Consulting Civil Engineers

# SuDS and Drainage Report

## Land east of Commonmead Barn, Pagham Road, Pagham, West Sussex PO21 3PY

Rev: **P1**

Ref: **C3552**

**CGS Civils Ltd**
Richard Cobden House
Lion Street
Chichester
West Sussex
PO19 1LW
[redacted]
www.cgscivils.co.uk

## Document Control

| **Project Number** | **C3552** | | |
|---|---|---|---|
| **Date** | 2nd May 2025 | **Revision** | P- |
| **Author** | LH | **Signature** | |
| **Reviewer** | CS | **Signature** | |
| **Approver** | CS | **Signature** | |

## Revision History

| **Date** | **Revision** | **Author** | **Approved** |
|---|---|---|---|
| **2nd May 2025** | **P-** | **LH** | |
| **24th September 2025** | **P1** | **LH** | |

# Contents

# 1 Introduction

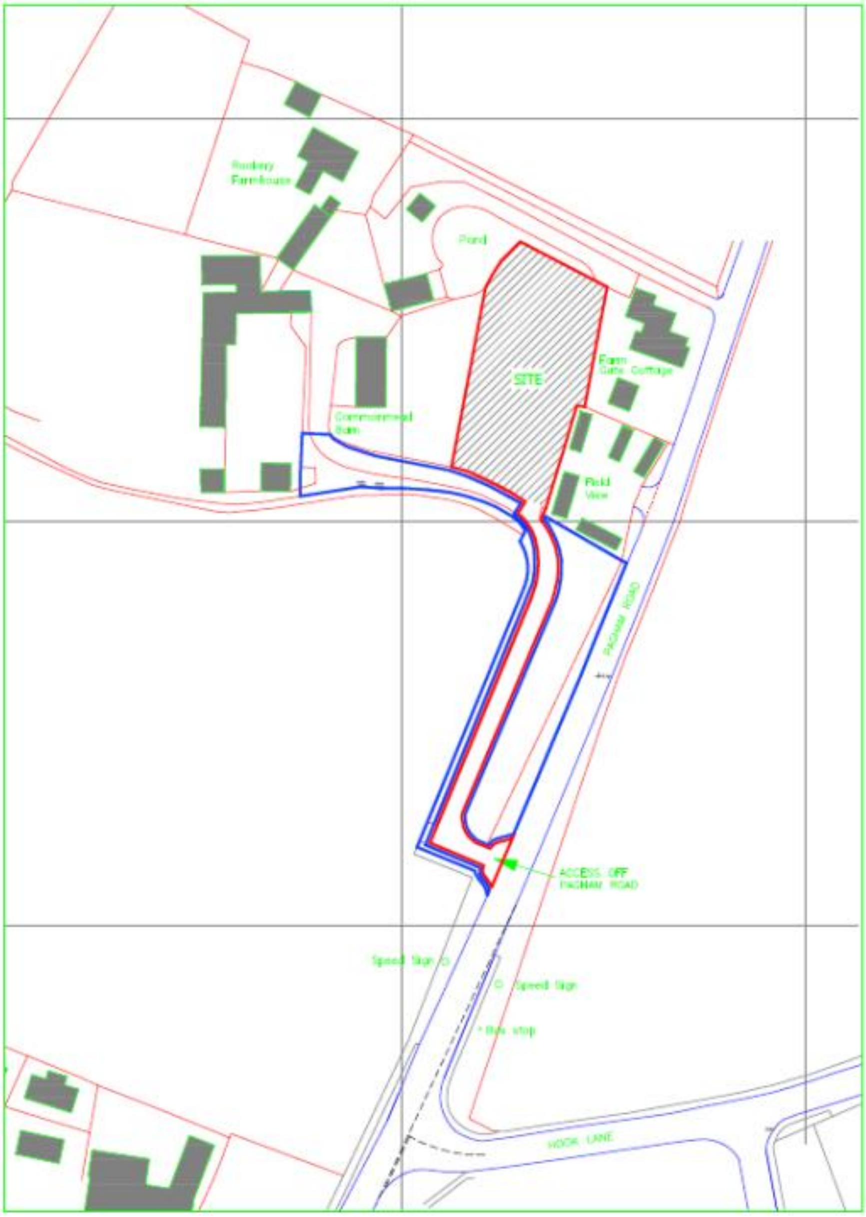
1.1.1 CGS Civils Ltd has been appointed to undertake a drainage strategy report for a proposed development at Land east of Commonmead Barn in Pagham, West Sussex.

1.1.2 The proposed development will consist of the construction of 2 No. detached dwellings and associated parking. The proposed development is located as OS Grid Reference SZ 89332 99033 and has the post code PO21 3PY.

1.1.3 The purpose of this drainage strategy is to demonstrate how the development area can be satisfactorily drained without increasing flood risk onsite and elsewhere. In addition, the following report is intended to supply the relevant data:

- The results of an assessment into the potential for disposing of surface water by means of Sustainable Drainage System (SuDS).
- Details of a management and maintenance plan for the drainage scheme
- The appropriate design standard for the surface water drainage scheme must be the 1 in 100-year return period with a 45% allowance for climate change.

**Fig 1. Site Location**



# 2 Executive Summary:

2.1.1 The Surface Water will discharge to the existing culverted watercourse that runs across the site at a rate of 2.0l/s. Surface water runoff from the roof areas will be discharged at a restricted rate of 1.0l/s per plot and will make use of a bio-retention planter for storage in order to cater for the 1 in 100-year +45% storm whilst also providing a degree of infiltration. The hard paved areas are to discharge freely to ground via infiltration.

2.1.2 The Foul water will be treated on site via a new package treatment plant prior to discharge to the existing culverted watercourse.

# 3 Site Geology

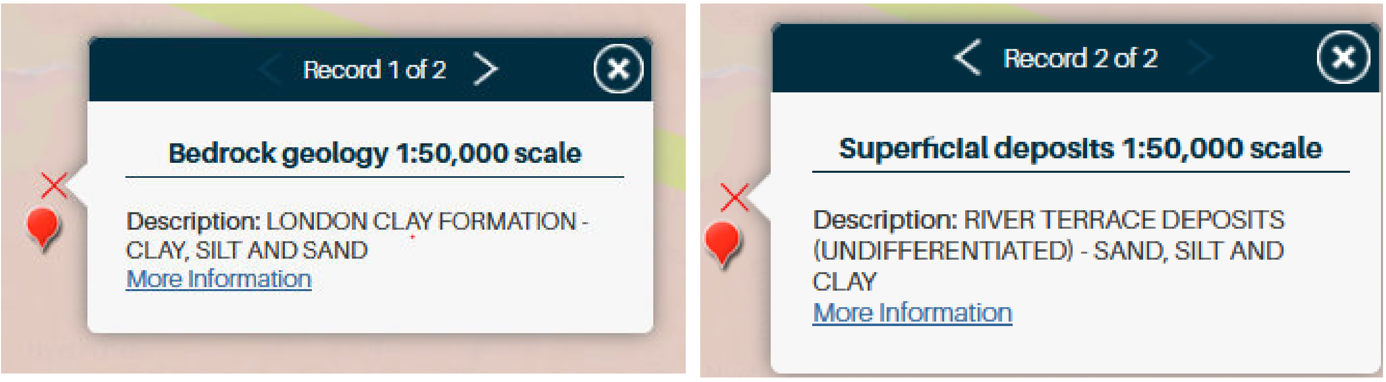
## 3.1 British Geological Survey information

3.1.1 The British Geological Survey confirms the bedrock geology to be made up London Clay Formation. The BGS website confirms the superficial deposits on site to be made up of River Terrace Deposits. Both formations are comprised of Sand, Silt and Clay.

3.1.2 The British Geological survey also holds records of historical boreholes near the site which give some insight into the ground geology.

- Borehole SZ89NE4 (Located approx. 500m North of the site) – Gravel, Clay and Sand.

**Fig 2. British Geological Survey**




## 3.2 Geological Assessment

3.2.1 An infiltration test to BRE365 was conducted on site on the 25th and 27th June 2024, which recorded a worst-case infiltration rate of $5.04\times10^{-6}$m/s. This is deemed to be a fair rate and confirms that infiltration is viable on site. During the testing, the ground was noted to be thick clay, photographs can be found in **Fig 3.** A copy of the soakaway tests results can be found in **Appendix E.**

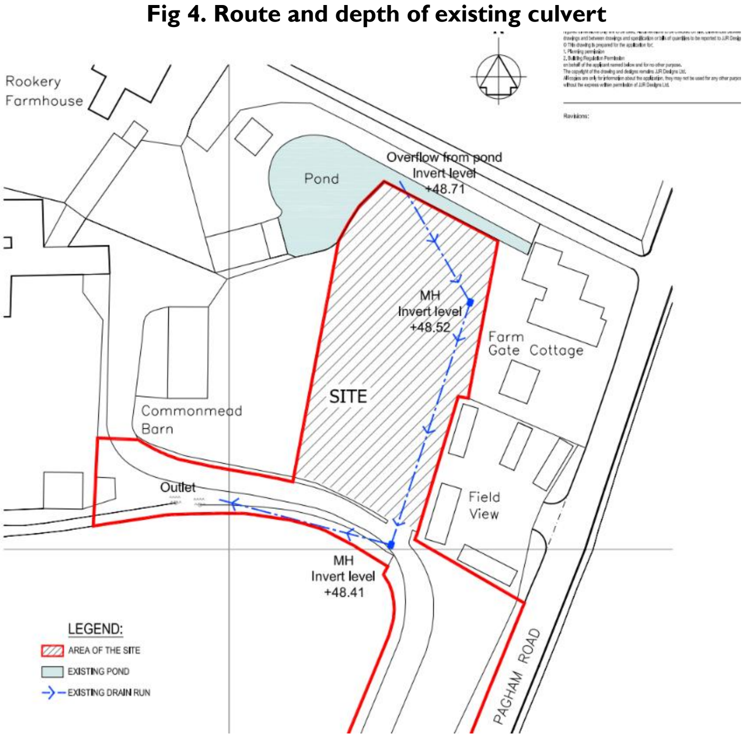
3.2.2 Ground water monitoring was carried out on site over the 2024/2025 winter period, with the monitoring commencing at the start of October and finishing at the end of March. The highest recorded groundwater level was recorded at 1.02mbgl which rules out the use of conventional soakaways due to the requirement of a 1m easement between the base of the soakaway and highest recorded groundwater level as set out by Arun DC. The groundwater monitoring results can be found in **Appendix E.**

**Fig 3. Soakaway test photographs**

# 4 Existing Drainage

4.1.1 The site is currently an undeveloped space with no private drainage. It is noted that there is an existing 300mm culverted watercourse that runs across the site prior to discharging into a larger watercourse on the adjacent site of the site access to the south.

**Fig 4. Route and depth of existing culvert**



# 5 Proposed Drainage Strategy

## 5.1 SuDS Hierarchy

5.1.1 All options for the destination of run-off generated on site have been assessed in line with the SuDS hierarchy as set out in Building Regulations Part H document and DEFRA's Draft National Standards for SuDS.

**Table 1. SuDS Discharge Hierarchy**

| Discharge Destination | |
|---|---|
| Rainwater Harvesting | Can be utilised. To be confirmed at detailed design stage. |
| Discharge to Ground (infiltration) | On-site infiltration test resulted in a viable infiltration rate, however, due to high groundwater the use of conventional soakaways is ruled out. Infiltration can still be achieved within permeable paving and bio-retention planters which are proposed on site. |
| Discharge to Watercourse | Surface water runoff from the roof areas are to be discharged into the existing culverted watercourse at a restricted rate of 1.0l/s per plot or 2.0l/s for the entire site. |
| Discharge to Surface Water Sewer | N/A due to above |
| Discharge to Other Sewer | N/A due to above |

## 5.2 Proposed Hydraulic Calculation Specifications:

**Table 2. SuDS Calculation Settings.**

| Hydraulic Calculations Settings – Bio-Retention unit: | |
|---|---|
| Rainfall Methodology | **FEH-22** |
| Volumetric Run-off Coefficient Cv | **1** |
| CV Winter and Summer | **1** |
| Additional Storage ($m^3$ / ha) | **0.0** |
| Maximum Rainfall (mm/hr) | **75** |
| Flow Control 1 | **0.737m Head @ 1l/s discharge** |
| Flow Control 2 | **0.663 Head @ 1l/s discharge** |
| Bio-Retention unit Design | Base Coefficient (m/hr): **0.01814** |
| | Side Coefficient (m/hr): **0.01814** |
| | Factor of Safety: **2** |
| | Porosity: **30%** |
| | Time to Half Empty (mins): **11 + 35** |

## 5.3 Surface Water Drainage

5.3.1 Although onsite testing by others indicated a favourable infiltration rate, conventional soakaways are not feasible due to the recorded groundwater level. The highest groundwater level of 1.02mbgl means that the required 1m distance between the soakaway base and groundwater level, as specified in the latest Arun DC policies, cannot be maintained.

5.3.2 It is therefore proposed that all surface water runoff from roof areas are to be discharged into the existing culverted watercourse which runs across the site. Both plots are to be served by a private surface water network before connecting into a single network prior to the discharge to the watercourse. The private networks are to discharge at a restricted rate of 2.0l/s and will make use of a bio-retention planter for storage to cater for the 1 in 100-year +45% storm. The bio-retention planter will also make use of as much infiltration as possible; however, it should be noted that this is not the main means of surface water discharge.

5.3.3 The existing culvert is a 300mm pipe which discharges to the south into an existing watercourse which then flows to the west. The existing culvert and watercourse are within the client's ownership. In order to obtain the necessary permissions for the discharge, an Ordinary Watercourse Consent application is to be undertaken with West Sussex County Council.

**Fig 3. Existing manhole/Culvert and existing watercourse.**

5.3.4 It is proposed that the access road and the parking spaces are to be constructed from a permeable surface to allow surface water runoff to discharge freely to ground via infiltration.

5.3.5 Greenfield Runoff and Hydraulic calculations have been carried out which can be found at Appendix C.

**Table 3. Greenfield Runoff Calculations**

| Greenfield Runoff Calculations | | | |
|---|---|---|---|
| **Storm period** | **Greenfield runoff rate (l/s)** | **Proposed Discharge Rate (l/s)** | **Difference (l/s)** |
| $Q_{BAR}$ | 0.1 | 2 | + 1.9 |
| 2 | 0.1 | 2 | + 1.9 |
| 10 | 0.19 | 2 | + 1.81 |
| 30 | 0.26 | 2 | + 1.74 |
| 100 | 0.37 | 2 | + 1.63 |

## 5.4 Water Quality

5.4.1 A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution.

5.4.2 Frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals, and various organic and inorganic contaminants) Therefore the first 5-10mm of rainfall should be adequately treated with SuDS.

5.4.3 The new SuDS Manual (Ciria C753, November 2015) introduces slightly different approach compared to the previous version for the water quality management of surface water. The Manual describes risks posed by the surface water runoff to the receiving environment as a function of:

- The pollution hazard at a particular site (i.e., the pollution source)
- The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels
- The sensitivity of the receiving environment

5.4.4 The recommended approaches for water quality risk management are given in the SuDS Manual Table 26.1.

**Table 26.1 from SuDS manual. Approaches to Water Quality Risk Management**

| **Table 26.1** | **Approaches to Water Quality Risk Management** | | |
|---|---|---|---|
| **Design method** | **Hazard Characterisation** | **Risk Reduction** | |
| | | **For Surface Water** | **For Groundwater** |
| Simple Index Approach | Simple pollution hazard indices based on land use (Table 26.2) | Simple SuDS hazard mitigation indices (Table 26.3) | Simple SuDS hazard mitigation indices (Table 26.4) |
| Risk Screening | Factors characterising traffic density and extent of infiltration likely to occur (Table 26.5) | N/A | Factors characterising unsaturated soil depth and type, and predominant flow type through the soils (Table 26.5) |
| Detailed Risk Assessment | Site specific information used to define likely pollutants and their significance | More detailed, component specific performance information used to demonstrate that the proposed SuDS components reduce the hazard to acceptable levels | |
| Process-based treatment modelling | Time series rainfall used with generic pollution characteristics to determine statistical distributions of likely concentrations and loadings in the runoff | Models that represent the treatment processes in the proposed SuDS components give estimates of reductions in even mean discharge concentrations and total annual load reductions delivered by the system | |

5.4.5 As per Table 26.1 Simple Index approach will be used as a design method for this site.

5.4.6 Table 26.2 will provide hazard classification of different land uses. The land uses for the surface water drainage for this site are.

- Residential Roofs
- Individual Property driveways and residential car parks

5.4.7 To deliver adequate treatment, the selected SuDS components should have a total pollution mitigation index for each contaminant type that equals or exceeds the pollution hazard index for each contaminant type. Therefore, the following must be achieved for the surface running off the site.

**Total SuDS mitigation index >=pollution hazard index**

5.4.8 Pollution Hazard Indices are given for different land uses in Table 26.2 of the SuDS manual;

**Table 26.2 from SuDS manual. Pollution Hazard Indices for Different Land Use Classifications**

**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 metals to leach from the roof) | 0.05 |
| Individual property driveways, residential car parks, low traffic roads (e.g., cul-de-sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day | Low | 0.5 | 0.4 | 0.4 |
| Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail), all roads except low traffic roads and trunk roads/motorways | Medium | 0.7 | 0.6 | 0.7 |
| Sites with heavy pollution (e.g., 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 | High | 0.8 | 0.8 | 0.9 |

5.4.9 From Table 26.2 the following information is tabulated in Table 1

**Table 3**: **Pollution hazard index and destination of runoff for the proposed site**

**Table 3: Pollution Hazard Index and Destination of runoff for the proposed Site**

| Land Use | Destination of Runoff | Pollution Hazard Level | Total Suspended Solids | Metals | Hydrocarbons |
|---|---|---|---|---|---|
| Residential Roof | Surface Water | Very Low | 0.2 | 0.2 | 0.05 |
| Individual driveways, residential car parks and low traffic roads | Ground water | Low | 0.5 | 0.4 | 0.4 |

5.4.10 The SuDS mitigation index will be obtained from Table 26.4 (for groundwater) of the SuDS manual.

**Table 26.4 from SuDS manual. Indicative SuDS Mitigation Indices for discharges to ground waters.**

5.4.11 SuDS mitigation index are tabulated in Table 5 as followed.

| 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** | **TSS** | **Metals** | **Hydrocarbons** |
| A layer of dense vegetation underlain by a soil with good containment attenuation potential of at least 300mm in depth | 0.6 | 0.5 | 0.6 |
| A soil with good contaminant attenuation potential of at least 300mm in depth | 0.4 | 0.3 | 0.3 |
| Infiltration trench (where a suitable depth of filtration material is included that provides treatment, i.e., graded gravel with sufficient smaller particles but not single size coarse aggregate such as 20mm gravel) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth. | 0.4 | 0.4 | 0.4 |
| Constructed permeable pavement (where a suitable filtration later 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 300mm in depth | 0.7 | 0.6 | 0.7 |
| Bioretention underlain by a soil with good contaminant attenuation potential of at least 300mm in depth | 0.8 | 0.8 | 0.8 |
| Proprietary treatment systems | 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 26.5 Indicative SuDS mitigation indices for discharges to surface waters | | | |
|---|---|---|---|
| | **Mitigation Indices** | | |
| **Type of SuDS Components** | **TSS** | **Metals** | **Hydrocarbons** |
| Filter Strip | 0.4 | 0.4 | 0.5 |
| Filter Drain | 0.4 | 0.4 | 0.4 |
| Swale | 0.5 | 0.6 | 0.6 |
| Bioretention System | 0.8 | 0.8 | 0.8 |
| Permeable Pavement | 0.7 | 0.6 | 0.7 |
| Detention Basin | 0.5 | 0.5 | 0.6 |
| Pond | 0.7 | 0.7 | 0.5 |
| Wetland | 0.8 | 0.8 | 0.8 |
| Proprietary treatment systems | 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 4: SuDS mitigation index**

| Table 4 Mitigation Indices | | | | | | |
|---|---|---|---|---|---|---|
| **Runoff Source** | **Destination of Runoff** | **Mitigation Index Source** | **Type of SuDS Component** | **Total Suspended Solids (TSS)** | **Metals** | **Hydrocarbons** |
| Residential Roof | Surface Water | Table 26.5 | Bioretention system | 0.8 | 0.8 | 0.8 |
| Individual driveways, residential car parks and low traffic roads | Ground water | Table 26.4 | Permeable paving | 0.7 | 0.6 | 0.7 |

5.4.12 The above analysis demonstrates that the SuDS devices within the design will mitigate any pollution present within the surface water system.

# 7 Appendices

## 7.1 Appendix A – Site Plan


JJR DESIGNS Limited



Revisions:

1:200

4m 0 4m 8m

jjr designs

Suite 6a,
Church House,
94 Felpham Road
Felpham
West Sussex,
PO22 7PG

TEL: 01243 822081

Architectural Services
Planning
Building Regs
On Site Supervision
Landscape Design

e-mail: info@jjrdesigns.com

Client:
MR H. PHILLIPS

Project:
LAND EAST OF COMMONMEAD BARN
PAGHAM ROAD PO21 3PY

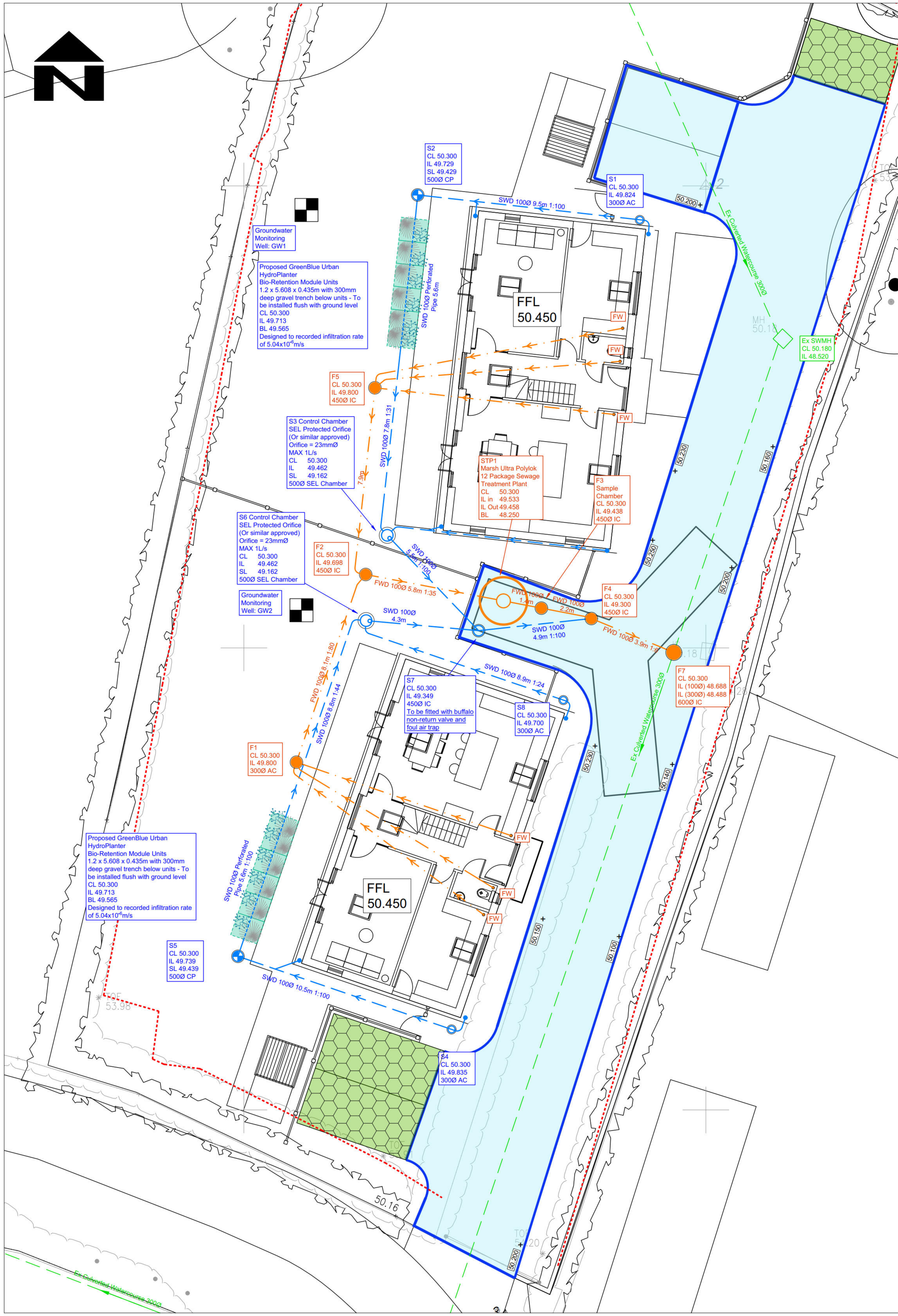
Drawing Title:
PROPOSED SITE PLAN

Issue status:

| | | |
|---|---|---|
| Outline proposals ☐ | Production Information ☐ | Scheme design ☐ |
| Tender drawing ☐ | Detail design ☐ | Contract drawing ☐ |

| Scale: 1:200 @A3 | Drawn: | Checked: | Date: 20.08.2025 |
|---|---|---|---|
| Job No: 1683 | | Drawing No: PL 103 | Revision: |

## 7.2 Appendix B – Drainage Layout




EXISTING FEATURES

- Existing Culverted Watercourse

PROPOSED FEATURES

- Foul Drainage
- Surface Water Drainage
- Pipe crossing (thickening denotes pipe above)
- Channel drain
- Rainwater pipe
- Storm water access chamber (300Ø)
- Storm water inspection chamber (450Ø)
- Storm water catchpit chamber (450Ø)
- Extent of infiltrating permeable paving with porous sub-base
- 'NO DIG' Construction
- Storm water orifice flow control chamber (500Ø)
- Foul water access chamber (300Ø)
- Foul water inspection chamber (450Ø)
- Foul water manhole (1050Ø)
- 00.000 Finished floor level
- 100Ø 4.5m 1:100 Z BED — Pipe info - diameter, length, gradient, bedding type
- Root Protection Area
- Groundwater monitoring well location
- 18.250 Existing surface level

ABBREVIATIONS

- MH - MANHOLE
- IC - INSPECTION CHAMBER
- AC - ACCESS CHAMBER
- CP - CATCHPIT
- BC - BRAKE CHAMBER
- RE - RODDING EYE
- IL - INVERT LEVEL
- SL - SUMP LEVEL
- RA - RESTRICTED ACCESS COVER
- CL - COVER LEVEL
- TL - TOP OF CELLULAR SA
- BL - BASE OF CELLULAR SA
- FL - FORMATION LEVEL

STANDARD DRAINAGE NOTES

1. DO NOT SCALE FROM THIS DRAWING, REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
2. ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
3. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
4. ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
5. BEFORE COMMENCING CONSTRUCTION THE CONTRACTOR MUST CHECK THE INVERT LEVELS OF EXISTING SEWERS TO WHICH CONNECTIONS ARE MADE. IN ADDITION THE CONTRACTOR MUST LOCATE AND DETERMINE INVERT LEVELS OF THE EXISTING SPURS TO WHICH CONNECTIONS ARE PROPOSED. ANY DISCREPANCIES ARE TO BE NOTIFIED TO THE ENGINEER IMMEDIATELY, PRIOR TO CONSTRUCTION.
6. ALL DRAINAGE WORKS SHOULD COMMENCE AT THE PROPOSED DOWNSTREAM CONNECTION POINT, THE WORKS CONTINUING UPSTREAM FOLLOWING CONFIRMATION OF THE TIE-IN INVERT LEVELS TO THE ENGINEER. CONNECTIONS TO MANHOLES OR LARGER SIZED PIPES ETC. SHOULD BE SOFFIT TO SOFFIT UNLESS OTHERWISE INSTRUCTED BY THE ENGINEER, IF THIS IS NOT POSSIBLE INFORM THE ENGINEER IMMEDIATELY.
7. COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
8. ALL UN-REFERENCED PIPES ARE TO BE 100mm DIA
9. ALL PIPES TO BE ADOPTED, OR CONNECTING TO ADOPTED SEWERS, TO BE VITRIFIED CLAY TO BS EN 295 AND BS65 (SWS ONLY), OR CONCRETE PIPES TO BE EN 1916 AND BS5911:PART 1.
10. ROAD GULLY OUTLET PIPES ARE TO BE 150mm DIA. WITH CONCRETE SURROUND AND FLEXIBLE JOINTS. ALL GULLIES SHALL BE FITTED WITH GRADE D400 GRATINGS AND FRAMES TO BS EN124, UNLESS OTHERWISE STATED.
11. ALL ADOPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATION LAID DOWN DOWN IN `SEWERS FOR ADOPTION' 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
12. ALL PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT PART-H, AND TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
13. THE CONTRACTOR IS TO KEEP A RECORD OF ANY VARIATIONS MADE ON SITE, INCLUDING THE RELOCATION OF SEWERS OR DRAINS, SO THAT AN AS CONSTRUCTED DRAWING CAN BE PREPARED UPON COMPLETION OF THE PROJECT.
14. STUB CONNECTIONS TO ADOPTABLE MANHOLES SHALL BE MADE FROM VITRIFIED CLAY AND CONSIST OF TWO ROCKER PIPES LAID AT THE SAME GRADIENT AS THE UP OR DOWNSTREAM PIPE.
15. IF ANY SUB SOIL DRAINAGE SYSTEMS ARE UNCOVERED DURING THE WORKS CONTACT THE ENGINEER FOR INSTRUCTIONS. SUB SOIL DRAINS ARE TO BE DIVERTED AROUND NEW WORKS AND CONNECTED INTO THE SURFACE WATER.
16. NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.
17. ALL EXISTING MANHOLE COVER'S, GULLIES, ETC, ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
18. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT
19. UPON COMPLETION BUT PRIOR TO HANDOVER, CONTRACTOR TO CARRY OUT FULL CCTV SURVEY OF DRAINAGE SYSTEM WHICH IS TO BE REVIEWED BY ENGINEER TO ENSURE SATISFACTORY INSTALLATION
20. PROPRIETARY PRODUCTS TO BE INSTALLED IN FULL ACCORDANCE WITH MANUFACTURER'S GUIDANCE.
21. MANHOLE AND CHAMBER COVER GRADES:
 - 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
 - 'B125' IN ALL DRIVEWAYS
 - 'C250' IN PRIVATE PARKING AREAS
 - 'D400' IN CARRIAGEWAY/ACCESS ROAD

Prefixed to drawing numbers shall signify the following:-

| | |
|---|---|
| PL = PLANNING | Shall not be used for contract or construction purposes |
| P = PRELIMINARY | Shall not be used for contract or construction purposes |
| T = TENDER | Shall not be used for construction purposes |
| C = CONSTRUCTION | These are the only drawings that shall be used for construction purposes |
| R = RECORD | Record of actual completed work |

DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL

DESIGN SUBJECT TO THE CONFIRMATION OF:
EXTERNAL LEVELS DESIGN
ORDINARY WATERCOURSE APPROVAL

Site Specific Notes

1. The proposed scheme consists of the construction of 2 No. dwelling with associated parking and access.
2. The British Geological survey website confirms the geology on site to be made up of London Clay formation and River terrace deposits, which are comprised of Sand, Silt and Clay.
3. An infiltration test to BRE365 was undertaken on site by UNDA which recorded a worst case infiltration rate of $5.04 \times 10^{-6}$m/s which is deemed a fair rate; however, groundwater was recorded at a depth of 1.02mbgl which rules out the use of conventional soakaways due to Arun DC policies restricting the use of soakaways if there is groundwater within 1m of the base of the soakaway.
4. It is therefore proposed that all surface water runoff is discharged into the existing culverted watercourse which runs across the site at a restricted rate of 2.0l/s. The surface water networks will make use of bio-retention planters in order to cater for the 1 in 100-year +45% storm whilst also providing a degree of infiltration and treatment. It should be noted that the planters are not the primary source of surface water disposal.
5. It is proposed that the access road and parking areas are to be constructed from a permeable surface to allow surface water runoff to flow freely to ground via infiltration.
6. All storage volumes and flow controls are designed to the critical 1 in 100 year storm event plus an allowance of 45% for the predicted effects of climate change.
7. The foul water is to be treated via a new package treatment plant and all treated effluent runoff is to discharge into the culverted watercourse.

| REV | DATE | DESCRIPTION | BY | CHK | APP |
|---|---|---|---|---|---|
| P1 | 10.09.25 | REVISED TO NEW SITEPLAN | LH | CS | CS |
| P- | 15.05.25 | PRELIMINARY ISSUE | LH | CS | CS |

FOR PLANNING ONLY

cgs civils
Consulting Civil Engineers

CLIENT: HOWARD PHILLIPS

ARCHITECT: JJR DESIGNS LTD

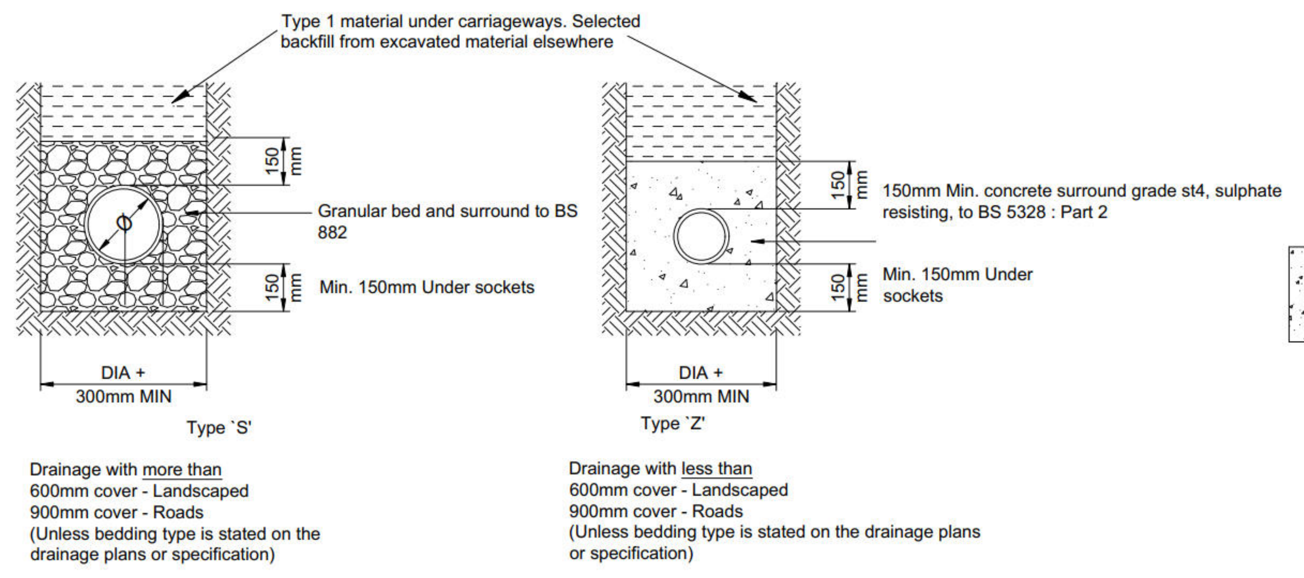
JOB TITLE: LAND EAST OF COMMONMEAD BARN PAGHAM

DRAWING TITLE: DRAINAGE LAYOUT

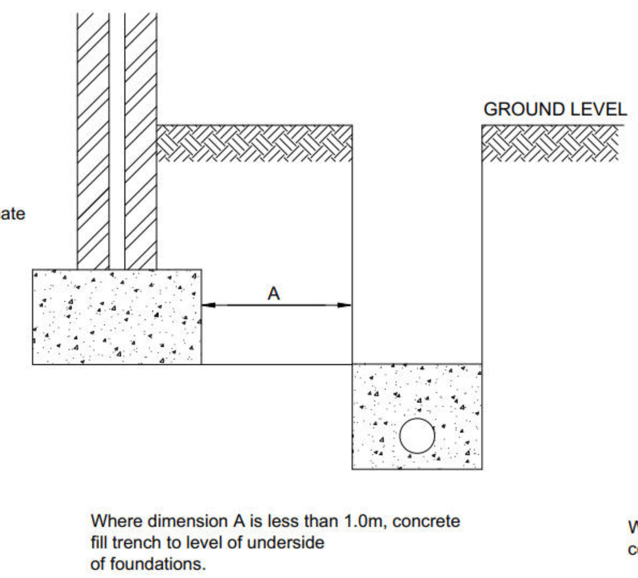
| DRAWN | ENGINEER | CHECKED | APPROVED |
|---|---|---|---|
| LH | C SLADE | CS | CS |

| DATE | SCALE @ A1 |
|---|---|
| MAY 2025 | 1:100 |

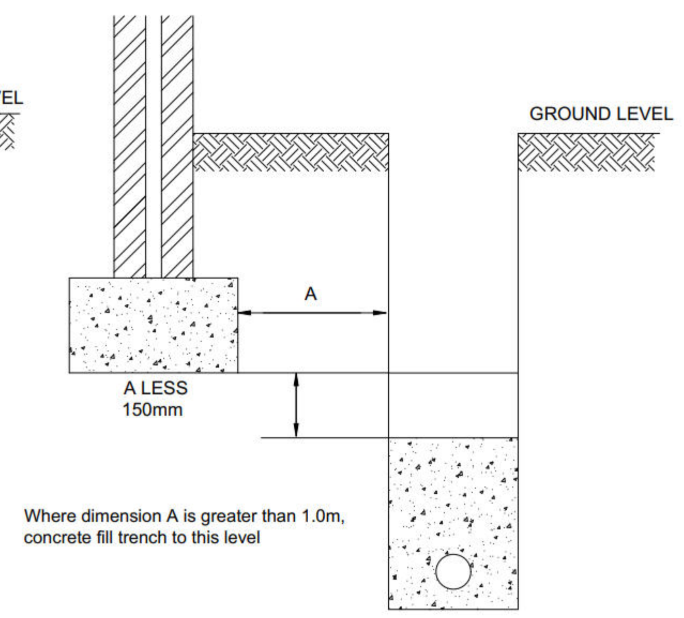
| JOB No. | STATUS | DRAWING No. | REV. |
|---|---|---|---|
| C3552 | P | 101 | P1 |



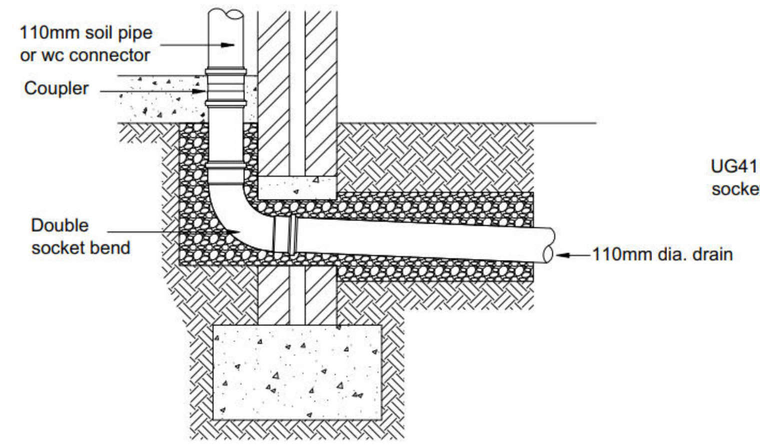

Pipe bedding details in private Areas



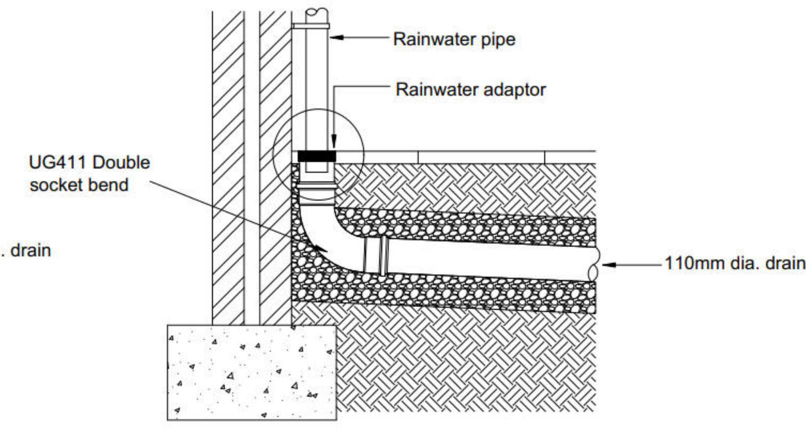

Pipes near buildings



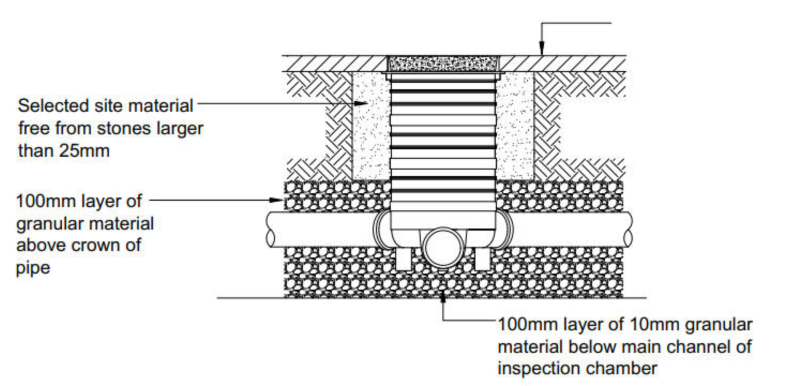

Pipes near buildings



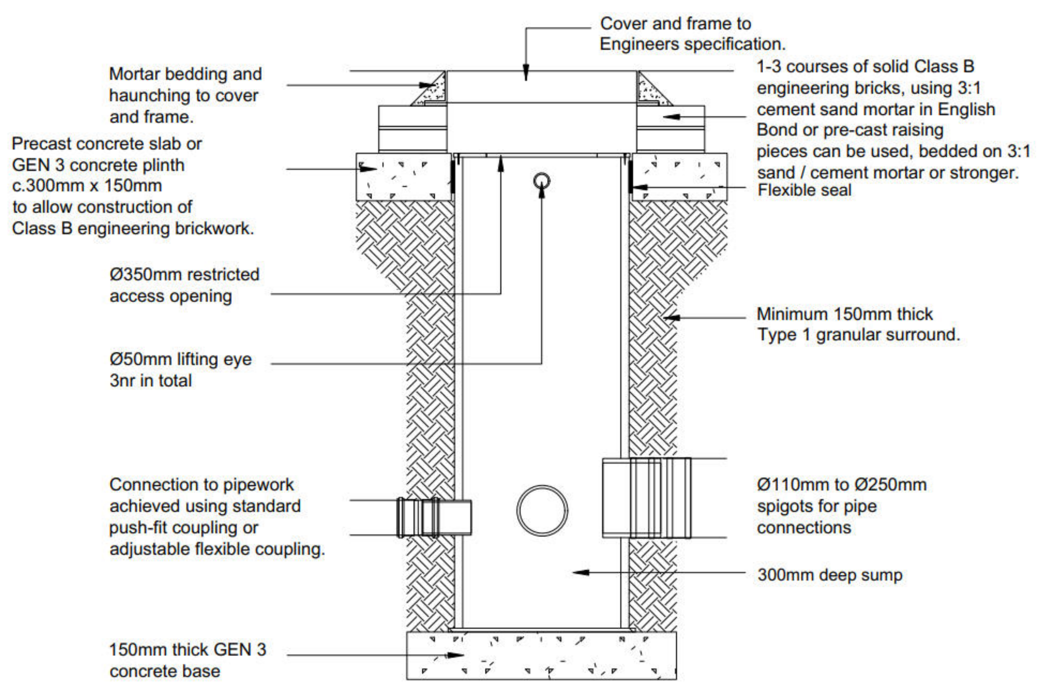

Soil pipe / wc connection



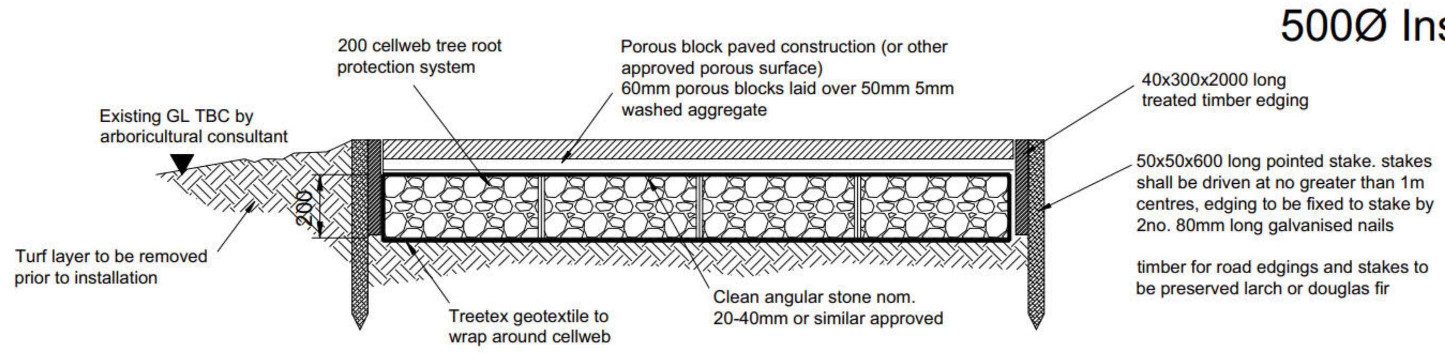

Rainwater pipe connection




300mmØ SHALLOW INSPECTION CHAMBER DETAIL



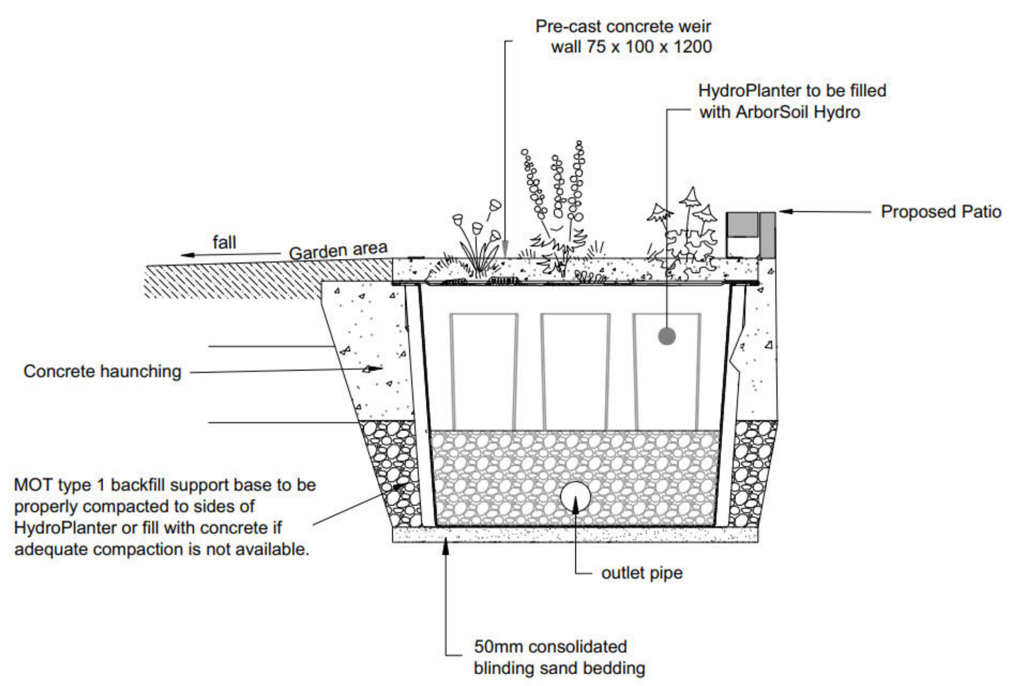

SEL WASP05050
500Ø Inspection Chamber



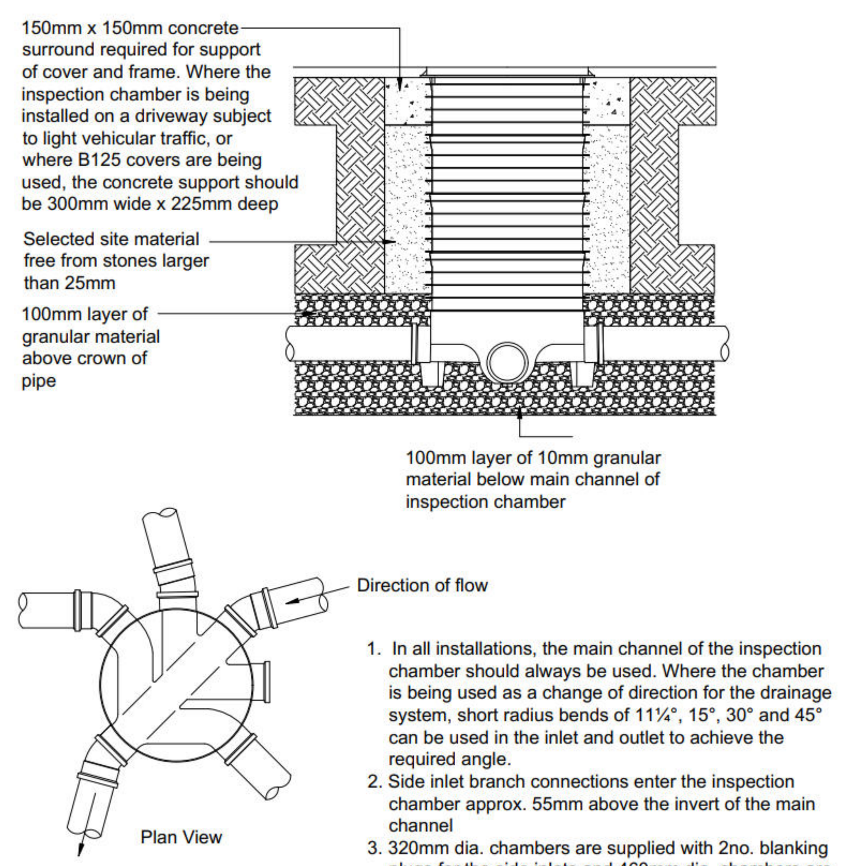

Typical 'no dig' access road construction

subject to detailed design by geosynthetics ltd

to be installed in accordance with geosynthetic ltds sinstallation guide and specification




HydroPlanter (Infiltrating) Typical Detail
by GreenBlue Urban
Final detail to be confirmed by the manufacturer

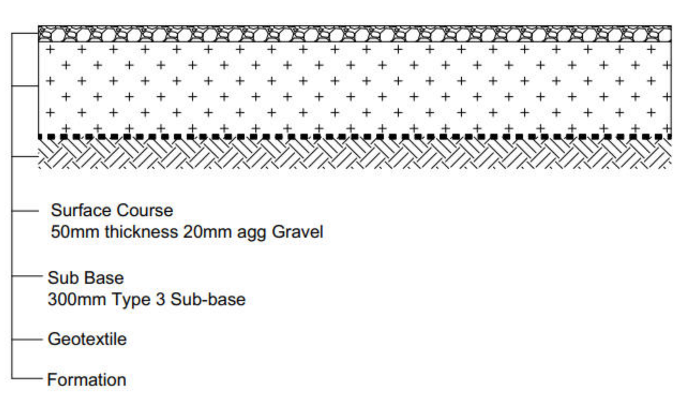



1. In all installations, the main channel of the inspection chamber should always be used. Where the chamber is being used as a change of direction for the drainage system, short radius bends of 11¼°, 15°, 30° and 45° can be used in the inlet and outlet to achieve the required angle.
2. Side inlet branch connections enter the inspection chamber approx. 55mm above the invert of the main channel
3. 320mm dia. chambers are supplied with 2no. blanking plugs for the side inlets and 460mm dia. chambers are supplied with 3no. blanking plugs.

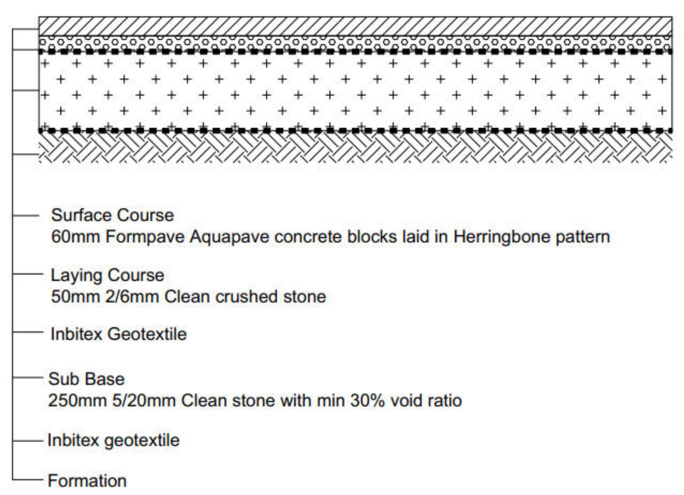
460mmØ INSPECTION CHAMBER DETAIL

Prefixed to drawing numbers shall signify the following:-

| | |
|---|---|
| PL = PLANNING | Shall not be used for contract or construction purposes |
| P = PRELIMINARY | Shall not be used for contract or construction purposes |
| T = TENDER | Shall not be used for construction purposes |
| C = CONSTRUCTION | These are the only drawings that shall be used for construction purposes |
| R = RECORD | Record of actual completed work |

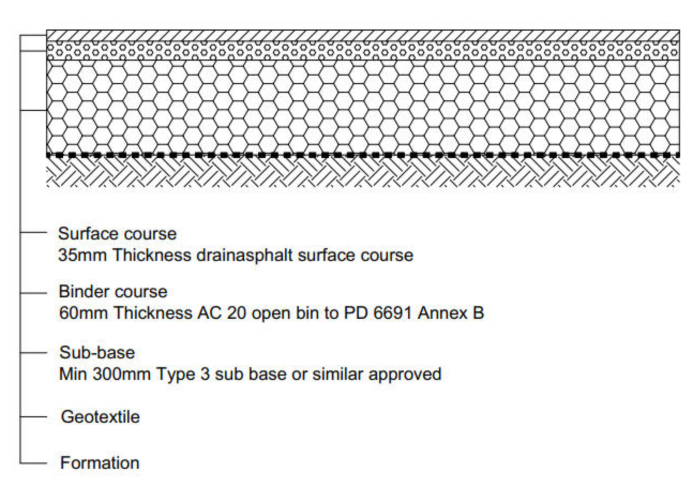



Infiltrating Gravel Car Parking area construction




Formpave permeable block paving private driveway construction

To be read in accordance with Formpave details and specification




Permeable asphalt construction

To be read in accordance with Aggregate Industries details and specification

PERMEABLE PAVED CONSTRUCTION
TBC BY CLIENT
1:20

FOR PLANNING ONLY

| REV | DATE | DESCRIPTION | BY | CHK | APP |
|---|---|---|---|---|---|
| P- | 15.05.25 | PRELIMINARY ISSUE | LH | CS | CS |

cgs civils
Consulting Civil Engineers

CLIENT: HOWARD PHILLIPS

ARCHITECT: JJR DESIGNS LTD

JOB TITLE: LAND EAST OF COMMONMEAD BARN PAGHAM

DRAWING TITLE: CONSTRUCTION DETAILS

| DRAWN | ENGINEER | CHECKED | APPROVED |
|---|---|---|---|
| LH | C SLADE | CS | CS |

| DATE | SCALE @ A1 |
|---|---|
| MAY 2025 | 1:20 |

| JOB No. | STATUS | DRAWING No. | REV. |
|---|---|---|---|
| C3552 | P | 301 | P- |


FOR PLANNING ONLY

Prefixed to drawing numbers shall signify the following:-

| | |
|---|---|
| PL = PLANNING | **Shall not be used for contract or construction purposes** |
| P = PRELIMINARY | **Shall not be used for contract or construction purposes** |
| T = TENDER | **Shall not be used for construction purposes** |
| C = CONSTRUCTION | These are the only drawings that shall be used for construction purposes |
| R = RECORD | Record of actual completed work |

| REV | DATE | DESCRIPTION | BY | CHK | APP |
|---|---|---|---|---|---|
| P1 | 10.09.25 | REVISED TO SUIT NEW SITEPLAN | LH | CS | CS |
| P- | 15.05.25 | PRELIMINARY ISSUE | LH | CS | CS |

cgs civils
Consulting Civil Engineers

CLIENT
HOWARD PHILLIPS

ARCHITECT
JJR DESIGNS LTD

JOB TITLE
LAND EAST OF COMMONMEAD BARN
PAGHAM

DRAWING TITLE
IMPERMEABLE AREAS
& OVERLAND FLOW ROUTE PLAN

| DRAWN | ENGINEER | CHECKED | APPROVED |
|---|---|---|---|
| LH | C SLADE | CS | CS |

| DATE | SCALE @ A1 |
|---|---|
| MAY 2025 | 1:100 |

| JOB No. | STATUS | DRAWING No. | REV. |
|---|---|---|---|
| C3552 | P | 401 | P1 |

## 7.3 Appendix C – Surface Water Calculations

## Design Settings

| | | | |
|---|---|---|---|
| Rainfall Methodology | FEH-22 | Minimum Velocity (m/s) | 1.00 |
| Return Period (years) | 2 | Connection Type | Level Soffits |
| Additional Flow (%) | 0 | Minimum Backdrop Height (m) | 0.200 |
| CV | 1.000 | Preferred Cover Depth (m) | 0.350 |
| Time of Entry (mins) | 2.00 | Include Intermediate Ground | ✓ |
| Maximum Time of Concentration (mins) | 30.00 | Enforce best practice design rules | ✓ |
| Maximum Rainfall (mm/hr) | 75.0 | | |

## Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Node Type | Manhole Type | Diameter (mm) | Easting (m) | Northing (m) | Depth (m) |
|---|---|---|---|---|---|---|---|---|---|
| S1 | 0.002 | 2.00 | 50.300 | Manhole | Adoptable | 300 | 997.139 | 998.526 | 0.476 |
| S2 | 0.002 | 2.00 | 50.300 | Manhole | Adoptable | 500 | 987.523 | 999.608 | 0.571 |
| S3 | 0.004 | 2.00 | 50.300 | Manhole | Adoptable | 500 | 986.208 | 984.874 | 0.838 |
| S7 | | | 50.300 | Manhole | Adoptable | 450 | 990.163 | 980.746 | 0.951 |
| BIO1 | 0.000 | | 50.300 | Manhole | Adoptable | 100 | 987.411 | 998.577 | 0.577 |
| BIO2 | | 2.00 | 50.300 | Manhole | Adoptable | 100 | 986.790 | 993.004 | 0.587 |
| S4 | 0.002 | 2.00 | 50.300 | Manhole | Adoptable | 300 | 988.990 | 963.487 | 0.465 |
| S5 | 0.002 | 2.00 | 50.300 | Manhole | Adoptable | 500 | 979.742 | 966.651 | 0.561 |
| S6 | 0.002 | 2.00 | 50.300 | Manhole | Adoptable | 500 | 985.291 | 981.182 | 0.838 |
| S8 | 0.002 | 2.00 | 50.300 | Manhole | Adoptable | 300 | 993.829 | 977.741 | 0.600 |
| BIO3 | 0.000 | | 50.300 | Manhole | Adoptable | 100 | 980.117 | 967.695 | 0.577 |
| BIO4 | | 2.00 | 50.300 | Manhole | Adoptable | 100 | 981.812 | 972.693 | 0.587 |
| OUTFALL | 0.000 | | 50.300 | Manhole | Adoptable | 450 | 995.043 | 981.273 | 1.000 |

## Links (Input)

| Name | US Node | DS Node | Length (m) | US IL (m) | DS IL (m) | Fall (m) | Slope (1:X) | Dia (mm) |
|---|---|---|---|---|---|---|---|---|
| 1.000 | S1 | S2 | 9.677 | 49.824 | 49.729 | 0.095 | 101.9 | 100 |
| 1.001 | S2 | BIO1 | 1.037 | 49.729 | 49.723 | 0.006 | 172.8 | 100 |
| 1.002 | BIO2 | S3 | 8.151 | 49.713 | 49.462 | 0.251 | 32.5 | 100 |
| 1.003 | S3 | S7 | 5.717 | 49.462 | 49.349 | 0.113 | 50.6 | 100 |
| 2.000 | S4 | S5 | 9.774 | 49.835 | 49.739 | 0.096 | 101.8 | 100 |
| 2.001 | S5 | BIO3 | 1.109 | 49.739 | 49.723 | 0.016 | 69.3 | 100 |
| 2.002 | BIO4 | S6 | 9.174 | 49.713 | 49.462 | 0.251 | 36.6 | 100 |
| 2.003 | S6 | S7 | 4.891 | 49.462 | 49.349 | 0.113 | 43.3 | 100 |
| 3.000 | S8 | S6 | 9.205 | 49.700 | 49.462 | 0.238 | 38.7 | 100 |
| 1.002_1 | S7 | OUTFALL | 4.908 | 49.349 | 49.300 | 0.049 | 100.2 | 100 |

## Manhole Schedule

| Node | Easting (m) | Northing (m) | CL (m) | Depth (m) | Dia (mm) | Node Type | MH Type | Connections | Link | IL (m) | Dia (mm) | Link Type |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S1 | 997.139 | 998.526 | 50.300 | 0.476 | 300 | Manhole | Adoptable | 0 | 1.000 | 49.824 | 100 | Circular |
| S2 | 987.523 | 999.608 | 50.300 | 0.571 | 500 | Manhole | Adoptable | 1 | 1.000 | 49.729 | 100 | Circular |
| | | | | | | | | 0 | 1.001 | 49.729 | 100 | Circular |
| S3 | 986.208 | 984.874 | 50.300 | 0.838 | 500 | Manhole | Adoptable | 1 | 1.002 | 49.462 | 100 | Circular |
| | | | | | | | | 0 | 1.003 | 49.462 | 100 | Circular |
| S7 | 990.163 | 980.746 | 50.300 | 0.951 | 450 | Manhole | Adoptable | 1 | 1.003 | 49.349 | 100 | Circular |
| | | | | | | | | 2 | 2.003 | 49.349 | 100 | Circular |
| | | | | | | | | 0 | 1.002_1 | 49.349 | 100 | Circular |
| BIO1 | 987.411 | 998.577 | 50.300 | 0.577 | 100 | Manhole | Adoptable | 1 | 1.001 | 49.723 | 100 | Circular |
| BIO2 | 986.790 | 993.004 | 50.300 | 0.587 | 100 | Manhole | Adoptable | 0 | 1.002 | 49.713 | 100 | Circular |
| S4 | 988.990 | 963.487 | 50.300 | 0.465 | 300 | Manhole | Adoptable | 0 | 2.000 | 49.835 | 100 | Circular |
| S5 | 979.742 | 966.651 | 50.300 | 0.561 | 500 | Manhole | Adoptable | 1 | 2.000 | 49.739 | 100 | Circular |
| | | | | | | | | 0 | 2.001 | 49.739 | 100 | Circular |
| S6 | 985.291 | 981.182 | 50.300 | 0.838 | 500 | Manhole | Adoptable | 1 | 2.002 | 49.462 | 100 | Circular |
| | | | | | | | | 2 | 3.000 | 49.462 | 100 | Circular |
| | | | | | | | | 0 | 2.003 | 49.462 | 100 | Circular |
| S8 | 993.829 | 977.741 | 50.300 | 0.600 | 300 | Manhole | Adoptable | 0 | 3.000 | 49.700 | 100 | Circular |
| BIO3 | 980.117 | 967.695 | 50.300 | 0.577 | 100 | Manhole | Adoptable | 1 | 2.001 | 49.723 | 100 | Circular |
| BIO4 | 981.812 | 972.693 | 50.300 | 0.587 | 100 | Manhole | Adoptable | 0 | 2.002 | 49.713 | 100 | Circular |
| OUTFALL | 995.043 | 981.273 | 50.300 | 1.000 | 450 | Manhole | Adoptable | 1 | 1.002_1 | 49.300 | 100 | Circular |

## Simulation Settings

| | | | | | |
|---|---|---|---|---|---|
| Rainfall Methodology | FEH-22 | Analysis Speed | Normal | 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) | 0.0 | | |

**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 | 10 | 0 |
| 10 | 0 | 10 | 0 |
| 30 | 45 | 10 | 0 |
| 100 | 45 | 10 | 0 |

## Node OUTFALL Surcharged Outfall

| | | | | | |
|---|---|---|---|---|---|
| Overrides Design Area | x | Depression Storage Area (m²) | 0 | Evapo-transpiration (mm/day) | 0 |
| Overrides Design Additional Inflow | x | Depression Storage Depth (mm) | 0 | | |

Applies to 2yr, 10yr, 30yr+45% CC, 100yr+45% CC 15, 30, 60, 120, 180, 240, 360, 480, 600, 720, 960, 1440 minute storms

| Time (mins) | Depth (m) | Time (mins) | Depth (m) | Time (mins) | Depth (m) | Time (mins) | Depth (m) | Time (mins) | Depth (m) | Time (mins) | Depth (m) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | 0.750 | 11 | 0.000 | 22 | 0.000 | 33 | 0.000 | 44 | 0.000 | 55 | 0.000 |
| 1 | 0.750 | 12 | 0.000 | 23 | 0.000 | 34 | 0.000 | 45 | 0.000 | 56 | 0.000 |
| 2 | 0.000 | 13 | 0.000 | 24 | 0.000 | 35 | 0.000 | 46 | 0.000 | 57 | 0.000 |
| 3 | 0.000 | 14 | 0.000 | 25 | 0.000 | 36 | 0.000 | 47 | 0.000 | 58 | 0.000 |
| 4 | 0.000 | 15 | 0.000 | 26 | 0.000 | 37 | 0.000 | 48 | 0.000 | 59 | 0.000 |
| 5 | 0.000 | 16 | 0.000 | 27 | 0.000 | 38 | 0.000 | 49 | 0.000 | 60 | 0.000 |
| 6 | 0.000 | 17 | 0.000 | 28 | 0.000 | 39 | 0.000 | 50 | 0.000 | | |
| 7 | 0.000 | 18 | 0.000 | 29 | 0.000 | 40 | 0.000 | 51 | 0.000 | | |
| 8 | 0.000 | 19 | 0.000 | 30 | 0.000 | 41 | 0.000 | 52 | 0.000 | | |
| 9 | 0.000 | 20 | 0.000 | 31 | 0.000 | 42 | 0.000 | 53 | 0.000 | | |
| 10 | 0.000 | 21 | 0.000 | 32 | 0.000 | 43 | 0.000 | 54 | 0.000 | | |

## Node S3 Online Orifice Control

| | | | | | |
|---|---|---|---|---|---|
| Flap Valve | x | Design Depth (m) | 0.737 | Discharge Coefficient | 0.650 |
| Replaces Downstream Link | x | Design Flow (l/s) | 1.0 | | |
| Invert Level (m) | 49.462 | Diameter (m) | 0.021 | | |

## Node S6 Online Orifice Control

| | | | | | |
|---|---|---|---|---|---|
| Flap Valve | x | Design Depth (m) | 0.663 | Discharge Coefficient | 0.650 |
| Replaces Downstream Link | x | Design Flow (l/s) | 1.0 | | |
| Invert Level (m) | 49.462 | Diameter (m) | 0.023 | | |

## Node BIO2 Bioretention Area Storage Structure

| | | | |
|---|---|---|---|
| Underdrain Link Type | Circular | Underdrain Height above base (m) | 0.100 |
| Underdrain Diameter (mm) | 100 | Underdrain DS Node | S3 |
| Underdrain Velocity | Colebrook-White | Filter Conductivity (m/hr) | 0.03600 |
| Underdrain ks (mm) / n | 0.030 | Filter Depth (m) | 0.300 |
| Underdrain Length (m) | 6.600 | Base Inf Coefficient (m/hr) | 0.01814 |
| Underdrain Slope (1:X) | 999.0 | Side Inf Coefficient (m/hr) | 0.00000 |

## Node BIO2 Bioretention Area Storage Structure

| | | | |
|---|---|---|---|
| Safety Factor | 2.0 | Main Channel Length (m) | 6.700 |
| Porosity | 0.30 | Main Channel Slope (1:X) | 999.0 |
| Invert Level (m) | 49.913 | Main Channel n | 0.030 |
| Time to half empty (mins) | 38 | | |

| Inlet Node | Connects To |
|---|---|
| BIO1 | Underdrain |

| Depth (m) | Area (m²) | Depth (m) | Area (m²) |
|---|---|---|---|
| 0.000 | 6.7 | 0.435 | 6.7 |

## Node BIO4 Bioretention Area Storage Structure

| | | | |
|---|---|---|---|
| Underdrain Link Type | Circular | Base Inf Coefficient (m/hr) | 0.01814 |
| Underdrain Diameter (mm) | 100 | Side Inf Coefficient (m/hr) | 0.00000 |
| Underdrain Velocity | Colebrook-White | Safety Factor | 2.0 |
| Underdrain ks (mm) / n | 0.030 | Porosity | 0.30 |
| Underdrain Length (m) | 6.600 | Invert Level (m) | 49.913 |
| Underdrain Slope (1:X) | 999.0 | Time to half empty (mins) | 0 |
| Underdrain Height above base (m) | 0.100 | Main Channel Length (m) | 6.600 |
| Underdrain DS Node | S7 | Main Channel Slope (1:X) | 999.0 |
| Filter Conductivity (m/hr) | 0.03600 | Main Channel n | 0.030 |
| Filter Depth (m) | 0.300 | | |

| Inlet Node | Connects To |
|---|---|
| BIO3 | Underdrain |

| Depth (m) | Area (m²) | Depth (m) | Area (m²) |
|---|---|---|---|
| 0.000 | 6.7 | 0.435 | 6.7 |

**Results for 2 year +10% A 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 | 9 | 49.845 | 0.021 | 0.6 | 0.0015 | 0.0000 | OK |
| 15 minute summer | S2 | 9 | 49.767 | 0.038 | 1.2 | 0.0075 | 0.0000 | OK |
| 30 minute summer | S3 | 21 | 49.721 | 0.259 | 1.3 | 0.0508 | 0.0000 | SURCHARGED |
| 30 minute summer | S7 | 19 | 49.386 | 0.037 | 1.6 | 0.0058 | 0.0000 | OK |
| 15 minute summer | BIO1 | 1 | 49.723 | 0.000 | 0.0 | 0.0000 | 0.0000 | OK |
| 30 minute summer | BIO2 | 21 | 49.721 | 0.008 | 0.1 | 0.0002 | 0.0000 | OK |
| 30 minute summer | BIO2 Filter Layer | 18 | 49.738 | 0.125 | 0.9 | 0.2486 | 0.0000 | OK |
| 15 minute summer | S4 | 9 | 49.856 | 0.021 | 0.6 | 0.0015 | 0.0000 | OK |
| 15 minute summer | S5 | 9 | 49.770 | 0.031 | 1.2 | 0.0061 | 0.0000 | OK |
| 15 minute summer | S6 | 11 | 49.626 | 0.164 | 1.2 | 0.0322 | 0.0000 | SURCHARGED |
| 15 minute summer | S8 | 9 | 49.717 | 0.017 | 0.6 | 0.0012 | 0.0000 | OK |
| 15 minute summer | BIO3 | 1 | 49.723 | 0.000 | 0.0 | 0.0000 | 0.0000 | OK |
| 15 minute summer | BIO4 | 1 | 49.713 | 0.000 | 0.0 | 0.0002 | 0.0000 | OK |
| 30 minute summer | BIO4 Filter Layer | 18 | 49.738 | 0.125 | 0.9 | 0.2492 | 0.0000 | OK |
| 30 minute summer | OUTFALL | 19 | 49.335 | 0.035 | 1.6 | 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 | S1 | 1.000 | S2 | 0.6 | 0.304 | 0.100 | 0.0193 | |
| 15 minute summer | S2 | 1.001 | BIO1 | 1.2 | 0.458 | 0.258 | 0.0027 | |
| 30 minute summer | S3 | 1.003 | S7 | 0.5 | 0.403 | 0.058 | 0.0097 | |
| 30 minute summer | S7 | 1.002_1 | OUTFALL | 1.6 | 0.626 | 0.261 | 0.0123 | 1.4 |
| 15 minute summer | BIO1 | Bioretention Area | BIO2 | 0.0 | 0.000 | 0.000 | | |
| 30 minute summer | BIO2 | 1.002 | S3 | -0.1 | -0.033 | -0.014 | 0.0331 | |
| 30 minute summer | BIO2 | Filtration | | 0.0 | | | | |
| 30 minute summer | BIO2 Filter Layer | Underdrain | | 0.9 | 0.423 | 0.406 | 0.0141 | |
| 30 minute summer | BIO2 Filter Layer | Infiltration | | 0.0 | | | | |
| 15 minute summer | S4 | 2.000 | S5 | 0.6 | 0.364 | 0.100 | 0.0161 | |
| 15 minute summer | S5 | 2.001 | BIO3 | 1.2 | 0.581 | 0.159 | 0.0022 | |
| 15 minute summer | S6 | 2.003 | S7 | 0.5 | 0.386 | 0.050 | 0.0077 | |
| 15 minute summer | S8 | 3.000 | S6 | 0.6 | 0.238 | 0.061 | 0.0400 | |
| 15 minute summer | BIO3 | Bioretention Area | BIO4 | 0.0 | 0.000 | 0.000 | | |
| 15 minute summer | BIO4 | 2.002 | S6 | 0.0 | 0.000 | 0.000 | 0.0359 | |
| 15 minute summer | BIO4 | Filtration | | 0.0 | | | | |
| 15 minute summer | BIO4 Filter Layer | Underdrain | | 1.0 | 0.444 | 0.456 | 0.0150 | |
| 30 minute summer | BIO4 Filter Layer | Infiltration | | 0.0 | | | | |

**Results for 10 year +10% A 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 |
|---|---|---|---|---|---|---|---|---|
| 60 minute summer | S1 | 39 | 49.857 | 0.033 | 0.6 | 0.0023 | 0.0000 | OK |
| 60 minute summer | S2 | 40 | 49.857 | 0.128 | 1.2 | 0.0251 | 0.0000 | SURCHARGED |
| 60 minute summer | S3 | 40 | 49.857 | 0.395 | 1.5 | 0.0773 | 0.0000 | SURCHARGED |
| 15 minute summer | S7 | 10 | 49.405 | 0.056 | 3.2 | 0.0089 | 0.0000 | OK |
| 15 minute summer | BIO1 | 1 | 49.723 | 0.000 | 0.0 | 0.0000 | 0.0000 | OK |
| 60 minute summer | BIO2 | 40 | 49.857 | 0.144 | 0.7 | 0.0013 | 0.0000 | SURCHARGED |
| 60 minute summer | BIO2 Filter Layer | 40 | 49.854 | 0.241 | 0.9 | 0.4686 | 0.0000 | OK |
| 15 minute summer | S4 | 9 | 49.864 | 0.029 | 1.1 | 0.0021 | 0.0000 | OK |
| 15 minute summer | S5 | 9 | 49.787 | 0.048 | 2.2 | 0.0095 | 0.0000 | OK |
| 30 minute summer | S6 | 20 | 49.760 | 0.298 | 1.8 | 0.0583 | 0.0000 | SURCHARGED |
| 30 minute summer | S8 | 20 | 49.759 | 0.059 | 0.9 | 0.0042 | 0.0000 | OK |
| 15 minute summer | BIO3 | 1 | 49.723 | 0.000 | 0.0 | 0.0000 | 0.0000 | OK |
| 30 minute summer | BIO4 | 20 | 49.760 | 0.047 | 0.4 | 0.0006 | 0.0000 | OK |
| 15 minute summer | BIO4 Filter Layer | 10 | 49.757 | 0.144 | 2.2 | 0.2837 | 0.0000 | OK |
| 15 minute summer | OUTFALL | 10 | 49.352 | 0.052 | 3.2 | 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) |
|---|---|---|---|---|---|---|---|---|
| 60 minute summer | S1 | 1.000 | S2 | 0.6 | 0.288 | 0.095 | 0.0487 | |
| 60 minute summer | S2 | 1.001 | BIO1 | 0.9 | 0.425 | 0.206 | 0.0081 | |
| 60 minute summer | S3 | 1.003 | S7 | 0.6 | 0.506 | 0.072 | 0.0123 | |
| 15 minute summer | S7 | 1.002_1 | OUTFALL | 3.2 | 0.747 | 0.533 | 0.0211 | 2.3 |
| 15 minute summer | BIO1 | Bioretention Area | BIO2 | 0.0 | 0.000 | 0.000 | | |
| 60 minute summer | BIO2 | 1.002 | S3 | -0.7 | -0.132 | -0.067 | 0.0638 | |
| 60 minute summer | BIO2 | Filtration | | 0.0 | | | | |
| 60 minute summer | BIO2 Filter Layer | Underdrain | | 0.8 | 0.400 | 0.353 | 0.0516 | |
| 60 minute summer | BIO2 Filter Layer | Infiltration | | 0.0 | | | | |
| 15 minute summer | S4 | 2.000 | S5 | 1.1 | 0.409 | 0.184 | 0.0275 | |
| 15 minute summer | S5 | 2.001 | BIO3 | 2.2 | 0.600 | 0.300 | 0.0042 | |
| 30 minute summer | S6 | 2.003 | S7 | 0.6 | 0.369 | 0.069 | 0.0122 | |
| 30 minute summer | S8 | 3.000 | S6 | 0.9 | 0.238 | 0.090 | 0.0580 | |
| 15 minute summer | BIO3 | Bioretention Area | BIO4 | 0.0 | 0.000 | 0.000 | | |
| 30 minute summer | BIO4 | 2.002 | S6 | -0.4 | -0.065 | -0.035 | 0.0526 | |
| 30 minute summer | BIO4 | Filtration | | 0.0 | | | | |
| 30 minute summer | BIO4 Filter Layer | Underdrain | | 1.7 | 0.518 | 0.772 | 0.0218 | |
| 15 minute summer | BIO4 Filter Layer | Infiltration | | 0.0 | | | | |

**Results for 30 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 96.05%**

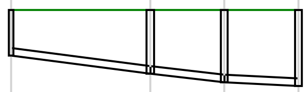
| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 60 minute summer | S1 | 45 | 49.988 | 0.164 | 1.1 | 0.0116 | 0.0000 | SURCHARGED |
| 60 minute summer | S2 | 45 | 49.988 | 0.259 | 1.8 | 0.0507 | 0.0000 | SURCHARGED |
| 60 minute summer | S3 | 45 | 49.987 | 0.525 | 3.0 | 0.1029 | 0.0000 | SURCHARGED |
| 15 minute summer | S7 | 10 | 49.430 | 0.081 | 5.3 | 0.0129 | 0.0000 | OK |
| 60 minute summer | BIO1 | 46 | 49.987 | 0.264 | 2.2 | 0.0000 | 0.0000 | OK |
| 60 minute summer | BIO2 | 45 | 49.987 | 0.274 | 2.3 | 0.4763 | 0.0000 | SURCHARGED |
| 15 minute summer | BIO2 Filter Layer | 10 | 49.913 | 0.300 | 3.4 | 0.5870 | 0.0000 | OK |
| 15 minute summer | S4 | 9 | 49.876 | 0.041 | 2.1 | 0.0029 | 0.0000 | OK |
| 15 minute summer | S5 | 9 | 49.814 | 0.075 | 4.2 | 0.0148 | 0.0000 | OK |
| 30 minute summer | S6 | 21 | 49.921 | 0.459 | 2.6 | 0.0899 | 0.0000 | SURCHARGED |
| 30 minute summer | S8 | 21 | 49.922 | 0.222 | 1.7 | 0.0157 | 0.0000 | SURCHARGED |
| 30 minute summer | BIO3 | 25 | 49.725 | 0.002 | 0.0 | 0.0000 | 0.0000 | OK |
| 30 minute summer | BIO4 | 21 | 49.920 | 0.207 | 1.0 | 0.0241 | 0.0000 | SURCHARGED |
| 15 minute summer | BIO4 Filter Layer | 9 | 49.783 | 0.170 | 4.2 | 0.3308 | 0.0000 | OK |
| 15 minute summer | OUTFALL | 10 | 49.373 | 0.073 | 5.3 | 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) |
|---|---|---|---|---|---|---|---|---|
| 60 minute summer | S1 | 1.000 | S2 | 0.9 | 0.295 | 0.146 | 0.0757 | |
| 60 minute summer | S2 | 1.001 | BIO1 | 1.5 | 0.425 | 0.329 | 0.0081 | |
| 60 minute summer | S3 | 1.003 | S7 | 0.7 | 0.540 | 0.083 | 0.0167 | |
| 15 minute summer | S7 | 1.002_1 | OUTFALL | 5.3 | 0.823 | 0.880 | 0.0316 | 4.4 |
| 60 minute summer | BIO1 | Bioretention Area | BIO2 | -2.2 | -0.122 | -0.017 | | |
| 60 minute summer | BIO2 | 1.002 | S3 | -2.3 | -0.289 | -0.212 | 0.0638 | |
| 60 minute summer | BIO2 | Filtration | | 0.0 | | | | |
| 60 minute summer | BIO2 Filter Layer | Underdrain | | 1.5 | 0.400 | 0.688 | 0.0516 | |
| 15 minute summer | BIO2 Filter Layer | Infiltration | | 0.0 | | | | |
| 15 minute summer | S4 | 2.000 | S5 | 2.1 | 0.462 | 0.351 | 0.0456 | |
| 15 minute summer | S5 | 2.001 | BIO3 | 4.2 | 0.677 | 0.574 | 0.0069 | |
| 30 minute summer | S6 | 2.003 | S7 | 0.8 | 0.430 | 0.086 | 0.0172 | |
| 30 minute summer | S8 | 3.000 | S6 | 0.9 | 0.295 | 0.089 | 0.0720 | |
| 30 minute summer | BIO3 | Bioretention Area | BIO4 | 0.0 | -0.004 | 0.000 | | |
| 30 minute summer | BIO4 | 2.002 | S6 | -1.0 | -0.149 | -0.096 | 0.0718 | |
| 30 minute summer | BIO4 | Filtration | | 0.0 | | | | |
| 30 minute summer | BIO4 Filter Layer | Underdrain | | 3.1 | 0.635 | 1.413 | 0.0326 | |
| 15 minute summer | BIO4 Filter Layer | Infiltration | | 0.0 | | | | |

**Results for 100 year +45% CC +10% A Critical Storm Duration. Lowest mass balance: 93.91%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 60 minute winter | S1 | 47 | 50.063 | 0.239 | 0.9 | 0.0169 | 0.0000 | FLOOD RISK |
| 60 minute winter | S2 | 49 | 50.062 | 0.333 | 1.7 | 0.0654 | 0.0000 | FLOOD RISK |
| 60 minute winter | S3 | 49 | 50.062 | 0.600 | 3.3 | 0.1176 | 0.0000 | FLOOD RISK |
| 15 minute summer | S7 | 10 | 49.454 | 0.105 | 6.4 | 0.0166 | 0.0000 | SURCHARGED |
| 60 minute winter | BIO1 | 50 | 50.062 | 0.339 | 1.9 | 0.0000 | 0.0000 | OK |
| 60 minute winter | BIO2 | 49 | 50.062 | 0.349 | 2.5 | 0.9791 | 0.0000 | FLOOD RISK |
| 15 minute summer | BIO2 Filter Layer | 9 | 49.913 | 0.300 | 2.6 | 0.5870 | 0.0000 | OK |
| 15 minute summer | S4 | 9 | 49.881 | 0.046 | 2.6 | 0.0033 | 0.0000 | OK |
| 15 minute summer | S5 | 9 | 49.829 | 0.090 | 5.2 | 0.0176 | 0.0000 | OK |
| 30 minute summer | S6 | 18 | 49.950 | 0.488 | 3.0 | 0.0956 | 0.0000 | SURCHARGED |
| 30 minute summer | S8 | 18 | 49.955 | 0.255 | 2.1 | 0.0181 | 0.0000 | SURCHARGED |
| 30 minute summer | BIO3 | 23 | 49.936 | 0.213 | 1.6 | 0.0000 | 0.0000 | OK |
| 30 minute summer | BIO4 | 19 | 49.942 | 0.229 | 1.7 | 0.1314 | 0.0000 | SURCHARGED |
| 15 minute summer | BIO4 Filter Layer | 9 | 49.794 | 0.181 | 5.2 | 0.3502 | 0.0000 | OK |
| 15 minute summer | OUTFALL | 10 | 49.381 | 0.081 | 6.3 | 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) |
|---|---|---|---|---|---|---|---|---|
| 60 minute winter | S1 | 1.000 | S2 | 0.8 | 0.272 | 0.134 | 0.0757 | |
| 60 minute winter | S2 | 1.001 | BIO1 | 1.6 | 0.397 | 0.350 | 0.0081 | |
| 60 minute winter | S3 | 1.003 | S7 | 0.8 | 0.555 | 0.089 | 0.0162 | |
| 15 minute summer | S7 | 1.002_1 | OUTFALL | 6.3 | 0.828 | 1.039 | 0.0358 | 5.5 |
| 60 minute winter | BIO1 | Bioretention Area | BIO2 | -2.5 | -0.116 | -0.019 | | |
| 60 minute winter | BIO2 | 1.002 | S3 | -2.5 | -0.324 | -0.237 | 0.0638 | |
| 60 minute winter | BIO2 | Filtration | | 0.0 | | | | |
| 60 minute winter | BIO2 Filter Layer | Underdrain | | 1.5 | 0.376 | 0.671 | 0.0516 | |
| 15 minute summer | BIO2 Filter Layer | Infiltration | | 0.0 | | | | |
| 15 minute summer | S4 | 2.000 | S5 | 2.6 | 0.481 | 0.435 | 0.0535 | |
| 15 minute summer | S5 | 2.001 | BIO3 | 5.2 | 0.712 | 0.708 | 0.0080 | |
| 30 minute summer | S6 | 2.003 | S7 | 0.8 | 0.415 | 0.089 | 0.0198 | |
| 30 minute summer | S8 | 3.000 | S6 | 1.3 | 0.295 | 0.131 | 0.0720 | |
| 30 minute summer | BIO3 | Bioretention Area | BIO4 | -1.6 | -0.103 | -0.012 | | |
| 30 minute summer | BIO4 | 2.002 | S6 | -1.7 | -0.222 | -0.173 | 0.0718 | |
| 30 minute summer | BIO4 | Filtration | | 0.0 | | | | |
| 30 minute summer | BIO4 Filter Layer | Underdrain | | 3.9 | 0.689 | 1.770 | 0.0376 | |
| 15 minute summer | BIO4 Filter Layer | Infiltration | | 0.0 | | | | |



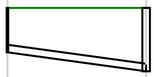
A4 drawing

Hor Scale 500
Ver Scale 100

Datum (m) 40.000

| Node Name | S8 | | S6 | | S7 | | OUTFALL |
|---|---|---|---|---|---|---|---|
| Link Name | | 3.000 | | 2.003 | | 1.002_ | |
| Section Type | | 100mm | | 100mn | | 100mn | |
| Slope (1:X) | | 38.7 | | 43.3 | | 100.2 | |
| Cover Level (m) | 50.300 | | 50.300 | | 50.300 | | 50.300 |
| Invert Level (m) | 49.700 | 49.462 | 49.462 | 49.349 | 49.349 | 49.300 | |
| Length (m) | | 9.205 | | 4.891 | | 4.908 | |

| Node Name | BIO4 | S6 |
|---|---|---|



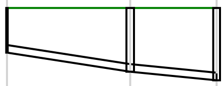
A4 drawing

Hor Scale 500
Ver Scale 100

Datum (m) 40.000

| | BIO4 | | S6 |
|---|---|---|---|
| Link Name | 2.002 | | |
| Section Type | 100mm | | |
| Slope (1:X) | 36.6 | | |
| Cover Level (m) | 50.300 | | 50.300 |
| Invert Level (m) | 49.713 | 49.462 | |
| Length (m) | 9.174 | | |

| Node Name | BIO2 | | S3 | | S7 |
|---|---|---|---|---|---|



A4 drawing

Hor Scale 500
Ver Scale 100

Datum (m) 40.000

| | | | |
|---|---|---|---|
| Link Name | 1.002 | 1.003 | |
| Section Type | 100mm | 100mm | |
| Slope (1:X) | 32.5 | 50.6 | |
| Cover Level (m) | 50.300 | 50.300 | 50.300 |
| Invert Level (m) | 49.713 / 49.462 | 49.462 / 49.349 | |
| Length (m) | 8.151 | 5.717 | |

| Node Name | S4 | S5 | BIO3 |
|---|---|---|---|

A4 drawing

Hor Scale 500
Ver Scale 100

Datum (m) 40.000

| | | |
|---|---|---|
| Link Name | 2.000 | 2 |
| Section Type | 100mm | 1( |
| Slope (1:X) | 101.8 | 6( |
| Cover Level (m) | 50.300 | 50.300 50.300 |
| Invert Level (m) | 49.835 | 49.739 49.723 49.739 |
| Length (m) | 9.774 | 1 |

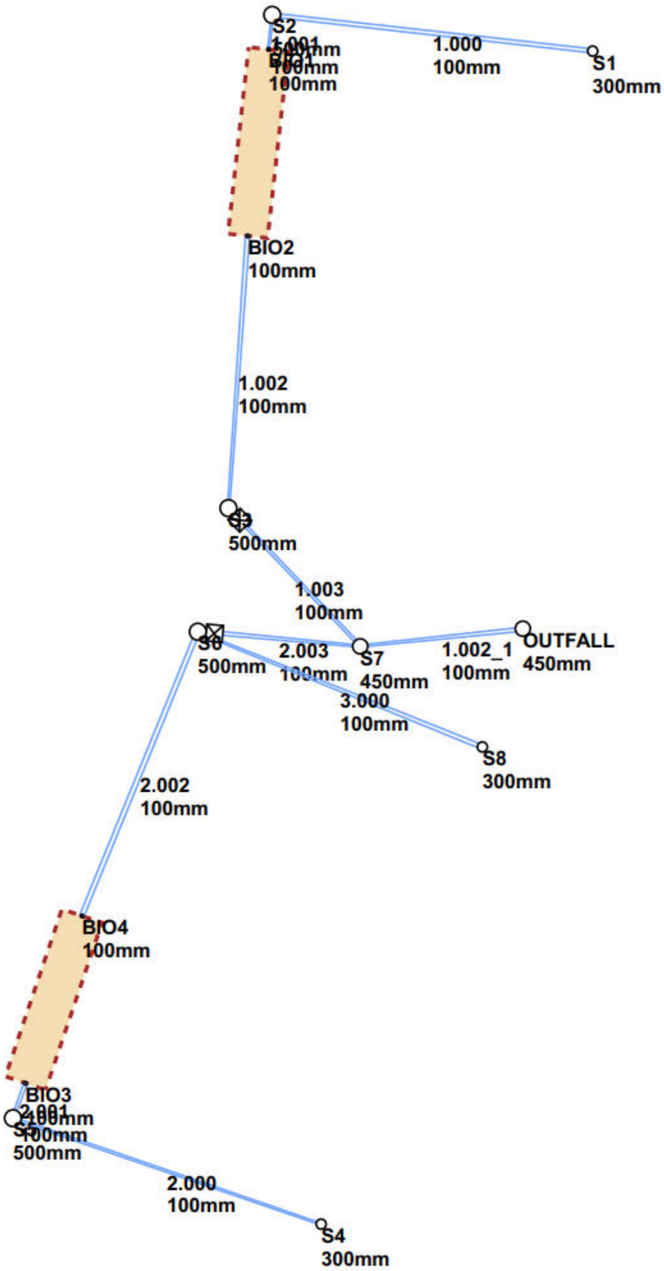
| Node Name | S1 | S2 | BIO1 |
|---|---|---|---|

A4 drawing

Hor Scale 500
Ver Scale 100

Datum (m) 40.000

| | | | |
|---|---|---|---|
| Link Name | 1.000 | 1 | |
| Section Type | 100mm | 1 | |
| Slope (1:X) | 101.9 | 1 | |
| Cover Level (m) | 50.300 | 50.300 | 50.300 |
| Invert Level (m) | 49.824 | 49.729 49.723 | 49.729 |
| Length (m) | 9.677 | 1 | |



S2
1.000
100mm
S1
300mm
BIO2
100mm
1.002
100mm
500mm
1.003
100mm
500mm
2.003
100mm
S7
450mm
1.002_1
100mm
OUTFALL
450mm
3.000
100mm
S8
300mm
2.002
100mm
BIO4
100mm
BIO3
500mm
2.000
100mm
S4
300mm

# Greenfield runoff rate estimation tool

hr wallingford

www.uksuds.com | Greenfield runoff rate estimation tool (https://www.uksuds.com/)

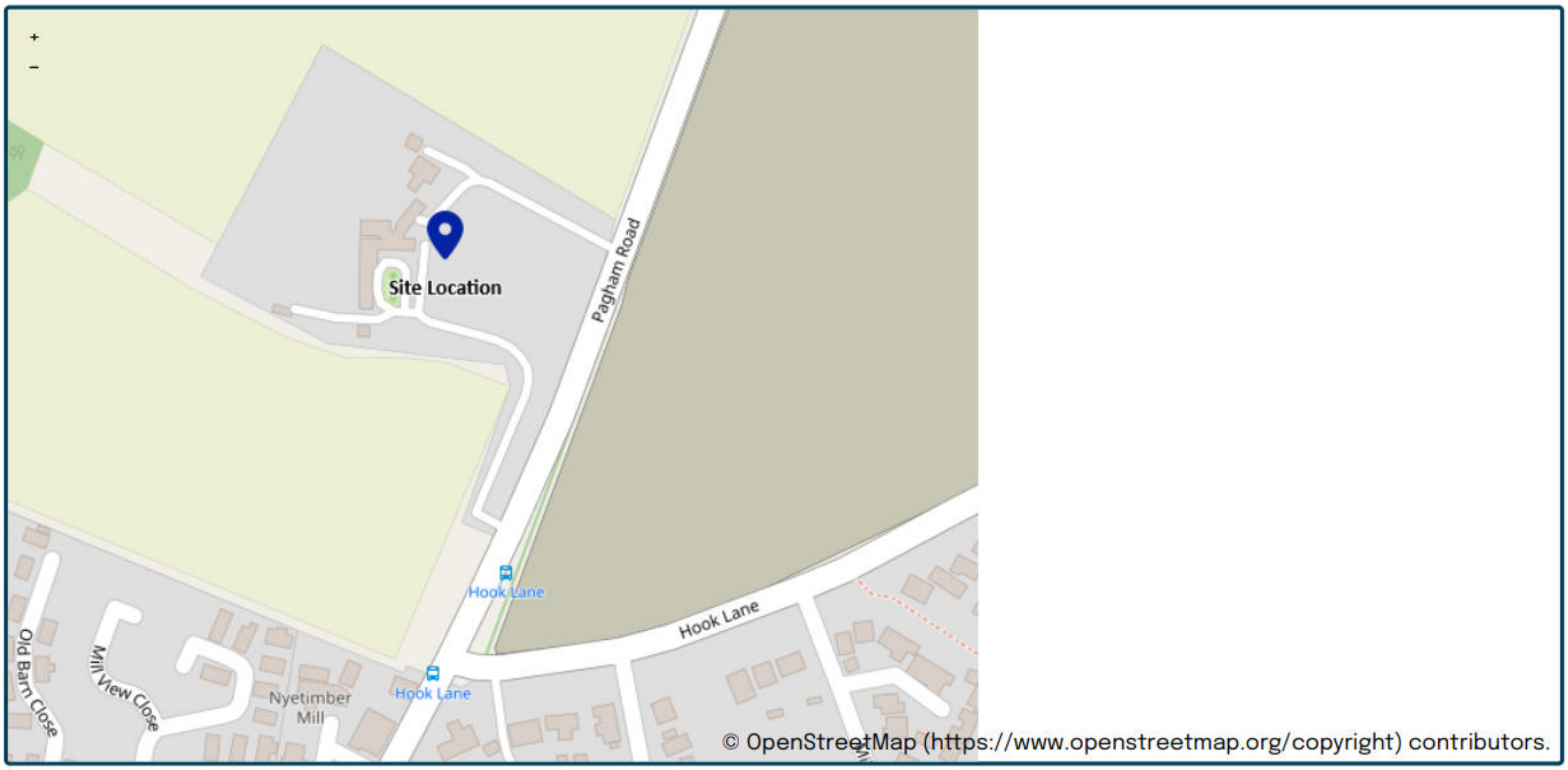
This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013), the SuDS Manual C753 (CIRIA, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

## Project details

| | |
|---|---|
| Date | 06/05/2025 |
| Calculated by | LH |
| Reference | C3552 |
| Model version | 2.0.0 |

## Location

| | |
|---|---|
| Site name | Land east of commonmead Barn |
| Site location | Pagham |




| | |
|---|---|
| Site easting | 489293 |
| Site northing | 99035 |

## Site details

| | |
|---|---|
| Total site area (ha) | 0.04 ha |

## Greenfield runoff

### Method

| | |
|---|---|
| Method | IH124 |

### IH124

| | My value | | Map value |
|---|---|---|---|
| SAAR (mm) | 700 mm | | 700 |
| How should SPR be derived? | WRAP soil type | | |
| WRAP soil type | 3 | | 3 |
| SPR | 0.37 | | |
| QBar (IH124) (l/s) | 0.11 l/s | | |

### Growth curve factors

| | My value | | Map value |
|---|---|---|---|
| Hydrological region | 7 | | 7 |
| 1 year growth factor | 0.85 | | |
| 2 year growth factor | 0.88 | | |
| 10 year growth factor | 1.62 | | |
| 30 year growth factor | 2.3 | | |
| 100 year growth factor | 3.19 | | |
| 200 year growth factor | 3.74 | | |

## Results

| | |
|---|---|
| Method | IH124 |
| Flow rate 1 year (l/s) | 0.098 l/s |
| Flow rate 2 year (l/s) | 0.1 l/s |
| Flow rate 10 years (l/s) | 0.19 l/s |
| Flow rate 30 years (l/s) | 0.26 l/s |
| Flow rate 100 years (l/s) | 0.37 l/s |
| Flow rate 200 years (l/s) | 0.43 l/s |

Disclaimer

## 7.5 Appendix E – Groundwater monitoring and infiltration test results

# Groundwater Monitoring

cgs civils

| Hole ID | Instrument ID | Instrument Type | Recorded Base of Instrument (mBGL) | Reading | | | |
|---|---|---|---|---|---|---|---|
| | | | | Date | Water Level (mBGL) | Water level (mOD) | Ground Level m(OD) |
| GW1 | 1 | SP | 2m | 03.10.24 | 1.940 | 3.11 | 5.05 |
| | | | | 09.10.24 | 1.92 | 3.13 | 5.05 |
| | | | | 17.10.24 | 1.895 | 3.155 | 5.05 |
| | | | | 25.10.24 | 1.885 | 3.17 | 5.05 |
| | | | | 08.11.24 | 1.800 | 3.25 | 5.05 |
| | | | | 22.11.24 | 1.770 | 3.28 | 5.05 |
| | | | | 13.12.24 | 1.735 | 3.32 | 5.05 |
| | | | | 27.12.24 | 1.420 | 3.63 | 5.05 |
| | | | | 03.01.25 | 1.200 | 3.85 | 5.05 |
| | | | | 17.01.25 | 1.720 | 3.33 | 5.05 |
| | | | | 31.01.25 | 1.480 | 3.57 | 5.05 |
| | | | | 06.02.25 | 1.400 | 3.65 | 5.05 |
| | | | | 22.02.25 | 1.330 | 3.72 | 5.05 |
| | | | | 26.02.25 | 1.110 | 3.94 | 5.05 |
| | | | | 02.03.25 | 1.290 | 3.76 | 5.05 |
| | | | | 10.03.25 | 1.44 | 3.61 | 5.05 |
| | | | | 18.03.25 | 1.520 | 3.53 | 5.05 |
| | | | | 28.03.25 | 1.470 | 3.58 | 5.05 |
| | | | | | | | |
| GW2 | 2 | SP | 2m | 03.10.24 | 1.905 | 3.145 | 5.05 |
| | | | | 09.10.24 | 1.89 | 3.16 | 5.05 |
| | | | | 17.10.24 | 1.855 | 3.195 | 5.05 |
| | | | | 25.10.24 | 1.825 | 3.23 | 5.05 |
| | | | | 08.11.24 | 1.715 | 3.34 | 5.05 |
| | | | | 22.11.24 | 1.660 | 3.39 | 5.05 |
| | | | | 13.12.24 | 1.630 | 3.42 | 5.05 |
| | | | | 27.12.24 | 1.380 | 3.67 | 5.05 |
| | | | | 03.01.25 | 1.075 | 3.98 | 5.05 |
| | | | | 17.01.25 | 1.520 | 3.53 | 5.05 |
| | | | | 31.01.25 | 1.440 | 3.61 | 5.05 |
| | | | | 06.02.25 | 1.250 | 3.80 | 5.05 |
| | | | | 22.02.25 | 1.250 | 3.80 | 5.05 |
| | | | | 26.02.25 | 1.020 | 4.03 | 5.05 |
| | | | | 02.03.25 | 1.220 | 3.83 | 5.05 |
| | | | | 10.03.25 | 1.40 | 3.65 | 5.05 |
| | | | | 18.03.25 | 1.400 | 3.65 | 5.05 |
| | | | | 28.03.25 | 1.470 | 3.58 | 5.05 |

| | | |
|---|---|---|
| Project: | Land east of Commonmead Barn, Pagham | GW1 |
| Project No: | C3552 | |
| Client: | Howard Phillips | |

The soil infiltration rate (f) is calculated by dividing the volume of water lost between 75% and 25% of the initial test depth by the sum of the average surface area of the sides of the trial pit in contact with the water during the test monitoring period (time taken for the water level to fall between 75% and 25% of the initial test depth), and its base area. This figure is then divided by the test duration to give the soil infiltration rate in metres per second. Each pit should be filled and allowed to drain three times to near empty on the same or consecutive days.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Trail Pit 1 | | | | | | | | |
| | | | | | | | | |
| V(p75-25) | | Length | Width | Total Depth | 75% depth | 25% depth | 50%depth |
| length*width*(75%depth-25%depth) | | 0.3 | 1 | 0.4 | 0.3 | 0.1 | 0.2 |
| 0.06 | | | | | | | |
| a(p50) | | | | | | | |
| (length*(50% total depth)*2)+(width*(50% total depth)*2)+(area base) | | | | | | | |
| 0.82 | | | | | | | |
| | | | | | | | |
| t(p75-25) | | | | | | | |
| Cycle 1 = | 61 | | | | | | |
| Cycle 2 = | 161 | | | | | | |
| Cycle 3 = | 242 | | | | | | |
| | | | | | | | |
| f=V(p75-25)/(ap50*tp75-25) | | | | | | | |
| 1.9992E-05 | Test 1 | m/s | | | | | |
| 7.57461E-06 | Test 2 | m/s | | | | | |
| 5.03931E-06 | Test 3 | m/s | | | | | |

The soil infiltration rate (f) is calculated by dividing the volume of water lost between 75% and 25% of the initial test depth by the sum of the average surface area of the sides of the trial pit in contact with the water during the test monitoring period (time taken for the water level to fall between 75% and 25% of the initial test depth), and its base area. This figure is then divided by the test duration to give the soil infiltration rate in metres per second. Each pit should be filled and allowed to drain three times to near empty on the same or consecutive days.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Trail Pit 2 | | | | | | | | |
| | | | | | | | | |
| V(p75-25) | | Length | Width | Total Deptl | 75% depth | 25% depth | 50%depth |
| length*width*(75%depth-25%depth) | | 0.3 | 1 | 0.6 | 0.45 | 0.15 | 0.3 |
| 0.09 | | | | | | | |
| a(p50) | | | | | | | |
| (length*(50% total depth)*2)+(width*(50% total depth)*2)+(area base) | | | | | | | |
| 1.08 | | | | | | | |
| | | | | | | | |
| t(p75-25) | | | | | | | |
| Cycle 1 = | 128 | | | | | | |
| Cycle 2 = | 252 | | | | | | |
| Cycle 3 = | 200 | | | | | | |
| | | | | | | | |
| f=V(p75-25)/(ap50*tp75-25) | | | | | | | |
| 1.08507E-05 | Test 1 | m/s | | | | | |
| 5.51146E-06 | Test 2 | m/s | | | | | |
| 6.94444E-06 | Test 3 | m/s | | | | | |

### 5.5 Foul water drainage

5.5.1 The foul water will be treated on site via a new package treatment plant; all treated effluent runoff will be discharged into the existing watercourse.

5.5.2 The proposed foul water discharge does not require Environment Agency approval as it adheres to the general binding rules for small discharge to surface water. This is because the proposed discharge:

- Is less than $5m^3$ a day
- Utilises a sufficient treatment system
- Is not causing pollution
- Is not within 500 meters of a protected site
- Is not within 50m of any other exempt discharge

# 6 Summary and Conclusions

6.1.1 CGS Civils has been instructed to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for the construction of 2 No. dwellings.

6.1.2 The Surface Water will discharge to the existing culverted watercourse that runs across the site at a rate of 2.0l/s. Surface water runoff from the roof areas will be discharged at a restricted rate of 1.0l/s per plot and will make use of a bio-retention planter for storage in order to cater for the 1 in 100-year +45% storm whilst also providing a degree of infiltration. The hard paved areas are to discharge freely to ground via infiltration.

6.1.3 The Foul water will be treated on site via a new package treatment plant prior to discharge to the existing culverted watercourse.