Consulting Civil Engineers

Surface Water Drainage Report

Brinsbury Agricultural College, Blackgate Lane, Codmore Hill, Pulborough RH20 1DD

Planning Ref: DC/23/2101

For

Brinsbury Agricultural College

Rev – **P1**

Reference **C2822**

Date **20th May 2024**

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P	11/03/2024	Initial Issue	LH	CS
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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 Brinsbury Agricultural College, Blackgate Lane in Pulborough, West Sussex.

1.1.2 The purpose of this drainage strategy is to demonstrate how the development area can be satisfactorily drained without increasing flood risk onsite and elsewhere. Comments were received from the council on **26th January 2024** in respect to planning reference: **DC/23/2101.** The comments require the following to be included:

- Provide catchment plans of existing and proposed drainage areas and assess details of current and proposed runoff to the watercourse.
- Provide evidence of necessary discharge consents
- Surface water to be designed to cater for the 1 in 100-year +45% climate change event.
- Detailed Drainage Design
- Evidence of measures to prevent pollution of the groundwater and/or surface water.
- Exceedance flows for events greater than the 1 in 100 year +45% storm.

1.1.3 The proposed development will consist of the increase in size of an existing cattle barn and associated silage clamp in order to increase the welfare of cattle on site and reduce the amount of contaminated water produced. The proposed development is located as OS Grid Reference TQ 05644 22011 and has the post code RH20 1DD.

Fig 1. Site Location



2 Executive Summary:

2.1.1 The Surface Water will discharge into an existing watercourse at a restricted rate of 2.0l/s. The proposed surface water network will make use of a detention basin with a flow control chamber to cater for the 1 in 100-year +45% storm.

2.1.2 The silage clamp is to be surrounded by heavy duty linear drains in order to capture all dirty water runoff prior to discharging into the existing dirty water network on site. All dirty water from site is discharged into a slurry lagoon.

3 Site Geology

3.1 British Geological Survey information

3.1.1 The British Geological Survey confirms the bedrock geology to be made up Weald Clay Formation, which is comprised of Sandstone and Mudstone. At the time of writing the British Geological Survey website does not have any recorded information of the Superficial deposits on site.

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 TQ02SW5 (Located approx. 705m South West of the site) – Clay

Fig 2. British Geological Survey



4 Existing Drainage

4.1.1 The existing cattle shed and other barns within the site are all currently discharged into an existing watercourse as per the proposed drainage layout. All rainwater that falls within hard paved areas at the cattle yard is classed as 'contaminated' water and is discharged into a slurry lagoon.

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 Hierarchy

Discharge Destination	
Rainwater Harvesting	Yes – existing mains fed water tank to be converted to rainwater harvesting tank.
Discharge to Ground	No – thick clay
Discharge to Watercourse	Yes – Surface water discharge restricted to 2.0l/s
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 Hierarchy

Hydraulic Calculations Settings:	
Rainfall Methodology	**FEH-22**
Volumetric Run-off Coefficient Cv	**0.75**
CV Winter and Summer	**0.75 / 0.84**
Additional Storage (m^3 / ha)	**0.0**
Flow Control	**1.346m Head @ 2l/s discharge**
Detention Basin designs	Detention Basin 1 base area: 176.1m^2
	Detention Basin 2 base area: 88.8m^2
	Factor of Safety: **2**

5.3 Surface Water Drainage

5.3.1 Due to the presence of clay on site it is deemed that infiltration is not a viable option for surface water disposal on site, however, an infiltration test to BRE365 should be carried out to confirm. It is proposed that all surface water runoff mimics the existing arrangement by discharging into an existing watercourse located to the north of the proposed cattle barn. The surface water discharge is to be discharged into the watercourse at a restricted rate of 2.0 l/s.

5.3.2 The proposed surface water network will make use of an attenuation basin in order to cater for the 1 in 100-year +45% storm. The proposed attenuation basin is to be surrounded by a 300mm high bund in order to stop any 'dirty' water runoff from exceedance events discharging into the watercourse. It is noted that the site and the existing watercourse is surrounded by bunding.

5.3.3 The proposed roof area from the new cattle barn will reduce the amount of hard paved area on site by 0.162 Ha or 1620m^2. Whilst this area is still classed as impermeable, there will be a significant betterment as all rainwater runoff from the existing hard paved areas will be classed as dirty water and therefore 1620m^2 of impermeable area will not need discharging into the slurry lagoon.

5.3.4 The proposed silage clamp will have a separate 'dirty' water network will discharge into the existing network on site prior to being discharged into the existing slurry lagoon.

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

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
- Low traffic roads

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**
Other roofs (Typically commercial/industrial roofs)	Surface Water	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05

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

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

5.4.11 SuDS mitigation index is tabulated in Table 4 as followed

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**
Other roofs (Typically commercial/industrial roofs)	Surface water	Table 26.4 (for surface waters)	Detention Basin	0.5	0.5	0.6

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

6 Summary and Conclusions

6.1.1 CGS Civils has been instructed by to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for the development to increase the size of cattle barn and silage clamp.

6.1.2 The Surface Water will discharge into an existing watercourse at a restricted rate of 2.0l/s. The proposed surface water network will make use of a detention basin with a flow control chamber to cater for the 1 in 100-year +45% storm.

6.1.3 The silage clamp is to be surrounded by heavy duty linear drains in order to capture all dirty water runoff prior to discharging into the existing dirty water network on site. All dirty water from site is discharged into a slurry lagoon.

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

7 Appendices

7.1 Appendix A – Site Plan

Summary of Options

The existing cattle sheds are beyond repair with most of the primary steel structure corroded and the cladding perished beyond repair, therefore all the proposed options review replacements in alternative sizes and locations.

The chosen option provides the required 1600m2 bedded area for the cattle (unlike option 2) and does not require relocation of the overhead power cable and excavation of the existing bank (unlike option 1 and 2). This has been achieved through the reorientation of the shed to a north-south position rather than the existing east-west orientation of the existing shed. No further options in this orientation are possible due to the location of all the existing buildings, which are not required to be demolished.

The time line of the construction phase is critical for the cattle sheds, as construction will need to be when the cattle are at grass, as no temporary cattle housing can be provided on site for 160 cattle. The cattle will be typically out at grass from March-September (weather and ground conditions permitting). As highlighted in the programme, this restricts the construction period to 6-7months. Excavation of a large bank with its associated retaining structures and relocation of an existing overhead power cable add significant risk to the construction programme. With a hard deadline of September for indoor calving and housing of the cattle through the winter, options which extend to the east of the existing cattle sheds are not viable.

Option 3 provides more certainty during the construction phase of the programme while also reducing the costs for the additional site facilitating works.

As outlined within the proposed scheme section of this report, the preferred option also has a number of welfare and environmental benefits including covered collection areas, relocation of the silage clamp, safer student access from the teaching block to the main campus and a covered connection from the parlour to the cattle handing facilities.



Existing image highlighting the extent of the bank and direction of the overhead power cables



Existing image highlighting the east end of the cattle shed and its proximity to the existing bank

2.4 PROPOSED SCHEME

Due to the number of positives of option 3 outweighing the alternative options it was agreed to progress the design of option 3, changing the original orientation of the cattle accommodation.

The proposal is depicted in the adjacent plan and highlights the proposed cattle shed and silage clamp in white.

The scheme includes the following scope:

Cattle shed/ Housing

The existing cattle sheds are of steel frame construction and are in poor condition, with most of the primary frame corroded beyond repair.

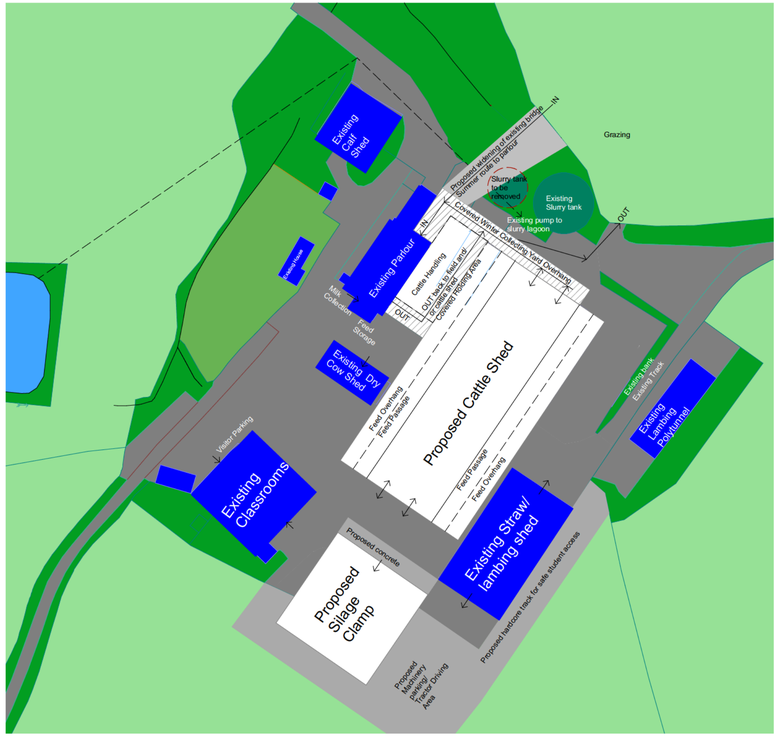
Due to the age of the cattle housing the layout, size and facilities are now below current welfare standards.

To correctly educate students it is imperative to showcase the highest level of animal welfare and teach the correct husbandry methods within safe and easily accessible spaces.

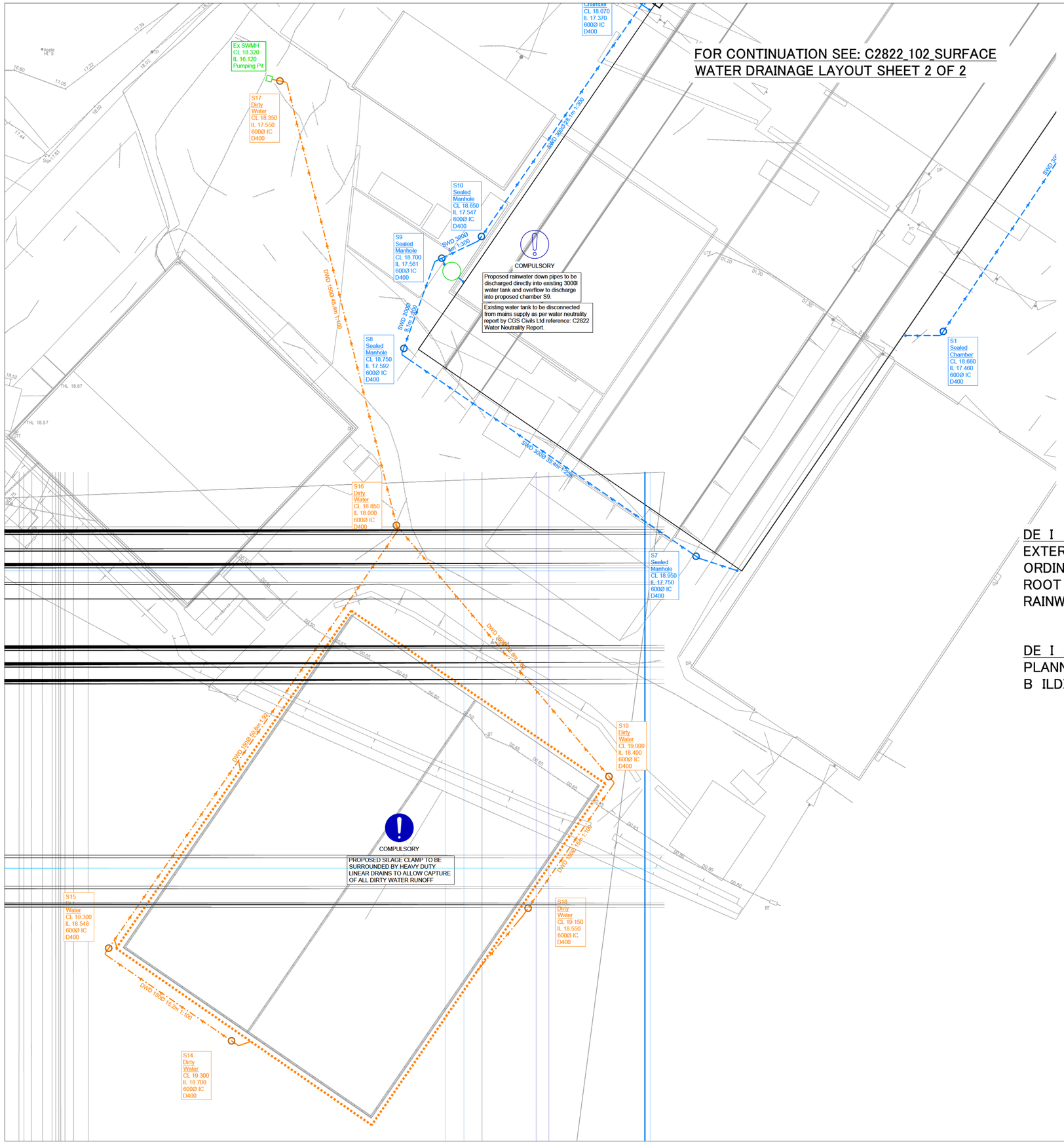
It is a welfare requirement that, when housed, each cow has an area of 10m2 for feeding, drinking and laying down.

The existing cattle sheds are smaller than required therefore, an area externally is currently used to make up the shortfall in space to meet Red Tractor standards.

This existing set up is not best practice as it reduces the internal lay down space for the cattle and increases the quantity of slurry proposed, with rainwater mixing with cattle faeces to a large external area.



7.2 Appendix B – Drainage Layout



DRAINAGE LEGEND

EXISTING FEATURES

Ex SWD — Existing surface water sewer/drain and manhole

PROPOSED FEATURES

SWD — Surface Water Drainage

Rainwater pipe

Storm water inspection chamber (600Ø)

Storm water catchpit chamber (600Ø)

Storm water orifice flow control chamber (600Ø)

DWD — Dirty Water Drainage

Dirty water inspection chamber (600Ø)

Dirty Water Channel drain

100Ø 4.5m 1:100 Z BED — Pipe info - diameter, length, gradient, bedding type

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

DE I N B E T TO THE ONFIRMATION OF:
EXTERNAL LEVEL DE I N
ORDINARY WATER O R E APPROVAL
ROOT PROTE TION AREA
RAINWATER DOWN PIPE PO ITION

DE I N B E T TO THE APPROVAL OF:
PLANNIN A THORITY
B ILDIN ONTROL

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. 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

Site Specific Notes

1. The proposed scheme consists of the increase in size of an existing cattle barn and associated silage clamp in order to increase the welfare of cattle on site and reduce the amount of contaminated water.
2. The British Geological Survey website confirms the bedrock geology to be made up of Weald Clay Formation which is comprised of Sandstone and Mudstone. At the time of writing, the BGS website does not have any recorded information of the superficial deposits on site.
3. The BGS website also holds information on historical borehole records. A nearby borehole confirms the presence of clay up to a depth of 33mbgl.
4. It is proposed the surface water runoff from the site is to be discharged into an existing watercourse located to the north of the site. This discharge will mimic the disposal of surface water runoff from the existing roof areas. The proposed discharge is to be restricted to 2.0l/s and the network will make use of a two-stage attenuation basin which is to utilise two seperate flow control chambers.
5. The proposed roof area from the cattle barn will reduce the amount of hard paved area on site by 0.162 Ha which will provide a significant betterment on the amount of dirty water produced by the site as runoff from the hard paved areas surrounding the cattle barn will be classed as dirty water. Therefore, 1620m² of impermeable area will not need discharging into the slurry lagoon.
6. The proposed silage clamp will have a seperate dirty water network which will discharge into the existing network on site prior to being discharged into the slurry lagoon.

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

FOR PLANNING ONLY

REV	DATE	DESCRIPTION	BY	CHK	APP
P-	12.04.24	PRELIMINARY ISSUE	LH	CS	CS

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CLIENT: BRINSBURY COLLEGE

ARCHITECT: BOND BRYAN ARCHITECTS LTD

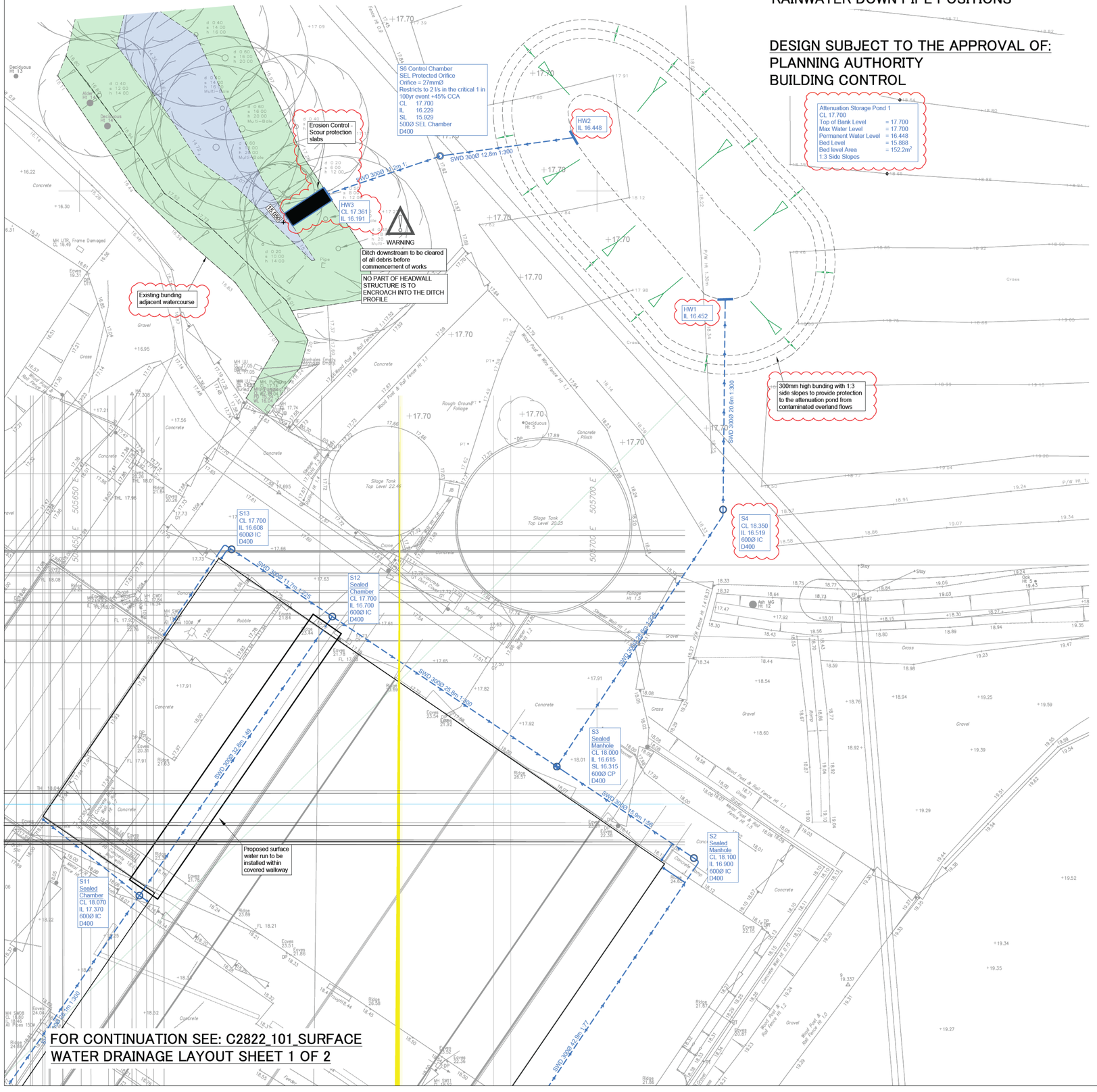
JOB TITLE: BRINSBURY AGRICULTURAL COLLEGE PULBOROUGH

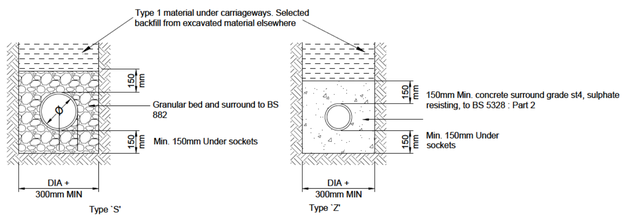
DRAWING TITLE: SURFACE WATER DRAINAGE LAYOUT SHEET 1 OF 2

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE	SCALE @ A1
MARCH 2024	1:200

JOB No.	STATUS	DRAWING No.	REV.
C2822	PL	101	PL-

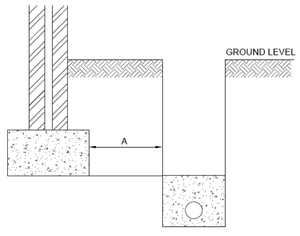

S6 Control Chamber
SEL Protected Orifice
Orifice = 27mmØ
Restricts to 2 l/s in the critical 1 in 100yr event +45% CCA
CL 17.700
IL 16.229
SL 15.929
500Ø SEL Chamber
D400
Erosion Control - Scour protection slabs
SWD 300Ø 12.8m 1:300
HW2
IL 16.448
HW3
CL 17.361
IL 16.191
WARNING
Ditch downstream to be cleared of all debris before commencement of works
NO PART OF HEADWALL STRUCTURE IS TO ENCROACH INTO THE DITCH PROFILE
Existing bunding adjacent watercourse
Attenuation Storage Pond 1
CL 17.700
Top of Bank Level = 17.700
Max Water Level = 17.700
Permanent Water Level = 16.448
Bed Level = 15.888
Bed level Area = 152.2m²
1:3 Side Slopes
HW1
IL 16.452
300mm high bunding with 1:3 side slopes to provide protection to the attenuation pond from contaminated overland flows
SWD 300Ø 20.6m 1:300
S4
CL 18.350
IL 16.519
600Ø IC
D400
S13
CL 17.700
IL 16.608
600Ø IC
D400
SWD 300Ø 11.7m 1:225
S12
Sealed Chamber
CL 17.700
IL 16.700
600Ø IC
D400
SWD 300Ø 22.8m 1:300
SWD 300Ø 12.4m 1:49
S3
Sealed Manhole
CL 18.000
IL 16.615
SL 16.315
600Ø CP
D400
SWD 300Ø 19.9m 1:35
S2
Sealed Manhole
CL 18.100
IL 16.900
600Ø IC
D400
S11
Sealed Chamber
CL 18.070
IL 17.370
600Ø IC
D400
SWD 300Ø 19.3m 1:300
SWD 300Ø 42.9m 1:27
Proposed surface water run to be installed within covered walkway
Sloge Tank Top Level 22.46
Sloge Tank Top Level 20.25
Wood Post & Rail Fence Ht 1.1
Wood Post & Wire Fence Ht 1.1
Stagger Rail Ht 1.4
Rough Ground / Foliage
Concrete Plinth
Gravel
Concrete
Grass
Rubble
Ramp
Slurry Pit
Silage Clamp
Deciduous Ht 13
Deciduous Ht 12
Deciduous Ht 9
Ash MG Ht 12
Oak Ht 5
Stay
Crane
Fence Ht 0.9
Fence Ht 1.5
P/W Ht 1.50m
P/W Ht 1.1
Gross
Pipe
MH UTR Frame Damaged CL 16.49
MH SWD CL 18.00 Dia 1.20 Depth 2.05 Inv In 16.05 Inv Out 16.00
MH SWD CL 17.95 Dia 1.20 Depth 1.95 Inv In 16.00 Inv Out 15.95
MH SWD CL 17.73 Dia 1.20 Depth 1.73 Inv In 15.73 Inv Out 15.68
MH SWD CL 17.64 Dia 1.20 Depth 1.64 Inv In 15.64 Inv Out 15.59
MH SWD CL 17.56 Dia 1.20 Depth 1.56 Inv In 15.56 Inv Out 15.51
MH SWD CL 17.54 Dia 1.20 Depth 1.54 Inv In 15.54 Inv Out 15.49



Drainage with more than
600mm cover - Landscaped
900mm cover - Roads
(Unless bedding type is stated on the drainage plans or specification)

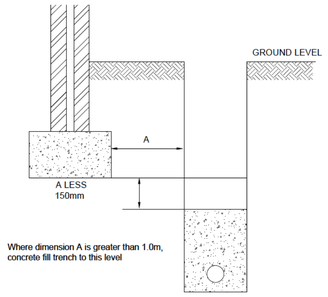
Drainage with less than
600mm cover - Landscaped
900mm cover - Roads
(Unless bedding type is stated on the drainage plans or specification)

Pipe bedding details in private Areas



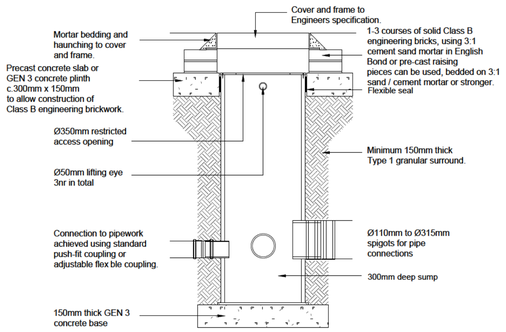
Where dimension A is less than 1.0m, concrete fill trench to level of underside of foundations.

Pipes near buildings

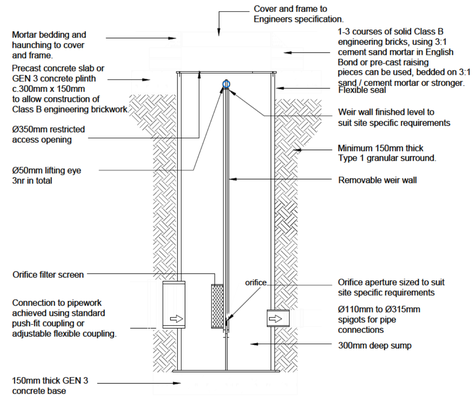


Where dimension A is greater than 1.0m, concrete fill trench to this level

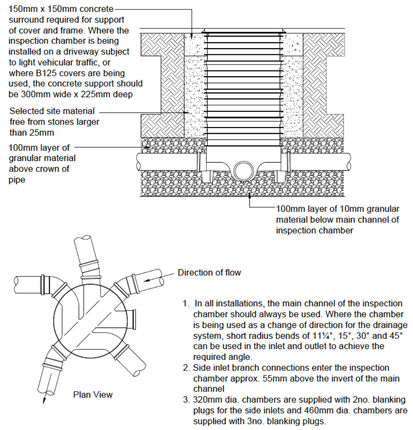
Pipes near buildings



SEL WASP05100
600Ø Inspection Chamber

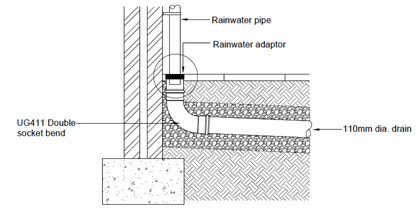


SEL WASP06103WW
600Ø Orifice Flow Control Chamber

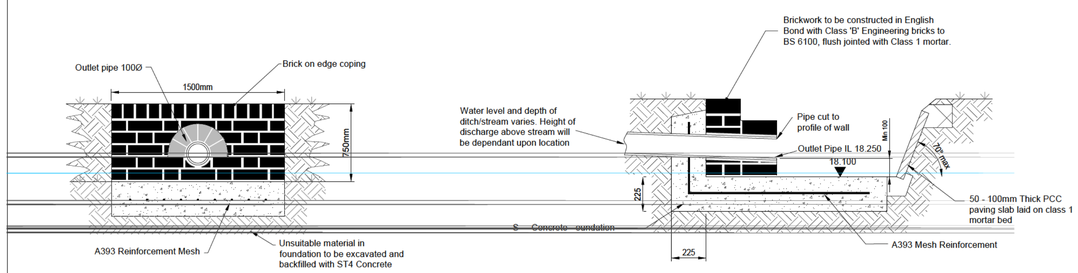


1. In all installations, the main channel of the inspection chamber should always be used. Where the chamber is being used as a change of direction for the drainage system, short radius bends of 11¼°, 15°, 30° and 45° can be used in the inlet and outlet to achieve the required angle.
2. Side inlet branch 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.

600mmØ INSPECTION CHAMBER DETAIL



Rainwater pipe connection



ELEVATION OF HEADWALL OUTFALL TO POND / SIDE OF DITCH

HEADWALL SECTION OUTFALL TO SIDE OF DITCH

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 COVERS, 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. 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

REV	DATE	DESCRIPTION	BY	CHK	APP
P-	12.04.24	PRELIMINARY ISSUE	LH	CS	CS

FOR PLANNING ONLY

CLIENT: BRINSBURY COLLEGE

ARCHITECT: BOND BRYAN ARCHITECTS LTD

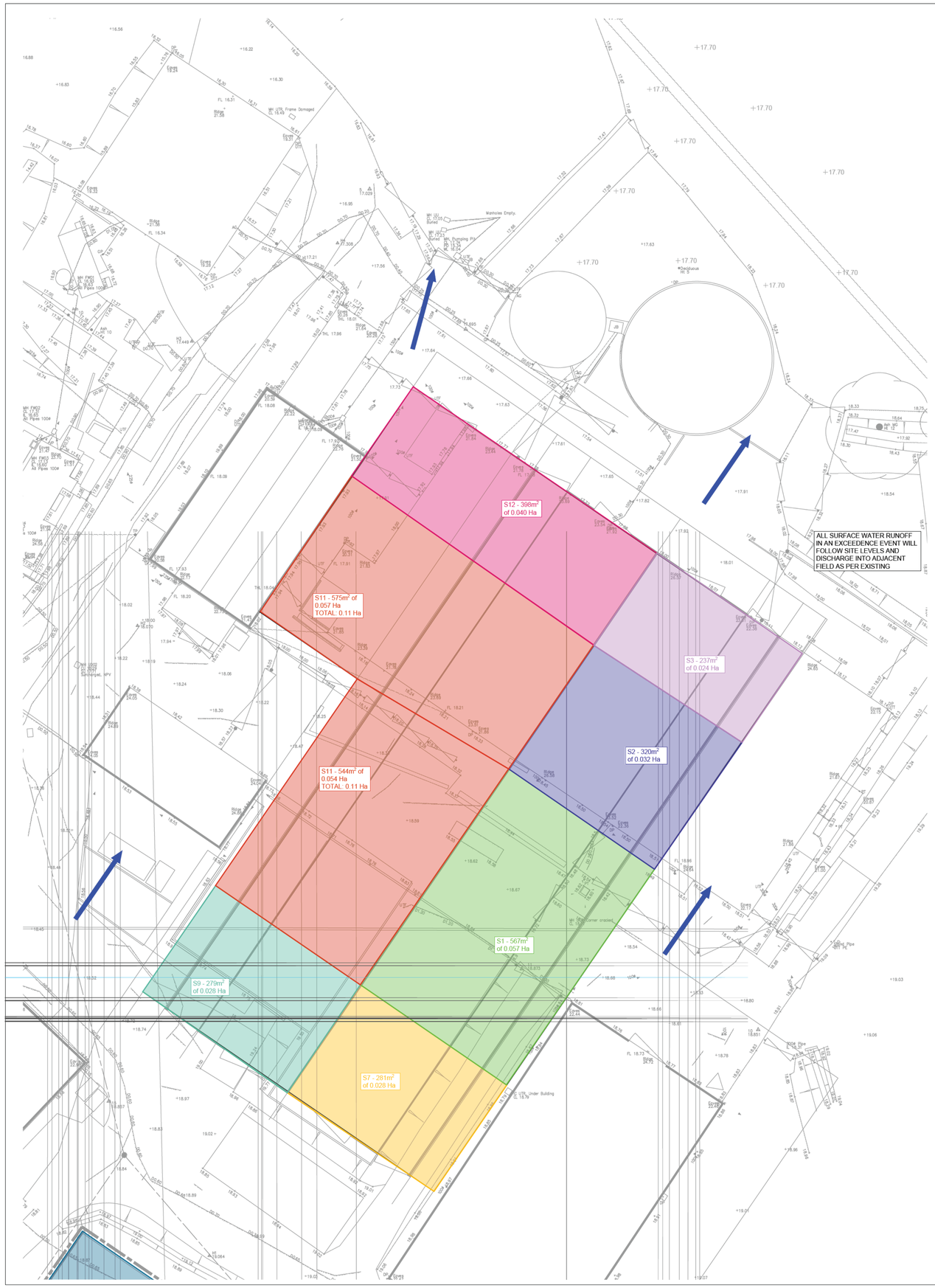
JOB TITLE: BRINSBURY AGRICULTURAL COLLEGE PULBOROUGH

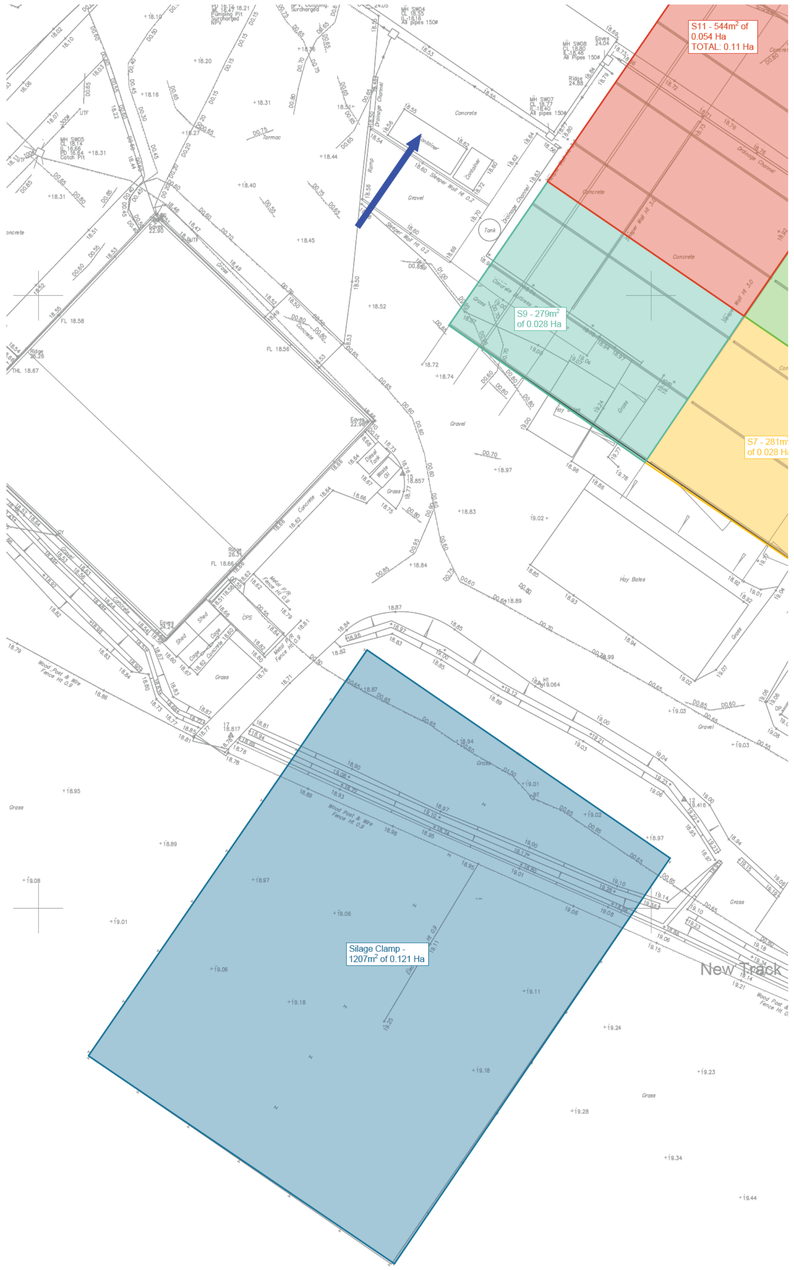
DRAWING TITLE: CONSTRUCTION DETAILS

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE	SCALE @ A1
MARCH 2024	1:20

JOB No.	STATUS	DRAWING No.	REV.
C2822	PL	301	PL-





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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R = RECORD	Record of actual completed work

REV	DATE	DESCRIPTION	BY	CHK	APP
P-	12.04.24	PRELIMINARY ISSUE	LH	CS	CS

FOR PLANNING ONLY

CLIENT: BRINSBURY COLLEGE

ARCHITECT: BOND BRYAN ARCHITECTS LTD

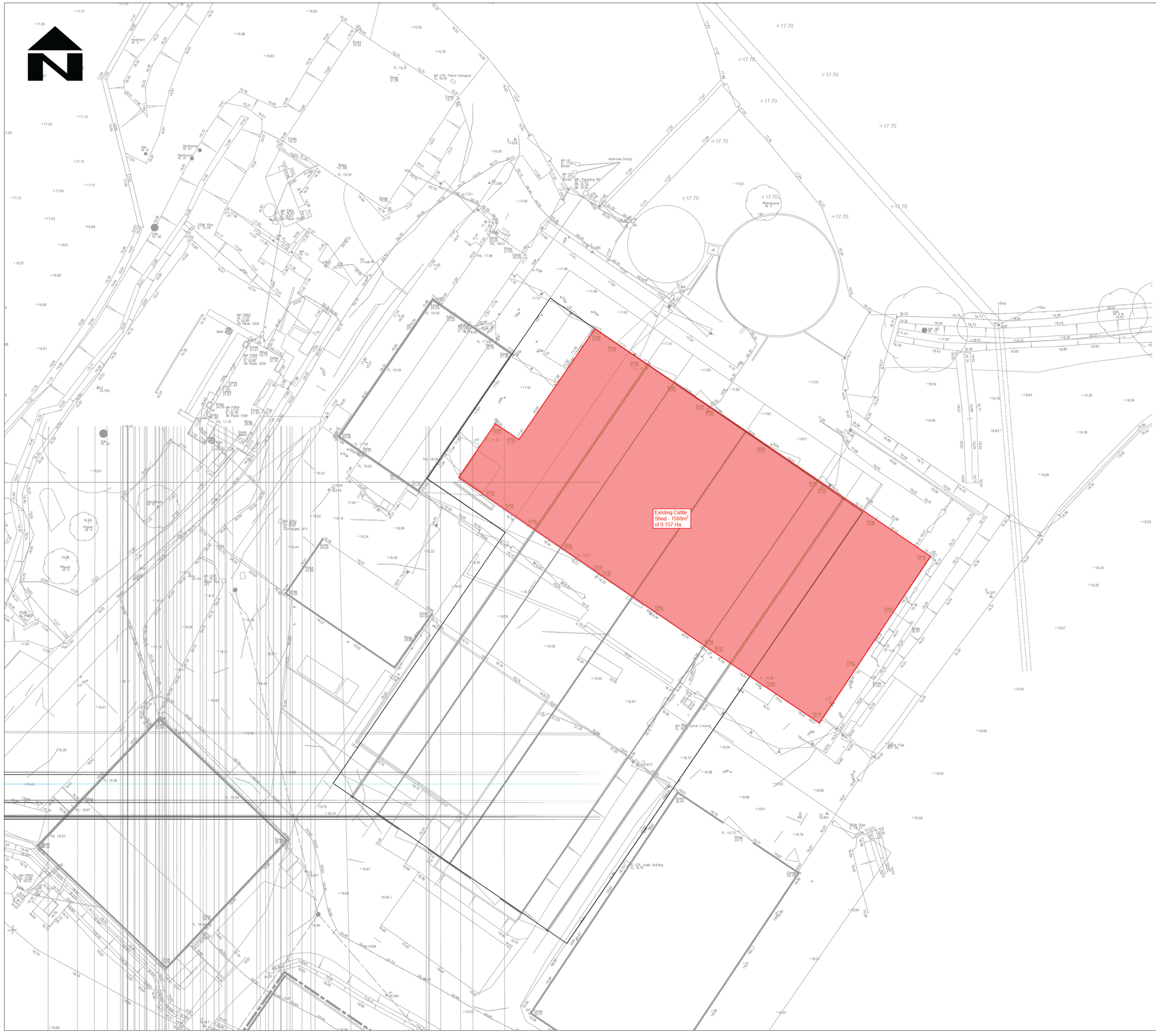
JOB TITLE: BRINSBURY AGRICULTURAL COLLEGE PULBOROUGH

DRAWING TITLE: IMPERMEABLE AREA & OVERLAND FLOW ROUTE

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE	SCALE @ A1
MARCH 2024	1:250

JOB No.	STATUS	DRAWING No.	REV.
C2822	PL	401	PL-



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
P-	12.04.24	PRELIMINARY ISSUE	LH	CS	CS

FOR PLANNING ONLY

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Collingwood Civil Engineering

CLIENT: BRINSBURY COLLEGE

ARCHITECT: BOND BRYAN ARCHITECTS LTD

JOB TITLE: BRINSBURY AGRICULTURAL COLLEGE PULBOROUGH

DRAWING TITLE: EXISTING IMPERMEABLE AREA

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE	SCALE @ A1
MARCH 2024	1:250

JOB No.	STATUS	DRAWING No.	REV.
C2822	PL	401	PL-

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	0.750	Preferred Cover Depth (m)	0.350
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)	Node Type	Manhole Type	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S1	0.057	5.00	18.660	Sealed Manhole	Adoptable	600	505685.829	121999.371	1.200
S2	0.032	5.00	18.100	Sealed Manhole	Adoptable	600	505709.350	122035.567	1.250
S3	0.024	5.00	18.000	Sealed Manhole	Adoptable	600	505696.108	122044.413	1.385
S4			18.350	Manhole	Adoptable	600	505711.990	122068.970	1.831
S5			17.700	Sealed Manhole	Adoptable	600	505695.727	122095.251	1.226
S6			17.700	Manhole	Adoptable	600	505685.062	122103.494	1.471
S7	0.028	5.00	18.950	Sealed Manhole	Adoptable	600	505661.188	121976.963	1.200
S8	0.000	5.00	18.750	Sealed Manhole	Adoptable	600	505632.068	121997.671	1.158
S9	0.028	5.00	18.700	Sealed Manhole	Adoptable	600	505635.848	122006.661	1.151
S10			18.650	Sealed Manhole	Adoptable	600	505639.799	122008.829	1.103
S11	0.110	5.00	18.070	Sealed Manhole	Adoptable	600	505655.778	122031.939	0.700
S12	0.040	5.00	17.700	Sealed Manhole	Adoptable	600	505674.420	122058.900	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	43.167	17.460	16.900	0.560	77.1	300
1.002	S2	S3	15.925	16.850	16.615	0.235	67.8	300
1.003	S3	S4	29.245	16.615	16.519	0.096	304.6	300
1.004	S4	S5	30.906	16.519	16.474	0.045	686.8	300
1.005	S5	S6	13.479	16.474	16.229	0.245	55.0	300
2.000	S7	S8	35.732	17.750	17.592	0.158	226.2	300
2.001	S8	S9	9.752	17.592	17.561	0.031	314.6	300
2.002	S9	S10	4.507	17.549	17.547	0.002	2253.4	300
2.003	S10	S11	28.096	17.547	17.370	0.177	158.7	300
2.004	S11	S12	32.778	17.370	16.700	0.670	48.9	300
2.005	S12	S3	26.081	16.700	16.615	0.085	306.8	300

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	0.750	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	0.840	Drain Down Time (mins)	240	Check Discharge Volume	x

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
10	0	0	0
30	0	0	0
100	45	0	0

Node S6 Online Orifice Control

Flap Valve	✓	Design Depth (m)	1.346	Discharge Coefficient	0.650
Replaces Downstream Link	x	Design Flow (l/s)	2.0		
Invert Level (m)	16.229	Diameter (m)	0.027		

Node S6 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	16.488
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	148.7	0.0	1.212	347.4	0.0

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Results for 2 year Critical Storm Duration. Lowest mass balance: 98.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	17.514	0.054	9.0	0.0152	0.0000	OK
15 minute winter	S2	10	16.914	0.064	13.7	0.0181	0.0000	OK
15 minute winter	S3	11	16.821	0.206	47.7	0.0583	0.0000	OK
360 minute winter	S4	344	16.791	0.272	9.5	0.0770	0.0000	OK
360 minute winter	S5	344	16.791	0.317	9.4	0.0897	0.0000	SURCHARGED
360 minute winter	S6	344	16.791	0.562	11.6	52.8086	0.0000	OK
15 minute winter	S7	10	17.799	0.049	4.4	0.0139	0.0000	OK
15 minute winter	S8	11	17.647	0.055	4.3	0.0156	0.0000	OK
15 minute winter	S9	11	17.632	0.083	8.4	0.0236	0.0000	OK
15 minute winter	S10	11	17.609	0.062	8.4	0.0175	0.0000	OK
15 minute winter	S11	11	17.450	0.080	25.1	0.0225	0.0000	OK
15 minute winter	S12	11	16.861	0.161	30.9	0.0455	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 winter	S1	1.000	S2	8.7	1.034	0.069	0.3635	
15 minute winter	S2	1.002	S3	13.6	0.496	0.101	0.4977	
15 minute winter	S3	1.003	S4	46.8	0.909	0.739	1.5050	
360 minute winter	S4	1.004	S5	9.4	0.429	0.225	2.1257	
360 minute winter	S5	1.005	S6	11.6	0.198	0.078	0.9492	
360 minute winter	S6	Orifice		1.2				37.8
15 minute winter	S7	2.000	S8	4.3	0.549	0.059	0.2905	
15 minute winter	S8	2.001	S9	4.2	0.397	0.068	0.1056	
15 minute winter	S9	2.002	S10	8.4	0.643	0.370	0.0595	
15 minute winter	S10	2.003	S11	8.4	0.671	0.095	0.3567	
15 minute winter	S11	2.004	S12	24.9	0.983	0.156	0.8755	
15 minute winter	S12	2.005	S3	30.5	0.681	0.484	1.1749	

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Results for 10 year Critical Storm Duration. Lowest mass balance: 98.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	17.537	0.077	18.4	0.0217	0.0000	OK
15 minute winter	S2	12	17.155	0.305	28.8	0.0863	0.0000	SURCHARGED
15 minute winter	S3	12	17.143	0.528	85.5	0.1495	0.0000	SURCHARGED
480 minute winter	S4	464	17.013	0.494	11.5	0.1398	0.0000	SURCHARGED
480 minute winter	S5	464	17.013	0.539	11.2	0.1526	0.0000	SURCHARGED
480 minute winter	S6	464	17.013	0.784	14.1	100.9798	0.0000	OK
15 minute winter	S7	10	17.819	0.069	9.0	0.0197	0.0000	OK
15 minute winter	S8	11	17.678	0.086	8.8	0.0245	0.0000	OK
15 minute winter	S9	11	17.666	0.117	17.2	0.0332	0.0000	OK
15 minute winter	S10	11	17.637	0.090	17.2	0.0254	0.0000	OK
15 minute winter	S11	10	17.485	0.115	51.6	0.0327	0.0000	OK
15 minute winter	S12	12	17.226	0.526	63.7	0.1488	0.0000	SURCHARGED

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 winter	S1	1.000	S2	18.5	1.217	0.146	1.6418	
15 minute winter	S2	1.002	S3	28.0	0.548	0.207	1.1214	
15 minute winter	S3	1.003	S4	85.5	1.215	1.352	2.0594	
480 minute winter	S4	1.004	S5	11.2	0.448	0.268	2.1764	
480 minute winter	S5	1.005	S6	14.1	0.246	0.094	0.9492	
480 minute winter	S6	Orifice		1.4				52.3
15 minute winter	S7	2.000	S8	8.8	0.633	0.120	0.5170	
15 minute winter	S8	2.001	S9	8.7	0.453	0.139	0.1896	
15 minute winter	S9	2.002	S10	17.2	0.806	0.754	0.0975	
15 minute winter	S10	2.003	S11	17.1	0.812	0.195	0.5991	
15 minute winter	S11	2.004	S12	50.8	1.075	0.319	1.5634	
15 minute winter	S12	2.005	S3	59.0	0.838	0.936	1.8366	

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Results for 30 year Critical Storm Duration. Lowest mass balance: 98.13%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	S1	10	17.547	0.087	24.0	0.0247	0.0000	OK
15 minute winter	S2	12	17.458	0.608	37.2	0.1721	0.0000	SURCHARGED
15 minute winter	S3	12	17.443	0.828	107.6	0.2343	0.0000	SURCHARGED
480 minute winter	S4	472	17.139	0.620	14.6	0.1753	0.0000	SURCHARGED
480 minute winter	S5	472	17.139	0.665	14.6	0.1881	0.0000	SURCHARGED
480 minute winter	S6	472	17.139	0.910	14.5	131.7699	0.0000	OK
15 minute winter	S7	10	17.830	0.080	11.8	0.0225	0.0000	OK
15 minute winter	S8	11	17.695	0.103	11.6	0.0292	0.0000	OK
15 minute winter	S9	11	17.683	0.134	22.6	0.0378	0.0000	OK
15 minute winter	S10	11	17.650	0.103	22.7	0.0291	0.0000	OK
15 minute winter	S11	12	17.637	0.267	67.7	0.0756	0.0000	OK
15 minute winter	S12	12	17.558	0.858	79.1	0.2429	0.0000	FLOOD RISK

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 winter	S1	1.000	S2	23.7	1.222	0.187	1.8862	
15 minute winter	S2	1.002	S3	31.1	0.589	0.230	1.1214	
15 minute winter	S3	1.003	S4	106.5	1.512	1.683	2.0594	
480 minute winter	S4	1.004	S5	14.6	0.470	0.348	2.1764	
480 minute winter	S5	1.005	S6	14.5	0.218	0.097	0.9492	
480 minute winter	S6	Orifice		1.6				56.0
15 minute winter	S7	2.000	S8	11.6	0.666	0.157	0.6454	
15 minute winter	S8	2.001	S9	11.5	0.481	0.185	0.2352	
15 minute winter	S9	2.002	S10	22.7	0.880	0.996	0.1165	
15 minute winter	S10	2.003	S11	22.7	0.824	0.258	1.2148	
15 minute winter	S11	2.004	S12	62.3	1.081	0.391	2.2403	
15 minute winter	S12	2.005	S3	67.6	0.959	1.071	1.8366	

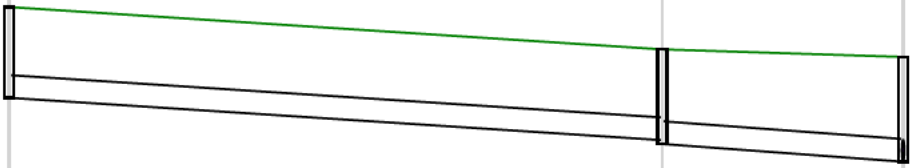
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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 98.13%

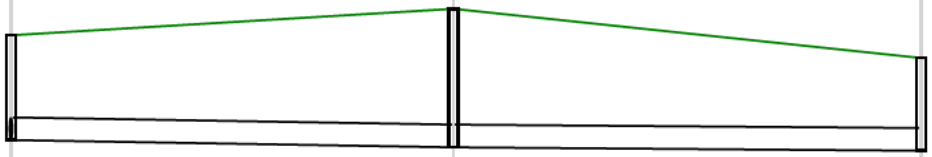
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	12	18.660	1.200	41.5	0.3454	0.0000	FLOOD RISK
15 minute summer	S2	11	18.100	1.250	61.1	0.5062	0.0000	FLOOD RISK
15 minute summer	S3	11	18.000	1.385	159.2	0.5611	0.0000	FLOOD RISK
15 minute winter	S4	13	18.056	1.537	166.4	0.4350	0.0000	FLOOD RISK
720 minute winter	S5	705	17.593	1.119	19.5	0.3167	0.0000	FLOOD RISK
720 minute winter	S6	705	17.593	1.364	19.5	264.8578	0.0000	OK
15 minute summer	S7	12	18.950	1.200	50.6	0.3868	0.0000	FLOOD RISK
15 minute summer	S8	11	18.750	1.158	33.5	0.4301	0.0000	FLOOD RISK
15 minute summer	S9	11	18.700	1.151	36.0	0.4412	0.0000	FLOOD RISK
15 minute summer	S10	11	18.650	1.103	39.1	0.4402	0.0000	FLOOD RISK
15 minute summer	S11	10	18.070	0.700	84.2	0.4834	0.0000	FLOOD RISK
15 minute summer	S12	9	17.700	1.000	101.6	0.6129	0.0000	FLOOD RISK

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	37.8	1.220	0.299	3.0398	
15 minute summer	S2	1.002	S3	50.2	0.712	0.371	1.1214	
15 minute summer	S3	1.003	S4	157.0	2.230	2.481	2.0594	
15 minute winter	S4	1.004	S5	164.3	2.333	3.924	2.1764	
720 minute winter	S5	1.005	S6	19.5	0.277	0.130	0.9492	
720 minute winter	S6	Orifice		1.9				88.2
15 minute summer	S7	2.000	S8	-30.2	0.739	-0.410	2.5162	
15 minute summer	S8	2.001	S9	-33.5	0.537	-0.537	0.6867	
15 minute summer	S9	2.002	S10	39.1	0.935	1.718	0.3174	
15 minute summer	S10	2.003	S11	43.5	0.766	0.494	1.9785	
15 minute summer	S11	2.004	S12	80.4	1.189	0.505	2.3082	
15 minute summer	S12	2.005	S3	99.0	1.406	1.570	1.8366	

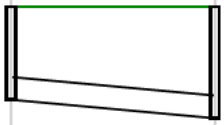
Flow+ v10.7 Copyright © 1988-2024 Causeway Technologies Ltd

Node Name	S1	S2	S3
			
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) 8.000			
Link Name	1.000	1.002	
Section Type	300mm	300mm	
Slope (1:X)	77.1	67.8	
Cover Level (m)	18.660	18.100	18.000
Invert Level (m)	17.460	16.900 / 16.850	16.615
Length (m)	43.167	15.925	

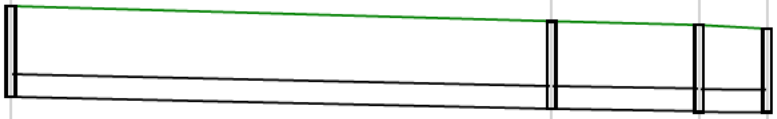
Flow+ v10.7 Copyright © 1988-2024 Causeway Technologies Ltd

Node Name	S3	S4	S5
			
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) 7.000			
Link Name	1.003	1.004	
Section Type	300mm	300mm	
Slope (1:X)	304.6	686.8	
Cover Level (m)	18.000	18.350	17.700
Invert Level (m)	16.615	16.519 16.519	16.474
Length (m)	29.245	30.906	

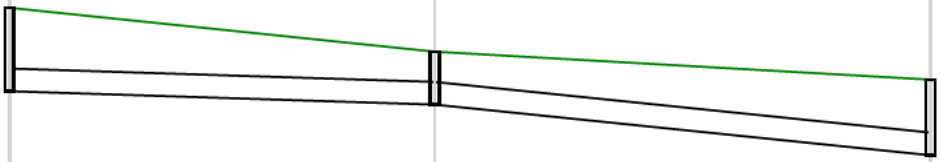
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Node Name		S5	S6
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) 7.000			
Link Name		1.005	
Section Type		300mm	
Slope (1:X)		55.0	
Cover Level (m)		17.700	17.700
Invert Level (m)		16.474	16.229
Length (m)		13.479	

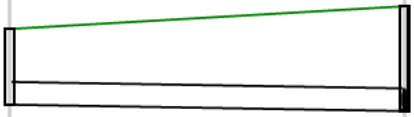
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Node Name	S7		S8		S9	S10
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) 8.000						
Link Name		2.000		2.001	2.002	
Section Type		300mm		300mm	300mı	
Slope (1:X)		226.2		314.6	2253.4	
Cover Level (m)	18.950		18.750		18.700	18.650
Invert Level (m)	17.750	17.592	17.592	17.561	17.549	17.547
Length (m)		35.732		9.752	4.507	

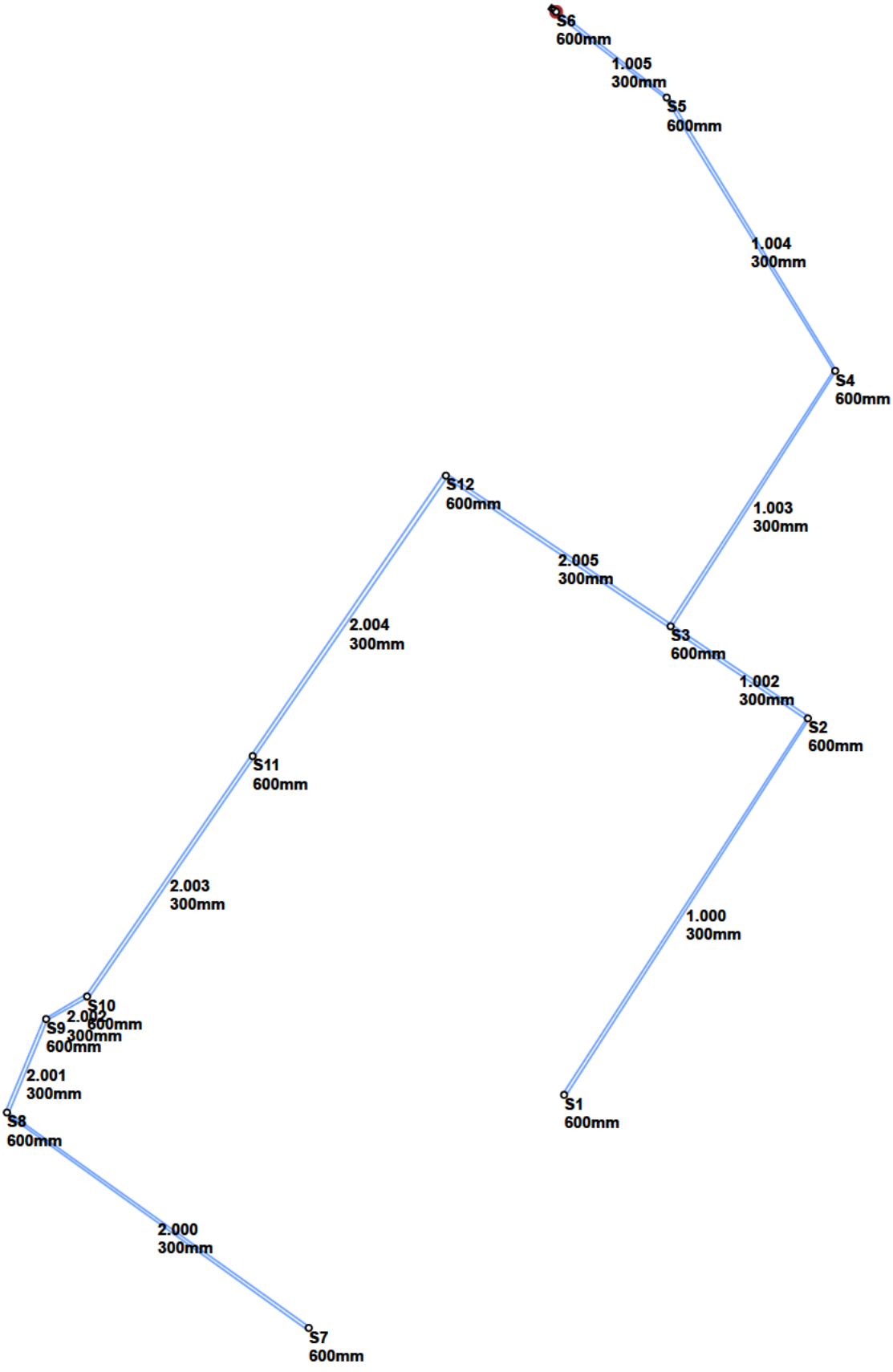
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Node Name	S10	S11	S12
			
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) 8.000			
Link Name		2.003	2.004
Section Type		300mm	300mm
Slope (1:X)		158.7	48.9
Cover Level (m)	18.650	18.070	17.700
Invert Level (m)	17.547	17.370 / 17.370	16.700
Length (m)		28.096	32.778

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Node Name	S12	S3
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) 7.000		
Link Name	2.005	
Section Type	300mm	
Slope (1:X)	306.8	
Cover Level (m)	17.700	18.000
Invert Level (m)	16.700	16.615
Length (m)	26.081	

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7.4 Appendix D – Borehole Logs

British Geological Survey

BGS ID: 570420 : BGS Reference: TQ02SW5
British National Grid (27700) : 504890,121670

TQ 02 SW/5

317/108B 0489 2167

RECORD OF WELL (SHAFT OR BORE)

At Toat Farm

Town or Village PULBOROUGH

County Sussex Six-inch quarter sheet 23. SE/W.

For Mr. [redacted]

Exact site of well 375 yds SE of Toat Farm. Sited on Field Slip - see 317/108a

{ Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface above sea-level (O.D.) 182 feet.

Is well-top at ground level? ____ If not, state how far above ; ____ feet.
below ;

Shaft — ft., diameter — ft. Details of headings —

Bore 100 ft.; diameter of bore: at top ____ ins.; at bottom ____ ins.

Lengths, diameters, perforations, etc., of lining tubes 100 ft x 4½ ins. Perforated 68-88'

Water struck at depths, below well-top, of (feet) ____

TEST DETAILS
Month July
Year 1939

Rest-level of water 63 ft. ~~above~~ below well-top. Suction at 85 ft. Yield on ____ hours' / days'
pumping 300 gallons per hour (max. capacity of pump ____ g.p.h.),
with depression of ____ feet. Recovery to ____ in ____ mins. / hours.

WORKING CONDITIONS

Rest-level of water in ____ (month), ____ (year), ____ ft. above / below well-top.
Highest " in ____ (month), ____ (year), ____ ft. above / below "
Lowest " in ____ (month), ____ (year), ____ ft. above / below "
Suction at ____ ft. Rate of pumping ____ galls. per ____ for ____ hours per day.
with average depression of ____ ft. Recovery to ____ in ____ mins. / hours

Quality of water (*attach copy of analysis if available*) ____

Well made by Messrs. Duke & Ockenden Date of well July 1939

Information from Duke & Ockenden.

Toat, Pulborough At Toat Farm Sussex.
for [redacted] Dec 0 July 1939

Bored to 100'-0"
Lined 4½" Tubes to 100'-0"
Perforations 68'-88'
Water Level 63'-0"
Tested at 300 g.p.h.
with suction at 85'-0"

Strata
Clay & shale 0'-26'
Blue clay 26'-70'
Hard Blue clay 70'-78'
Blue clay 78'-100'

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 570420 : BGS Reference: TQ02SW5
British National Grid (27700) : 504890,121670

TQ 02 SW 5

(For Survey use only)
GEOLOGICAL CLASSIFICATION

NATURE OF STRATA If measurements start below ground surface, state how far... ...	THICKNESS Feet ...	 Inches ...	DEPTH Feet	 Inches
Clay + Shale	26		26	
Blue Clay	44		70	
Hard Blue Clay	8		78	
Blue Clay	22		100	
Undescribed (deepening)	10		110	

Weald Clay 110'

MH 19/2/73

This bore was deepened to 110 feet following silting up. It is now lined to 105 down. Yield approx. 100 g.p.h. Originally supplied house & all farm-stalls; now only two small houses. Pump one a week for 6-7 hours. Boreholes in orchard.

13-5-59. [redacted]

DATA Bank

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 570420 : BGS Reference: TQ02SW5
British National Grid (27700) : 504890,121670

2

RECORD OF WELL (SHAFT OR BORE)

TQ02/7B
317/108B

At Toat Farm

Town or Village PULBOROUGH

County Sussex Six-inch quarter sheet 23. SE/W.

For Mr. [redacted]

Exact site of well 375 yds SE of Toat Farm. Sited on Field slip - see 317/108a

Attach a tracing from a map, or a sketch-map, if possible.

Level of ground surface above sea-level (O.D.) 182 feet. TQ 0489 2167

Is well-top at ground level? If not, state how far above ; below ; feet.

Shaft — ft., diameter — ft. Details of headings —

Bore 100 ft. ; diameter of bore : at top ins. ; at bottom ins.

Lengths, diameters, perforations, etc., of lining tubes 100 ft X 4½ ins. Perforated 68-88'

Water struck at depths, below well-top, of (feet)

TEST DETAILS
Month July
Year 1939

Rest-level of water 63 ft. ~~above~~ below well-top. Suction at 85 ft. Yield on hours' days'
pumping 300 gallons per hour (max. capacity of pump g.p.h.),
with depression of feet. Recovery to in mins. hours.

WORKING CONDITIONS

Rest-level of water in (month), (year), ft. above below well-top.
Highest " in (month), (year), ft. above below "
Lowest " in (month), (year), ft. above below "
Suction at ft. Rate of pumping galls. per for hours per day.
with average depression of ft. Recovery to in mins. hours

Quality of water (*attach copy of analysis if available*)

Well made by Messrs. Duke & Ockenden Date of well July 1939

Information from Duke & Ockenden.

Toat, Pulborough At Toat Farm Sussex.
for [redacted] Dr. 0 July 1939

Bored to 100'-0"
Lined 4½" Tubes to 100'-0"
Perforations 68'-88'
Water level 63'-0"
Tested at 300 g.p.h.
with suction at 85'-0"

Strata
Clay & shale 0-26'
Blue clay 26'-70'
Hard Blue clay 70'-78'
Blue clay 78'-100'

Ref:- W.S.B. 6/125 STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.

Date received	G.S.M. Office File No.	1" N.S. Map No.	1" O.S. Map No.	Site marked (use symbol) on 1" Map.	Site marked (use symbol) on 6" Map.
24/9/41		317		⊙	⊙

(17208) Wt.42901/0877 10,000 2/41 A.& E.W.Ltd. Gp.686

Contact BGS: ngdc@bgs.ac.uk

British Geological Survey

BGS ID: 570420 : BGS Reference: TQ02SW5
British National Grid (27700) : 504890,121670

3

(For Survey use only)
GEOLOGICAL CLASSIFICATION

NATURE OF STRATA If measurements start below ground surface, state how far... ...	Thickness Feet ...	 Inches ...	Depth Feet ...	 Inches ...
Clay + Shale	26		26	
Blue Clay	44		70	
Hard Blue Clay	8		78	
Blue Clay	22		100	
Undescribed (deepening)	10		110	

Weald Clay 190'

MH 19/2/73

This bore was deepened to 110 feet following silting up. It is now lined to 105 down. Yield appro. 100 g.p.h. Originally supplied house + all farm-estate; now only two small houses. Pump once a week for 6-7 hours. Boreholes in orchard.

13-5-59. [redacted]

DATA Bank

Contact BGS: ngdc@bgs.ac.uk

7.5 Appendix E – Maintenance Schedule

Consulting Civil Engineers

Maintenance Schedule

Brinsbury Agricultural College, Blackgate Lane, Codmore Hill, Pulborough RH20 1DD

Planning Ref: DC/23/2101

For

Brinsbury Agricultural College

Rev - P

Reference C2822

Date 11th March 2024

Revision	Date of Issue	Comments	Prepared By	Checked By
P	11/03/2024	Initial Issue	LH	CS

Contents

1 MAINTENANCE 3

1 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 client 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 Brinsbury Agricultural College, Pulborough

1.2.1 As listed above, in section 5.1.2, the SuDS features used on site will be a pond

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 Ponds and Wetlands

In order to maintain the functioning of the bio retention systems, the following maintenance requirements should be adhered to:

Table 23.1 Operation and maintenance requirements for ponds and wetlands

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and surface debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly
	Inspect marginal and bankside vegetations and remove nuisance plants (for first 3 years)	Monthly (at start then as required)
	Inspect inlets, outlets, banksides, structure, pipework etc for evidence of blockages and/o physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May-October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half Yearly
	Check any mechanical devices	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season	Annually
	Remove sediment from any forebay	Every 1 – 5 years
	Remove sediement and planting from one quadrant of the main body of ponds without sediment forebays	Every 5 years, or as required.
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	As required
Remedial actions	Repair erosion or other damage	As required
	Replant where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair/rehabilitee inlets, outlets and overflows	As required

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 be free from obstruction at all times 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