summer	26.919	7.214
2 year 360 minute winter	11.484	4.546	30 year +35% CC 720 minute winter	18.091	7.214
2 year 480 minute summer	14.071	3.718	30 year +35% CC 960 minute summer	21.957	5.782
2 year 480 minute winter	9.348	3.718	30 year +35% CC 960 minute winter	14.545	5.782
2 year 600 minute summer	11.593	3.171	30 year +35% CC 1440 minute summer	15.844	4.246
2 year 600 minute winter	7.921	3.171	30 year +35% CC 1440 minute winter	10.648	4.246
2 year 720 minute summer	10.369	2.779	100 year 15 minute summer	370.664	104.885
2 year 720 minute winter	6.969	2.779	100 year 15 minute winter	260.115	104.885
2 year 960 minute summer	8.545	2.250	100 year 30 minute summer	248.473	70.309
2 year 960 minute winter	5.660	2.250	100 year 30 minute winter	174.367	70.309
2 year 1440 minute summer	6.227	1.669	100 year 60 minute summer	170.520	45.063
2 year 1440 minute winter	4.185	1.669	100 year 60 minute winter	113.290	45.063
30 year 15 minute summer	292.192	82.680	100 year 120 minute summer	100.246	26.492
30 year 15 minute winter	205.047	82.680	100 year 120 minute winter	66.601	26.492
30 year 30 minute summer	194.392	55.006	100 year 180 minute summer	75.366	19.394
30 year 30 minute winter	136.416	55.006	100 year 180 minute winter	48.990	19.394
30 year 60 minute summer	132.340	34.974	100 year 240 minute summer	58.826	15.546
30 year 60 minute winter	87.924	34.974	100 year 240 minute winter	39.082	15.546
30 year 120 minute summer	79.449	20.996	100 year 360 minute summer	44.276	11.394
30 year 120 minute winter	52.784	20.996	100 year 360 minute winter	28.780	11.394
30 year 180 minute summer	60.273	15.510	100 year 480 minute summer	34.661	9.160
30 year 180 minute winter	39.179	15.510	100 year 480 minute winter	23.028	9.160
30 year 240 minute summer	47.227	12.481	100 year 600 minute summer	28.320	7.746
30 year 240 minute winter	31.377	12.481	100 year 600 minute winter	19.350	7.746
30 year 360 minute summer	35.545	9.147	100 year 720 minute summer	25.233	6.763
30 year 360 minute winter	23.105	9.147	100 year 720 minute winter	16.958	6.763
30 year 480 minute summer	27.696	7.319	100 year 960 minute summer	20.790	5.475
30 year 480 minute winter	18.400	7.319	100 year 960 minute winter	13.772	5.475
30 year 600 minute summer	22.504	6.155	100 year 1440 minute summer	15.208	4.076
30 year 600 minute winter	15.376	6.155	100 year 1440 minute winter	10.221	4.076
30 year 720 minute summer	19.940	5.344	100 year +40% CC 15 minute summer	518.930	146.839
30 year 720 minute winter	13.401	5.344	100 year +40% CC 15 minute winter	364.161	146.839
30 year 960 minute summer	16.264	4.283	100 year +40% CC 30 minute summer	347.863	98.433
30 year 960 minute winter	10.774	4.283	100 year +40% CC 30 minute winter	244.114	98.433
30 year 1440 minute summer	11.736	3.145	100 year +40% CC 60 minute summer	238.728	63.089
30 year 1440 minute winter	7.887	3.145	100 year +40% CC 60 minute winter	158.605	63.089
30 year +35% CC 15 minute summer	394.459	111.618	100 year +40% CC 120 minute summer	140.344	37.089
30 year +35% CC 15 minute winter	276.814	111.618	100 year +40% CC 120 minute winter	93.241	37.089
30 year +35% CC 30 minute summer	262.429	74.258	100 year +40% CC 180 minute summer	105.512	27.152
30 year +35% CC 30 minute winter	184.161	74.258	100 year +40% CC 180 minute winter	68.586	27.152
30 year +35% CC 60 minute summer	178.659	47.214	100 year +40% CC 240 minute summer	82.356	21.764
30 year +35% CC 60 minute winter	118.697	47.214	100 year +40% CC 240 minute winter	54.715	21.764

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 360 minute summer	61.986	15.951	100 year +40% CC 720 minute summer	35.326	9.468
100 year +40% CC 360 minute winter	40.293	15.951	100 year +40% CC 720 minute winter	23.741	9.468
100 year +40% CC 480 minute summer	48.525	12.824	100 year +40% CC 960 minute summer	29.106	7.664
100 year +40% CC 480 minute winter	32.239	12.824	100 year +40% CC 960 minute winter	19.281	7.664
100 year +40% CC 600 minute summer	39.648	10.845	100 year +40% CC 1440 minute summer	21.291	5.706
100 year +40% CC 600 minute winter	27.090	10.845	100 year +40% CC 1440 minute winter	14.309	5.706

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1.2	10	91.681	0.019	1.2	0.0071	0.0000	OK
15 minute summer	S1.4	10	91.213	0.029	1.2	0.0045	0.0000	OK
15 minute summer	S1.0	10	91.733	0.022	1.1	0.0076	0.0000	OK
15 minute summer	S1.1	10	91.403	0.019	1.8	0.0053	0.0000	OK
15 minute summer	RWH1	10	91.178	0.050	2.9	0.0079	0.0000	OK
960 minute winter	OUT 1	645	89.949	-1.162	0.3	3.6921	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1.2	1.000	S1.4	1.2	0.668	0.033	0.0211	
15 minute summer	S1.4	1.001	RWH1	1.2	0.318	0.080	0.0310	
15 minute summer	S1.0	2.000	S1.1	1.1	0.764	0.042	0.0219	
15 minute summer	S1.1	2.001	RWH1	1.8	0.582	0.034	0.0095	
15 minute summer	RWH1	1.002	OUT 1	2.9	0.600	0.198	0.0122	
960 minute winter	OUT 1	Head/Flow		0.0				0.0
960 minute winter	OUT 1	Infiltration		0.0				3.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1.2	10	91.692	0.030	3.1	0.0112	0.0000	OK
15 minute summer	S1.4	10	91.231	0.047	3.1	0.0074	0.0000	OK
15 minute summer	S1.0	10	91.745	0.034	2.7	0.0119	0.0000	OK
15 minute summer	S1.1	10	91.414	0.030	4.5	0.0083	0.0000	OK
15 minute summer	RWH1	10	91.215	0.087	7.5	0.0138	0.0000	OK
480 minute winter	OUT 1	464	90.361	-0.750	0.8	8.7797	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1.2	1.000	S1.4	3.1	0.877	0.086	0.0418	
15 minute summer	S1.4	1.001	RWH1	3.1	0.406	0.212	0.0635	
15 minute summer	S1.0	2.000	S1.1	2.7	0.989	0.103	0.0419	
15 minute summer	S1.1	2.001	RWH1	4.5	0.872	0.085	0.0194	
15 minute summer	RWH1	1.002	OUT 1	7.5	0.766	0.520	0.0251	
480 minute winter	OUT 1	Head/Flow		0.0				0.0
480 minute winter	OUT 1	Infiltration		0.0				4.2

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1.2	10	91.697	0.035	4.2	0.0130	0.0000	OK
15 minute summer	S1.4	10	91.240	0.056	4.2	0.0090	0.0000	OK
15 minute summer	S1.0	10	91.751	0.040	3.7	0.0140	0.0000	OK
15 minute summer	S1.1	10	91.418	0.034	6.1	0.0097	0.0000	OK
15 minute summer	RWH1	10	91.234	0.106	10.1	0.0169	0.0000	OK
720 minute winter	OUT 1	690	90.673	-0.438	0.8	12.6314	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1.2	1.000	S1.4	4.2	0.949	0.116	0.0533	
15 minute summer	S1.4	1.001	RWH1	4.1	0.426	0.283	0.0809	
15 minute summer	S1.0	2.000	S1.1	3.7	1.083	0.141	0.0524	
15 minute summer	S1.1	2.001	RWH1	6.0	1.006	0.115	0.0244	
15 minute summer	RWH1	1.002	OUT 1	10.0	0.817	0.698	0.0316	
720 minute winter	OUT 1	Head/Flow		0.0				0.0
720 minute winter	OUT 1	Infiltration		0.1				5.6

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1.2	10	91.696	0.034	4.0	0.0127	0.0000	OK
15 minute summer	S1.4	10	91.237	0.053	4.0	0.0085	0.0000	OK
15 minute summer	S1.0	10	91.750	0.039	3.5	0.0136	0.0000	OK
15 minute summer	S1.1	10	91.417	0.033	5.7	0.0094	0.0000	OK
15 minute summer	RWH1	10	91.230	0.102	9.6	0.0162	0.0000	OK
1440 minute winter	OUT 1	1110	90.601	-0.510	0.5	11.7424	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1.2	1.000	S1.4	4.0	0.940	0.110	0.0502	
15 minute summer	S1.4	1.001	RWH1	3.9	0.428	0.271	0.0766	
15 minute summer	S1.0	2.000	S1.1	3.5	1.069	0.134	0.0502	
15 minute summer	S1.1	2.001	RWH1	5.6	0.967	0.108	0.0233	
15 minute summer	RWH1	1.002	OUT 1	9.5	0.807	0.659	0.0302	
1440 minute winter	OUT 1	Head/Flow		0.0				0.0
1440 minute winter	OUT 1	Infiltration		0.1				6.3

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1.2	10	91.702	0.040	5.5	0.0149	0.0000	OK
15 minute summer	S1.4	11	91.264	0.080	5.5	0.0127	0.0000	OK
15 minute summer	S1.0	10	91.757	0.046	4.9	0.0162	0.0000	OK
15 minute summer	S1.1	10	91.424	0.040	8.0	0.0111	0.0000	OK
15 minute summer	RWH1	10	91.257	0.129	13.3	0.0204	0.0000	OK
960 minute winter	OUT 1	915	91.082	-0.029	0.8	17.6864	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S1.2	1.000	S1.4	5.5	0.980	0.152	0.0771	
15 minute summer	S1.4	1.001	RWH1	5.4	0.431	0.374	0.1068	
15 minute summer	S1.0	2.000	S1.1	4.9	1.173	0.187	0.0640	
15 minute summer	S1.1	2.001	RWH1	7.9	1.022	0.151	0.0295	
15 minute summer	RWH1	1.002	OUT 1	13.2	0.890	0.914	0.0378	
960 minute winter	OUT 1	Head/Flow		0.0				0.0
960 minute winter	OUT 1	Infiltration		0.1				7.5

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	200.0		

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S2.0	0.007	91.991	450	533099.727	139117.900	0.600	91.391
S2.1		92.553	450	533101.797	139130.353	1.246	91.307
S2.2	0.009	92.382	450	533089.729	139132.375	1.156	91.226
RWH2		91.910	450	533085.022	139120.366	0.770	91.140
OUT 2		91.810	1	533082.449	139118.245	0.693	91.117

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)
1.000	S2.0	S2.1	12.623	91.391	91.307	0.084	150.3
1.001	S2.1	S2.2	12.237	91.307	91.226	0.081	151.1
1.002	S2.2	RWH2	12.898	91.226	91.140	0.086	150.0
1.003	RWH2	OUT 2	3.335	91.140	91.117	0.023	145.0

Name	US Node	DS Node	US Depth (m)	DS Depth (m)	Σ Area (ha)
1.000	S2.0	S2.1	0.450	1.096	0.007
1.001	S2.1	S2.2	1.096	1.006	0.007
1.002	S2.2	RWH2	1.006	0.620	0.016
1.003	RWH2	OUT 2	0.620	0.543	0.016

Pipeline Schedule

Length (m)	Slope (1:X)	Dia (mm)	US CL (m)	US IL (m)	DS CL (m)	DS IL (m)
12.623	150.3	150	91.991	91.391	92.553	91.307
12.237	151.1	150	92.553	91.307	92.382	91.226
12.898	150.0	150	92.382	91.226	91.910	91.140
3.335	145.0	150	91.910	91.140	91.810	91.117

Node OUT 2 Online Head/Flow Control

Flap Valve x | Replaces Downstream Link x | Invert Level (m) 91.117

Head
(m)
0.001

Flow
(l/s)
0.000

Node OUT 2 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.01296	Safety Factor	2.0	Invert Level (m)	89.670
Side Inf Coefficient (m/hr)	0.01296	Porosity	0.95	Time to half empty (mins)	1050

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	13.0	13.0	1.600	13.0	39.4	1.601	0.0	39.4

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	111.975	31.685	30 year +35% CC 120 minute summer	107.256	28.345
2 year 15 minute winter	78.579	31.685	30 year +35% CC 120 minute winter	71.259	28.345
2 year 30 minute summer	73.507	20.800	30 year +35% CC 180 minute summer	81.369	20.939
2 year 30 minute winter	51.584	20.800	30 year +35% CC 180 minute winter	52.892	20.939
2 year 60 minute summer	49.868	13.179	30 year +35% CC 240 minute summer	63.757	16.849
2 year 60 minute winter	33.131	13.179	30 year +35% CC 240 minute winter	42.359	16.849
2 year 120 minute summer	34.457	9.106	30 year +35% CC 360 minute summer	47.986	12.348
2 year 120 minute winter	22.893	9.106	30 year +35% CC 360 minute winter	31.192	12.348
2 year 180 minute summer	27.828	7.161	30 year +35% CC 480 minute summer	37.389	9.881
2 year 180 minute winter	18.089	7.161	30 year +35% CC 480 minute winter	24.841	9.881
2 year 240 minute summer	22.601	5.973	30 year +35% CC 600 minute summer	30.380	8.310
2 year 240 minute winter	15.015	5.973	30 year +35% CC 600 minute winter	20.758	8.310
2 year 360 minute summer	17.667	4.546	30 year +35% CC 720 minute summer	26.919	7.214
2 year 360 minute winter	11.484	4.546	30 year +35% CC 720 minute winter	18.091	7.214
2 year 480 minute summer	14.071	3.718	30 year +35% CC 960 minute summer	21.957	5.782
2 year 480 minute winter	9.348	3.718	30 year +35% CC 960 minute winter	14.545	5.782
2 year 600 minute summer	11.593	3.171	30 year +35% CC 1440 minute summer	15.844	4.246
2 year 600 minute winter	7.921	3.171	30 year +35% CC 1440 minute winter	10.648	4.246
2 year 720 minute summer	10.369	2.779	100 year 15 minute summer	370.664	104.885
2 year 720 minute winter	6.969	2.779	100 year 15 minute winter	260.115	104.885
2 year 960 minute summer	8.545	2.250	100 year 30 minute summer	248.473	70.309
2 year 960 minute winter	5.660	2.250	100 year 30 minute winter	174.367	70.309
2 year 1440 minute summer	6.227	1.669	100 year 60 minute summer	170.520	45.063
2 year 1440 minute winter	4.185	1.669	100 year 60 minute winter	113.290	45.063
30 year 15 minute summer	292.192	82.680	100 year 120 minute summer	100.246	26.492
30 year 15 minute winter	205.047	82.680	100 year 120 minute winter	66.601	26.492
30 year 30 minute summer	194.392	55.006	100 year 180 minute summer	75.366	19.394
30 year 30 minute winter	136.416	55.006	100 year 180 minute winter	48.990	19.394
30 year 60 minute summer	132.340	34.974	100 year 240 minute summer	58.826	15.546
30 year 60 minute winter	87.924	34.974	100 year 240 minute winter	39.082	15.546
30 year 120 minute summer	79.449	20.996	100 year 360 minute summer	44.276	11.394
30 year 120 minute winter	52.784	20.996	100 year 360 minute winter	28.780	11.394
30 year 180 minute summer	60.273	15.510	100 year 480 minute summer	34.661	9.160
30 year 180 minute winter	39.179	15.510	100 year 480 minute winter	23.028	9.160
30 year 240 minute summer	47.227	12.481	100 year 600 minute summer	28.320	7.746
30 year 240 minute winter	31.377	12.481	100 year 600 minute winter	19.350	7.746
30 year 360 minute summer	35.545	9.147	100 year 720 minute summer	25.233	6.763
30 year 360 minute winter	23.105	9.147	100 year 720 minute winter	16.958	6.763
30 year 480 minute summer	27.696	7.319	100 year 960 minute summer	20.790	5.475
30 year 480 minute winter	18.400	7.319	100 year 960 minute winter	13.772	5.475
30 year 600 minute summer	22.504	6.155	100 year 1440 minute summer	15.208	4.076
30 year 600 minute winter	15.376	6.155	100 year 1440 minute winter	10.221	4.076
30 year 720 minute summer	19.940	5.344	100 year +40% CC 15 minute summer	518.930	146.839
30 year 720 minute winter	13.401	5.344	100 year +40% CC 15 minute winter	364.161	146.839
30 year 960 minute summer	16.264	4.283	100 year +40% CC 30 minute summer	347.863	98.433
30 year 960 minute winter	10.774	4.283	100 year +40% CC 30 minute winter	244.114	98.433
30 year 1440 minute summer	11.736	3.145	100 year +40% CC 60 minute summer	238.728	63.089
30 year 1440 minute winter	7.887	3.145	100 year +40% CC 60 minute winter	158.605	63.089
30 year +35% CC 15 minute summer	394.459	111.618	100 year +40% CC 120 minute summer	140.344	37.089
30 year +35% CC 15 minute winter	276.814	111.618	100 year +40% CC 120 minute winter	93.241	37.089
30 year +35% CC 30 minute summer	262.429	74.258	100 year +40% CC 180 minute summer	105.512	27.152
30 year +35% CC 30 minute winter	184.161	74.258	100 year +40% CC 180 minute winter	68.586	27.152
30 year +35% CC 60 minute summer	178.659	47.214	100 year +40% CC 240 minute summer	82.356	21.764
30 year +35% CC 60 minute winter	118.697	47.214	100 year +40% CC 240 minute winter	54.715	21.764

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +40% CC 360 minute summer	61.986	15.951	100 year +40% CC 720 minute summer	35.326	9.468
100 year +40% CC 360 minute winter	40.293	15.951	100 year +40% CC 720 minute winter	23.741	9.468
100 year +40% CC 480 minute summer	48.525	12.824	100 year +40% CC 960 minute summer	29.106	7.664
100 year +40% CC 480 minute winter	32.239	12.824	100 year +40% CC 960 minute winter	19.281	7.664
100 year +40% CC 600 minute summer	39.648	10.845	100 year +40% CC 1440 minute summer	21.291	5.706
100 year +40% CC 600 minute winter	27.090	10.845	100 year +40% CC 1440 minute winter	14.309	5.706

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S2.0	10	91.421	0.030	1.2	0.0112	0.0000	OK
15 minute summer	S2.1	11	91.336	0.029	1.2	0.0046	0.0000	OK
15 minute summer	S2.2	10	91.272	0.046	2.8	0.0147	0.0000	OK
15 minute summer	RWH2	11	91.188	0.048	2.8	0.0076	0.0000	OK
1440 minute winter	OUT 2	990	90.018	-1.099	0.2	4.2949	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S2.0	1.000	S2.1	1.2	0.493	0.081	0.0301	
15 minute summer	S2.1	1.001	S2.2	1.2	0.339	0.080	0.0421	
15 minute summer	S2.2	1.002	RWH2	2.8	0.596	0.194	0.0607	
15 minute summer	RWH2	1.003	OUT 2	2.8	0.612	0.192	0.0154	
1440 minute winter	OUT 2	Head/Flow		0.0				0.0
1440 minute winter	OUT 2	Infiltration		0.0				3.9

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S2.0	10	91.440	0.049	3.1	0.0183	0.0000	OK
15 minute summer	S2.1	10	91.354	0.047	3.1	0.0074	0.0000	OK
15 minute summer	S2.2	10	91.307	0.081	7.5	0.0261	0.0000	OK
15 minute summer	RWH2	11	91.224	0.084	7.5	0.0134	0.0000	OK
960 minute winter	OUT 2	825	90.413	-0.704	0.5	9.1711	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S2.0	1.000	S2.1	3.1	0.641	0.213	0.0606	
15 minute summer	S2.1	1.001	S2.2	3.1	0.430	0.212	0.0879	
15 minute summer	S2.2	1.002	RWH2	7.5	0.754	0.516	0.1277	
15 minute summer	RWH2	1.003	OUT 2	7.5	0.785	0.508	0.0317	
960 minute winter	OUT 2	Head/Flow		0.0				0.0
960 minute winter	OUT 2	Infiltration		0.0				5.0

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S2.0	10	91.448	0.057	4.2	0.0216	0.0000	OK
15 minute summer	S2.1	10	91.362	0.055	4.2	0.0087	0.0000	OK
15 minute summer	S2.2	10	91.325	0.099	10.2	0.0320	0.0000	OK
15 minute summer	RWH2	11	91.243	0.103	10.1	0.0164	0.0000	OK
960 minute summer	OUT 2	960	90.725	-0.392	1.0	13.0258	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S2.0	1.000	S2.1	4.2	0.695	0.288	0.0756	
15 minute summer	S2.1	1.001	S2.2	4.1	0.453	0.286	0.1112	
15 minute summer	S2.2	1.002	RWH2	10.1	0.799	0.697	0.1627	
15 minute summer	RWH2	1.003	OUT 2	10.1	0.837	0.686	0.0401	
960 minute summer	OUT 2	Head/Flow		0.0				0.0
960 minute summer	OUT 2	Infiltration		0.1				6.3

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S2.0	10	91.447	0.056	4.0	0.0210	0.0000	OK
15 minute summer	S2.1	10	91.360	0.053	4.0	0.0085	0.0000	OK
15 minute summer	S2.2	10	91.321	0.095	9.6	0.0306	0.0000	OK
15 minute summer	RWH2	11	91.239	0.099	9.5	0.0157	0.0000	OK
1440 minute winter	OUT 2	1200	90.674	-0.443	0.5	12.3963	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S2.0	1.000	S2.1	4.0	0.686	0.274	0.0729	
15 minute summer	S2.1	1.001	S2.2	3.9	0.453	0.272	0.1062	
15 minute summer	S2.2	1.002	RWH2	9.5	0.790	0.655	0.1547	
15 minute summer	RWH2	1.003	OUT 2	9.5	0.827	0.645	0.0382	
1440 minute winter	OUT 2	Head/Flow		0.0				0.0
1440 minute winter	OUT 2	Infiltration		0.1				6.7

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S2.0	10	91.458	0.067	5.5	0.0252	0.0000	OK
15 minute summer	S2.1	10	91.370	0.063	5.5	0.0101	0.0000	OK
15 minute summer	S2.2	10	91.352	0.126	13.4	0.0405	0.0000	OK
15 minute summer	RWH2	11	91.267	0.127	13.2	0.0202	0.0000	OK
1440 minute summer	OUT 2	1410	91.194	0.077	1.0	18.8180	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	S2.0	1.000	S2.1	5.5	0.745	0.378	0.0926	
15 minute summer	S2.1	1.001	S2.2	5.4	0.463	0.376	0.1399	
15 minute summer	S2.2	1.002	RWH2	13.2	0.835	0.912	0.2038	
15 minute summer	RWH2	1.003	OUT 2	13.2	0.898	0.899	0.0489	
1440 minute summer	OUT 2	Head/Flow		0.0				0.0
1440 minute summer	OUT 2	Infiltration		0.1				9.2

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	1	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	200.0		

Nodes

Name	Area (ha)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
PP1	0.053	93.801	1	533115.327	139194.511	0.450	93.351
S3.0	0.009	92.781	450	533108.311	139132.515	0.588	92.193
S3.1		92.903	450	533102.082	139143.078	0.793	92.110
S3.2	0.007	92.874	450	533118.874	139137.436	0.745	92.129
RWH3		93.024	450	533111.877	139149.849	1.045	91.979
SOAK ROAD		93.012	450	533109.938	139152.790	1.075	91.937
OUT 3		92.994	1	533107.544	139153.641	1.074	91.920

Links

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)
1.000	PP1	SOAK ROAD	42.067	93.351	92.588	0.763	55.1
2.000	S3.0	S3.1	12.263	92.193	92.110	0.083	147.7
2.001	S3.1	RWH3	11.908	92.110	91.979	0.131	90.9
3.000	S3.2	RWH3	14.249	92.129	92.051	0.078	182.7
2.002	RWH3	SOAK ROAD	3.523	91.979	91.937	0.042	83.9
1.001	SOAK ROAD	OUT 3	2.541	91.937	91.920	0.017	150.0

Name	US Node	DS Node	US Depth (m)	DS Depth (m)	Σ Area (ha)
1.000	PP1	SOAK ROAD	0.225	0.199	0.053
2.000	S3.0	S3.1	0.438	0.643	0.009
2.001	S3.1	RWH3	0.643	0.895	0.009
3.000	S3.2	RWH3	0.595	0.823	0.007
2.002	RWH3	SOAK ROAD	0.895	0.925	0.016
1.001	SOAK ROAD	OUT 3	0.925	0.924	0.069

Pipeline Schedule

Length (m)	Slope (1:X)	Dia (mm)	US CL (m)	US IL (m)	DS CL (m)	DS IL (m)
42.067	55.1	225	93.801	93.351	93.012	92.588
12.263	147.7	150	92.781	92.193	92.903	92.110
11.908	90.9	150	92.903	92.110	93.024	91.979
14.249	182.7	150	92.874	92.129	93.024	92.051
3.523	83.9	150	93.024	91.979	93.012	91.937
2.541	150.0	150	93.012	91.937	92.994	91.920

Node OUT 3 Online Head/Flow Control

Flap Valve x | Replaces Downstream Link x | Invert Level (m) 91.920

Head
(m)
0.001

Flow
(l/s)
0.000

Node OUT 3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.01296	Safety Factor	2.0	Invert Level (m)	90.487
Side Inf Coefficient (m/hr)	0.01296	Porosity	0.95	Time to half empty (mins)	960

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	64.0	64.0	1.600	64.0	128.0	1.601	0.0	128.0

Node SOAK ROAD Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.01296	Invert Level (m)	92.650	Slope (1:X)	55.0
Side Inf Coefficient (m/hr)	0.01296	Time to half empty (mins)		Depth (m)	0.200
Safety Factor	2.0	Width (m)	4.800	Inf Depth (m)	
Porosity	0.30	Length (m)	100.000		

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
2 year 15 minute summer	111.975	31.685	30 year 720 minute summer	19.940	5.344
2 year 15 minute winter	78.579	31.685	30 year 720 minute winter	13.401	5.344
2 year 30 minute summer	73.507	20.800	30 year 960 minute summer	16.264	4.283
2 year 30 minute winter	51.584	20.800	30 year 960 minute winter	10.774	4.283
2 year 60 minute summer	49.868	13.179	30 year 1440 minute summer	11.736	3.145
2 year 60 minute winter	33.131	13.179	30 year 1440 minute winter	7.887	3.145
2 year 120 minute summer	34.457	9.106	30 year +35% CC 15 minute summer	394.459	111.618
2 year 120 minute winter	22.893	9.106	30 year +35% CC 15 minute winter	276.814	111.618
2 year 180 minute summer	27.828	7.161	30 year +35% CC 30 minute summer	262.429	74.258
2 year 180 minute winter	18.089	7.161	30 year +35% CC 30 minute winter	184.161	74.258
2 year 240 minute summer	22.601	5.973	30 year +35% CC 60 minute summer	178.659	47.214
2 year 240 minute winter	15.015	5.973	30 year +35% CC 60 minute winter	118.697	47.214
2 year 360 minute summer	17.667	4.546	30 year +35% CC 120 minute summer	107.256	28.345
2 year 360 minute winter	11.484	4.546	30 year +35% CC 120 minute winter	71.259	28.345
2 year 480 minute summer	14.071	3.718	30 year +35% CC 180 minute summer	81.369	20.939
2 year 480 minute winter	9.348	3.718	30 year +35% CC 180 minute winter	52.892	20.939
2 year 600 minute summer	11.593	3.171	30 year +35% CC 240 minute summer	63.757	16.849
2 year 600 minute winter	7.921	3.171	30 year +35% CC 240 minute winter	42.359	16.849
2 year 720 minute summer	10.369	2.779	30 year +35% CC 360 minute summer	47.986	12.348
2 year 720 minute winter	6.969	2.779	30 year +35% CC 360 minute winter	31.192	12.348
2 year 960 minute summer	8.545	2.250	30 year +35% CC 480 minute summer	37.389	9.881
2 year 960 minute winter	5.660	2.250	30 year +35% CC 480 minute winter	24.841	9.881
2 year 1440 minute summer	6.227	1.669	30 year +35% CC 600 minute summer	30.380	8.310
2 year 1440 minute winter	4.185	1.669	30 year +35% CC 600 minute winter	20.758	8.310
30 year 15 minute summer	292.192	82.680	30 year +35% CC 720 minute summer	26.919	7.214
30 year 15 minute winter	205.047	82.680	30 year +35% CC 720 minute winter	18.091	7.214
30 year 30 minute summer	194.392	55.006	30 year +35% CC 960 minute summer	21.957	5.782
30 year 30 minute winter	136.416	55.006	30 year +35% CC 960 minute winter	14.545	5.782
30 year 60 minute summer	132.340	34.974	30 year +35% CC 1440 minute summer	15.844	4.246
30 year 60 minute winter	87.924	34.974	30 year +35% CC 1440 minute winter	10.648	4.246
30 year 120 minute summer	79.449	20.996	100 year 15 minute summer	370.664	104.885
30 year 120 minute winter	52.784	20.996	100 year 15 minute winter	260.115	104.885
30 year 180 minute summer	60.273	15.510	100 year 30 minute summer	248.473	70.309
30 year 180 minute winter	39.179	15.510	100 year 30 minute winter	174.367	70.309
30 year 240 minute summer	47.227	12.481	100 year 60 minute summer	170.520	45.063
30 year 240 minute winter	31.377	12.481	100 year 60 minute winter	113.290	45.063
30 year 360 minute summer	35.545	9.147	100 year 120 minute summer	100.246	26.492
30 year 360 minute winter	23.105	9.147	100 year 120 minute winter	66.601	26.492
30 year 480 minute summer	27.696	7.319	100 year 180 minute summer	75.366	19.394
30 year 480 minute winter	18.400	7.319	100 year 180 minute winter	48.990	19.394
30 year 600 minute summer	22.504	6.155	100 year 240 minute summer	58.826	15.546
30 year 600 minute winter	15.376	6.155	100 year 240 minute winter	39.082	15.546

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)	Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year 360 minute summer	44.276	11.394	100 year +40% CC 120 minute summer	140.344	37.089
100 year 360 minute winter	28.780	11.394	100 year +40% CC 120 minute winter	93.241	37.089
100 year 480 minute summer	34.661	9.160	100 year +40% CC 180 minute summer	105.512	27.152
100 year 480 minute winter	23.028	9.160	100 year +40% CC 180 minute winter	68.586	27.152
100 year 600 minute summer	28.320	7.746	100 year +40% CC 240 minute summer	82.356	21.764
100 year 600 minute winter	19.350	7.746	100 year +40% CC 240 minute winter	54.715	21.764
100 year 720 minute summer	25.233	6.763	100 year +40% CC 360 minute summer	61.986	15.951
100 year 720 minute winter	16.958	6.763	100 year +40% CC 360 minute winter	40.293	15.951
100 year 960 minute summer	20.790	5.475	100 year +40% CC 480 minute summer	48.525	12.824
100 year 960 minute winter	13.772	5.475	100 year +40% CC 480 minute winter	32.239	12.824
100 year 1440 minute summer	15.208	4.076	100 year +40% CC 600 minute summer	39.648	10.845
100 year 1440 minute winter	10.221	4.076	100 year +40% CC 600 minute winter	27.090	10.845
100 year +40% CC 15 minute summer	518.930	146.839	100 year +40% CC 720 minute summer	35.326	9.468
100 year +40% CC 15 minute winter	364.161	146.839	100 year +40% CC 720 minute winter	23.741	9.468
100 year +40% CC 30 minute summer	347.863	98.433	100 year +40% CC 960 minute summer	29.106	7.664
100 year +40% CC 30 minute winter	244.114	98.433	100 year +40% CC 960 minute winter	19.281	7.664
100 year +40% CC 60 minute summer	238.728	63.089	100 year +40% CC 1440 minute summer	21.291	5.706
100 year +40% CC 60 minute winter	158.605	63.089	100 year +40% CC 1440 minute winter	14.309	5.706

Results for 2 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	PP1	11	93.407	0.056	9.7	0.1323	0.0000	OK
15 minute summer	S3.0	10	92.229	0.036	1.7	0.0171	0.0000	OK
15 minute summer	S3.1	10	92.140	0.030	1.7	0.0048	0.0000	OK
15 minute summer	S3.2	10	92.160	0.031	1.2	0.0103	0.0000	OK
15 minute summer	RWH3	11	92.059	0.080	2.8	0.0128	0.0000	OK
15 minute summer	SOAK ROAD	11	92.059	0.122	12.2	0.0194	0.0000	OK
1440 minute winter	OUT 3	1110	90.794	-1.126	0.8	18.6470	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	PP1	1.000	SOAK ROAD	9.4	1.230	0.134	0.3217	
15 minute summer	S3.0	2.000	S3.1	1.7	0.589	0.115	0.0350	
15 minute summer	S3.1	2.001	RWH3	1.6	0.408	0.088	0.0720	
15 minute summer	S3.2	3.000	RWH3	1.1	0.455	0.088	0.0361	
15 minute summer	RWH3	2.002	SOAK ROAD	2.8	0.290	0.146	0.0439	
15 minute summer	SOAK ROAD	1.001	OUT 3	12.3	0.868	0.849	0.0358	
15 minute summer	SOAK ROAD	Infiltration		0.0				0.0
1440 minute winter	OUT 3	Head/Flow		0.0				0.0
1440 minute winter	OUT 3	Infiltration		0.1				19.3

Results for 30 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	PP1	10	93.446	0.095	25.3	0.2226	0.0000	OK
15 minute summer	S3.0	9	92.250	0.057	4.5	0.0275	0.0000	OK
15 minute summer	S3.1	11	92.245	0.135	4.5	0.0215	0.0000	OK
15 minute summer	S3.2	11	92.244	0.115	3.1	0.0386	0.0000	OK
15 minute summer	RWH3	11	92.239	0.260	7.5	0.0413	0.0000	SURCHARGED
15 minute summer	SOAK ROAD	11	92.229	0.292	31.3	0.0464	0.0000	SURCHARGED
960 minute winter	OUT 3	945	91.144	-0.776	2.1	39.9505	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	PP1	1.000	SOAK ROAD	24.7	1.599	0.352	0.6516	
15 minute summer	S3.0	2.000	S3.1	4.5	0.717	0.307	0.1395	
15 minute summer	S3.1	2.001	RWH3	4.5	0.452	0.244	0.2042	
15 minute summer	S3.2	3.000	RWH3	2.9	0.459	0.223	0.2290	
15 minute summer	RWH3	2.002	SOAK ROAD	8.5	0.484	0.439	0.0620	
15 minute summer	SOAK ROAD	1.001	OUT 3	31.2	1.775	2.161	0.0443	
15 minute summer	SOAK ROAD	Infiltration		0.0				0.0
960 minute winter	OUT 3	Head/Flow		0.0				0.0
960 minute winter	OUT 3	Infiltration		0.2				20.0

Results for 30 year +35% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	PP1	10	93.464	0.113	34.1	0.2655	0.0000	OK
15 minute summer	S3.0	11	92.391	0.198	6.1	0.0950	0.0000	SURCHARGED
15 minute summer	S3.1	11	92.377	0.267	5.6	0.0424	0.0000	SURCHARGED
15 minute summer	S3.2	11	92.372	0.243	4.2	0.0813	0.0000	SURCHARGED
15 minute summer	RWH3	11	92.364	0.385	10.2	0.0612	0.0000	SURCHARGED
15 minute summer	SOAK ROAD	11	92.350	0.413	41.3	0.0657	0.0000	SURCHARGED
1440 minute winter	OUT 3	1410	91.447	-0.473	2.1	58.3656	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	PP1	1.000	SOAK ROAD	33.4	1.724	0.476	0.8171	
15 minute summer	S3.0	2.000	S3.1	5.6	0.768	0.387	0.2159	
15 minute summer	S3.1	2.001	RWH3	6.4	0.455	0.343	0.2096	
15 minute summer	S3.2	3.000	RWH3	3.9	0.501	0.299	0.2509	
15 minute summer	RWH3	2.002	SOAK ROAD	11.8	0.671	0.609	0.0620	
15 minute summer	SOAK ROAD	1.001	OUT 3	41.0	2.331	2.838	0.0443	
15 minute summer	SOAK ROAD	Infiltration		0.0				0.0
1440 minute winter	OUT 3	Head/Flow		0.0				0.0
1440 minute winter	OUT 3	Infiltration		0.2				26.6

Results for 100 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	PP1	10	93.460	0.109	32.1	0.2559	0.0000	OK
15 minute summer	S3.0	11	92.356	0.163	5.7	0.0779	0.0000	SURCHARGED
15 minute summer	S3.1	11	92.343	0.233	5.3	0.0371	0.0000	SURCHARGED
15 minute summer	S3.2	11	92.340	0.211	4.0	0.0706	0.0000	SURCHARGED
15 minute summer	RWH3	11	92.332	0.353	9.6	0.0562	0.0000	SURCHARGED
15 minute summer	SOAK ROAD	11	92.319	0.382	39.0	0.0608	0.0000	SURCHARGED
1440 minute winter	OUT 3	1380	91.400	-0.520	2.0	55.5374	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	PP1	1.000	SOAK ROAD	31.4	1.698	0.448	0.7797	
15 minute summer	S3.0	2.000	S3.1	5.3	0.767	0.362	0.2159	
15 minute summer	S3.1	2.001	RWH3	6.0	0.441	0.324	0.2096	
15 minute summer	S3.2	3.000	RWH3	3.7	0.492	0.282	0.2509	
15 minute summer	RWH3	2.002	SOAK ROAD	11.0	0.627	0.569	0.0620	
15 minute summer	SOAK ROAD	1.001	OUT 3	38.8	2.203	2.683	0.0443	
15 minute summer	SOAK ROAD	Infiltration		0.0				0.0
1440 minute winter	OUT 3	Head/Flow		0.0				0.0
1440 minute winter	OUT 3	Infiltration		0.2				26.1

Results for 100 year +40% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	PP1	10	93.485	0.134	44.9	0.3160	0.0000	OK
15 minute summer	S3.0	12	92.608	0.415	8.0	0.1986	0.0000	FLOOD RISK
15 minute summer	S3.1	12	92.585	0.475	6.8	0.0754	0.0000	SURCHARGED
15 minute summer	S3.2	12	92.572	0.443	5.5	0.1482	0.0000	SURCHARGED
15 minute summer	RWH3	12	92.557	0.578	13.6	0.0919	0.0000	SURCHARGED
15 minute summer	SOAK ROAD	11	92.532	0.595	53.0	0.0947	0.0000	SURCHARGED
1440 minute winter	OUT 3	1410	91.838	-0.082	2.8	82.1426	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute summer	PP1	1.000	SOAK ROAD	44.0	1.837	0.627	1.0099	
15 minute summer	S3.0	2.000	S3.1	6.8	0.738	0.465	0.2159	
15 minute summer	S3.1	2.001	RWH3	8.5	0.481	0.454	0.2096	
15 minute summer	S3.2	3.000	RWH3	5.1	0.483	0.390	0.2509	
15 minute summer	RWH3	2.002	SOAK ROAD	15.9	0.902	0.819	0.0620	
15 minute summer	SOAK ROAD	1.001	OUT 3	52.4	2.978	3.626	0.0443	
15 minute summer	SOAK ROAD	Infiltration		0.0				0.0
1440 minute winter	OUT 3	Head/Flow		0.0				0.0
1440 minute winter	OUT 3	Infiltration		0.2				30.5

Manholes and Inspection Chambers

Schedule	Action Required	Frequency
Regular maintenance	Lift covers and ensure there are no blockages. Inspect and identify any parts that are not operating correctly and rectify.	For 3 months following installation
	Ensure covers are in a good state of repair.	Monthly
	Inspect manholes, and inspection chambers, to ensure that the drainage system is running freely.	Six monthly and every Autumn after leaf fall
Occasional maintenance	High pressure jetting (to Water Jetting Association standards) and CCTV where necessary.	Every 2 – 4 years
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repair. • System rehabilitation following a pollution event. • Manhole cover replacement. • Repairs to brickwork or concrete. • Channel repair.	As required (tasks to repair problems due to wear, damage or vandalism).

Catchpits

Schedule	Action Required	Frequency
Regular maintenance	Lift covers and ensure there are no blockages. Inspect and identify any parts that are not operating correctly and rectify. Inspect silt storage in sump. Remove silt as required using sub-contractor with vacuum suction plant.	For 3 months following installation
	Ensure covers are in a good state of repair. Repair/replace as necessary.	Monthly
	Inspect catchpits to ensure that the drainage is running freely, and free of debris. Inspect silt storage in sump. Remove silt as required using sub-contractor with vacuum suction plant.	Six Monthly and every autumn after leaf fall
Occasional maintenance	High pressure jetting (to Water Jetting Association standards) and CCTV where necessary. Remediate any chamber structural defects, or any defects that may reduce the free flow of water.	Every 2 – 4 Years
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repair. • System rehabilitation following a pollution event. • Manhole cover replacement. • Repairs to brickwork or concrete.	As required (tasks to repair problems due to wear, damage or vandalism).

Linear Drains

Schedule	Action Required	Frequency
Regular maintenance	Inspect linear drains to ensure there are no blockages at surface level. Lift covers to outflow sumps and check for blockages or siltation. Inspect and identify any parts that are not operating correctly and rectify.	For 3 months following installation
	Inspect linear drains to ensure that there are no blockages at surface level.	Monthly
	Lift covers to outflow sumps and check for blockages or siltation.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Jetting of linear drains and vacuum suction of outlet sumps (to Water Jetting Association standards). CCTV where necessary.	Every 1 – 2 Years
Remedial maintenance	- Silt removal. - Inlet/outlet repair. - Erosion repair. - System rehabilitation following a pollution event. - Linear drain cover replacement. - Channel repair. - Ensure that impermeable surfaces surrounding linear drains have not settled below top of linear drain level, causing ponding.	As required (tasks to repair problems due to wear, damage or vandalism).

Gullies

Schedule	Action Required	Frequency
Regular maintenance	Inspect to ensure that there are no blockages at surface level, and that the outfall is operating effectively. Inspect and identify any parts that are not operating correctly and rectify.	For 3 months following installation
	Ensure that there are no blockages at surface level.	Monthly
	Lift covers to check for blockages or siltation.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Remove oil and silt using specialist vacuum suction plant.	Every 1 – 2 Years
Remedial maintenance	• Silt removal. • Inlet/outlet repair. • Erosion repair. • System rehabilitation following a pollution event. • Cover replacement. • Structural failure of gully pot. • Ensure that impermeable surfaces surrounding linear drains have not settled below top of gully cover level, causing ponding.	As required (tasks to repair problems due to wear, damage or vandalism).

Pipework

Schedule	Action Required	Frequency
Regular maintenance	Refer to manufacturer's specification. Inspect and identify any parts that are not operating correctly, consult supplier and rectify as required.	For 3 months following installation
	Monitor working of drainage at ground level. If there is localised flooding check the condition of all system elements.	Monthly
	Lift manholes covers to check for blockages. Remove sediment from pre-treatment structures, gullies, catchpits etc.	Six Monthly and every autumn after leaf fall
Occasional maintenance	Jetting of pipe runs (to Water Jetting Association standards). Remediate as necessary.	Every 1 – 2 Years
Remedial maintenance	Inspect, and carry out remediation works to ensure that the features are in fully working order.	As required (tasks to repair problems due to wear, damage or vandalism).

Rainwater Harvesting

Any property with an RWH system installed should be provided with appropriate information as to what equipment has been installed, its purpose, its operation and maintenance requirements, the actions needed to address any potential failure and the expected performance of the system. Information on the options for external maintenance support should also be provided.

Most systems require periodic checking and maintenance to ensure trouble-free and reliable operation. There are wide differences in the extent of maintenance required for different systems, and manufacturers' guidelines should always be followed. The table provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions may not always be required.

Maintenance requirements are largely dependent on the runoff source and the runoff use (and thus treatment processes provided). This will range from weekly input through to rare intervention. Routine inspection of the filter system at quarterly annual intervals is advised, even if they do not appear to need specific intervention. Pumps need very little attention, but their design life is generally regarded as only being 10 years. Where automatic provision of potable water occurs (if and when rainwater is either not available or the system has failed), it is useful to have sensor warnings relayed in such a manner as to inform the user of the current status of the system.

RWH systems should be designed so that when there is an absence of rain, or a need to disconnect the system for maintenance or repair, that potable water is safely available for all appliances to avoid inconvenience.

Tanks should be accessible for internal inspection, and the cover should preferably be lockable. For more guidance on operation and maintenance of RWH systems, see BS 8515:2009+A1:2013.

Activity	Action Required	Frequency
Regular maintenance	Inspection of the tank for debris and sediment build-up, inlets/outlets/withdrawal devices, overflow areas, pumps, filters. Cleaning of tank, inlets, outlets, withdrawal devices and roof drain filters of silts and other debris.	Annually (and following poor performance)
Occasional maintenance	Cleaning and/or replacement of any filters.	3 Monthly (or as required)
Remedial maintenance	Repair of overflow erosion damage or damage to tank. Pump repairs.	As required

The maintenance responsibility for an RWH system is usually with the owner of the property, but any communal systems require the participating community to be informed of the system, as detailed, but also be provided with information of who the organization is that is maintaining the system and any financial commitments and any legally binding maintenance agreement.

Infiltration Systems - Soakaways

The design of soakaways, infiltration trenches and blankets should include monitoring points where the water level in the system can be observed or measured. This can either be via an inspection well or inspection cover (where the attenuation storage space is a void). For larger installations the inspection access should provide a clear view of the infiltration surface (even if the storage zone is filled). For small, filled soakaways, a 50 mm perforated pipe is adequate.

The useful life and effective operation of an infiltration component is related to the frequency of maintenance and the risk of sediment being introduced into the system.

An easement should be considered where multiple properties discharge to a single soakaway, to ensure long-term access for maintenance purposes.

The table provides guidance on the type of operational and maintenance requirements that may be appropriate for soakaways. The list of actions is not exhaustive and some actions may not always be required.

Activity	Action Required	Frequency
Regular inspections	Inspect for sediment and debris in pre-treatment components and sump of borehole chamber. Cleaning of gutters and any filters on downpipes. Trimming any roots that may be causing blockages	Annually or as required
Occasional maintenance	Remove sediment and debris from pre-treatment components sump of borehole chamber.	As required based on inspections
Monitoring	Inspect silt traps and note rate of sediment accumulation.	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring.	Annually
Remedial maintenance	Reconstruct soakaway and/or replace if performance deteriorates or failure occurs.	As required

Bioretention Systems (Rain Garden)

Dalrymple (2013) concluded that bioretention systems will typically require approximately 2.5 times more maintenance than typical landscape designs. Bioretention systems will require regular maintenance to ensure continuing operation to design performance standards, and all designers should provide detailed specifications and frequencies for the required maintenance activities along with likely machinery requirements and typical annual costs – within the Maintenance Plan. The treatment performance of bioretention systems is dependent on maintenance, and robust management plans will be required to ensure that maintenance is carried out in the long term. Different designs will have different operation and maintenance requirements, but this section gives some generic guidance. Ease of access for maintenance and inspection is essential.

The main cause of failure of bioretention systems is clogging of the surface, which is easily visible. Underdrains and drainage layers are beneath the ground, and malfunctioning is not so easy to detect and therefore could potentially be ignored. However, the results of any malfunction are likely to cause surface ponding. The clogging of the surface or drainage layers can cause poor outflow water quality due to water bypassing the filter medium to the overflow more frequently than allowed for. During the first few months after installation, the system should be visually inspected after rainfall events, and the amount of deposition measured, to give the operator an idea of the expected rate of sediment deposition. After this initial period, systems should be inspected each quarter, to verify the appropriate level of maintenance. Adequate access should be provided for all bioretention areas for inspection and maintenance, including for the appropriate equipment and vehicles.

Litter picking should be frequent, as rubbish is detrimental to the visual appearance of bioretention systems. Frequent street sweeping in the catchment area will increase the time interval between cleaning out forebays or the filter surface and will reduce the loading of fine suspended solids that can potentially clog the filter medium.

All vegetation management activities should take account of the need to maximize biosecurity and prevent the spread of invasive species.

Maintenance responsibility for all systems should be placed with an appropriate organization, and Maintenance Plans and schedules should be developed during the design phase. The table provides guidance on the type of operation and maintenance schedule that may be appropriate. The list of actions is not exhaustive and some actions may not always be required. The most intensive maintenance is required during the establishment period. Herbicides and pesticides (such as Roundup) and fertilizers should not be used on bioretention systems. This is because these pollutants will wash through the system quite easily.

Sediments excavated from pre-treatment devices that receive runoff from residential or standard road and roof areas are generally not toxic or hazardous material and can therefore be safely disposed of by either land application or landfilling. However, consultation should take place with the environmental regulator to confirm appropriate protocols. Sediment testing may be required before sediment excavation, to determine its classification and appropriate disposal methods. For industrial site runoff, sediment testing will be essential. In the majority of cases, it will be acceptable to distribute the sediment on site, if there is an appropriate safe and acceptable location to do so. Proper disposal of sediment and debris removed must be ensured, and the environmental regulator should be approached for advice where there are any doubts concerning disposal options.

Specific maintenance needs of the bioretention area should be monitored, and maintenance schedules adjusted to suit requirements.

In general, the maintenance for bioretention areas can often be undertaken as part of routine landscape maintenance.

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.

Activity	Action Required	Frequency
Regular Inspection	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary. Assess plants for disease infection, poor growth, invasive species etc and replace as necessary. Inspect inlets and outlets for blockage.	Quarterly
	Check operation of underdrains by inspection of flows after rain.	Annually
Regular maintenance	Remove litter and surface debris and weeds.	Quarterly
	Replace any plants to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays.	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required. Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch.	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be >20 years

Pervious Pavements

Regular inspection and maintenance is important for the effective operation of pervious pavements. Maintenance responsibility for a pervious pavement and its surrounding area should be placed with an appropriate responsible organization. Before handing over the pavement to the client, it should

be inspected for clogging, litter, weeds and water ponding, and all failures should be rectified. After handover, the pavement should be inspected regularly, preferably during and after heavy rainfall to check effective operation and to identify any areas of ponding.

Pervious pavements need to be regularly cleaned of silt and other sediments to preserve their infiltration capacity. Extensive experience suggests that sweeping once per year should be sufficient to maintain an acceptable infiltration rate on most sites. However, in some instances, more or less sweeping may be required and the frequency should be adjusted to suit site-specific circumstances and should be informed by inspection reports.

A brush and suction cleaner (which can be a lorry-mounted device or a smaller precinct sweeper) should be used for regular sweeping. Care should be taken in adjusting vacuuming equipment to avoid removal of jointing material. Any lost material should be replaced. It is also possible to clean the surface using lightweight rotating brush cleaners combined with power spraying using hot water, as shown in **Figure 20.30 of CIRIA SuDS Manual 2015**. This is done every two years at the site shown.

If the surface has clogged then a more specialist sweeper with water jetting and oscillating and rotating brushes may be required, especially for porous asphalt surfaces, to restore the surface infiltration rate to an acceptable level. The specialist equipment should be adjusted so that it does not strip binder from the aggregate in the asphalt. The likely design life of grass reinforcement will be dictated by trafficking and is likely to be about 20 years if designed correctly. For concrete block permeable paving the design life should be no different from standard paving, assuming that an effective maintenance regime is in place to minimize risks of infiltration clogging. Porous asphalt will lose strength and begin to fatigue due to oxidation of the binder. This is likely to occur slightly faster in porous asphalt than normal asphalt, so the design life will be reduced slightly. Porous concrete should have a similar design life to a normal concrete slab.

The reconstruction of failed areas of concrete block pavement should be less costly and disruptive than the rehabilitation of continuous concrete or asphalt porous surfaces due to the reduced area that is likely to be affected. Materials removed from the voids or the layers below the surface may contain heavy metals and hydrocarbons and may need to be disposed of as controlled waste. Sediment testing should be carried out before disposal to confirm its classification and appropriate disposal methods.

The table provides guidance on the type of operational and maintenance requirements that may be appropriate. The list of actions is not exhaustive and some actions may not always be required.

Maintenance Plans and schedules should be prepared during the design phase. Specific maintenance needs of the pervious pavement should be monitored, and maintenance schedules adjusted to suit requirements.

Many of the specific maintenance activities for pervious pavements can be undertaken as part of a general site cleaning contract (many car parks or roads are swept to remove litter and for visual reasons to keep them tidy) and therefore, if litter management is already required at site, this should have marginal cost implications.

Generally, pervious pavements require less frequent gritting in winter to prevent ice formation. There is also less risk of ice formation after snow melt, as the melt water drains directly into the underlying sub-base and does not have chance to refreeze. A slight frost may occur more frequently on the surface of pervious pavements compared to adjacent impermeable surfaces, but this is only likely to last for a few hours. It does not happen in all installations and, if necessary, this can be dealt with by application of salt. It is not likely to pose a hazard to vehicle movements.

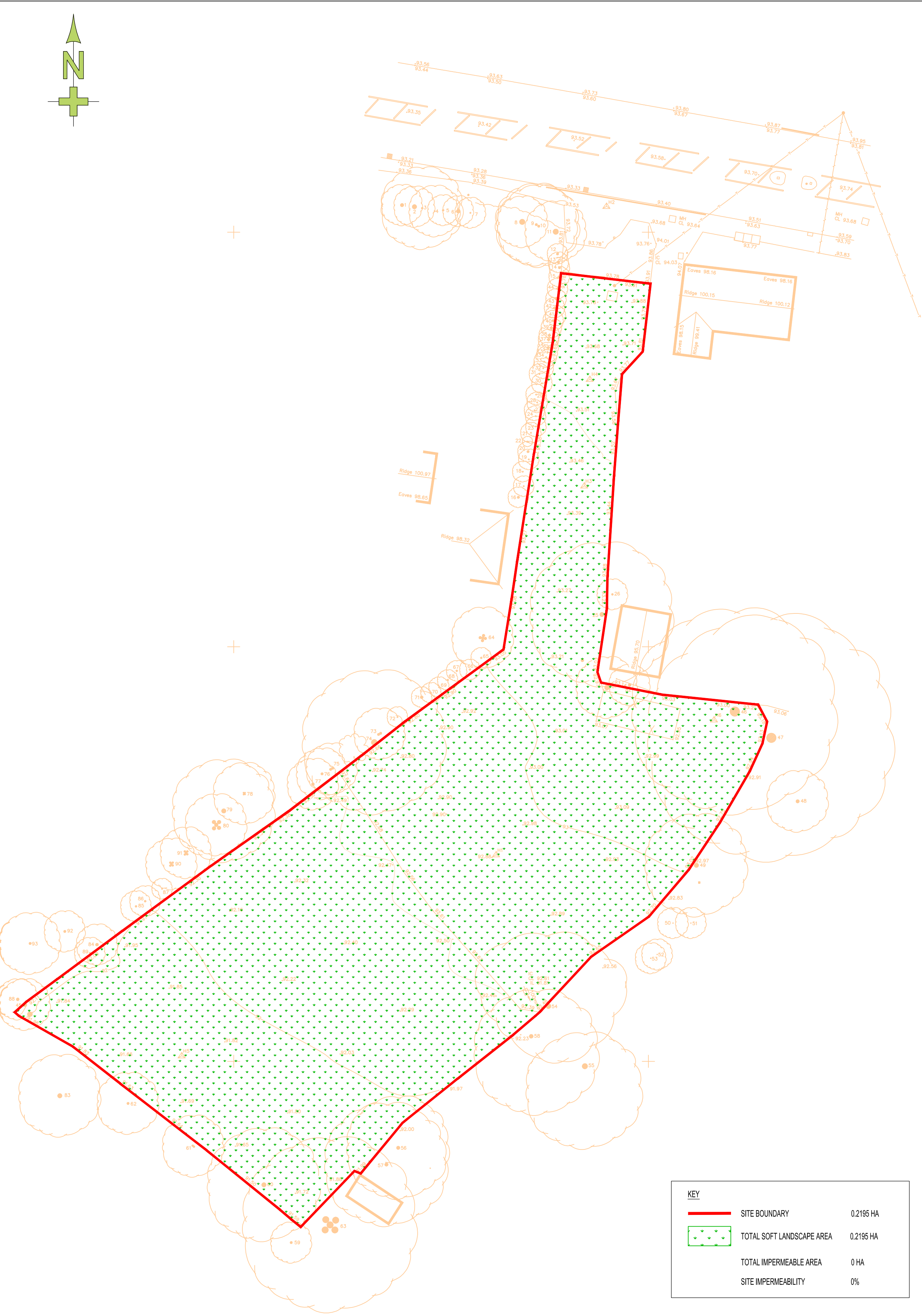
Activity	Action Required	Frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas. Removal of weeds or management using glyphosate applied directly into weeds by an applicator rather than spraying.	As required
Remedial actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving. Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material.	As required
	Rehabilitation of surface and upper substructure by remedial sweeping.	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection.	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action.	Three-monthly, 48 hr after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies. Monitor inspection chambers	Annually

CDM 2015 requires designers to ensure that all maintenance risks have been identified, eliminated, reduced and/or controlled where appropriate. This information will be required as part of the health and safety file.

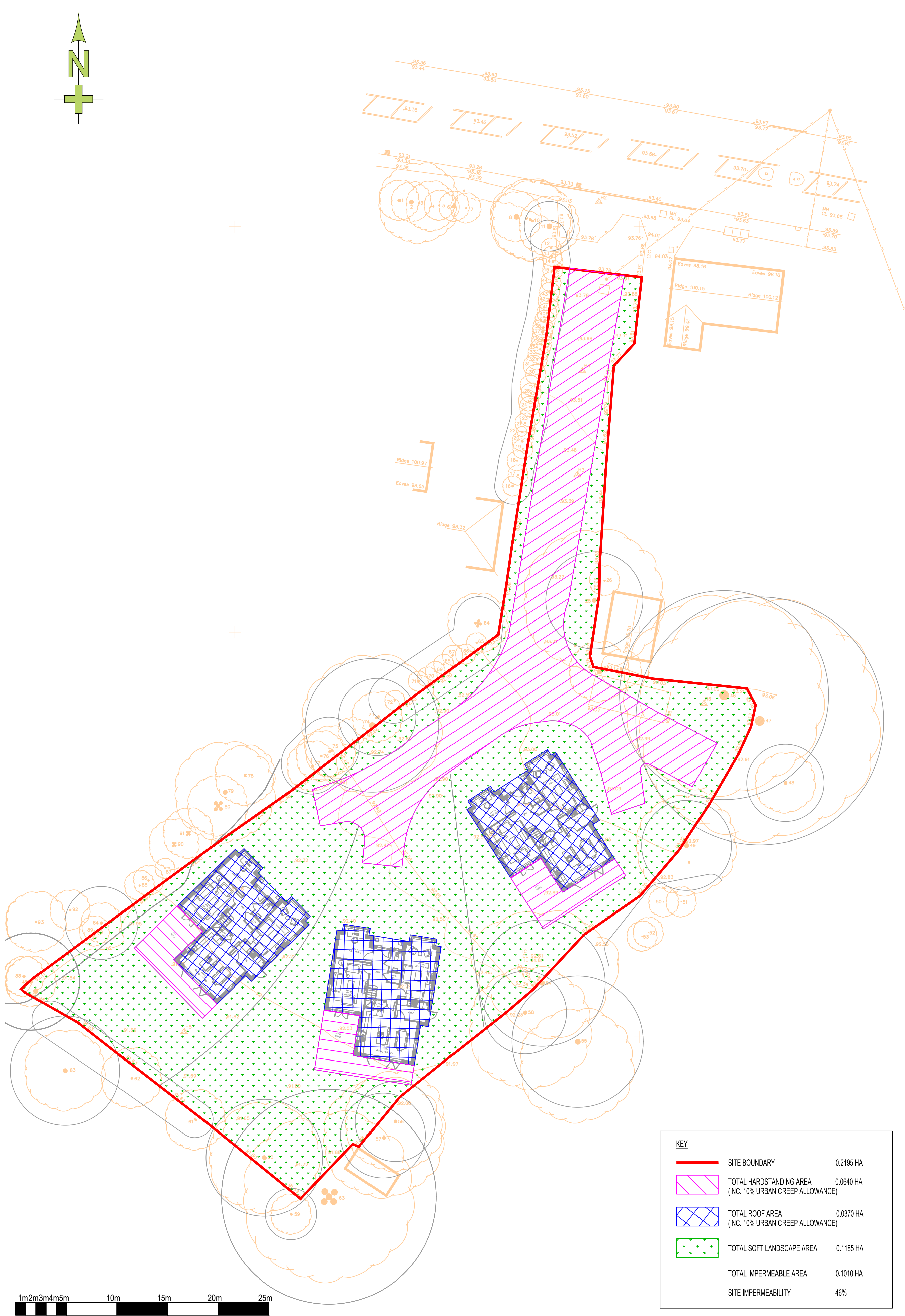
Appendix 6

Pre & Post-Development Impermeable Area Plans

Conceptual Drainage Layout



PRE DEVELOPMENT IMPERMEABLE AREA PLAN



POST DEVELOPMENT IMPERMEABLE AREA PLAN

Notes:
1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS ASSOCIATED WITH THIS PROJECT.
3. THE DEVELOPMENT LAYOUT HAS BEEN TAKEN FROM ???????S ??? DRG. NO. ??? REV ?? DATED ?? & THE SURVEY FROM HOOK SURVEYS TOPOGRAPHICAL LAND SURVEY DRG. NO. S28/11029/01 REV A DATED JULY 2026
4. ALL DRAINAGE WORKS SHALL BE DESIGNED IN ACCORDANCE WITH 'DESIGN AND CONSTRUCTION GUIDANCE FOR FOUL & SURFACE WATER SEWERS OFFERED FOR ADOPTION' (DCG) APPROVED CURRENT VERSION.

A	FOR APPROVAL	SGS	CJM	13.10.26
Rev	Description	Drm	Chk	Date



Civil & Structural Engineering Consultants
The Old Engine House, Goblands Farm Business Park
Court Lane, Hadlow, Kent, TN11 0DP
Tel 01732 851416
email: engineering@bdr.uk.com

Client
STEADFAST HOMES DESIGN LTD

Project
HEATHERVIEW COTTAGES
COPTHORNE COMMON ROAD
COPTHORNE, CRAWLEY, RH10 3LG

Drawing
PRE AND POST IMPERMEABLE
AREA PLAN

FOR APPROVAL

Scale @ A1 1:250	Date 13/10/26	Drawn by SGS	Checked CJM
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Job No. 26-0474	Drg. No. C10521	Rev A
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SURFACE WATER FLOW REGIME

1. RUNOFF FROM ROOFS DISCHARGES TO RAINWATER HARVESTING TANKS/ RAIN GARDENS AND OVERFLOWS TO THE SOAKWAYS.
2. RUNOFF FROM ACCESS DRIVEWAY AREAS DRAINS TO PERMEABLE CONSTRUCTION TYPE A (FULL INFILTRATION) AND INFILTRATES TO THE GROUND WITH AN ASSUMED INFILTRATION RATE OF 3.6x10⁻⁶ m/s.
3. UNDERGROUND DRAINAGE NETWORK INFILTRATES TO THE GROUND VIA GEOCELLULAR SOAKWAYS WITH AN ASSUMED INFILTRATION RATE OF 3.6x10⁻⁶ m/s. SURFACE WATER RUNOFF UP TO THE 1 IN 100 YEAR PLUS 40% CLIMATE CHANGE ALLOWANCE EVENT WILL BE ATTENUATED ON SITE WITHIN THE PIPED SYSTEM AND THE BELOW GROUND GEOCELLULAR SOAKAWAY LOCATED BENEATH THE DRIVEWAY.

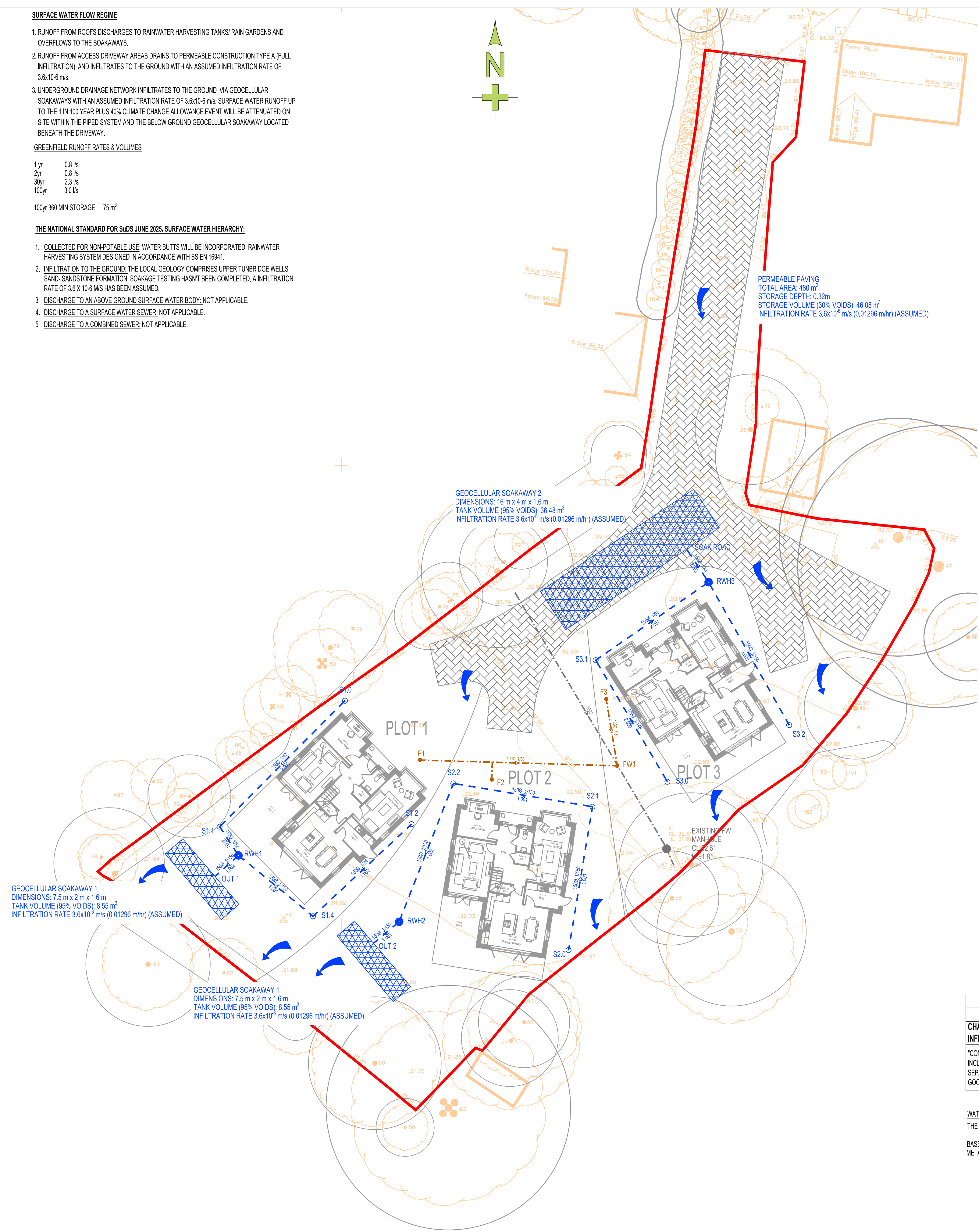
GREENFIELD RUNOFF RATES & VOLUMES

1 yr	0.8 ls
2 yr	0.8 ls
30 yr	2.3 ls
100 yr	3.0 ls

100yr 360 MIN STORAGE 75 m³

THE NATIONAL STANDARD FOR SUDS JUNE 2025. SURFACE WATER HIERARCHY:

1. COLLECTED FOR NON-POTABLE USE: WATER BUTTS WILL BE INCORPORATED. RAINWATER HARVESTING SYSTEM DESIGNED IN ACCORDANCE WITH BS EN 16941.
2. INFILTRATION TO THE GROUND: THE LOCAL GEOLOGY COMPRISES UPPER TUNBRIDGE WELLS SAND- SANDSTONE FORMATION. SOAKAGE TESTING HASNT BEEN COMPLETED. A INFILTRATION RATE OF 3.6 X 10-6 M/S HAS BEEN ASSUMED.
3. DISCHARGE TO AN ABOVE GROUND SURFACE WATER BODY: NOT APPLICABLE.
4. DISCHARGE TO A SURFACE WATER SEWER: NOT APPLICABLE.
5. DISCHARGE TO A COMBINED SEWER: NOT APPLICABLE.



DRAINAGE LAYOUT

INDEXES HAVE BEEN OBTAINED FROM THE FOLLOWING TABLES:

BOX 26.2: STEPS OF THE SIMPLE INDEX APPROACH:

- STEP 1 - ALLOCATE SUITABLE POLLUTION HAZARD INDICES FOR THE PROPOSED LAND USE
- STEP 2 - SELECT SUDS WITH A TOTAL POLLUTION MITIGATION INDEX THAT EQUALS OR EXCEEDS THE POLLUTION HAZARD INDEX
- STEP 3 - WHERE THE DISCHARGE IS TO PROTECTED1 SURFACE WATERS OR GROUNDWATER, CONSIDER THE NEED FOR A MORE PRECAUTIONARY APPROACH
- NOTE: DESIGNATED AS THOSE PROTECTED FOR THE SUPPLY OF DRINKING WATER (TABLE 4.3).

TABLE 26.2: POLLUTION HAZARD INDICES FOR DIFFERENT LAND USE CLASSIFICATIONS:

LAND USE	POLLUTION HAZARD LEVEL	TOTAL SUSPENDED SOLIDS (TSS)	METALS	HYDROCARBONS
RESIDENTIAL ROOFS	VERY LOW	0.2	0.2	0.05
OTHER ROOF (TYPICALLY COMMERCIAL / INDUSTRIAL ROOFS)	LOW	0.3	0.2 (UP TO 0.8 WHERE THERE IS POTENTIAL FOR METALS TO LEACH FROM THE ROOF)	0.05
INDIVIDUAL PROPERTY DRIVEWAYS, RESIDENTIAL CAR PARKS, LOW TRAFFIC ROADS (EG CUL DE SACS, HOMEZONES AND GENERAL ACCESS ROADS) AND NON-RESIDENTIAL CAR PARKING WITH INFREQUENT CHANGE (EG SCHOOLS, OFFICES) (IE < 300 TRAFFIC MOVEMENTS/DAY)	LOW	0.5	0.4	0.4
COMMERCIAL YARD AND DELIVERY AREAS, NON-RESIDENTIAL CAR PARKING WITH FREQUENT CHANGE (EG HOSPITALS, RETAIL), ALL ROADS EXCEPT LOW TRAFFIC ROADS AND TRUNK ROADS/MOTORWAYS ¹	LOW	0.7	0.6	0.7
SITES WITH HEAVY POLLUTION (EG HAULAGE YARDS, LORRY PARKS, HIGHLY FREQUENTED LORRY APPROACHES TO INDUSTRIAL ESTATES, WASTE SITES), SITES WHERE CHEMICALS AND FUELS (OTHER THAN DOMESTIC FUEL OIL), ARE TO BE DELIVERED, HANDLED, STORED, USED OR MANUFACTURED; INDUSTRIAL SITES; TRUNK ROADS AND MOTORWAYS ¹	HIGH	0.8 ²	0.8 ²	0.9 ²

NOTES:

1. MOTORWAYS AND TRUNK ROADS SHOULD FOLLOW THE GUIDANCE AND RISK ASSESSMENT PROCESS SET OUT IN HIGHWAYS AGENCY (2009).
2. THESE SHOULD ONLY BE USED IF CONSIDERED APPROPRIATE AS PART OF A DETAILED RISK ASSESSMENT - REQUIRED FOR ALL THESE LAND USE TYPES (TABLE 4.3). WHEN DEALING WITH HIGH HAZARD SITES, THE ENVIRONMENTAL REGULATOR SHOULD FIRST BE CONSULTED FOR PRE-PERMITTING ADVICE. THIS WILL HELP DETERMINE THE MOST APPROPRIATE APPROACH TO THE DEVELOPMENT OF A DESIGN SOLUTION.

TABLE 26.4: INDICATIVE SUDS MITIGATION INDICES FOR DISCHARGES TO GROUNDWATER

CHARACTERISTICS OF THE MATERIAL OVERLYING THE PROPOSED INFILTRATION SURFACE, THROUGH WHICH THE RUNOFF PERCOLATES ¹	TSS	METALS	HYDROCARBONS
A LAYER OF DENSE VEGETATION UNDERLAIN BY A SOIL WITH GOOD CONTAMINANT ATTENUATION POTENTIAL ² OF AT LEAST 300 MM IN DEPTH ³ .	0.6 ⁴	0.5	0.6
A SOIL WITH GOOD CONTAMINANT ATTENUATION POTENTIAL ² OF AT LEAST 300 mm IN DEPTH ³	0.4 ⁴	0.3	0.3
INFILTRATION TRENCH (WHERE A SUITABLE DEPTH OF FILTRATION MATERIAL IS INCLUDED THAT PROVIDES TREATMENT, IE GRADED GRAVEL WITH SUFFICIENT SMALLER PARTICLES BUT NOT SINGLE SIZE COARSE AGGREGATE SUCH AS 20 MM GRAVEL) UNDERLAIN BY A SOIL WITH GOOD CONTAMINANT ATTENUATION POTENTIAL ⁴ OF AT LEAST 300 mm IN DEPTH ³	0.4 ⁴	0.4	0.4
CONSTRUCTED PERMEABLE PAVEMENT (WHERE A SUITABLE FILTRATION LAYER IS INCLUDED THAT PROVIDES TREATMENT, AND INCLUDING A GEOTEXTILE AT THE BASE SEPARATING THE FOUNDATION FROM THE SUBGRADE) UNDERLAIN BY A SOIL WITH GOOD CONTAMINANT ATTENUATION POTENTIAL ⁴ OF AT LEAST 300 mm IN DEPTH ³	0.7	0.6	0.7
BIORETENTION UNDERLAIN BY A SOIL WITH GOOD CONTAMINANT ATTENUATION POTENTIAL ⁴ OF AT LEAST 300 mm IN DEPTH ³	0.8 ⁴	0.8	0.8
PROPRIETARY TREATMENT SYSTEMS ⁶	THESE MUST DEMONSTRATE THAT THEY CAN ADDRESS EACH OF THE CONTAMINANT TYPES TO ACCEPTABLE LEVELS FOR INFLOW CONCENTRATIONS RELEVANT TO THE CONTRIBUTING DRAINAGE AREA.		

NOTES

- 1 ALL DESIGNS MUST INCLUDE A MINIMUM OF 1 M UNSATURATED DEPTH OF AQUIFER MATERIAL BETWEEN THE INFILTRATION SURFACE AND THE MAXIMUM LIKELY GROUNDWATER LEVEL (AS REQUIRED IN INFILTRATION DESIGN – CHAPTER 25).
- 2 FOR EXAMPLE AS RECOMMENDED IN SNIFFER (2008A AND 2008B), SCOTT WILSON (2010) OR OTHER APPROPRIATE GUIDANCE.
- 3 ALTERNATIVE DEPTHS MAY BE CONSIDERED WHERE IT CAN BE DEMONSTRATED THAT THE COMBINATION OF THE PROPOSED DEPTH AND SOIL CHARACTERISTICS WILL PROVIDE EQUIVALENT PROTECTION TO THE UNDERLYING GROUNDWATER – SEE NOTE 1.
- 4 IF SIGNIFICANT VOLUMES OF SEDIMENT ARE ALLOWED TO ENTER AN INFILTRATION SYSTEM, THERE WILL BE A HIGH RISK OF RAPID CLOGGING AND SUBSEQUENT SYSTEM FAILURE.
- 5 SEE CHAPTER 14 FOR APPROACHES TO DEMONSTRATE PRODUCT PERFORMANCE. NOTE: A BRITISH WATER/ENVIRONMENT AGENCY ASSESSMENT CODE OF PRACTICE IS CURRENTLY UNDER DEVELOPMENT THAT WILL ALLOW MANUFACTURERS TO COMPLETE AN AGREED TEST PROTOCOL FOR SYSTEMS INTENDED TO TREAT CONTAMINATED SURFACE WATER RUNOFF. FULL DETAILS CAN BE FOUND AT: www.britishtwater.co.uk/Publications/codes-of-practice.aspx
- 6 SEPA ONLY CONSIDERS PROPRIETARY TREATMENT SYSTEMS AS APPROPRIATE IN EXCEPTIONAL CIRCUMSTANCES WHERE OTHER TYPES OF SUDS COMPONENT ARE NOT PRACTICABLE. PROPRIETARY TREATMENT SYSTEMS MAY ALSO BE CONSIDERED APPROPRIATE FOR EXISTING SITES THAT ARE CAUSING POLLUTION, WHERE THERE IS A REQUIREMENT TO RETROFIT TREATMENT. WAT-RM-08 (SEPA, 2014) ALSO PROVIDES A FLOWCHART WITH A SUMMARY OF CHECKS ON SUITABILITY OF A PROPRIETARY SYSTEM.

CHARACTERISTICS OF THE MATERIAL OVERLYING THE PROPOSED INFILTRATION SURFACE, THROUGH WHICH THE RUNOFF PERCOLATES ¹	GROUND WATER		METALS		HYDROCARBONS	
	POLLUTION INDEX	MITIGATION INDEX	POLLUTION INDEX	MITIGATION INDEX	POLLUTION INDEX	MITIGATION INDEX
"CONSTRUCTED PERMEABLE PAVEMENT (WHERE A SUITABLE FILTRATION LAYER IS INCLUDED THAT PROVIDES TREATMENT, AND INCLUDING A GEOTEXTILE AT THE BASE SEPARATING THE FOUNDATION FROM THE SUBGRADE) UNDERLAIN BY A SOIL WITH GOOD CONTAMINANT ATTENUATION POTENTIAL OF AT LEAST 300 MM IN DEPTH"	0.5	0.7	0.4	0.6	0.4	0.7

WATER QUALITY MANAGEMENT

THE EFFECT OF THE PROPOSED WORK ON LOCAL WATER QUALITY HAS BEEN ASSESSED USING THE SIMPLE QUALITATIVE METHOD AS SET OUT IN CIRIA REPORT C753 THE SUDS MANUAL 2015 (CHAPTER 26).

BASED ON THE INCORPORATION OF PERMEABLE CONSTRUCTION IN DRIVESWAYS FOR TREATMENT OF RUNOFF, THE TOTAL POLLUTION MITIGATION INDEX FOR THESE SUDS COMPONENTS IS HIGHER THAN THE POLLUTION HAZARD INDEX FOR TSS, METALS AND HYDROCARBONS.

SURFACE WATER QUALITY ANALYSIS

Notes:

1. DO NOT SCALE FROM THIS DRAWING.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER DRAWINGS AND SPECIFICATIONS ASSOCIATED WITH THIS PROJECT.
3. THE DEVELOPMENT LAYOUT HAS BEEN TAKEN FROM ???????S ???? DRG. NO. ???? REV ?? DATED ?? & THE SURVEY FROM HOOK SURVEYS TOPOGRAPHICAL LAND SURVEY DRG. NO. S26/11029/01 REV A DATED JULY 2026
4. ALL DRAINAGE WORKS SHALL BE DESIGNED IN ACCORDANCE WITH DESIGN AND CONSTRUCTION GUIDANCE FOR FOUL & SURFACE WATER SEWERS OFFERED FOR ADOPTION (DCG) APPROVED CURRENT VERSION.

KEY

- SITE BOUNDARY**
- EXISTING**
- FOUL WATER SEWER
- PROPOSED**
- SURFACE WATER DRAINAGE - DIA GRADIENT/PIPE NUMBER
- FOUL WATER DRAINAGE - DIA GRADIENT/PIPE NUMBER
- GEOCELLULAR SOAKAWAY
- HARDSTANDING PERMEABLE AREA TYPE A FULL INFILTRATION
- EXCEEDANCE FLOW ROUTE
- RWH3
- RAINWATER HARVESTING TANKS SM3 STORAGE VOLUME

A	FOR APPROVAL	SGS	CJM	13.10.26
Rev	Description	Drm	Chk	Date

BdR

Civil & Structural Engineering Consultants
The Old Engine House, Goblands Farm Business Park
Court Lane, Hadlow, Kent. TN11 0DP
Tel 01732 851416
email: engineering@bdr.uk.com

Client
STEADFAST HOMES DESIGN LTD

Project
**HEATHERVIEW COTTAGES
COPTHORNE COMMON ROAD
COPTHORNE, CRAWLEY, RH10 3LG**

Drawing
**CONCEPTUAL DRAINAGE LAYOUT &
SURFACE WATER QUALITY ANALYSIS**

FOR APPROVAL

Scale @ A1 1:200	Date 13/10/26	Drawn by SGS	Checked CJM
Job No.	Drg. No.	Rev	
26-0474	C10501	A	

Appendix 7

WSCC Flood Risk Validation Checklist For Planning Applications
WSCC Surface Water Drainage Proforma

Flood Risk Validation Checklist for Planning Applications

SITE NAME	No. 3 HEATHERVIEW COTTAGES, COPTHORNE COMMON ROAD, COPTHORNE, CRAWLEY
DATE	13/10/2026

1. Proforma

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Application only be validated by LPA if the LLFA surface water proforma is completed and attached	FRADS Ref 26-0474	

2. Site Surveys (if appropriate)

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Topographic survey	FRADS Appendix 1	
Details of existing site layout, drainage, and catchment areas plus pre- and post-development impermeable areas	FRADS Appendix 1, 3 & 6	
Evidence of % increase for urban creep and how it has been applied to post-development calculations	FRADS Appendix 5 & 6	
Ground investigation including groundwater level information (for seasonally high groundwater level), potential contamination and infiltration testing (to BRE365 or similar)	No Ground Investigation or BRE DG365 testing undertaken to date.	
Existing drainage scheme survey, e.g., CCTV or historic plans	FRADS Appendix 1	
Survey of existing waterbodies, e.g., watercourses, ponds or springs and culverts or bridges	N/A	

3. Plans and Drawings

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Layout drawing including drainage scheme SuDS and other water features. Including invert levels, cover levels, conveyance systems any pipe gradients, flow directions and labels that match any drainage modelling calculations. Outfall locations, control devices, attenuation systems and water quality treatment features.	FRADS Appendix 6	

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
High level construction management plan including phasing access arrangements and operational characteristics. Temporary drainage and water pollution including discharge points and flow controls should be included.	N/A	
Landscaping planting scheme for vegetated SuDS	N/A	
Maintenance plan and confirmation in principle of adopting authority for the lifetime of the development	FRADS Appendix 5	

4. Assessments

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Evidence that that the SuDS hierarchy and the 4 pillars have been met	FRADS Page 16	
Full supporting calculations for the drainage design including design parameters using FEH and predevelopment greenfield runoff rates/volumes	FRADS Appendix 5	
Critical storm simulation results of the conveyance network by level and discharge for events 100% AEP, 3.33% AEP, 3.33% AEP plus climate change, 1% AEP and 1% AEP plus climate change	FRADS Appendix 5	
Evidence of calculations to support the sizing of storage features to accommodate the 3.33% AEP plus climate change and 1% AEP climate change critical storms	FRADS Appendix 5	
Evidence and drawing of where any flooding would occur during a 1% AEP plus climate change critical storm event would occur. Information should include extent, depth, and velocity of flooding, demonstrating that it would not leave the site boundary.	No flooding predicted	
Flood resistance and resilience measures 300mm above flood levels	N/A	
Drawing showing exceedance flows greater than 1% AEP plus climate change or if the drainage system is compromised	FRADS Appendix 6	

5. Supplementary Evidence

Description	Document/Drawing Ref and Page No. APPLICANT TO COMPLETE	Submitted? (Yes/No) LPA TO CHECK
Confirmation of discharge location approval (in principal agreements from third parties if appropriate)	FRADS Appendix 6	
Confirmation of any consents required	FRADS Page 24	
Evidence of predevelopment discharge capacity analysis (where discharging from an existing pipe)	N/A	

Surface Water Drainage Proforma

West Sussex County Council (WSCC) as Lead Local Flood Authority recommends this proforma is completed and submitted to support any planning application for a major development. The information contained in this form will be used by WSCC officers in their role as 'statutory consultee' on surface water drainage. The proforma should accompany the site-specific Flood Risk Assessment and Drainage Strategy submitted as part of the planning application.

1. Site Details

No.	Requirement	Answer	Application Type
1.1	Address including postcode	No. 3 Heatherview Cottages, Copthorne Common Road, Copthorne RH10 3LG	Outline & Full
1.2	OS grid reference (easting and northing)	533102 , 139137	Outline & Full
1.3	Planning application reference	TBA	Outline & Full
1.4	Total site area (hectares)	0.2195 ha	Outline & Full
1.5	Pre-development use	Greenfield / Grazing	Outline & Full
1.6	Proposed design life	60 years	Outline & Full
1.7	Have agreements in principle for discharge been provided (where applicable)? (YES/NO)	No	Outline & Full
1.8	Topographic Survey Plan showing existing site layout, site levels and drainage system	Yes included in FRADS Appendix 1	Outline & Full

2. Discharge Hierarchy/Methods of Discharge¹

No.	Requirement	Answer	Application Type
2.1	Store rainwater for later use (reuse) (YES/NO)	Yes	Full
2.2	Infiltration techniques such as soakaways, permeable paving, etc (YES/NO)	Type A permeable pavements / Soakaways	Outline & Full
2.3	Hybrid (YES/NO)	Yes	Outline & Full

¹ Runoff may be discharged via one or multiple methods.

No.	Requirement	Answer	Application Type
2.4	Attenuation with restricted discharge to watercourse (YES/NO)	No	Outline & Full
2.5	Attenuation with restricted discharge to surface water sewer (YES/NO)	No	Outline & Full
2.6	Attenuation with restricted discharge to combined sewer (YES/NO)	No	Outline & Full

3. Calculation Inputs

No.	Requirement	Answer	Application Type
3.1	Area within site which is drained by SuDS ² (hectares)	0.101	Outline & Full
3.2	Impermeable area drained pre-development ³ (hectares)	0	Outline & Full
3.3	Impermeable area drained post-development ³ (hectares)	0.101	Outline & Full
3.4	Urban Creep (hectares)	10	Outline & Full
3.5	Climate change factor applied (1 in 30 and 1 in 100) (percentage)	1 in 30 = 35% 1 in 100 = 40%	Outline & Full

4. Infiltration Feasibility/Ground Investigations

No.	Requirement	Answer	Application Type
4.1	Has winter groundwater monitoring and infiltration been undertaken? (YES/NO)	No	Outline & Full
4.2	Period of winter groundwater monitoring (from/to)	N/A	Outline & Full
4.3	Depth to highest recorded groundwater level (mAOD)	N/A	Full
4.4	Infiltration rate	Assumed 3×10^{-6} m/s	Outline & Full

² Impermeable area should be measured pre and post development. Impermeable surfaces include roofs, pavements, driveways and paths, where runoff is conveyed to the drainage system.

³ 10% Urban Creep should be added to the volumes required for storage and not increase discharge rates.

No.	Requirement	Answer	Application Type
4.5	Depth of infiltration structure (mAOD)	N/A	Full
4.6	Safety factor used for sizing infiltration storage	2	Outline & Full

5. Calculation Outputs: Greenfield Runoff Rates⁴

No.	Requirement	Answer	Application Type
5.1	Qbar (l/s)	0.9	Outline & Full
5.2	1 in 1 year rainfall (l/s)	0.8	Outline & Full
5.3	1 in 30 year rainfall (l/s)	2.3	Outline & Full
5.4	1 in 100 year rainfall (l/s)	3.0	Outline & Full

6. Calculation Outputs: Brownfield Runoff Rates (including Urban Creep) (if applicable)

No.	Requirement	Answer	Application Type
6.1	1 in 1 year rainfall (l/s)	N/A	Outline & Full
6.2	1 in 30 year rainfall (l/s)	N/A	Outline & Full
6.3	1 in 100 year rainfall (l/s)	N/A	Outline & Full

7. Calculation Outputs: Volume Control/Infiltration Provision

No.	Requirement	Answer	Application Type
7.1	Infiltration (m ³)	99.66	Outline & Full
7.2	Attenuation (m ³)	99.66	Outline & Full
7.3	Separate volume designated as long-term storage ⁵ (m ³)	N/A	Full
7.4	Total volume control (sum of inputs for 7.1 to 7.3) (m ³)	99.66	Full

⁴ Flows within long term storage areas should be infiltrated to the ground or discharged at low flow rate of maximum 2 litres per second per hectare (l/s/ha).

⁵ In calculations and for the avoidance of doubt FEH shall be used FSR is not acceptable, and CV values must equal 1.

8. Calculation Outputs: Attenuation/Restricted Discharge

No.	Requirement		Answer	Application Type
8.1	Proposed discharge rate (critical storm)	1 in 1 (100%) AEP (m/s)	N/A	Outline & Full
		1 in 30 (3.33%) AEP (m/s)	N/A	Outline & Full
		1 in 30 (3.33%) AEP plus climate change (m/s)	N/A	Outline & Full
		1 in 100 (1%) AEP (m/s)	N/A	Outline & Full
		1 in 100 (1%) AEP plus climate change (m/s)	N/A	Outline & Full
8.2	Calculations show critical storm durations (both by max height and max discharge) for 1 in 1, 1 in 30, 1 in 30 plus climate change, 1 in 100 and 1 in 100 year plus climate change allowance can be accommodated on site (YES/NO)		Refer to Appendix 5	Outline & Full
8.3	Has treatment of potential contaminants been considered? (YES/NO)		Yes	Outline & Full
8.4	Demonstration of source control features with substantive evidence why these cannot be used if not (YES/NO)		Yes	Full
8.5	If discharging into a watercourse, piped system or the sea, has the proposed drainage network been modelled against predicted top water levels for the 1 in 100 year storm event plus climate change allowance, within the existing system? (YES/NO)		N/A	Full

9. Other Supporting Details

No.	Requirement	Answer	Application Type
9.1	Plan detailing location of groundwater monitoring and infiltration testing	N/A	Outline & Full
9.2	Detailed drainage design layout	FRADS Appendix 6	Full
9.3	Maintenance strategy	FRADS Appendix 5	Full

No.	Requirement	Answer	Application Type
9.4	Detailed development layout	FRADS Appendix 3	Full
9.5	Impermeable area plan	FRADS Appendix 6	Full
9.6	Phasing plan?	N/A	Full
9.7	If ground levels are being raised over 300mm above existing levels and is unavoidable, have detailed plans been provided, together with drainage proposals, to address any potential drainage related issues?	N/A	Full

The above form should be completed using evidence from information which should be appended to this form. The information being submitted should be proportionate to the site conditions, flood risks and magnitude of development. It should serve as a summary of the drainage proposals and should clearly show that the proposed discharge rate and volume as a result of development will not be increasing. Where there is an increase in discharge rate or volume, then the relevant section of this form must be completed with clear evidence demonstrating how the requirements will be met.

This form is completed using factual information and can be used as a summary of the surface water drainage strategy on this site.

Form completed by	C J Mellett
Qualification of person responsible for signing off this proforma	lEng MICE
Company	BdR [Civil & Structural Engineering] Ltd
On behalf of (client's details)	Steadfast Homes Designs Ltd
Date	13/10/26