

SuDS and Drainage Report

Sunnymeade, Yapton, BN18 0DL

Rev: P

Ref: C1002

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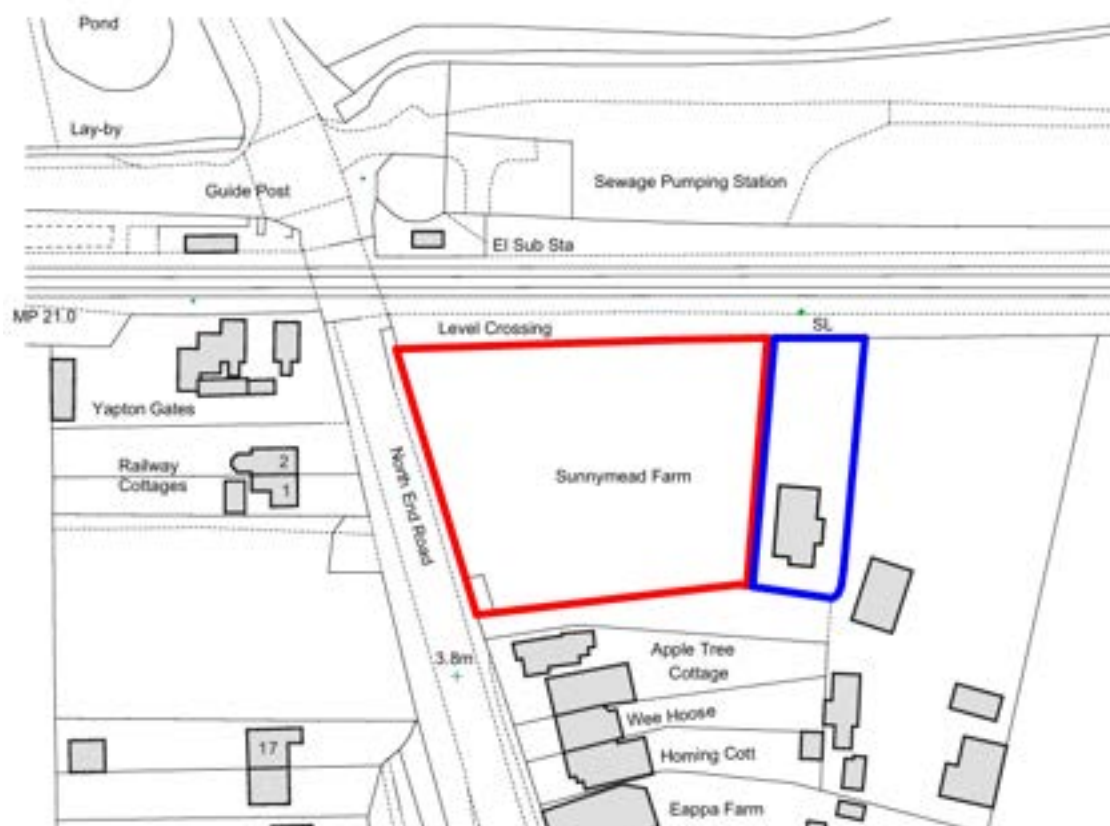
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1 Introduction

- 1.1.1 CGS Civils Ltd has been appointed to undertake a drainage strategy report for a proposed development at Sunnymeade, Yapton.
- 1.1.2 The site is currently an undeveloped plot of land of circa 2175m² which is served by a dedicated access off North End Road. To the east is an existing detached bungalow which is in the client's ownership but excluded from the application site.
- 1.1.3 The proposed development will consist of the erection of 3no chalets to the west of the site with access and a parking area to the east set at a lower level. The proposed development is located as OS Grid Reference SU981043 and has the post code BN18 0DL.
- 1.1.4 The purpose of this drainage strategy is to demonstrate how the development area can be satisfactorily drained without increasing flood risk onsite and elsewhere to support a planning application.

Fig 1. Site Location



2 Executive Summary

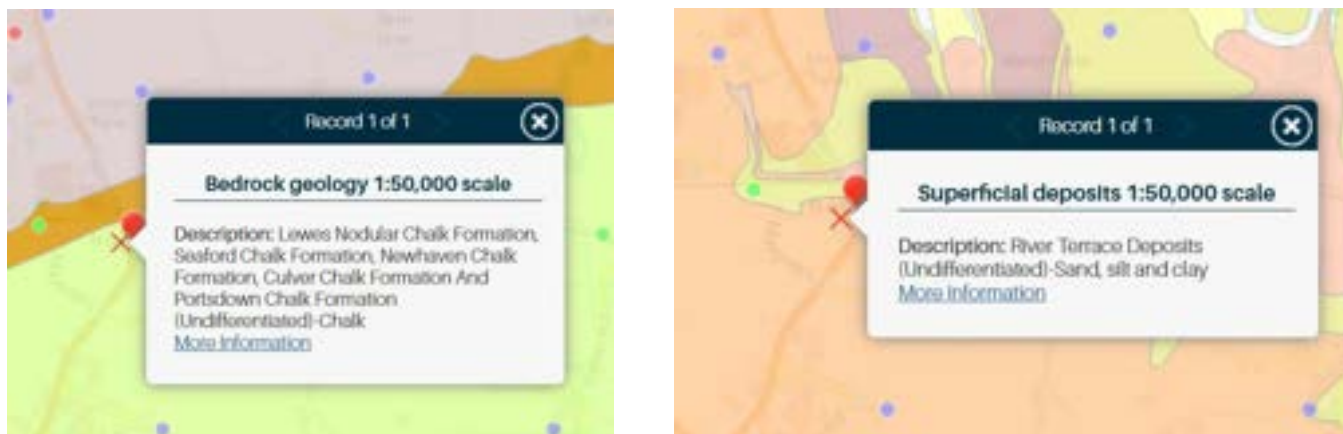
- 2.1.1 Winter groundwater monitoring established peak groundwater levels of **1.8mbgl** for the lower parking area and **2.6mbgl** for the upper chalet area which are acceptable, as a 1metre unsaturated buffer zone can be maintained between the peak level and base of infiltration structure. Infiltration testing to BRE 365 resulted in a worst-case recorded rate of 5.14×10^{-5} ms for the lower parking area and 4.64×10^{-5} ms for the upper area which are noted as being good rates.
- 2.1.2 Surface water will be discharged to ground via infiltration using traditional soakaways and porous paving for the hard surfaces. All systems will be designed to the 1 in 100 year storm + 45% for climate change allowance with an additional 10% for urban creep. Rainwater harvesting units will be installed to capture and reuse rainwater for use inside the chalets.
- 2.1.3 The foul water will discharge to the local foul water sewer via a direct connection into an existing manhole. This connection is subject to Southern Water approval under a Section 106 agreement.

3 Site Geology

3.1 British Geological Survey information

- 3.1.1 The British Geological Survey confirms the bedrock geology to be made up of Lewes Nodular Chalk Formation. The BGS website confirms the superficial deposits on site to be made up of River Terrace Deposits i.e. Sand, Silts and Clays.

Fig 2. British Geological Survey Bedrock and Superficial Deposits data



3.2 Geological Assessment

- 3.2.1 No full phase 2 ground investigation was undertaken on site however two boreholes were drilled on site to a depth of 4mbgl for groundwater monitoring which provided insight of the strata on site which is confirmed as being gravelly and silty clay over chalk. Borehole logs can be found in Appendix D.
- 3.2.2 The groundwater wells were installed in November 2025 and were monitored generally every fortnight until March 2026.
- 3.2.3 Peak groundwater levels were recorded as **1.8mbgl** for the lower parking area and **2.6mbgl** for the upper area where the chalets will be situated.
- 3.2.4 In addition to the groundwater monitoring, infiltration testing to BRE 365 was undertaken on site at both the upper and lower levels. The test at the lower level (SAT1) was undertaken at a depth of 0.6mbgl in line with the approximate depth of the formation of the parking area.
- 3.2.5 A second test was undertaken at the upper area (SAT2) to a depth of 0.9mbgl which would be representative of the depth of traditional crate style soakaways.
- 3.2.6 Worst-case infiltration rates were recorded as $5.14 \times 10^{-5} \text{m/s}$ for SAT1 and $4.64 \times 10^{-5} \text{m/s}$ for SAT2. Both rates are confirmed as being good and suitable for all infiltration devices. Soakaway test results can be found in Appendix D.

Fig 3. Infiltration test and well photos



4 Existing Drainage

- 4.1.1 The site is currently undeveloped land and as such there is no positive surface water system in place. The favourable and well-draining strata likely supports direct infiltration to ground.
- 4.1.2 A foul water sewer runs through the site from south to north. The existing bungalow is served by a gravity foul water connection to this although exact details are unknown at this stage.

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 National Standards for SuDS.

Table 1. SuDS Hierarchy

Discharge Destination	
Rainwater Harvesting	Suitable and included
Discharge to Ground	Suitable – infiltration is proposed through traditional soakaways and permeable paving
Discharge to Watercourse	N/A
Discharge to Surface Water Sewer	N/A
Discharge to Other Sewer	N/A

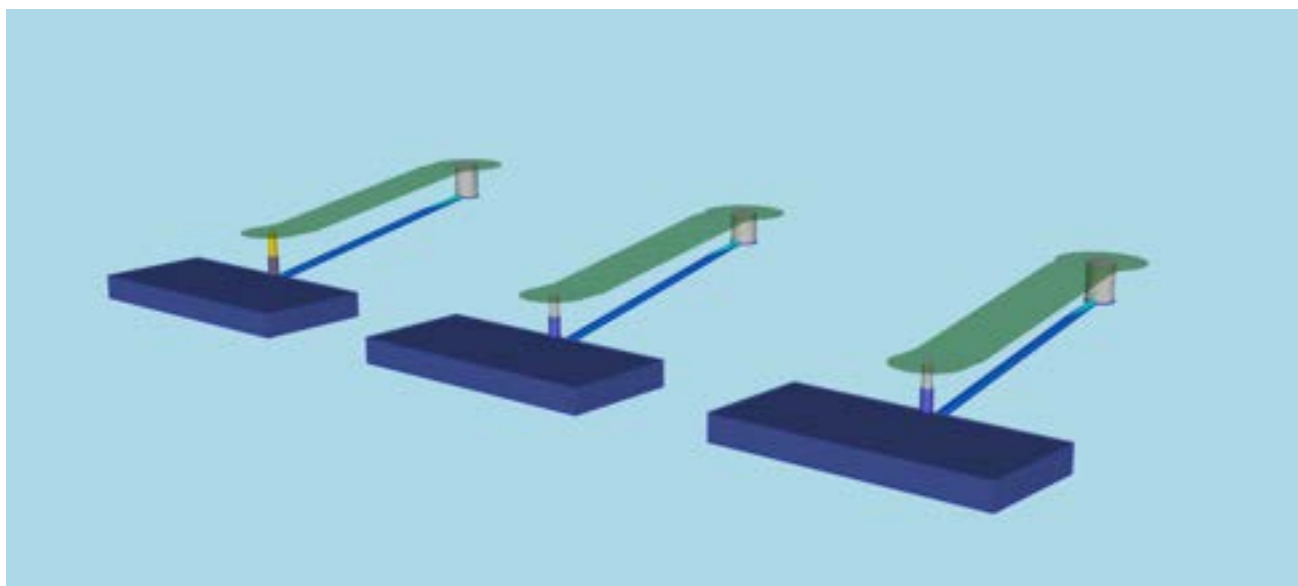
5.2 Proposed Hydraulic Calculation Specifications:

Table 2. Geocellular Soakaway properties

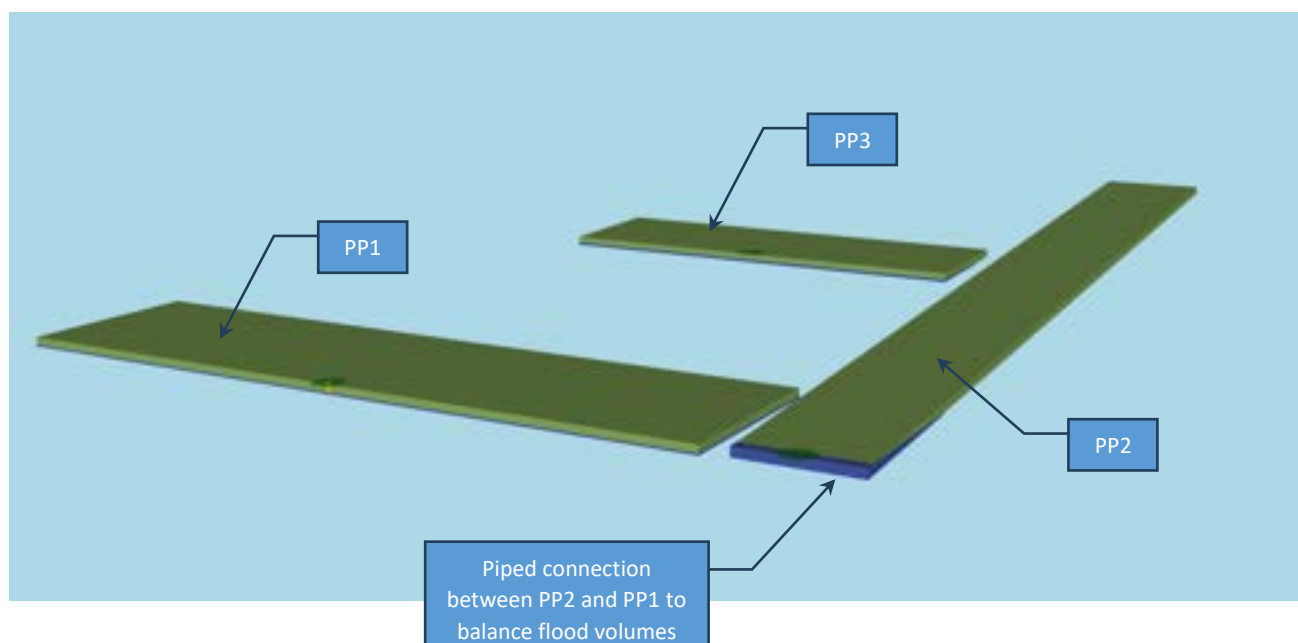
Hydraulic Calculations Settings:	
Rainfall Methodology	FEH-22
Volumetric Run-off Coefficient Cv	1
CV Winter and Summer	1
Additional Storage (m ³ / ha)	0.0
Maximum Rainfall (mm/hr)	75
Urban Creep%	10%
Geocellular soakaway trench	Base Coefficient (m/hr): 0.00000
	Side Coefficient (m/hr): 4.64x10⁻⁵m/s
	Factor of Safety: 2
	Porosity: 95%
	Time to Half Empty (mins): 387

5.3 Surface Water Drainage

- 5.3.1 Based on the results of the onsite soakage testing to BRE 365 for the lower and upper areas, which yielded good infiltration rates of 5.14x10⁻⁵m/s and 4.64x10⁻⁵m/s respectively, it is proposed that the site will discharge all surface water into the ground via infiltration. All roof areas are to be collected into a positive drainage network before being discharged into ground using traditional geocellular crate style soakaways. The soakaways have been designed to cater for the 1 in 100-year+40% storm plus 10% allowance for urban creep.
- 5.3.2 The soakaways have been designed with no infiltration to the base to account for the long term effects of siltation.

Figure 4 – Soakaway Trench Structure per chalet

- 5.3.3 A rainwater harvesting unit is proposed per chalet to capture roof water for reuse within the dwelling. This will cater for the inception requirement.
- 5.3.4 The access and parking areas vary in length, width and gradient and therefore to model the permeable access/parking areas it has been necessary to split this area into 3 distinct sub-catchments.
- 5.3.5 Due to the length of PP2 and reduced amount of storage at its lowest point, it will be necessary to provide a piped connection between PP2 to PP1 to allow for the balancing of flood volumes between the two storage structures.

Figure 5 – Permeable Paving 3D model

- 5.3.6 Each area has been designed based on a subbase thickness of 300mm which provides more than sufficient storage to allow for any slight variations in gradient or exceedance volumes.

6 Compliance with National SuDS Standards and Principles

6.1.1 The current national SuDS standards comprise 7 standards supported by 11 design principles. The tables below summarise how the proposed drainage strategy for Sunnymeade, Yapton responds to these requirements.

Standard	Requirement	Project response
1	Runoff destinations	Rainwater harvesting has been considered and included, and infiltration to ground has been tested and shown to be suitable.
2	Management of everyday rainfall	Rainfall is managed close to source by rainwater harvesting and permeable paving, reducing routine runoff from the site.
3	Management of extreme rainfall and flooding	Roof drainage is directed to soakaways sized for the 1 in 100-year +45% climate change storm with 10% urban creep. The infiltration-led strategy avoids increasing flood risk elsewhere. Any exceedance routes are directed safely away from habitable areas and towards the road.
4	Water quality	Runoff from roofs and parking areas is treated through the SuDS management train. Permeable paving and infiltration components provide pollutant mitigation in accordance with the simple index approach.
5	Amenity	The drainage strategy uses source control and permeable surfacing integrated within the site layout rather than relying solely on conventional buried drainage. Given the small nature of the site, open SuDS are not considered appropriate.
6	Biodiversity	Given the small nature of the site, it will not be appropriate to utilise open SuDS however a BNG proposal forms part of the scheme outside of SuDS.
7	Construction, operation, maintenance and structural integrity	The proposed SuDS components are conventional, buildable and maintainable. Long-term maintenance is addressed within the maintenance schedule and the design respects monitored groundwater levels.

Compliance Table A. Summary of compliance with the 7 national SuDS standards

The proposed drainage design also follows the 11 underpinning principles of the national standards as summarised below.

Principle	Summary	Project response
1	Natural approach to managing water	Surface water is retained and managed on site at source using infiltration in the form of soakaways, permeable paving and rainwater harvesting.
2	Management train close to source	Varying SuDS features are used together, with reuse, permeable surfacing and soakaways operating and discharging to source.
3	SuDS approach	The strategy manages runoff quantity, water quality and long-term maintenance in an integrated manner.
4	Early and integrated design	Drainage has been considered alongside site levels, layout, groundwater conditions and the proposed parking/courtyard arrangement.
5	Site layout informed by drainage	The lower parking area and upper chalet area have been assessed separately, with drainage measures reflecting their different levels and functions.
6	Follow natural drainage routes	The layout allows runoff to be managed in accordance with site topography and infiltration opportunities.
7	Take account of local policy and flood evidence	The design is based on BRE 365 testing, winter groundwater monitoring, BGS data and current national and local SuDS standards.
8	Early engagement with the authority	The report format and supporting evidence are intended to support planning review and future condition discharge.
9	Demonstrate compliance from concept stage	Compliance with the national standards is addressed within this planning-stage drainage strategy rather than deferred entirely to later stages.
10	Show how the standards are met in site design	The report sets out the hierarchy, testing, hydraulic basis, water quality approach and maintenance measures in one coordinated document.
11	Consider phasing where relevant	The development is small and not expected to be phased; however, the strategy is capable of being delivered in a single coordinated phase.

Compliance Table B. Summary of compliance with the 11 SuDS design principles

7 Water quality

- 7.1.1 A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution.
- 7.1.2 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.
- 7.1.3 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
- 7.1.4 The EA website indicates that the site does not lie within a Source Protection Zone.
- 7.1.5 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	

- 7.1.6 As per Table 26.1 Simple Index approach will be used as a design method for this site.
- 7.1.7 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
- 7.1.8 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 $\geq$ pollution hazard index

- 7.1.9 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

7.1.10 From Table 26.2 the following information is tabulated in Table I

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	Ground 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

7.1.11 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.

7.1.12 SuDS mitigation index is 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 no 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 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 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 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
Individual driveways, residential car parks and low traffic roads	Surface/Ground water	Table 26.4 (for ground waters) Table 26.3 (for surface waters)	Permeable Paving	0.7	0.6	0.7

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

7.2 Foul water drainage

7.2.1 The foul water will discharge into the local foul water sewer via a new direct connection into the existing sewer that runs across the site. This will be subject to Section 106 approval with Southern Water.

8 Summary and Conclusions

8.1.1 CGS Civils has been instructed to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for a site of 3no chalet dwellings with associated access and parking.

8.1.2 Winter testing and monitoring confirmed that infiltration is a fully viable option for surface water discharge.

8.1.3 The Surface Water will discharge to ground using traditional geocellular soakaways and permeable paving. All SuDS features have been designed to cater for the 1 in 100 year storm return period + 45% for climate change and 10% for urban creep.

8.1.4 The report has demonstrated that the proposed drainage measures ensure that suitable means of surface water and foul drainage can be achieved for the proposed development.

Appendices

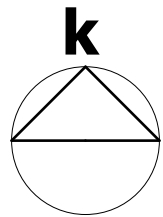
8.2 **Appendix A – Site Plan**



4 proposed detached dwellings
- approved planning ref:
Y/41/23/PL appeal ref: APP/
C3810/W/23/3329367

- hbv
- Drainage Easment
 - Existing Trees
 - Proposed Trees
 - Landscaped Buffer
 - 2m High Proposed Native Hedgerow Planting

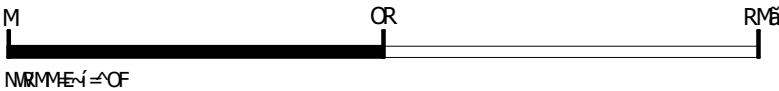
- 11 Existing gated Access
- 21 Max. 1m High Close Board Fence
- 31 Parking for Plots 1-3
- 41 Visitor Parking Space
- 51 Bin Store for Plots 1-3
- 61 Existing Parking for Bungalow
- 71 Existing Bungalow
- 81 Cycle Store
- 91 Acoustic Fence



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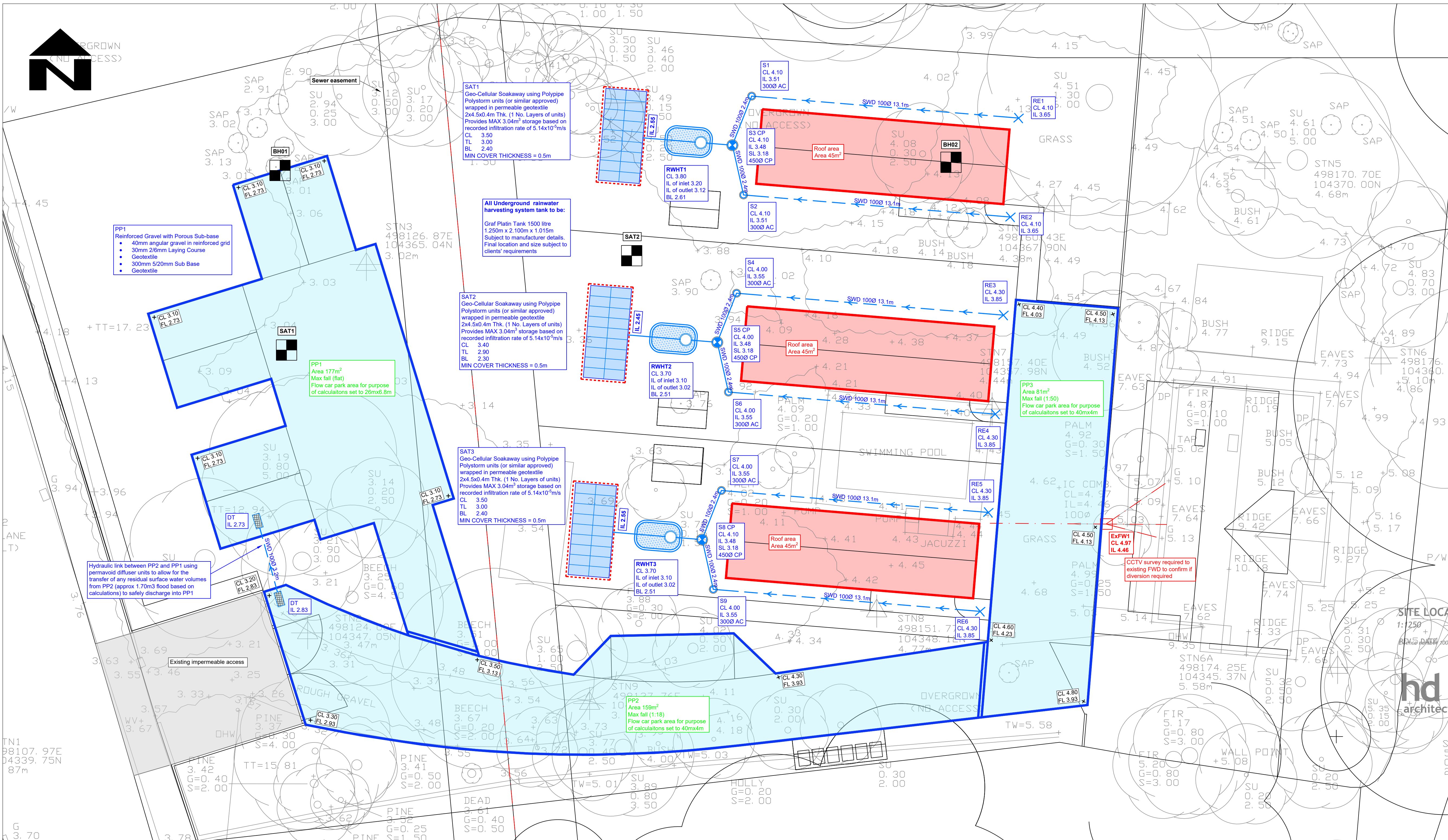
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7.3 **Appendix B – Drainage Layout**



- STANDARD DRAINAGE NOTES
- DO NOT SCALE FROM THIS DRAWING. REFER TO FIGURED DIMENSIONS ONLY. THE CONTRACTOR SHOULD CHECK ALL DIMENSIONS ON SITE.
 - ALL DIMENSIONS IN MILLIMETRES AND ALL LEVELS ARE IN METERS UNLESS NOTED OTHERWISE.
 - THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECT AND ENGINEERING DETAILS, DRAWINGS AND SPECIFICATIONS.
 - ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
 - 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.
 - 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.
 - COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
 - ALL UN-REFERENCED PIPES ARE TO BE 100mm DIA.
 - 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.
 - 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.
 - ALL ADOPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATIONS Laid Down In 'SEWERS FOR ADOPTION' 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
 - ALL PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT PART-H, AND TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
 - 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.
 - 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.
 - 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.
 - NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.
 - ALL EXISTING MANHOLE COVER'S, GULLIES, ETC. ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT.
 - 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.
 - PROPRIETARY PRODUCTS TO BE INSTALLED IN FULL ACCORDANCE WITH MANUFACTURER'S GUIDANCE.
 - 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

Prefix to drawing numbers shall signify the following:-

P-	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

DRAINAGE LEGEND

- Ex FWD - Existing foul water sewer/drain and manhole
- SWD - Surface Water Drainage
- Rainwater pipe
- Storm water access chamber (3000)
- Storm water inspection chamber (4500)
- Storm water catchpit chamber (4500)
- Storm water rodding eye
- Extent of permeable paving with porous sub-base
- Pipe info - diameter, length, gradient, bedding type
- Permavoid distribution tank

- 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

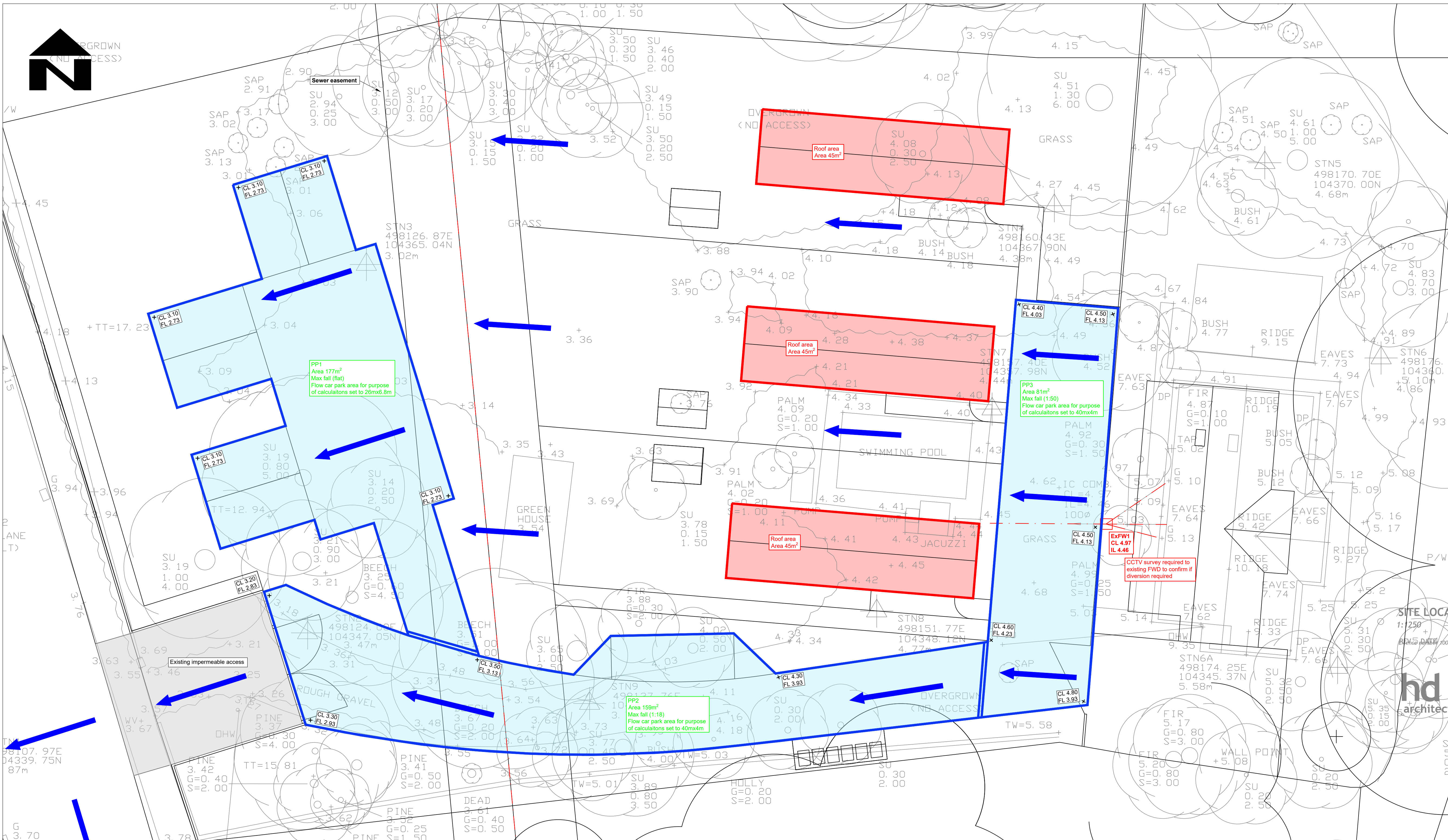
DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL
WATER AUTHORITY

DESIGN SUBJECT TO THE CONFIRMATION OF:
EXTERNAL LEVELS DESIGN
LOCATION AND DEPTH OF EXISTING UTILITIES

- Site Specific Notes
- 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 and an additional 10% for urban creep.
 - All infiltration structures designed to recorded infiltration rate of 5.14x10⁻³m/s and 4.64x10⁻³m/s.
 - All infiltration structures to be located min 5m from any building and with min 500mm cover to units

FOR PLANNING ONLY

P-	10.04.26	PRELIMINARY ISSUE	CS	CS	CS
REV	DATE	DESCRIPTION	BY	CHK	APP
CLIENT	ALBERT BRAZIL				
ARCHITECT	WELLSTEAD DESIGN				
JOB TITLE	SUNNYMEADE, YAPTON				
DRAWING TITLE	SURFACE WATER DRAINAGE STRATGEY				
DRAWN	CS	ENGINEER	C SLADE	CHECKED	CS
DATE	APRIL 2026	SCALE @ A1	1:100		
JOB No.	C1002	STATUS	P	DRAWING No.	101
REV.	P				



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 - ANY DISCREPANCIES SHOULD BE REPORTED TO THE ARCHITECT AND/OR ENGINEER IMMEDIATELY, SO THAT CLARIFICATION CAN BE SOUGHT PRIOR TO THE COMMENCEMENT OF WORK.
 - 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.
 - 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.
 - COVER LEVELS SHOWN ARE APPROXIMATE. COVERS AND FRAMES SHALL BE SET TO FINISHED GROUND LEVELS AND FALLS.
 - ALL UN-REFERENCED PIPES ARE TO BE 100mm DIA.
 - 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.
 - 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.
 - ALL ADOPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATION OF THE TIE-IN INVERTS FOR ADOPTION 6th EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF WORKS.
 - ALL PRIVATE DRAINAGE TO BE IN ACCORDANCE WITH THE BUILDING REGULATIONS APPROVED DOCUMENT PART-H, AND TO THE SATISFACTION OF THE BUILDING CONTROL INSPECTOR.
 - 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.
 - 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.
 - 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.
 - NO PRIVATE AREAS ARE TO DRAIN ONTO ADOPTABLE AREAS AND VICE VERSA.
 - ALL EXISTING MANHOLE COVER'S, GULLIES, ETC. ARE TO BE RAISED/LOWERED TO SUIT NEW LEVELS.
 - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO CONFIRM THE LOCATION AND DEPTH OF ALL EXISTING SERVICES AND UTILITIES THAT MAY BE PRESENT.
 - 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.
 - PROPRIETARY PRODUCTS TO BE INSTALLED IN FULL ACCORDANCE WITH MANUFACTURER'S GUIDANCE.
 - 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
- Prefix to drawing numbers shall signify the following:-
- | | |
|-----------------|--|
| P- 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 |

CONTRIBUTING AREA PLAN LEGEND

Permeable paving extents
(direct discharge to ground)
Total area = 417m²

Area of existing hardstanding
to drain as existing
Total area = 57m²

Roof area 45m² per roof
discharging to each soakaway
Total area 135m²

BLUE ARROWS SHOW ROUTE OF EXCEEDANCE FLOWS FROM PROJECTED POINTS OF EMERGENCE TOWARDS DIRECTION OF FALL.

ALL STRUCTURES DESIGNED TO ACCOMMODATE BELOW GROUND THE CRITICAL 1 IN 100 YEAR STORM EVENT PLUS 45% EXCEEDANCE WOULD ONLY OCCUR IN STORMS OF GREATER INTENSITY THAN THIS.

DUE TO THE ROUTES OF EXCEEDANCE SHOWN, A SAFETY FACTOR OF X.X HAS BEEN SELECTED FOR SOAKAWAY DESIGN IN ACCORDANCE WITH CIRIA156 TABLE 4.6.

FOR PLANNING ONLY

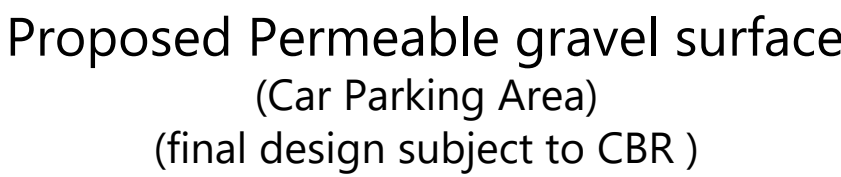
P-	10.04.26	PRELIMINARY ISSUE	CS	CS	CS
REV	DATE	DESCRIPTION	BY	CHK	APP
CLIENT	ALBERT BRAZIL				
ARCHITECT	WELLSTEAD DESIGN				
JOB TITLE	SUNNYMEADE, YAPTON				
DRAWING TITLE	DRAINAGE CATCHMENT AREAS AND EXCEEDANCE FLOWS				
DRAWN	CS	ENGINEER	C SLADE	CHECKED	CS
DATE	APRIL 2026		SCALE @ A1	1:100	
JOB No.	C1002	STATUS	P	DRAWING No.	201
REV.					P



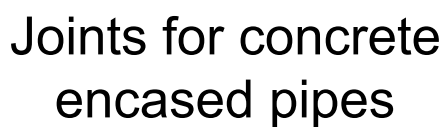
Landscaped areas only

0.4m thick

All storage tank drainage works shall be carried out in accordance with the specifications, method statements and recommendations of Polypipe



- #### 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 MADE. IF 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 RAINWATER SPIRES 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 TO BE 150mm DIA BS EN 1916 AND BS6511 (BWS 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 400 GRATING AND FRAMES TO BS EN1424, UNLESS OTHERWISE STATED.
 11. ALL ADAPTABLE SEWERS SHALL BE CONSTRUCTED TO THE STANDARDS AND SPECIFICATIONS LAID DOWN IN 'SEWERS FOR ADOPTION' 6TH EDITION, WITH A VIEW TO ADOPTION UPON COMPLETION OF THE 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 TO THE ORIGINAL DESIGN OF THE DRAINAGE SYSTEMS OR DRAINS, SO THAT AN AS CONSTRUCTED DRAWING CAN BE PREPARED UPON COMPLETION OF THE PROJECT.
 14. STUB CONNECTIONS TO ADAPTABLE MANHOLES SHALL BE MADE FROM VITRIFIED CLAY AND CONSIST OF TWO ROCKER MANHOLE COVERS AND AN INCH TO INCH LAID DOWN IN 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 INTO ADAPTABLE AREAS AND INTO SEWERS.
 17. ALL EXISTING MANHOLE COVERS, GULLIES, ETC. ARE TO BE RAISED/LOWED 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 LINE WITH 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
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C = CONSTRUCTION	These are the only drawings that shall be used for construction purposes
R = RECORD	Record of actual completed work

P.	10.04.26	PRELIMINARY ISSUE	CS	CS	CS
REV	DATE	DESCRIPTION	BY	CHK	APP
 Consulting Civil Engineers					
CLIENT					
ALBERT BRAZIL					
ARCHITECT					
WELLSTEAD DESIGN					
JOB TITLE					
SUNNYMEADE, YAPTON					
DRAWING TITLE					
DRAINAGE DETAILS					
DRAWN		ENGINEER		CHECKED	APPROVED
CS		C SLADE		CS	CS
DATE		SCALE @ A1		1:20	
APRIL 2026					
JOB No.		STATUS		DRAWING No.	
C1002		P		301	
				REV.	
				P	

FOR PLANNING ONLY

7.4 **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 (%)	10	Minimum Backdrop Height (m)	0.200
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)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
PP1	0.018	5.00	3.100	150	90.000	111.000	0.370	2.730
PP2	0.016	5.00	3.200	150	90.000	95.000	0.370	2.830
PP3	0.008	5.00	4.400	150	110.000	106.000	0.370	4.030

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	PP2	PP1	5.000	0.600	2.830	2.730	0.100	50.0	100	5.08	50.0

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	1.092	8.6	3.2	0.270	0.270	0.016	0.0	42	1.007

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	5.000	50.0	100	Circular	3.200	2.830	0.270	3.100	2.730	0.270

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	PP2	150	Sealed Manhole	Adoptable	PP1	150	Sealed Manhole	Adoptable

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)	240	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
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Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
30	45	0	0
100	45	0	0

Node PP1 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.18504	Invert Level (m)	2.730	Slope (1:X)	9999.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	10	Depth (m)	0.300
Safety Factor	2.0	Width (m)	26.000	Inf Depth (m)	
Porosity	0.30	Length (m)	6.800		

Node PP2 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.18504	Invert Level (m)	2.830	Slope (1:X)	25.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	12	Depth (m)	0.300
Safety Factor	2.0	Width (m)	4.000	Inf Depth (m)	
Porosity	0.30	Length (m)	40.000		

Node PP3 Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.16704	Invert Level (m)	4.030	Slope (1:X)	50.0
Side Inf Coefficient (m/hr)	0.00000	Time to half empty (mins)	8	Depth (m)	0.300
Safety Factor	2.0	Width (m)	16.000	Inf Depth (m)	
Porosity	0.30	Length (m)	5.000		

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
30 minute summer	PP1	21	2.762	0.032	5.7	1.6456	0.0000	OK
15 minute summer	PP2	10	2.878	0.048	3.1	0.0119	0.0000	OK
15 minute summer	PP3	13	4.076	0.046	1.5	0.2594	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
30 minute summer	PP1	Infiltration		2.9			
15 minute summer	PP2	1.000	PP1	3.0	1.325	0.346	0.0122
15 minute summer	PP2	Infiltration		0.1			
15 minute summer	PP3	Infiltration		0.9			

Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
30 minute summer	PP1	24	2.879	0.149	20.5	7.8700	0.0000	OK
15 minute summer	PP2	11	3.008	0.178	10.9	0.1092	0.0000	FLOOD RISK
30 minute summer	PP3	22	4.140	0.110	5.0	1.4528	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)
30 minute summer	PP1	Infiltration		4.5			
15 minute summer	PP2	1.000	PP1	10.1	1.458	1.180	0.0391
15 minute summer	PP2	Infiltration		0.5			
30 minute summer	PP3	Infiltration		1.9			

Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
60 minute summer	PP1	43	2.938	0.208	19.7	10.9942	0.0000	OK
15 minute summer	PP2	11	3.116	0.286	13.7	0.2610	0.0000	FLOOD RISK
30 minute summer	PP3	23	4.165	0.135	6.3	2.0436	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)
60 minute summer	PP1	Infiltration		4.5			
15 minute summer	PP2	1.000	PP1	12.2	1.557	1.419	0.0391
15 minute summer	PP2	Infiltration		0.7			
30 minute summer	PP3	Infiltration		1.9			

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)	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)	75.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S3 CP	0.005	5.00	4.100	450	100.000	100.000	0.620	3.480
SAT1			3.500	150	95.000	100.000	0.950	2.550
S5 CP	0.005	5.00	4.000	450	100.000	93.000	0.520	3.480
SAT2			3.400	150	95.000	93.000	0.950	2.450
C8 CP	0.005	5.00	4.100	450	100.000	86.000	0.620	3.480
SAT3			3.500	150	95.000	86.000	0.950	2.550

Links

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S3 CP	SAT1	5.000	0.600	3.480	2.550	0.930	5.4	100	5.02	57.5
2.000	S5 CP	SAT2	5.000	0.600	3.480	2.450	1.030	4.9	100	5.02	57.5
3.000	C8 CP	SAT3	5.000	0.600	3.480	2.550	0.930	5.4	100	5.02	57.5

Name	Vel (m/s)	Cap (l/s)	Flow (l/s)	US Depth (m)	DS Depth (m)	Σ Area (ha)	Σ Add Inflow (l/s)	Pro Depth (mm)	Pro Velocity (m/s)
1.000	3.357	26.4	1.0	0.520	0.850	0.005	0.0	14	1.625
2.000	3.534	27.8	1.0	0.420	0.850	0.005	0.0	13	1.647
3.000	3.357	26.4	1.0	0.520	0.850	0.005	0.0	14	1.625

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	5.000	5.4	100	Circular	4.100	3.480	0.520	3.500	2.550	0.850
2.000	5.000	4.9	100	Circular	4.000	3.480	0.420	3.400	2.450	0.850
3.000	5.000	5.4	100	Circular	4.100	3.480	0.520	3.500	2.550	0.850

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S3 CP	450	Manhole	Adoptable	SAT1	150	Manhole	Adoptable
2.000	S5 CP	450	Manhole	Adoptable	SAT2	150	Manhole	Adoptable
3.000	C8 CP	450	Manhole	Adoptable	SAT3	150	Manhole	Adoptable

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)	240	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 %)
10	0	10	0
30	0	10	0
100	45	10	0

Node SAT1 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	2.300	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.19656	Time to half empty (mins)	402	Inf Depth (m)	0.400
Safety Factor	2.0	Pit Width (m)	4.500	Number Required	1
Porosity	0.95	Pit Length (m)	2.000		

Node SAT2 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	2.300	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.19656	Time to half empty (mins)	402	Inf Depth (m)	0.400
Safety Factor	2.0	Pit Width (m)	4.500	Number Required	1
Porosity	0.95	Pit Length (m)	2.000		

Node SAT3 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	2.400	Depth (m)	0.400
Side Inf Coefficient (m/hr)	0.19656	Time to half empty (mins)	402	Inf Depth (m)	0.400
Safety Factor	2.0	Pit Width (m)	4.500	Number Required	1
Porosity	0.95	Pit Length (m)	2.000		

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
15 minute summer	S3 CP	10	3.499	0.019	2.0	0.0031	0.0000	OK
240 minute summer	SAT1	236	2.508	-0.042	0.6	1.7779	0.0000	OK
15 minute summer	S5 CP	10	3.499	0.019	2.0	0.0030	0.0000	OK
240 minute summer	SAT2	236	2.507	0.057	0.6	1.7703	0.0000	OK
15 minute summer	C8 CP	10	3.499	0.019	2.0	0.0031	0.0000	OK
240 minute summer	SAT3	236	2.607	0.057	0.6	1.7703	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	
15 minute summer	S3 CP	1.000	SAT1	2.0	1.930	0.075	0.0052	
240 minute summer	SAT1	Infiltration		0.1				
15 minute summer	S5 CP	2.000	SAT2	2.0	2.003	0.072	0.0050	
240 minute summer	SAT2	Infiltration		0.1				
15 minute summer	C8 CP	3.000	SAT3	2.0	1.930	0.075	0.0052	
240 minute summer	SAT3	Infiltration		0.1				

Results for 30 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	S3 CP	10	3.502	0.022	2.6	0.0035	0.0000	OK
360 minute summer	SAT1	320	2.552	0.002	0.5	2.1533	0.0000	OK
15 minute summer	S5 CP	10	3.502	0.022	2.6	0.0034	0.0000	OK
360 minute summer	SAT2	320	2.550	0.100	0.5	2.1400	0.0000	OK
15 minute summer	C8 CP	10	3.502	0.022	2.6	0.0035	0.0000	OK
360 minute summer	SAT3	320	2.650	0.100	0.5	2.1399	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	
15 minute summer	S3 CP	1.000	SAT1	2.6	2.080	0.098	0.0062	
360 minute summer	SAT1	Infiltration		0.1				
15 minute summer	S5 CP	2.000	SAT2	2.6	2.158	0.093	0.0060	
360 minute summer	SAT2	Infiltration		0.1				
15 minute summer	C8 CP	3.000	SAT3	2.6	2.080	0.098	0.0062	
360 minute summer	SAT3	Infiltration		0.1				

Results for 100 year +45% CC +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	S3 CP	10	3.510	0.030	4.7	0.0048	0.0000	OK
600 minute summer	SAT1	405	3.057	0.507	0.6	3.4334	0.0000	OK
15 minute summer	S5 CP	10	3.509	0.029	4.7	0.0047	0.0000	OK
600 minute summer	SAT2	405	3.045	0.595	0.6	3.4350	0.0000	OK
15 minute summer	C8 CP	10	3.510	0.030	4.7	0.0048	0.0000	OK
600 minute summer	SAT3	405	3.145	0.595	0.6	3.4350	0.0000	OK
Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	
15 minute summer	S3 CP	1.000	SAT1	4.7	2.440	0.178	0.0096	
600 minute summer	SAT1	Infiltration		0.1				
15 minute summer	S5 CP	2.000	SAT2	4.7	2.535	0.169	0.0171	
600 minute summer	SAT2	Infiltration		0.1				
15 minute summer	C8 CP	3.000	SAT3	4.7	2.440	0.178	0.0172	
600 minute summer	SAT3	Infiltration		0.1				

7.5 **Appendix D – Soakage Test Results and Groundwater monitoring**

Ref: C1002/CS

Albert Brazil

9th April 2026**Re: Sunnymeade, Yapton – Soakaway Testing – Infiltration Test Result Summary**

Dear Albert

The following investigation was carried out at the above location in accordance with our quotation.

1. Site Works

The purpose of the investigation was to supply soakaway test data in general accordance with BRE document 365 (Soakaway Design) at two locations which would be the approximate intended locations for possible infiltration devices to serve 3no new chalet buildings with access.

In addition to this test, 2no groundwater monitoring wells were sunk to a depth of 4m and monitored over the 2025/2026 winter. These were installed on 11th November 2025 and were monitored effectively bi-weekly until March 2026.

The appended drawing illustrates the position of the test pits. The BRE365 pits were excavated to a depth of 0.6m and 0.9m in line with the approximate depth of the proposed infiltration devices i.e. permeable paving and traditional soakaways.

The soakaway testing commenced on 13th February 2026 after a period of prolonged rainfall with three tests being undertaken successfully in accordance with BRE 365.

2. BRE 365 Soakaway Test Findings

Testing of the sub soils which was noted as predominantly silty clay with gravels produced a BRE 365 design infiltration rate of **$1.23 \times 10^{-5} \text{m/s}$** . This rate was the slowest taken from all three tests. This is considered a good rate and will likely be suitable for most infiltration devices.

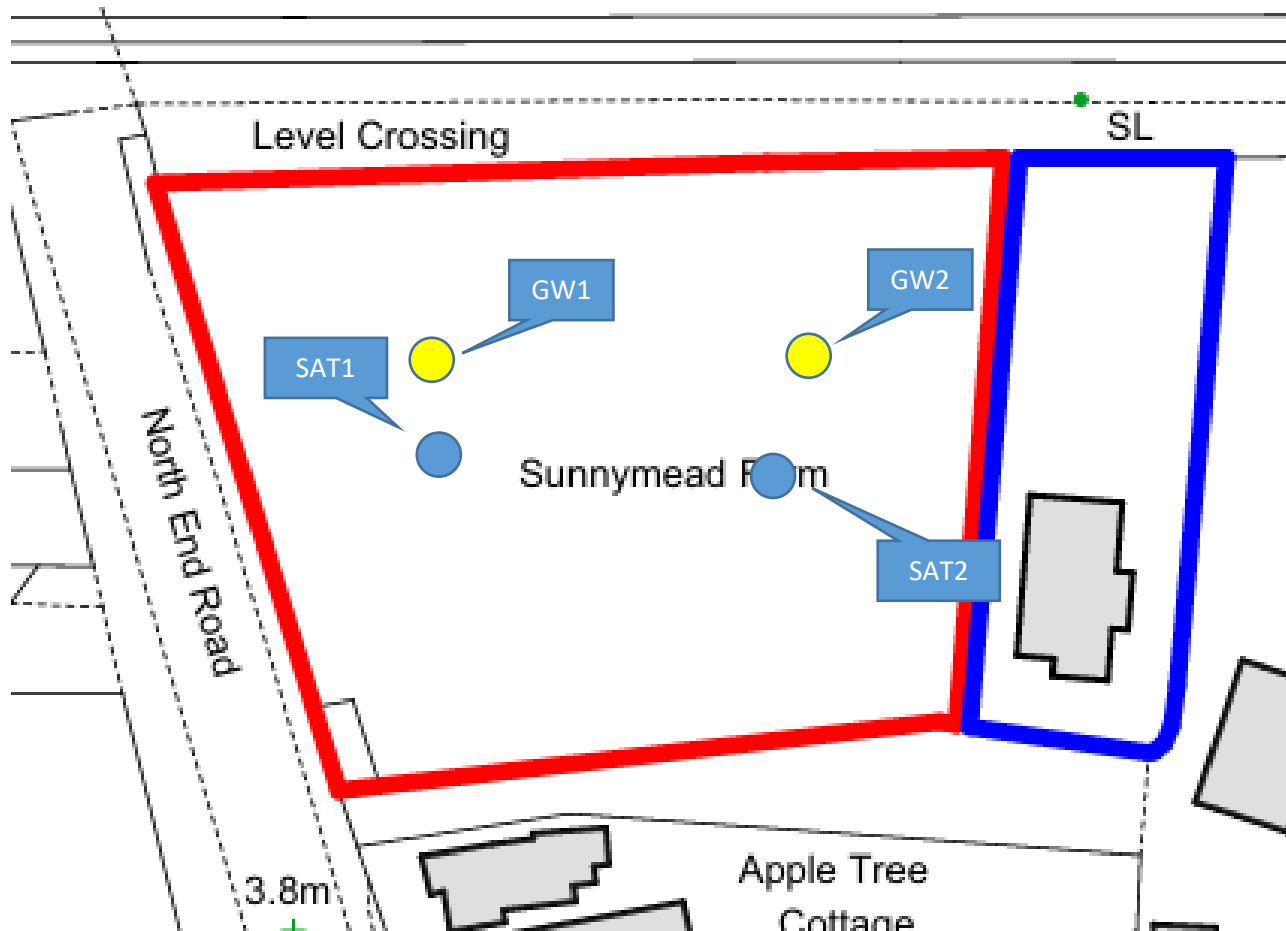
3. BRE 365 Soakaway Test Results

Test Pit No	Infiltration Rate (1-3 Tests)			Depth of Test	Soil Type
SAT1	$7.72 \times 10^{-5} \text{m/s}$	$6.04 \times 10^{-5} \text{m/s}$	$5.14 \times 10^{-5} \text{m/s}$	0.6mbgl	Silty Clay with gravels
SAT2	$5.47 \times 10^{-5} \text{m/s}$	$5.28 \times 10^{-5} \text{m/s}$	$4.64 \times 10^{-5} \text{m/s}$	0.9mbgl	Silty Clay with gravels

4. Winter Groundwater Monitoring Findings

The monitoring wells were monitored bi-weekly since mid-November 2025 to March 2026. Groundwater was encountered in both wells at varying depths with peak levels reaching

Appendix A – Soakaway Test Location Plan



Appendix B – Site Photographs

SAT1



SAT2





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Appendix C – Soakaway Test Results

Job: Sunnymeade, Yapton - SAT1 Test 1

Infiltration Calculator

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

a_{p50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.6
Trial pit length	=	1

a_{p50} = 1.08 m/squared

t_{p75-25} = 1080 seconds

V_{p75-25} = 0.09 m/cubed

F = 7.72E-05

Job: Sunnymeade, Yapton SAT1 - Test 2

Infiltration Calculator

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

a_{p50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.6
Trial pit length	=	1

a_{p50} = 1.08 m/squared

t_{p75-25} = 1380 seconds

V_{p75-25} = 0.09 m/cubed

F = 6.04E-05

Job: Sunnymeade, Yapton - SAT 1 Test 3

Infiltration Calculator

$$f = \frac{V_{p75-25}}{ap_{50} \times tp_{75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

ap_{50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

tp_{75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.6
Trial pit length	=	1

ap_{50} = 1.08 m/squared

tp_{75-25} = 1620 seconds

V_{p75-25} = 0.09 m/cubed

F = 5.14E-05

Job: Sunnymeade, Yapton SAT2 - Test 1

Infiltration Calculator

$$f = \frac{V_{p75-25}}{a_{p50} \times t_{p75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

a_{p50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

t_{p75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1

a_{p50} = 1.47 m/squared

t_{p75-25} = 1680 seconds

V_{p75-25} = 0.135 m/cubed

F = 5.47E-05

Job: Sunnymeade, Yapton SAT2 - Test 2

Infiltration Calculator

$$f = \frac{V_{p75-25}}{ap_{50} \times tp_{75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

ap_{50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

tp_{75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1

ap_{50} = 1.47 m/squared

tp_{75-25} = 1740 seconds

V_{p75-25} = 0.135 m/cubed

F = 5.28E-05

Job: Sunnymeade, Yapton SAT2 - Test 3

Infiltration Calculator

$$f = \frac{V_{p75-25}}{ap_{50} \times tp_{75-25}}$$

V_{p75-25} = Effective storage volume between 75% and 25% effective depth

ap_{50} = Internal surface area of the trial pit up to 50% effective depth and including the base area

tp_{75-25} = The time for the water level to fall from 75% to 25% effective depth

f = Infiltration rate

Trial pit width	=	0.3
Trial pit depth	=	0.9
Trial pit length	=	1

ap_{50} = 1.47 m/squared

tp_{75-25} = 1980 seconds

V_{p75-25} = 0.135 m/cubed

F = 4.64E-05



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Appendix D – Groundwater Monitoring Results

Project:	Sunnymeade, Yapton	GW1
Project No:	C1002	
Client:	Albert Brazil	



Middle Barn
East Ashey Manor Farm
Ashey Road, Ryde
Isle of Wight, PO33 4AU

e3sconsulting.co.uk

19 November 2025

Our ref: NN2086R01

Chris Slade
chris@cgscivils.co.uk

Attention: Mr Slade

Dear Sir,

GROUND WATER MONITORING INSTALLATIONS, SUNNYMEAD FARM, YAPTON

This letter presents a summary of a ground water well installations undertaken by E3S Consulting Ltd (E3S) on behalf of CGS Civils Ltd (The Client) in relation to a proposed development at the above site.

Fieldwork was undertaken on 11 November 2025. The site works consisted of the advancement of a 2 No. groundwater well installations (BH01 and BH02) advanced to a depth of 4.00meters below ground level (mbgl). A borehole location plan is included as **Figure 1** of this report.

The borehole locations were set out based on site access and logged by a Geo-Environmental Consultant from E3S. The borehole logs are presented as **Appendix A** of this letter. Groundwater was encountered at time of drilling (BH01 at 3.10mbgl and BH02 at 3.40mbgl). Due to limited advancement, solid cone SPT advancement approach was utilised from 3.00mbgl to 4.00mbgl therefore geology is inferred from 3.00mbgl.

We trust that the site works undertaken, and summary letter meet your current requirements. Should you have any immediate comments of queries please do not hesitate to contact the undersigned.

Kind Regards,

For and on behalf of E3S Consulting Ltd,

Chris Barron BSc (Hons) MEnvSc CGeol FGS

Attachments;

Figure 1 – Site & Borehole Location Plan (1 page)

Appendix A – Borehole Logs (2 Pages)

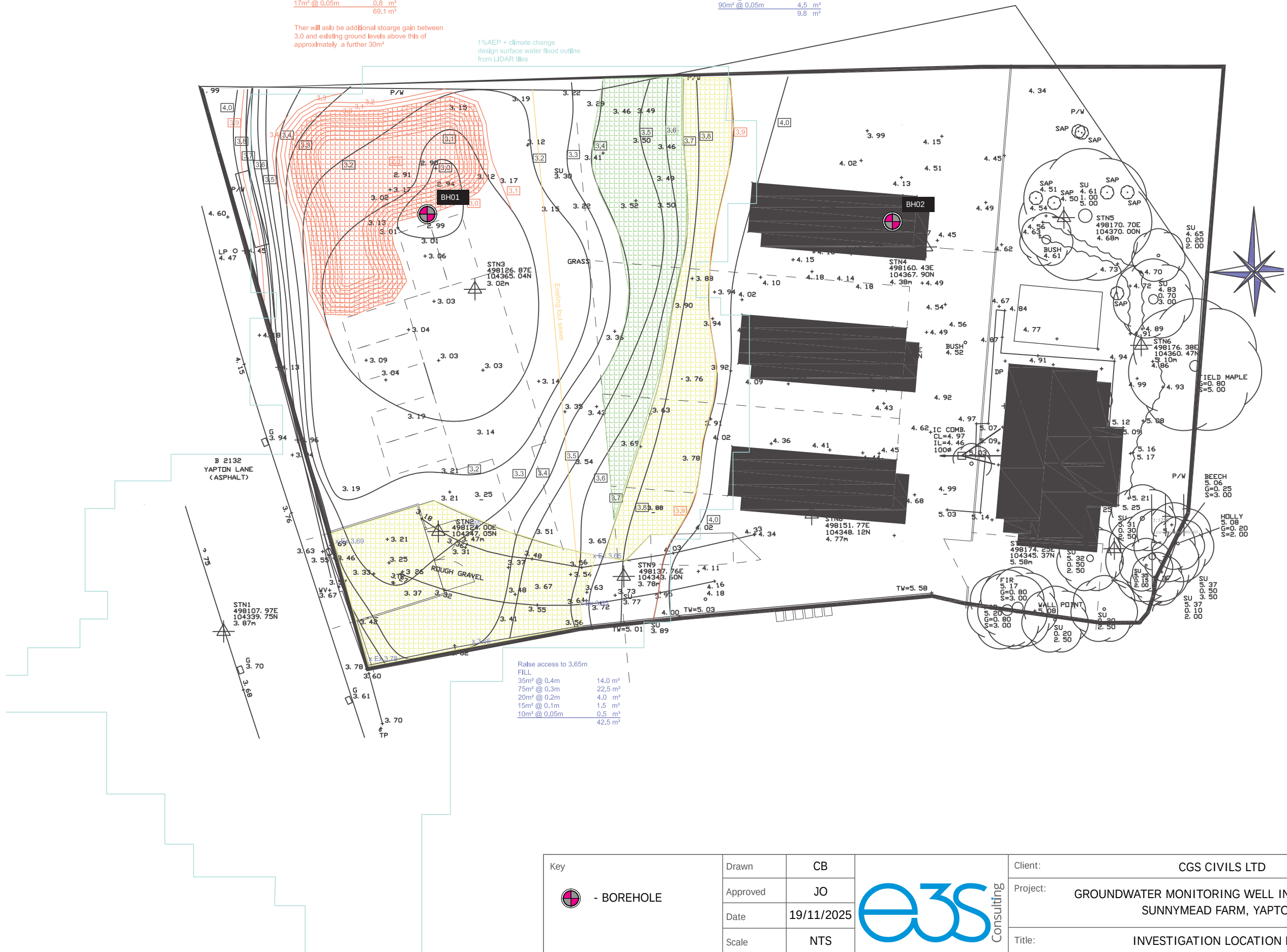
flood storage compensation lowering to 2.4 from 3.0
CUT
54m² @ 0.7m 37.8 m³
11m² @ 0.65m 7.1 m³
12m² @ 0.55m 6.6 m³
13m² @ 0.45m 5.8 m³
14m² @ 0.35m 4.9 m³
15m² @ 0.25m 3.7 m³
16m² @ 0.15m 2.4 m³
17m² @ 0.05m 0.8 m³
69.1 m³

There will also be additional storage gain between
3.0 and existing ground levels above this of
approximately a further 30m³

Land raise taper fill 3.9 to 3.4/existing
STORAGE LOSSES
130m² @ 0.1m 13.0 m³

Land raise
STORAGE LOSSES BELOW 3.9,
35m² @ 0.15m 5.3 m³
90m² @ 0.05m 4.5 m³
9.8 m³

1%AEP + climate change
design surface water flood outline
from LIDAR files



Key  - BOREHOLE	Drawn	CB				Client: CGS CIVILS LTD		
	Approved	JO				Project: GROUNDWATER MONITORING WELL INSTALLATIONS SUNNYMEAD FARM, YAPTON		
	Date	19/11/2025				Title: INVESTIGATION LOCATION PLAN		
	Scale	NTS				Project no:	NN2086	Figure no: FIGURE 1
	Original	A3				Rev: 1		

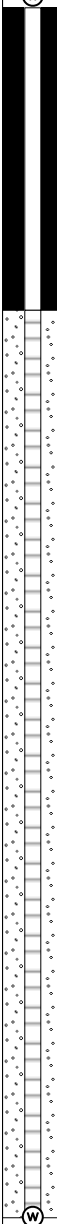
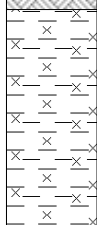
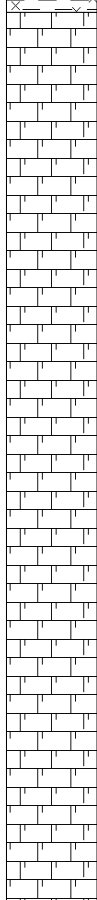
APPENDIX A

Exploratory Hole Log



BOREHOLE LOG

Project Name: GROUNDWATER WELL INSTALLATION		Client: CGS CIVILS LTD		Date: 11/11/2025	
Location: SUNNYMEAD FARM, YAPTON		Contractor:			
Project No. : NN2086		Crew Name: JO		Drilling Equipment: Archway Competitor	
Borehole Number BH01	Hole Type WLS	Level	Logged By CB	Scale 1:25	Page Number Sheet 1 of 1

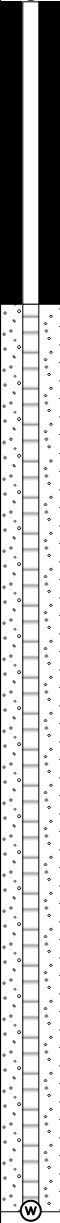
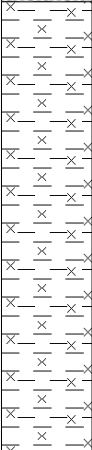
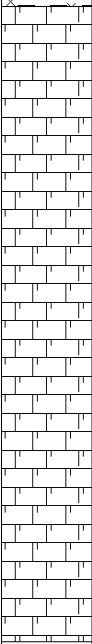
Well Ⓢ	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.30			Black brown silty clay TOPSOIL with some roots, gravel is fine to medium of chalk.	
								Brown slightly gravelly silty CLAY, gravel is fine to medium sub rounded to angular of flint and chalk.	
					1.05			Off white CHALK.	1
					4.00			End of Borehole at 4.000m	4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks	
---------	---

BOREHOLE LOG

Project Name: GROUNDWATER WELL INSTALLATION		Client: CGS CIVILS LTD		Date: 11/11/2025	
Location: SUNNYMEAD FARM, YAPTON		Contractor:			
Project No. : NN2086		Crew Name: JO		Drilling Equipment: Archway Competitor	
Borehole Number BH02	Hole Type WLS	Level	Logged By CB	Scale 1:25	Page Number Sheet 1 of 1

Well Ⓢ	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description	
		Depth (m)	Type	Results					
					0.40			Black brown silty clay TOPSOIL with some roots, gravel is fine to medium of chalk.	
								Brown slightly gravelly silty CLAY, gravel is fine to medium sub rounded to angular of flint and chalk.	1
					1.90			Off white CHALK	2
					4.00			End of Borehole at 4.000m	4
									5

Hole Diameter		Casing Diameter		Chiselling				Inclination and Orientation			
Depth Base	Diameter	Depth Base	Diameter	Depth Top	Depth Base	Duration	Tool	Depth Top	Depth Base	Inclination	Orientation

Remarks

7.6 **Appendix E – Maintenance Schedule**

SuDS Maintenance Schedule

Sunnymeade, Yapton

For

Albert Brazil

Rev – P

Reference **C1002**

Date **April 2026**

Revision	Date of Issue	Comments	Prepared By	Checked By
P1	13.04.26	Initial Issue	CS	CS

Maintenance

1.1 Introduction

- 1.1.1 During construction, the Contractor will be responsible for maintaining the drainage and SuDS (Sustainable Drainage Systems). Upon handover, the occupier will take on the responsibility of these duties as laid out in this report.
- 1.1.2 The maintenance schedule for the proposed development will be split down into two separate categories; SuDS features and regular private drainage.

1.2 SuDS at Sunnymeade, Yapton

- 1.2.1 As listed above, in section 5.1.2, the SuDS features used on site will be **geocellular soakaways and permeable paving**.
- 1.2.2 The SuDS features have been designed for easy maintenance and comprise:
- Regular Day-to-Day care – litter collection, regular gardening to control vegetation growth and checking inlets where water enters the SuDS features
 - Occasional tasks – checking the SuDS features and removing any silt that builds up in the SuDS feature
 - Remedial work – repairing damage where necessary

1.3 SuDS Drainage Maintenance Specification

1.3.1 Rainwater Harvesting Tank

In order to maintain the functioning of the rainwater harvesting tanks, the following maintenance requirements should be adhered to:

Operation and maintenance requirements for rainwater harvesting tanks		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Ensure that all inlets and outlets are clear of debris and blockage	Weekly
	Remove debris inlets and outlets	Weekly
	Inspect first flush diverter to ensure it is working correctly and not clogged	Weekly – Clean if necessary
	Clean Filter screens	Monthly – Replace if damaged
	Inspect the tank for sediment build-up and any signs of algae	Monthly
	Inspect roof and gutters and clear of all debris	Every 3 months
	Inspect pump for any signs of wear or damage and test to ensure it is functioning correctly	Every 3 months
	Check bottom of the tank for sediment build-up and clear if necessary	Every 6 months
	Ensure all downpipes are clear and functioning correctly and clear if necessary	Every 6 months
	Test water	Every 6 months
	Thorough tank cleaning – drain tank, scrub interior and rinse	Annually or as required
	Service the pump and filtration system and replace any worn parts	Annually
	Inspect overflow to ensure it is working correctly and clear any obstructions	Annually
Monitoring	Monitor Water levels	Annually
	Inspect for pests e.g. mosquitoes and take measures to prevent	As required

1.3.2 Soakaway

In order to maintain the functioning of the soakaway, the following maintenance requirements should be adhered to:

Operation and maintenance requirements for soakaway		
Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Inspect and identify any areas that are not operating correctly. If required, take remedial action	Monthly for 3 months, then annually
	Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
	For systems where rainfall infiltrates into the tank from above, check surface of filter for blockage by sediment, algae, or other matter; remove and replace surface infiltration medium as necessary.	Annually
	Remove sediment from per-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required
Monitoring	Inspect/check all inlets, outlets, vents, and overflows to ensure that they are in good condition and operating as designed	Annually
	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required

1.3.3 Permeable Paving

In order to maintain the functioning of the permeable paving, the following maintenance requirements should be adhered to:

Table 21.3 Operation and maintenance requirements for permeable paving		
Maintenance Schedule	Required Action	Typical 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	As required
	Removal of weeds or management using glyphosate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50mm of level of the paving	As required
	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, 48h after large storms in first six months
	Inspect silt accumulation rate and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

1.4 General Drainage Maintenance Specification

1.4.1 Inlet Structures and Inspection Chambers

- Inlet structures such as rainwater downpipes, road gullies and channel drains should always be free from obstruction to all free flow through the SuDS
- Inspection Chambers and Rodding Eyes are used on bends or where pipes come together. They allow access and cleaning to the system if necessary.

Inlet Structures and Inspection Chambers	
Regular Maintenance	Frequency
Inlet Structures Inspect rainwater downpipes, channel drains and road gullies, removing obstructions and silt as necessary. Check that there is no physical damage. Strim vegetation 1m min surround to structures and keep area free from silt and debris	Monthly
Inspections Chambers and below ground control chambers. Remove cover and inspect, ensuring that the water is flowing freely and that the exit route for water is unobstructed. Remove debris and silt. Undertake inspection after leaf fall in Autumn	Annually
Occasional Maintenance Check topsoil levels are 20mm above edges of chambers to avoid mower damage.	As necessary
Remedial Work Repair physical damage if necessary	As required

1.4.2 Below ground drainage pipes

- Below ground drainage pipes convey water to the SuDS system. They should always be free from obstruction to allow free flow.

Below Ground Drainage Pipes	
Regular Maintenance	Frequency
Inspect and identify any areas that are not operating correctly. If required, take remedial action.	Monthly for 3 months then annually
Remove debris from the catchment surface (where it may cause risks to performance)	Monthly
Remove sediment from pre-treatment inlet structures and inspection chambers.	Annually or as required
Maintain vegetation to designed limits within the vicinity of below ground drainage pipes and tanks.	Monthly or as required
Remedial Work	
Repair physical damage if necessary	As required
Monitoring	
Inspect all inlets, outlets and vents to ensure that they are in good conditions and operating as designed.	Annually
Survey inside of pipe runs for sediment build up and remove if necessary.	Every 5 years or as required