Consulting Civil Engineers

Foul and Surface Water Drainage Report

Topham Farm, Rusper Road in Horsham, West Sussex

Planning Ref: DC/23/0213

For

Jackie Aldrich

Rev – P3

Reference C2719

Date 31st October 2024

Revision	Date of Issue	Comments	Prepared By	Checked By
P	22.08.2024	Initial Issue	LH	CS
P1	28.08.2024	Revised to suit clients comments	LH	CS
P2	15.10.2024	Revised to suit HDC comments	LH	CS
P3	31.10.2024	Revised to suit HDC comments	LH	CS

Contents

1 INTRODUCTION 3

2 EXECUTIVE SUMMARY: 4

3 SITE GEOLOGY 4

4 EXISTING DRAINAGE 5

5 PROPOSED DRAINAGE STRATEGY 5

6 SUMMARY AND CONCLUSIONS 10

7 APPENDICES 11

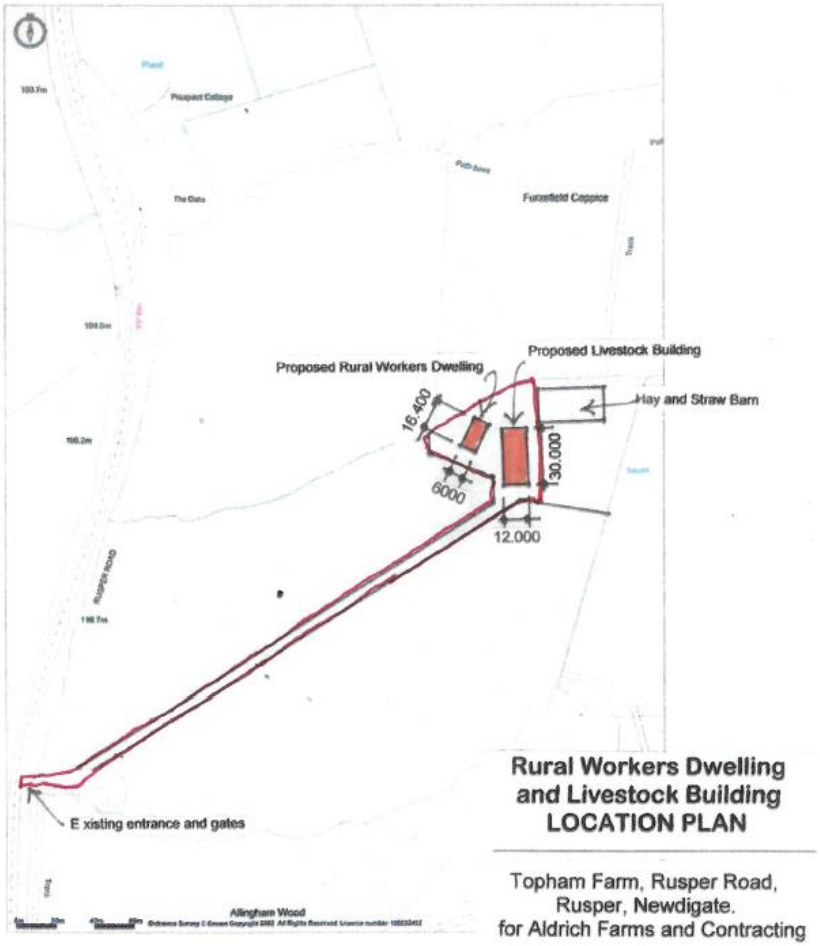
1 Introduction

1.1.1 CGS Civils Ltd has been appointed to undertake a drainage strategy report for a proposed development at Topham Farm on Rusper Road in Horsham, 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 in order to clear Condition 3. The condition is in place on Decision Notice with the planning reference: **DC/23/0213.**

1.1.3 The existing site consists of a hay and straw barn with an access track at Topham Farm. The proposed development will consist of the construction of a livestock barn and a rural worker dwelling that is to be located adjacent to the existing Hay and straw barn. The proposed development is located as OS Grid Reference TQ 19594 35309 and has the post code RH12 4QS.

Fig 1. Site Location



2 Executive Summary:

2.1.1 The Surface Water will discharge to an existing watercourse located to the north of the site. The discharge is to be restricted to the on-site Qbar of 1.0l/s.

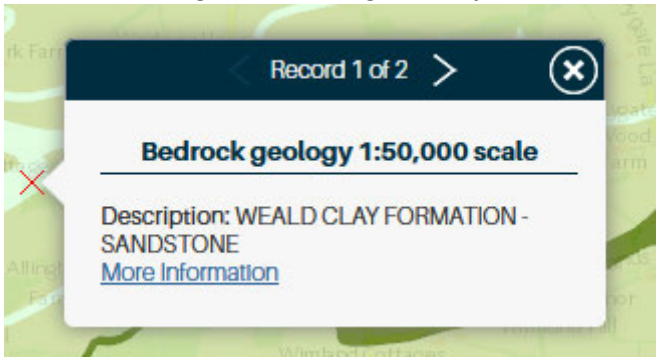
2.1.2 The Foul water will discharge into a new package treatment plant and all treated effluent runoff will discharge into the watercourse to the north. There is sufficient capacity within the 150mm pipe to cater for the foul and surface water flows from the site. Environment Agency approval is not required as the discharge adheres to general binding rules for small discharges to surface water.

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 Weald Clay formation which is comprised of Sandstone. At the time of writing the British Geological Survey website does not have any recorded information of the Superficial deposits on site.

Fig 2. British Geological Survey



3.2 Geological Assessment

3.2.1 An infiltration test was carried out on site by CGS Civils Ltd. The test was ultimately considered a failure, with the infiltrating failing to soakaway within a sufficient timeframe during the 2nd test in the trail pit.

3.2.2 A secondary infiltration test was undertaken on site at a shallow level (0.5mbgl) which drained within a sufficient time frame, resulting in a recorded infiltration rate of 2.63×10^{-5}m/s, which is sufficient for the use of permeable paving on site. A copy of the calculator can be found in **Appendix D.**

Fig 3. Infiltration test photograph



4 Existing Drainage

4.1.1 It is not currently known how the existing hay and straw barn discharges surface water runoff, but it is presumed to discharge into the watercourse to the north of the site.

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 – Rainwater harvesting is to be utilised for both the workers dwelling and the livestock barn.
Discharge to Ground	No for roof areas. Infiltration test failed on 2nd test. A secondary shallow test was carried out which confirmed that infiltration is viable at a shallow level. Hard paved areas to be constructed from a permeable surface discharging to ground at $2.63x10^{-5}$m/s.
Discharge to Watercourse	Yes, discharge to existing watercourse at discharge rate of 1.0l/s which is the calculated Qbar
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	**1**
CV Winter and Summer	**1**
Additional Storage (m^3 / ha)	**0.0**
Flow Control	**1.132m Head @ 1l/s discharge**
Attenuation Tank Design	Base Coefficient (m/hr): **0.00000**
	Side Coefficient (m/hr): **0.00000**
	Factor of Safety: **2**
	Porosity: **95%**
	Time to Half Empty (mins): **103**

5.3 Surface Water Drainage

5.3.1 Based upon the failure of the on-site infiltration test, it is proposed that the surface water runoff from roof areas at the site are discharge to the north into the existing watercourse. The runoff from all roof areas is to be collected into a positive drainage network before discharging into the watercourse at a restricted rate of 1.0l/s which is the calculated Qbar. The site will make use of rainwater harvesting tanks in order to supply water to the workers dwelling and the livestock barn.

5.3.2 The proposed surface water drainage network is to be make use of a geocellular attenuation tank in order to cater for the 1 in 100-year +45% storm.

5.3.3 The hard paved areas are to be constructed from a permeable surface which will allow runoff to discharge to ground as per the existing arrangement on site. A Shallow infiltration test has been carried out which confirms the infiltration rate of soils on site is suitable for the use of permeable paving. The proposed muck barn is to have the runoff from the roof discharged into the sub-base of the permeable paving via a diffuser unit. Due to the small area of the muck barn, the increase in runoff is negligible.

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

Table 3. Greenfield Runoff Calculations

Greenfield Runoff Calculations			
Storm period	**Greenfield runoff rate (l/s)**	**Proposed Discharge Rate (l/s)**	**Difference (l/s)**
Q_{BAR}	0.5	1	+ 0.5
1	0.4	1	+ 0.6
2	0.4	1	+ 0.6
30	1.1	1	- 0.1
100	1.5	1	- 0.5

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
- Other roofs

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, home zones 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 4: Pollution hazard index and destination of runoff for the proposed site

Table 3: Pollution Hazard Index and Destination of runoff for the proposed Site					
Land Use	**Destination of Runoff**	**Pollution Hazard Level**	**Total Suspended Solids**	**Metals**	**Hydrocarbons**
Residential Roof	Surface Water	Very Low	0.2	0.2	0.05
Individual driveways, residential car parks and low traffic roads	Ground water	Low	0.5	0.4	0.4
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 from SuDS manual. Indicative SuDS Mitigation Indices for discharges to ground waters and Table 26.5 for surface waters

5.4.11 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 later is included that provides treatment, and including a geotextile at the base separating the foundation from the subgrade) underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.7	0.6	0.7
Bioretention underlain by a soil with good contaminant attenuation potential of at least 300mm in depth	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area		

Table 26.5 Indicative SuDS mitigation indices for discharges to surface waters			
	Mitigation Indices		
Type of SuDS Components	**TSS**	**Metals**	**Hydrocarbons**
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention System	0.8	0.8	0.8
Permeable Pavement	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area		

Table 5: SuDS mitigation index

Table 5 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	Ground water	Table 26.4 (for ground waters)	Permeable Pavement	0.7	0.6	0.7
Residential Roof	Surface Water	Table 26.5 (for surface waters)	Filter Drain	0.4	0.4	0.4
Other roofs (Typically commercial/industrial roofs)	Surface Water	Table 26.5 (for surface waters)	Filter Drain	0.4	0.4	0.4

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

5.5 Foul water drainage

5.5.1 The foul water from the proposed workers dwelling is to be discharge into a new package treatment plant located on site. The treated effluent runoff is to then be discharged into an existing watercourse to the north alongside the surface water.

5.5.2 The maximum discharge rate of the foul water from site will be 0.0035 l/s. There will be sufficient capacity within the 150mm pipe to withstand both the foul and surface water discharge from the proposed site.

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

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

6 Summary And Conclusions

6.1.1 CGS Civils has been instructed to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for the construction of a workers dwelling and livestock barn at Topham Farm in Horsham.

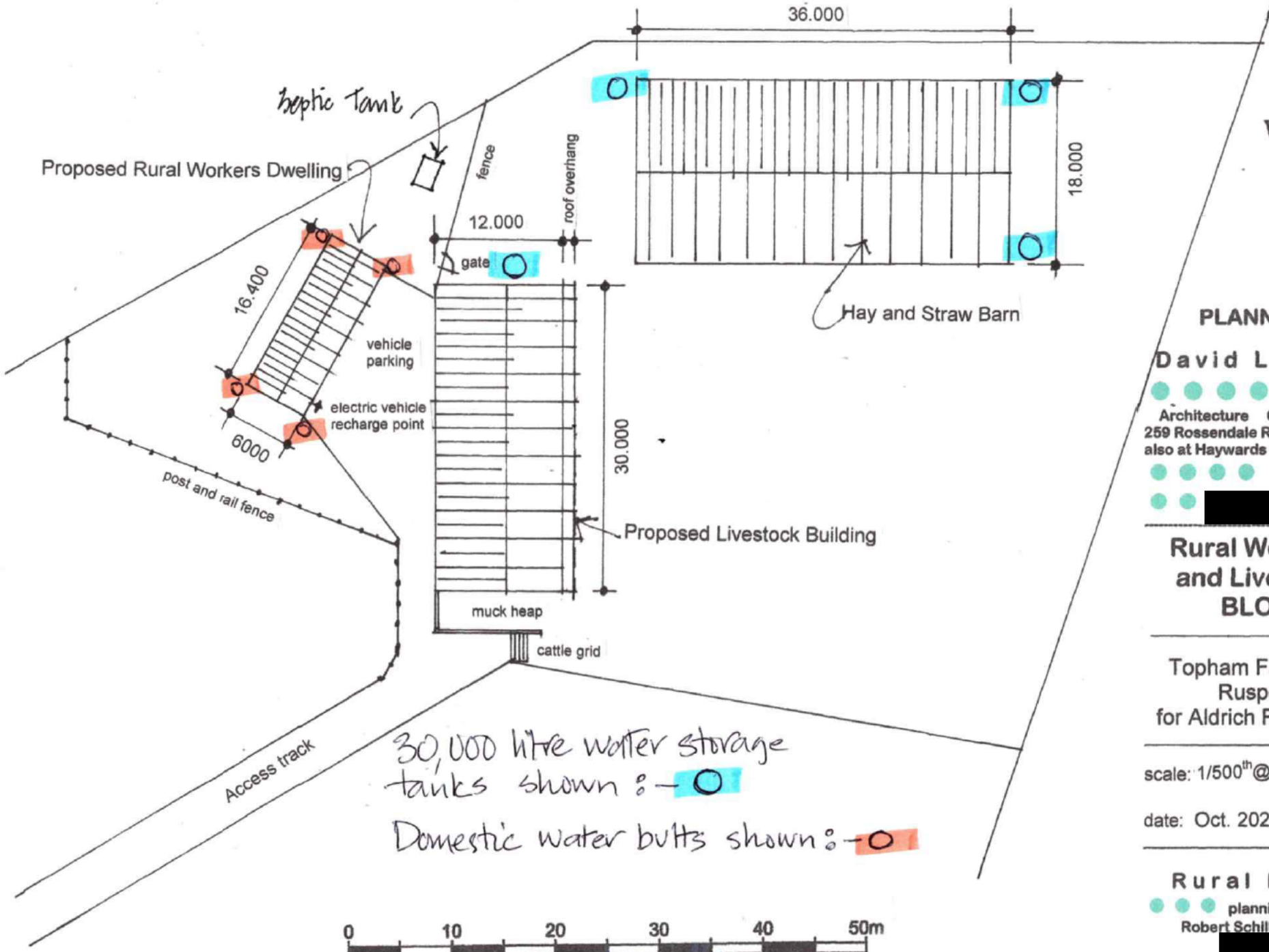
6.1.2 The Surface Water will discharge to an existing watercourse located to the north of the site. The discharge is to be restricted to the on-site Qbar of 1.0l/s.

6.1.3 The Foul water will discharge into a new package treatment plant and all treated effluent runoff will discharge into the watercourse to the north. There is sufficient capacity within the 150mm pipe to cater for the foul and surface water flows from the site. Environment Agency approval is not required as the discharge adheres to general binding rules for small discharges to surface water.

6.1.4 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.

7 Appendices

7.1 Appendix A – Site Plan



N
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PLANNING Drawing

David Liversidge design

Architecture Construction Development
259 Rossendale Road, Burnley, Lancs. BB11 5BZ
also at Haywards Heath, West Sussex, RH16 4DZ
[redacted]

Rural Workers Dwelling and Livestock Building BLOCK PLAN

Topham Farm, Rusper Road,
Rusper, Horsham
for Aldrich Farms and Contracting

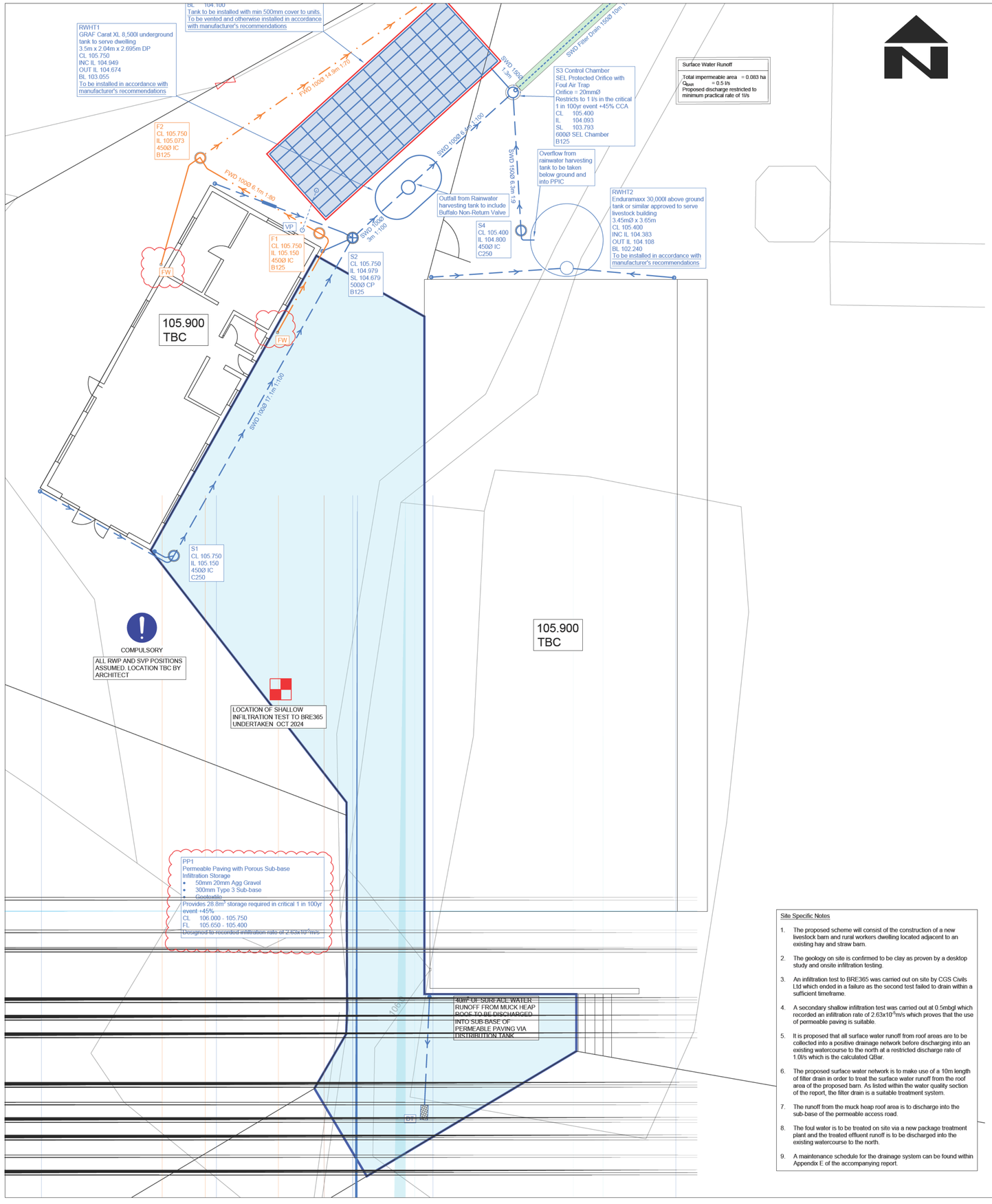
scale: 1/500th @ A4:

drawing no: 22/71/3B

date: Oct. 2022

Rural Regeneration
planning and development consultants
Robert Schiller BA (Land Econ) FBIAC
[redacted]

7.2 Appendix B – Drainage Layout



DRAINAGE LEGEND

PROPOSED FEATURES

- FWD — Foul Drainage
- SWD — Surface Water Drainage
- Rainwater pipe
- Storm water inspection chamber
- Storm water catchpit chamber
- Storm water orifice flow control chamber
- Extent of permeable paving with porous sub-base
- DT — Permavoid distribution tank
- FW — Soil stack (type TBC by architect/m&e engineer)
- Foul water access chamber (300Ø)
- Foul water inspection chamber (450Ø)
- FG — Trapped foul gully
- 00.000 — Finished floor level
- 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

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

Site Specific Notes

1. The proposed scheme will consist of the construction of a new livestock barn and rural workers dwelling located adjacent to an existing hay and straw barn.
2. The geology on site is confirmed to be clay as proven by a desktop study and onsite infiltration testing.
3. An infiltration test to BRE365 was carried out on site by CGS Civils Ltd which ended in a failure as the second test failed to drain within a sufficient timeframe.
4. A secondary shallow infiltration test was carried out at 0.5mbgl which recorded an infiltration rate of 2.63×10^{-5}m/s which proves that the use of permeable paving is suitable.
5. It is proposed that all surface water runoff from roof areas are to be collected into a positive drainage network before discharging into an existing watercourse to the north at a restricted discharge rate of 1.0l/s which is the calculated QBar.
6. The proposed surface water network is to make use of a 10m length of filter drain in order to treat the surface water runoff from the roof area of the proposed barn. As listed within the water quality section of the report, the filter drain is a suitable treatment system.
7. The runoff from the muck heap roof area is to discharge into the sub-base of the permeable access road.
8. The foul water is to be treated on site via a new package treatment plant and the treated effluent runoff is to be discharged into the existing watercourse to the north.
9. A maintenance schedule for the drainage system can be found within Appendix E of the accompanying report.

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

DE I N B E T TO THE ONFIRMATION OF:
EXTERNAL LEVEL DE I N
ORDINARY WATER O R E APPROVAL
LO ATION AND DEPTH OF EXI TIN TILITIE
ROOT PROTE TION AREA
RWP & VP PO ITION A MED – TB BY AR HITE T

FOR PLANNING ONLY

REV	DATE	DESCRIPTION	BY	CHK	APP
PL2	15.10.24	REVISED TO SUIT HDC COMMENTS	LH	CS	CS
PL1	28.08.24	REVISED TO SUIT CLIENTS COMMENTS	LH	CS	CS
P-	27.08.24	PRELIMINARY ISSUE	LH	CS	CS

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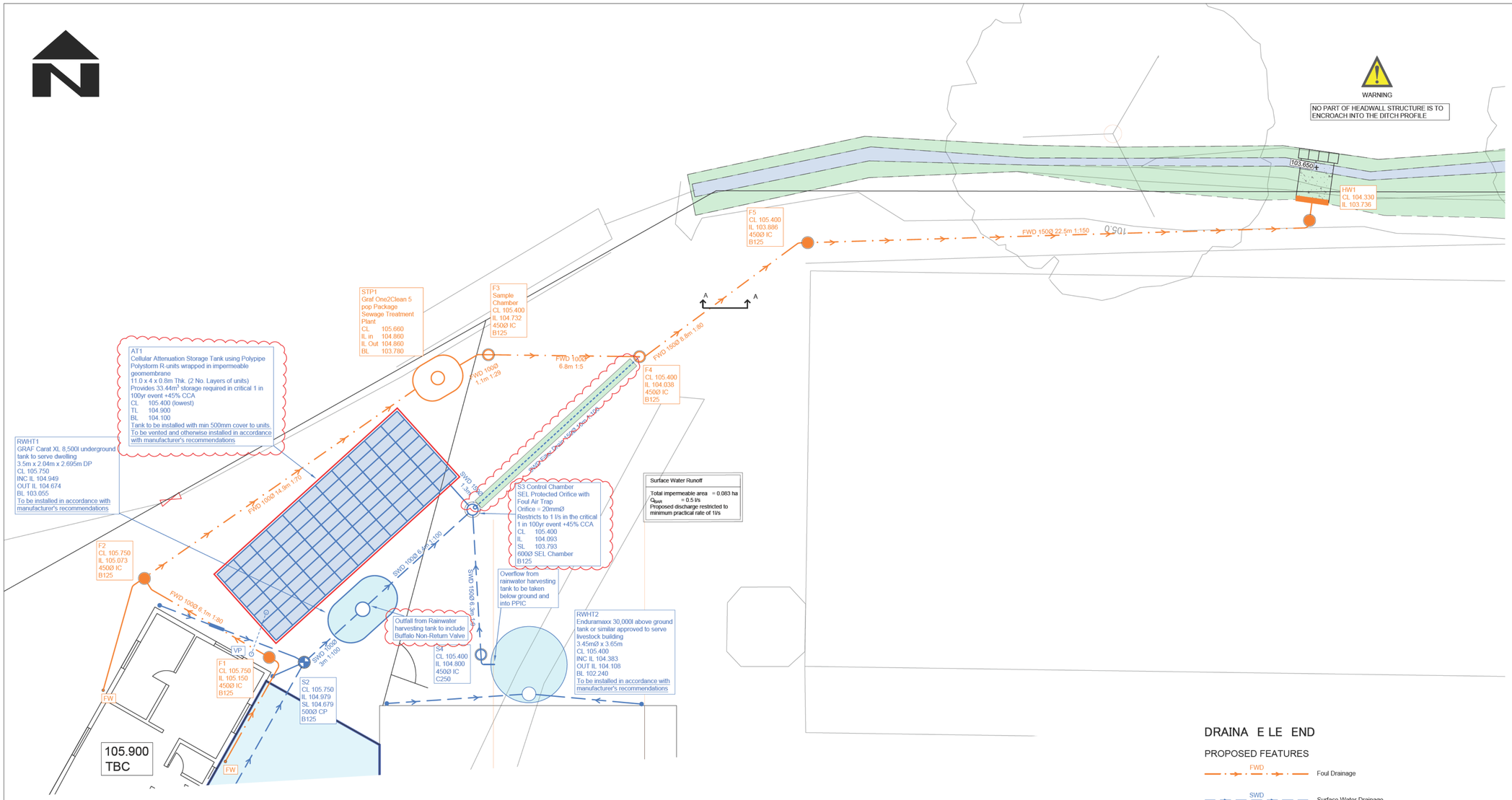
CLIENT: JACKIE ALDRICH
ARCHITECT: DAVID LIVERSIDGE DESIGNS
JOB TITLE: TOPHAM FARM RUSPER
DRAWING TITLE: DRAINAGE LAYOUT SHEET 1 OF 2

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE	SCALE @ A1
AUGUST 2024	1:100

JOB No.	STATUS	DRAWING No.	REV.
C2719	PL	101	PL2



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7. The runoff from the muck heap roof area is to discharge into the sub-base of the permeable access road.
8. The foul water is to be treated on site via a new package treatment plant and the treated effluent runoff is to be discharged into the existing watercourse to the north.
9. A maintenance schedule for the drainage system can be found within Appendix E of the accompanying report.

DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL

DESIGN SUBJECT TO THE CONFIRMATION OF:
EXTERNAL LEVELS DESIGN
ORDINARY WATERCOURSE APPROVAL
LOCATION AND DEPTH OF EXISTING UTILITIES
ROOT PROTECTION AREAS

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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

DRAINA E LE END

PROPOSED FEATURES

- FWD — Foul Drainage
- SWD — Surface Water Drainage
- Rainwater pipe
- Storm water inspection chamber
- Storm water catchpit chamber
- Storm water orifice flow control chamber
- Extent of permeable paving with porous sub-base
- DT — Permavoid distribution tank
- FW — Soil stack (type TBC by architect/m&e engineer)
- Foul water access chamber (300Ø)
- Foul water inspection chamber (450Ø)
- FG — Trapped foul gully
- 00.000 — Finished floor level
- 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

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REV	DATE	DESCRIPTION	BY	CHK	APP
PL2	15.10.24	REVISED TO SUIT HDC COMMENTS	LH	CS	CS
PL1	28.08.24	REVISED TO SUIT CLIENTS COMMENTS	LH	CS	CS
P-	27.08.24	PRELIMINARY ISSUE	LH	CS	CS

FOR PLANNING ONLY

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CLIENT: JACKIE ALDRICH

ARCHITECT: DAVID LIVERSIDGE DESIGNS

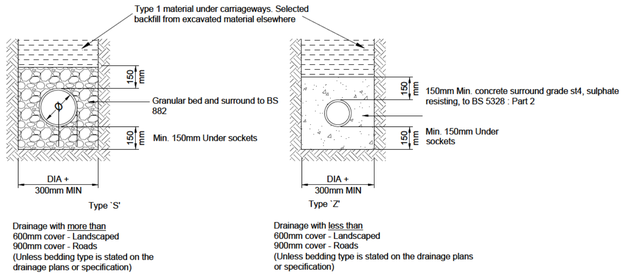
JOB TITLE: TOPHAM FARM
RUSPER

DRAWING TITLE: DRAINAGE LAYOUT
SHEET 2 OF 2

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE: AUGUST 2024 — SCALE @ A1: 1:100

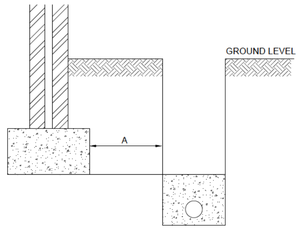
JOB No.	STATUS	DRAWING No.	REV.
C2719	PL	102	PL2



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

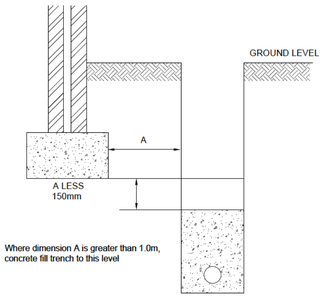
Drainage with less than
600mm cover - Landscaped
900mm cover - Roads
(Unless bedding type is stated on the drainage plans or specification)

Pipe bedding details in private Areas



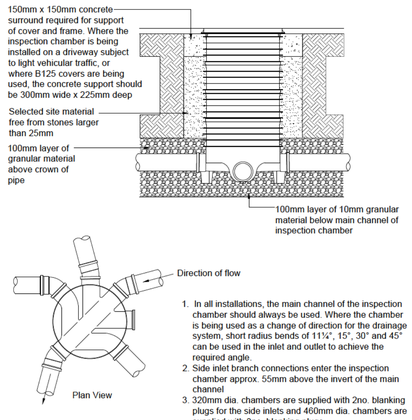
Where dimension A is less than 1.0m, concrete fill trench to level of underside of foundations.

Pipes near buildings



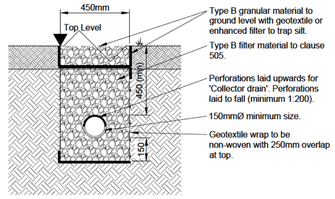
Where dimension A is greater than 1.0m, concrete fill trench to this level

Pipes near buildings



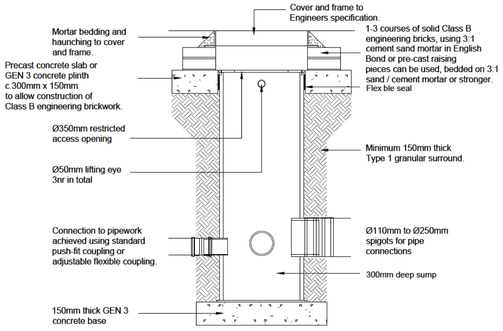
1. In all installations, the main channel of the inspection chamber should always be used. Where the chamber is being used as a change of direction for the drainage system, short radius bends of 11¼°, 15°, 30° and 45° can be used in the inlet and outlet to achieve the required angle.
2. Side inlet branch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

460mmØ INSPECTION CHAMBER DETAIL

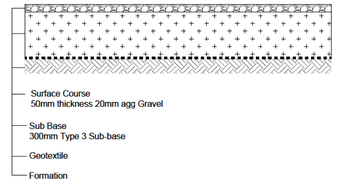


FILTER DRAIN

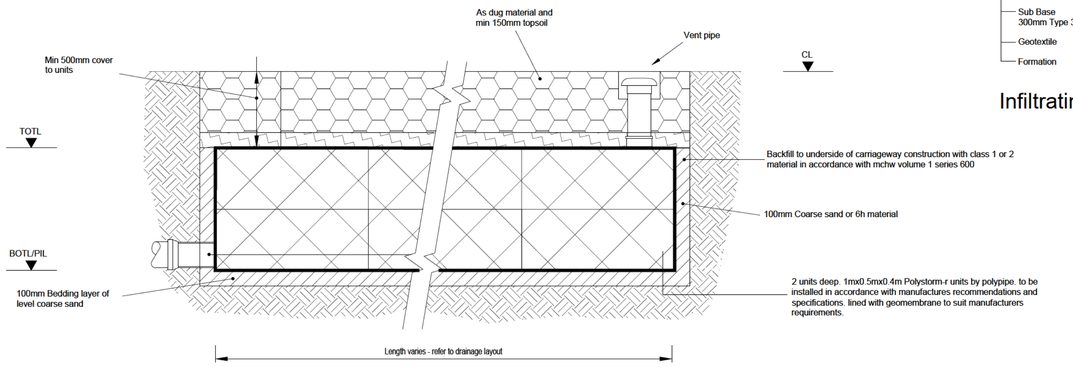
(Scale 1:20)



SEL WASP05050 500Ø Inspection Chamber



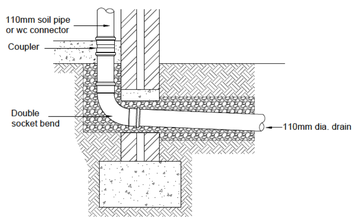
Infiltrating Gravel Car Parking area construction



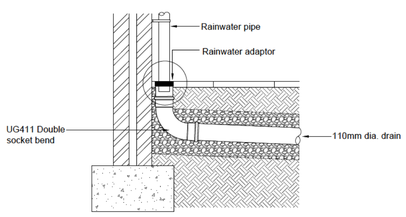
Attenuation tank using polystorm geomodular units landscaped areas only

0.8m thick

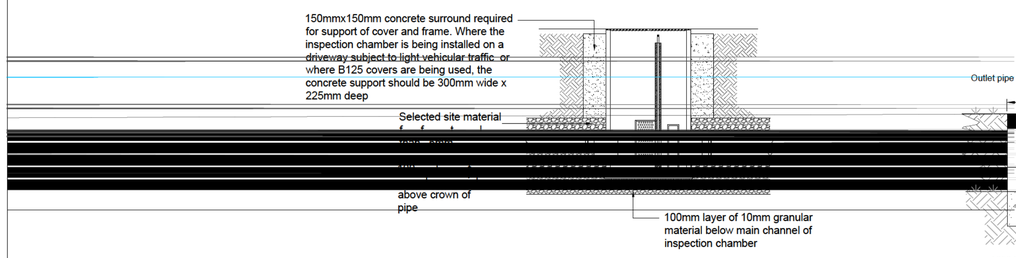
All storage tank drainage works shall be carried out in accordance with the specifications, method statements and recommendations of polypipe



Soil pipe / wc connection

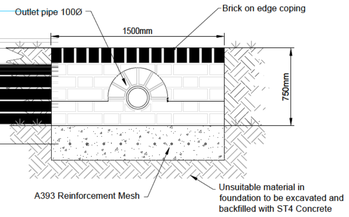


Rainwater pipe connection

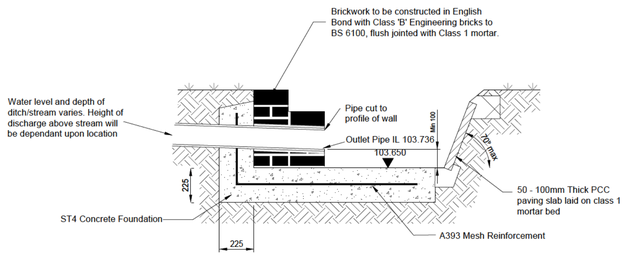


CONRAFLOW 500 WITH FOUL AIR TRAP

SEL Environmental LTD
Phone: 01254 589987
Email: sales@selenvironmental.com



ELEVATION OF HEADWALL OUTFALL TO POND / SIDE OF DITCH



HEADWALL SECTION OUTFALL TO SIDE OF DITCH

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REV	DATE	DESCRIPTION	BY	CHK	APP
PL2	31.10.24	REVISED TO SUIT COMMENTS	LH	CS	CS
PL1	15.10.24	REVISED TO SUIT DRAINAGE LAYOUT	LH	CS	CS
P-	27.08.24	PRELIMINARY ISSUE	LH	CS	CS

FOR PLANNING ONLY

CLIENT: JACKIE ALDRICH

ARCHITECT: DAVID LIVERSIDGE DESIGNS

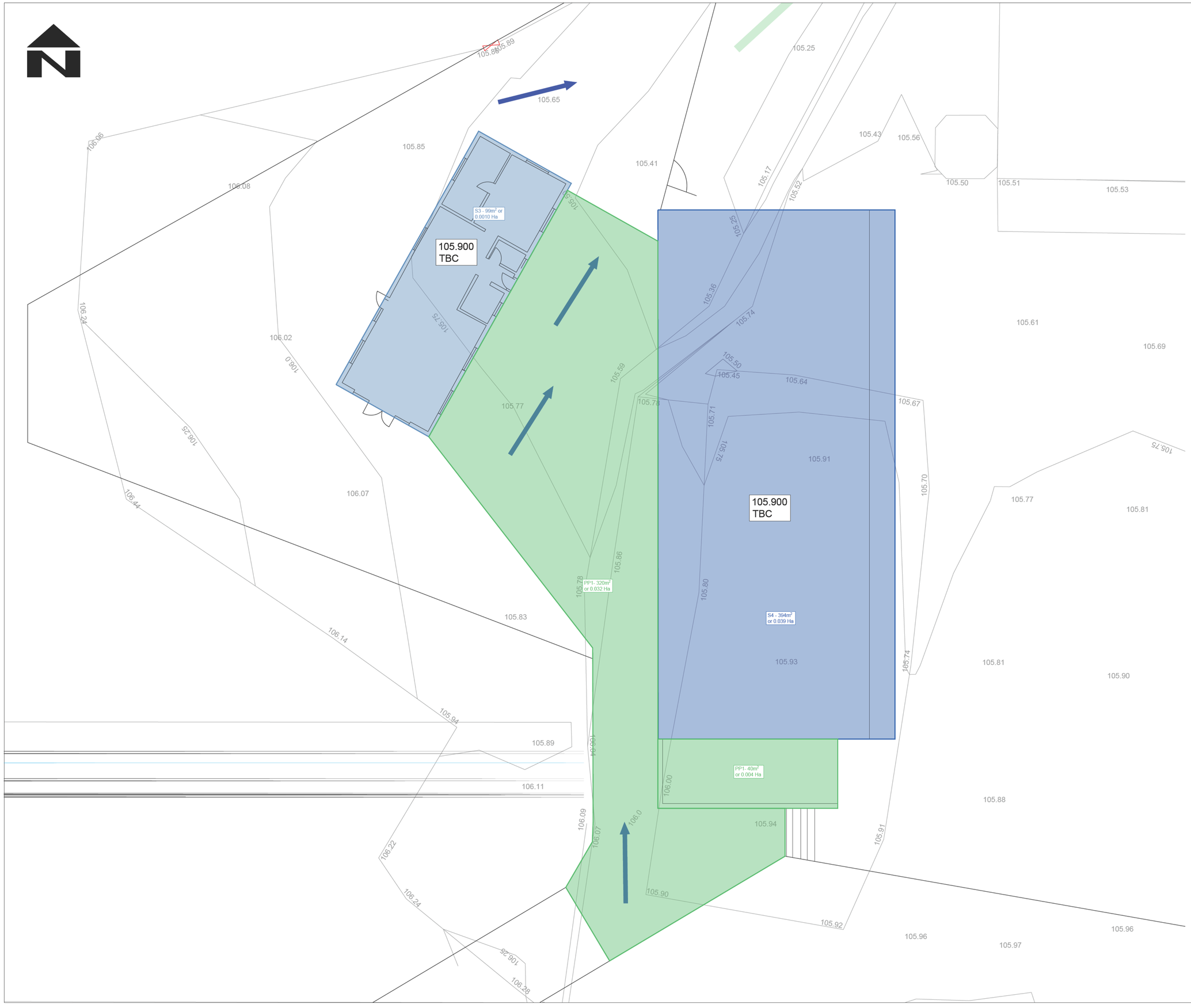
JOB TITLE: TOPHAM FARM RUSPER

DRAWING TITLE: CONSTRUCTION DETAILS

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE	SCALE @ A1
AUGUST 2024	1:20

JOB No.	STATUS	DRAWING No.	REV.
C2719	PL	301	PL2



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PL2	15.10.24	REVISED TO SUIT DRAINAGE LAYOUT	LH	CS	CS
PL1	28.08.24	REVISED TO SUIT CLIENTS COMMENTS	LH	CS	CS
P-	27.08.24	PRELIMINARY ISSUE	LH	CS	CS

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CLIENT
JACKIE ALDRICH

ARCHITECT
DAVID LIVERSIDGE DESIGNS

JOB TITLE
TOPHAM FARM
RUSPER

DRAWING TITLE
IMPERMEABLE AREAS
& OVERLAND FLOW ROUTE PLAN

DRAWN	ENGINEER	CHECKED	APPROVED
LH	C SLADE	CS	CS

DATE	SCALE @ A1
AUGUST 2024	1:100

JOB No.	STATUS	DRAWING No.	REV.
C2719	PL	401	PL2

7.3 Appendix C – Surface Water Calculations + Greenfield Runoff Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	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)	Node Type	Manhole Type	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
S3	0.010	5.00	105.400	Manhole	Adoptable	600	519544.222	135311.059	1.307
S4	0.039	5.00	105.750	Manhole	Adoptable	450	519544.222	135301.957	0.950
F4			105.400	Manhole	Adoptable	450	519548.483	135314.967	1.365
PP	0.036		105.750	Manhole	Adoptable	100	519537.629	135274.257	0.350
PP1.1		5.00	106.000	Manhole	Adoptable	100	519537.629	135270.528	0.550

Links (Input)

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.002	S3	F4	5.782	104.093	104.035	0.058	99.7	150
2.002	S4	S3	9.102	104.800	104.093	0.707	12.9	150
3.000	PP1.1	PP	3.729	105.450	105.400	0.050	74.6	100

Simulation Settings

Rainfall Methodology	FEH-22	Drain Down Time (mins)	240	30 year (l/s)	1.1
Summer CV	1.000	Additional Storage (m³/ha)	0.0	100 year (l/s)	1.5
Winter CV	1.000	Check Discharge Rate(s)	✓	Check Discharge Volume	x
Analysis Speed	Normal	1 year (l/s)	0.4		
Skip Steady State	x	2 year (l/s)	0.4		

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
2	0	0	0
10	0	0	0
20	0	0	0
30	45	0	0
100	45	0	0

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Pre-development Discharge Rate

Site Makeup	Greenfield	Growth Factor 30 year	2.40
Greenfield Method	IH124	Growth Factor 100 year	3.19
Positively Drained Area (ha)	0.083	Betterment (%)	0
SAAR (mm)	808	QBar	0.5
Soil Index	4	Q 1 year (l/s)	0.4
SPR	0.47	Q 2 year (l/s)	0.4
Region	7	Q 30 year (l/s)	1.1
Growth Factor 1 year	0.85	Q 100 year (l/s)	1.5
Growth Factor 2 year	0.88		

Node S3 Online Orifice Control

Flap Valve	x	Design Depth (m)	1.132	Discharge Coefficient	0.650
Replaces Downstream Link	✓	Design Flow (l/s)	1.0		
Invert Level (m)	104.093	Diameter (m)	0.020		

Node S3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	104.100
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	44.0	0.0	0.800	44.0	0.0	0.801	0.0	0.0

Node PP Carpark Storage Structure

Base Inf Coefficient (m/hr)	0.09468	Invert Level (m)	105.400	Slope (1:X)	1000.0
Side Inf Coefficient (m/hr)	0.09468	Time to half empty (mins)	14	Depth (m)	0.300
Safety Factor	2.0	Width (m)	10.000	Inf Depth (m)	
Porosity	0.30	Length (m)	32.000		

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Results for 2 year Critical Storm Duration. Lowest mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
600 minute summer	S3	405	104.295	0.202	1.5	8.2395	0.0000	SURCHARGED
15 minute summer	S4	9	104.838	0.038	6.9	0.0061	0.0000	OK
15 minute summer	F4	1	104.035	0.000	0.3	0.0000	0.0000	OK
30 minute summer	PP	21	105.431	0.031	5.7	1.4380	0.0000	OK
15 minute summer	PP1.1	1	105.450	0.000	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
600 minute summer	S3	Orifice	F4	0.4				12.4
15 minute summer	S4	2.002	S3	6.9	1.994	0.138	0.0530	
30 minute summer	PP	Infiltration		2.6				
15 minute summer	PP1.1	3.000	PP	0.0	0.000	0.000	0.0038	

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Results for 10 year Critical Storm Duration. Lowest mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	S3	264	104.430	0.337	3.7	13.8983	0.0000	SURCHARGED
15 minute summer	S4	10	104.853	0.053	13.4	0.0084	0.0000	OK
15 minute summer	F4	1	104.035	0.000	0.4	0.0000	0.0000	OK
30 minute summer	PP	22	105.452	0.052	11.2	3.4100	0.0000	OK
30 minute summer	PP1.1	22	105.452	0.002	0.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	S3	Orifice	F4	0.5				13.5
15 minute summer	S4	2.002	S3	13.4	2.145	0.268	0.0960	
30 minute summer	PP	Infiltration		4.2				
30 minute summer	PP1.1	3.000	PP	0.0	-0.024	-0.005	0.0076	

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Results for 20 year Critical Storm Duration. Lowest mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute summer	S3	272	104.486	0.392	4.3	16.2448	0.0000	SURCHARGED
15 minute summer	S4	10	104.858	0.058	16.0	0.0093	0.0000	OK
15 minute summer	F4	1	104.035	0.000	0.4	0.0000	0.0000	OK
30 minute summer	PP	23	105.461	0.061	13.4	4.3324	0.0000	OK
30 minute summer	PP1.1	23	105.461	0.011	0.1	0.0001	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute summer	S3	Orifice	F4	0.6				14.7
15 minute summer	S4	2.002	S3	16.0	2.184	0.320	0.1045	
30 minute summer	PP	Infiltration		4.3				
30 minute summer	PP1.1	3.000	PP	-0.1	-0.050	-0.015	0.0102	

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Results for 30 year +45% CC Critical Storm Duration. Lowest mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	S3	336	104.752	0.659	4.4	27.4400	0.0000	SURCHARGED
15 minute summer	S4	10	104.876	0.076	25.4	0.0121	0.0000	OK
15 minute summer	F4	1	104.035	0.000	0.5	0.0000	0.0000	OK
60 minute summer	PP	42	105.502	0.102	16.2	8.2232	0.0000	OK
60 minute summer	PP1.1	43	105.502	0.052	0.2	0.0004	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	S3	Orifice	F4	0.7				19.5
15 minute summer	S4	2.002	S3	25.3	2.223	0.508	0.1207	
60 minute summer	PP	Infiltration		4.3				
60 minute summer	PP1.1	3.000	PP	-0.2	-0.067	-0.026	0.0222	

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Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 99.80%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
360 minute winter	S3	328	105.165	1.072	5.4	33.7853	0.0000	FLOOD RISK
360 minute winter	S4	328	105.166	0.366	4.3	0.0581	0.0000	SURCHARGED
15 minute summer	F4	1	104.035	0.000	0.6	0.0000	0.0000	OK
60 minute summer	PP	44	105.539	0.139	20.9	11.7793	0.0000	OK
60 minute summer	PP1.1	44	105.539	0.089	0.2	0.0007	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
360 minute winter	S3	Orifice	F4	0.9				22.5
360 minute winter	S4	2.002	S3	4.3	0.828	0.086	0.1602	
60 minute summer	PP	Infiltration		4.3				
60 minute summer	PP1.1	3.000	PP	-0.2	-0.076	-0.029	0.0283	

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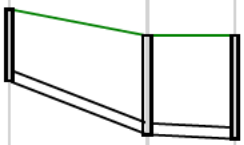
Node Name		S4	S3	F4
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) 95.000				
Link Name		2.002	1.002	
Section Type		150mm	150mm	
Slope (1:X)		12.9	99.7	
Cover Level (m)		105.750	105.400	105.400
Invert Level (m)		104.800	104.093 / 104.093	104.035
Length (m)		9.102	5.782	

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Node Name	PP1.1	PP
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) 96.000		
Link Name	3.000	
Section Type	100m	
Slope (1:X)	74.6	
Cover Level (m)	106.000	105.750
Invert Level (m)	105.450	105.400
Length (m)	3.729	

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7.4 Appendix D – Soakaway Test Calculator

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Job: Topham Farm - Test 1

Infiltration Calculator

$$f = \frac{Vp75\text{-}25}{ap50 \times tp75\text{-}25}$$

Vp 75-25	=	Effective storage volume between 75% and 25% effective depth
ap50	=	Internal surface area of the trial pit up to 50% effective depth and including the base area
tp75-25	=	The time for the water level to fall from 75% to 25% effective depth
f	=	Infilitration rate

Trial pit width	=	0.3
Trial pit depth	=	0.5
Trial pit length	=	1
ap50	=	0.95 m/squared
tp75-25	=	2400 seconds
Vp 75-25	=	0.075 m/cubed
F	=	3.29E-05

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Job: Topham Farm - Test 2

Infiltration Calculator

$$f = \frac{Vp75\text{-}25}{ap50 \times tp75\text{-}25}$$

Vp 75-25	=	Effective storage volume between 75% and 25% effective depth
ap50	=	Internal surface area of the trial pit up to 50% effective depth and including the base area
tp75-25	=	The time for the water level to fall from 75% to 25% effective depth
f	=	Infilitration rate

Trial pit width	=	0.3
Trial pit depth	=	0.5
Trial pit length	=	1
ap50	=	0.95 m/squared
tp75-25	=	2640 seconds
Vp 75-25	=	0.075 m/cubed
F	=	2.99E-05

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Job: Topham Farm - Test 3

Infiltration Calculator

$$f = \frac{Vp75\text{-}25}{ap50 \times tp75\text{-}25}$$

Vp 75-25	=	Effective storage volume between 75% and 25% effective depth
ap50	=	Internal surface area of the trial pit up to 50% effective depth and including the base area
tp75-25	=	The time for the water level to fall from 75% to 25% effective depth
f	=	Infilitration rate

Trial pit width	=	0.3
Trial pit depth	=	0.5
Trial pit length	=	1
ap50	=	0.95 m/squared
tp75-25	=	3000 seconds
Vp 75-25	=	0.075 m/cubed
F	=	2.63E-05

7.5 Appendix E – Maintenance Schedule

Consulting Civil Engineers

Maintenance Schedule

Topham Farm, Rusper Road in Horsham, West Sussex

Planning Ref: DC/23/0213

For

Jackie Aldrich

Rev - **P**

Reference **C2719**

Date **22nd August 2024**

Revision	Date of Issue	Comments	Prepared By	Checked By
P	22.08.2024	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 Topham Farm, Horsham

1.2.1 As listed above, in section 5.1.2, the SuDS features used on site will be **Attenuation Tank 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 Attenuation Tank

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

Table 21.3 Operation and maintenance requirements for attenuation storage tanks

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

1.3.2 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 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