

SuDS and Drainage Report

Willowbrook, Danworth Lane, Hurstpierpoint Hassocks BN6 9LW

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Author	Luke Honeywill	Signature	

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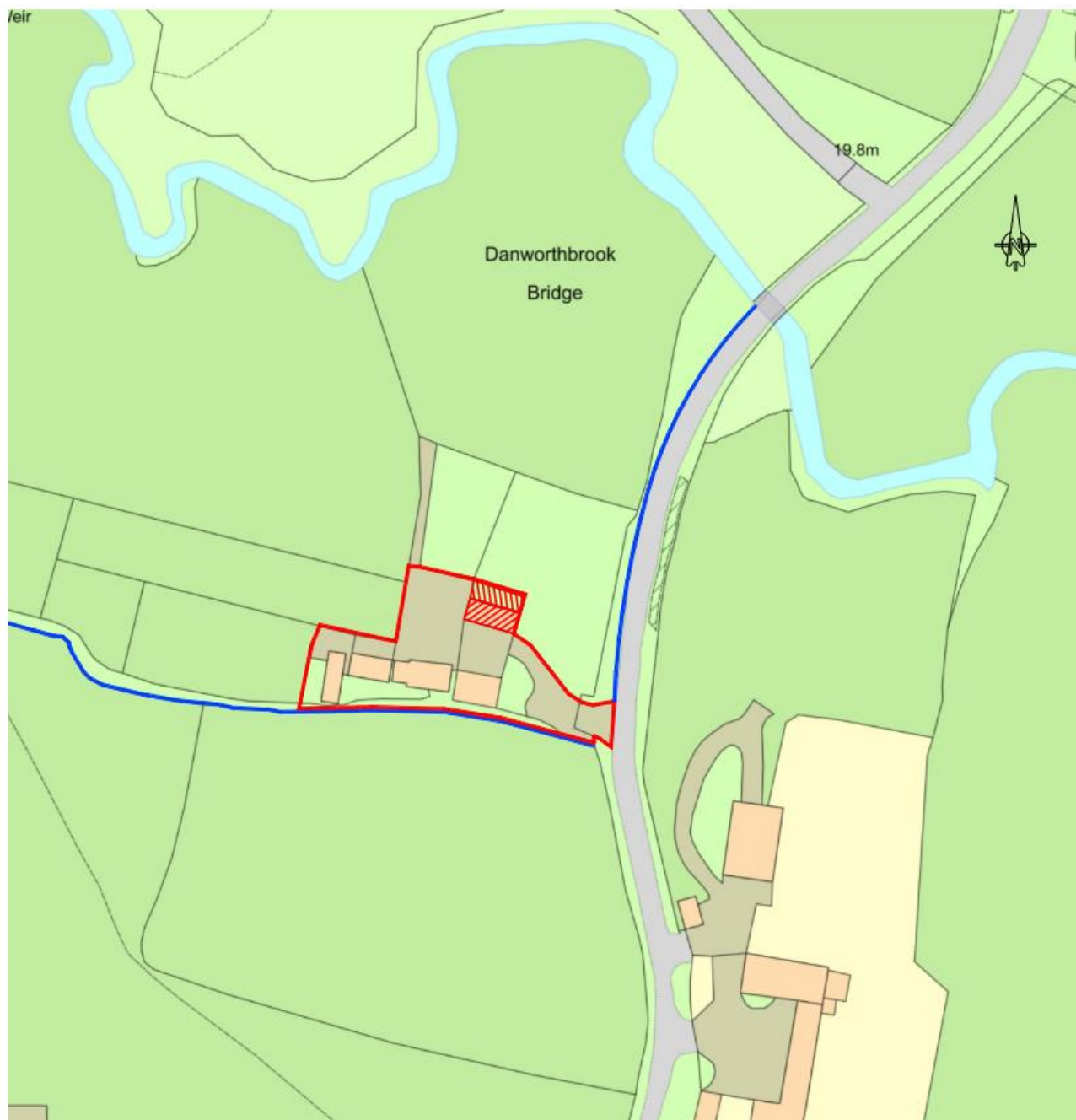
1 Introduction

- 1.1.1 CGS Civils Ltd has been appointed to undertake a drainage strategy report for a proposed development at Willowbrook in Hurstpierpoint, Hassocks.
- 1.1.2 The proposed development will consist of conversion and extension of an existing barn to form a single 1-bedroom dwelling.
- 1.1.3 The proposed development is located as OS Grid Reference TQ 28613 18431, what3words pranced.encounter.unsightly and has the post code BN6 9LW.
- 1.1.4 The purpose of this drainage strategy is to demonstrate how the development area can be satisfactorily drained without increasing flood risk on site and elsewhere.
- 1.1.5 This document has been prepared with reference to:
 - National Planning Policy Framework (NPPF)
 - DEFRA: Sustainable Drainage Systems: Non-Statutory technical standards for sustainable drainage systems
 - DEFRA: National Standards for Sustainable Drainage Systems (SuDS)
 - The SuDS Manual (C753)
 - Building Regulations Document H

2 The Site

- 2.1.1 The site is currently comprised of an agricultural storage barn on a farm within a parcel of land which encompasses 0.225 Ha or 2554m². The site is located adjacent a farmland area located to the north of Danworth Farm and will re-use an existing access into the site off Danworth Lane. A topographical survey of the site has not been conducted; however, OS Mapping confirms the site levels fall from south to north towards Herrings Stream to the north.
- 2.1.2 The proposed development will result in the conversion and extension of the existing agricultural barn to form a single 1-bedroom dwelling and will result in a total of 38m² of impermeable areas.

Fig 1. Site Location



3 Executive Summary:

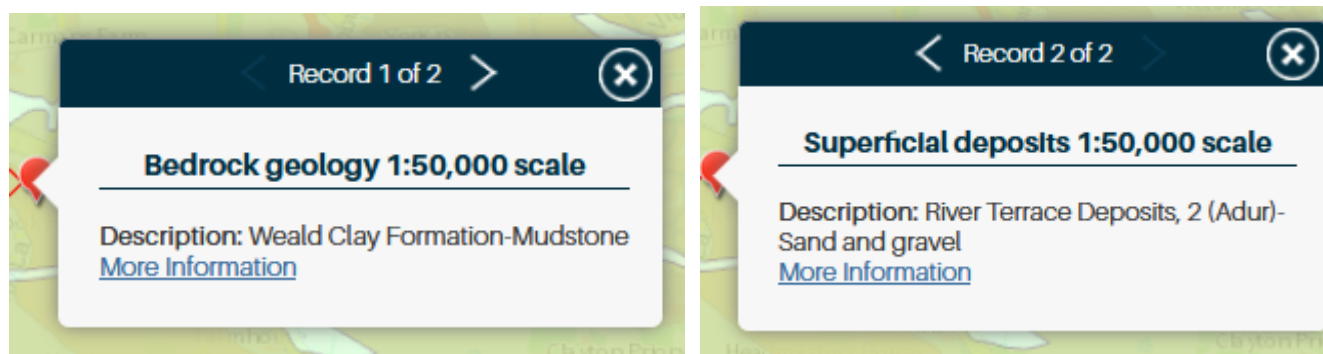
- 3.1.1 The proposed development will consist of the conversion and extension of an existing storage barn to form a single 1-bedroom dwelling.
- 3.1.2 The underlying geology is noted to be comprised of clay. Information from local boreholes indicates the presence of a clay strata and silty clay.
- 3.1.3 Infiltration testing undertaken at the site did not achieve a rate compliant with BRE365, with excavation confirming the sub-strata being comprised of clay.
- 3.1.4 Given the failure of the infiltration test, it is proposed that surface water runoff will be discharged to an existing drainage ditch located to the east of the site. The discharge rate is to be restricted to 0.5l/s, and a geocellular attenuation tank is to be included within the drainage network to cater for the 1 in 100-year storm +45% Climate change allowance and 10% urban creep.
- 3.1.5 Foul water will be managed on site via a new package treatment plant with treated effluent discharging into the existing drainage ditch alongside surface water runoff.

4 Site Geology

4.1 British Geological Survey information

- 4.1.1 Data from the British Geological Survey shows an expected bedrock geology of Weald Clay Formation which is comprised of Mudstone. Superficial deposits comprising of River Terrace Deposits are expected.
- 4.1.2 The BGS holds records of historical boreholes in the vicinity of the site which may give some insight into the underlying geology.
- Borehole TQ21NE95 (Located approx. 1.1km west of the site) – Silty Clay

Fig 2. British Geological Survey



4.2 Geological Assessment

- 4.2.1 At time of writing, a full ground investigation has not been carried out. However, an infiltration test was carried out by CGS Civils Ltd, which confirmed the underlying geology to be comprised of Clay. Testing was carried out within the trial pit, however, due to the clay soils, the infiltration test failed.

Fig 3. Infiltration Test Photographs



5 Existing Drainage

- 5.1 There is currently no known drainage infrastructure present on site. It is understood that the existing barn discharges surface water directly above ground which will then partially infiltrate as the soils allow and discharge into the existing watercourse to the east via overland flow routes.
- 5.2 The existing ditch located to the east is understood to discharge into a larger watercourse network to the north which forms part of Herring's Stream.

Fig 4. Existing Ditch



6 Proposed Drainage Strategy

6.1 SuDS Hierarchy

- 6.1.1 All options for the destination of run-off generated on site have been assessed in the following sequence, 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	Justification
Rainwater Harvesting	Yes – Rainwater harvesting has been included as part of the design.
Interception Features	Rainwater harvesting tanks and bio-retention will provide interception for the storm events.
Infiltration to ground	Onsite infiltration testing failed.
To Watercourse	Yes – Discharge to existing drainage ditch to east at restricted rate of 0.5l/s.
To Surface Water Sewer	N/A due to above
To Other Sewer	N/A due to above

6.2 Proposed Hydraulic Calculation Specifications:

Table 2. Hydraulic Calculations

Hydraulic Calculations Settings:	
Rainfall Methodology	FEH-22
Volumetric Run-off Coefficient Cv	1
CV Winter and Summer	1.0
Additional Storage (m ³ / ha)	0.0
Maximum Rainfall (mm/hr)	999
Urban Creep	10%
Storm Period and Climate Change Allowances (CCA)	1
	2
	10
	30
	100 + 45%

Table 3. Flow Control Settings

Flow Control Settings:	
Design head (m)	0.942
Discharge rate (l/s)	0.5
Discharge Coefficient	0.650
Orifice Diameter (m)	0.015

6.3 Surface Water Drainage

- 6.3.1 Due to the failure of the infiltration test that was carried out on site, it is proposed that all surface water runoff is discharged into an adjacent drainage ditch at a restricted discharge rate of 0.5l/s. Surface water runoff from roof areas are to be collected into a positive drainage network prior to being discharged into the drainage ditch. A geocellular attenuation tank is to be included within the drainage network to cater for the 1 in 100-year storm +45% CCA + 10% Urban creep.
- 6.3.2 National Standards for SuDS (NSfS) states that the discharge rate is to either be restricted to greenfield runoff rate or 3l/s/ha, whichever is greater. However, the greenfield runoff rate for the site is 0.1/s, which is not practicable and does not achieve self-cleansing velocity. It is therefore proposed that the discharge rate is increased to a minimum practical rate of 0.5l/s to achieve self-cleansing velocity and to reduce the risk of blockages within the network.
- 6.3.3 The proposed dwelling will have a rainwater harvesting tank installed which will allow for the re-use of rainwater within the gardens and external areas of the property. The plot is to also have a bio-retention planter installed to provide interception, water quality and bio-diversity benefits.
- 6.3.4 Greenfield runoff and hydraulic calculations have been carried out which can be found in **Appendix C**. Note that urban creep has been applied to roof areas only which is reflected within the impermeable area plan in **Appendix B**.

Table 3. Greenfield Runoff Calculations

Storm return period without CCA	Greenfield runoff rate (l/s)	Proposed Discharge Rate (l/s)	Difference (l/s)
Q _{BAR}	0.1	0.5	+ 0.4
1	0.1	0.5	+ 0.4
2	0.1	0.5	+ 0.4
30	0.1	0.5	+ 0.4
100	0.1	0.5	+ 0.4

7 Compliance with National SuDS Standards and Principles

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

Standard	Requirement	Project response
1	Runoff destinations	Rainwater harvesting has been included. Due to the failure of onsite infiltration testing, surface water is to discharge to a drainage ditch to the east of the site.
2	Management of everyday rainfall	Rainfall is managed close to source by rainwater harvesting and bio retention, reducing routine runoff from the site.
3	Management of extreme rainfall and flooding	Roof drainage is directed to an existing drainage ditch located to the east of the site. Any exceedance routes are directed safely away from habitable areas and towards the ditch
4	Water quality	Runoff from roofs and parking areas is treated through the SuDS management train. Bio-retention components provide pollutant mitigation in accordance with the simple index approach.
5	Amenity	The drainage strategy uses source control integrated within the site layout rather than relying solely on conventional buried drainage. Given the restrictive nature of the site, open SuDS are not considered appropriate. However, the inclusion of SuDS planters will provide amenity benefits.
6	Biodiversity	Given the small nature of the site, it will not be appropriate to utilise open SuDS however, the use of SuDS planters will provide biodiversity benefits.
7	Construction, operation, maintenance and structural integrity	The proposed SuDS components are conventional, buildable and maintainable.

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

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

Principle	Summary	Project response
1	Natural approach to managing water	Surface water is retained and managed on site at source in the form of rainwater harvesting.
2	Management train close to source	Rainwater harvesting and bioretention is utilised to reduce volume at source.
3	SuDS approach	The strategy manages runoff quantity, water quality and long-term maintenance in an integrated manner.
4	Early and integrated design	Drainage has been considered alongside site levels and layout.
5	Site layout informed by drainage	Drainage serving the dwelling has been designed to reflect on site infiltration capabilities.
6	Follow natural drainage routes	The layout allows runoff to be managed in accordance with site topography and infiltration opportunities.
7	Take account of local policy and flood evidence	The design is based on BRE 365 testing, BGS data and current national and local SuDS standards.
8	Early engagement with the authority	The report format and supporting evidence are intended to support the planning application.
9	Demonstrate compliance from concept stage	Compliance with the national standards is addressed within this planning-stage drainage strategy rather than deferred entirely to later stages.
10	Show how the standards are met in site design	The report sets out the hierarchy, testing, hydraulic basis, water quality approach in one coordinated document.
11	Consider phasing where relevant	The development is small and not expected to be phased; however, the strategy is capable of being delivered in a single coordinated phase.

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

7.2 Water Quality

- 7.2.1 A key requirement of any SuDS system is that it protects the receiving water body from the risk of pollution.
- 7.2.2 Frequent and short duration rainfall events are those that are most loaded with potential contaminants (silts, fines, heavy metals, and various organic and inorganic contaminants) Therefore the first 5-10mm of rainfall should be adequately treated with SuDS.
- 7.2.3 The SuDS Manual (CIRIA C753) describes risks posed to the receiving environment by any proposed drainage discharge.
- 7.2.4 The Manual describes risks posed by the surface water runoff to the receiving environment as a function of:
- The pollution hazard at a particular site (i.e., the pollution source)
 - The effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels
 - The sensitivity of the receiving environment
- 7.2.5 The recommended approaches for water quality risk management are given in the SuDS Manual Table 26.1.

Table 26.1, (SuDS Manual Section E) from SuDS manual. Approaches to Water Quality Risk Management

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

- 7.2.6 In accordance with the guidelines above, the Simple Index Approach will be used to determine the water quality requirements for this developments.

7.2.7 Table 26.2 (SuDS Manual Section E) provides hazard classifications that are to be applied to various land uses. The land uses relevant to this development are:

Land Use	Pollution Hazard Level	Total Suspended solids (TSS)	Metals	Hydro-Carbons
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs (Typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g., cul-de-sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g., haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

7.2.8 To deliver adequate treatment, the selected SuDS components must have a total pollution mitigation index that exceeds the pollution hazard index for each containment type.

Total SuDS mitigation index $\geq$ pollution hazard index

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

Table 26.2 Pollution hazard indices for different land use classifications				
Land Use	Pollution Hazard Level	Total Suspended solids (TSS)	Metals	Hydro-Carbons
Residential roofs	Very Low	0.2	0.2	0.05
Other roofs (Typically commercial/industrial roofs)	Low	0.3	0.2 (up to 0.8 where there is potential for metals to leach from the roof)	0.05
Individual property driveways, residential car parks, low traffic roads (e.g., cul-de-sacs, homezones and general access roads) and non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day	Low	0.5	0.4	0.4
Commercial yard and delivery areas, non-residential car parking with frequent change (e.g., hospitals, retail), all roads except low traffic roads and trunk roads/motorways	Medium	0.7	0.6	0.7
Sites with heavy pollution (e.g., haulage yards, lorry parks, highly frequented lorry approaches to industrial estates, waste sites), sites where chemicals and fuels (other than domestic fuel oil) are to be delivered, handled, stored, used or manufactured; industrial sites; trunk roads and motorways	High	0.8	0.8	0.9

7.2.9 The relevant land uses for this development are highlighted.

7.2.10 Table 26.4 (SuDS Manual Section E) provides indicative SuDS mitigation indices for proposed discharges to groundwater.

Table 26.3 Indicative SuDS mitigation indices for discharges to surface waters			
Type of SuDS Components	Mitigation Indices		
	TSS	Metals	Hydrocarbons
Filter Strip	0.4	0.4	0.5
Filter Drain	0.4	0.4	0.4
Swale	0.5	0.6	0.6
Bioretention System	0.8	0.8	0.8
Permeable Pavement	0.7	0.6	0.7
Detention Basin	0.5	0.5	0.6
Pond	0.7	0.7	0.5
Wetland	0.8	0.8	0.8
Proprietary treatment systems	These must demonstrate that they can address each of the contaminant types to acceptable levels for inflow concentrations relevant to the contributing drainage area		

Table 4: SuDS mitigation index

Table 4 Mitigation Indices						
Runoff Source	Destination of Runoff	Mitigation Index Source	Type of SuDS Component	Hazard Index (Table 26.2)		
				Total Suspended Solids (TSS)	Metals	Hydrocarbons
Residential Roofs	Surface water	Table 26.3 (for surface waters)	Bioretention System	0.2	0.2	0.05
				Mitigation Indices (Table 26.3 / Table 26.4)		
				0.8	0.8	0.8

7.2.11 This analysis has demonstrated that the SuDS components proposed for this development will adequately mitigate any pollution risks identified during the assessment.

7.3 Foul water drainage

7.3.1 The foul water is to be treated on site via a new package treatment plant which has been sized to cater for the 1-bedroom dwelling. Treated effluent runoff is to discharge into the existing drainage ditch to the east alongside the surface water runoff.

7.3.2 The proposed discharge of treated effluent 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:

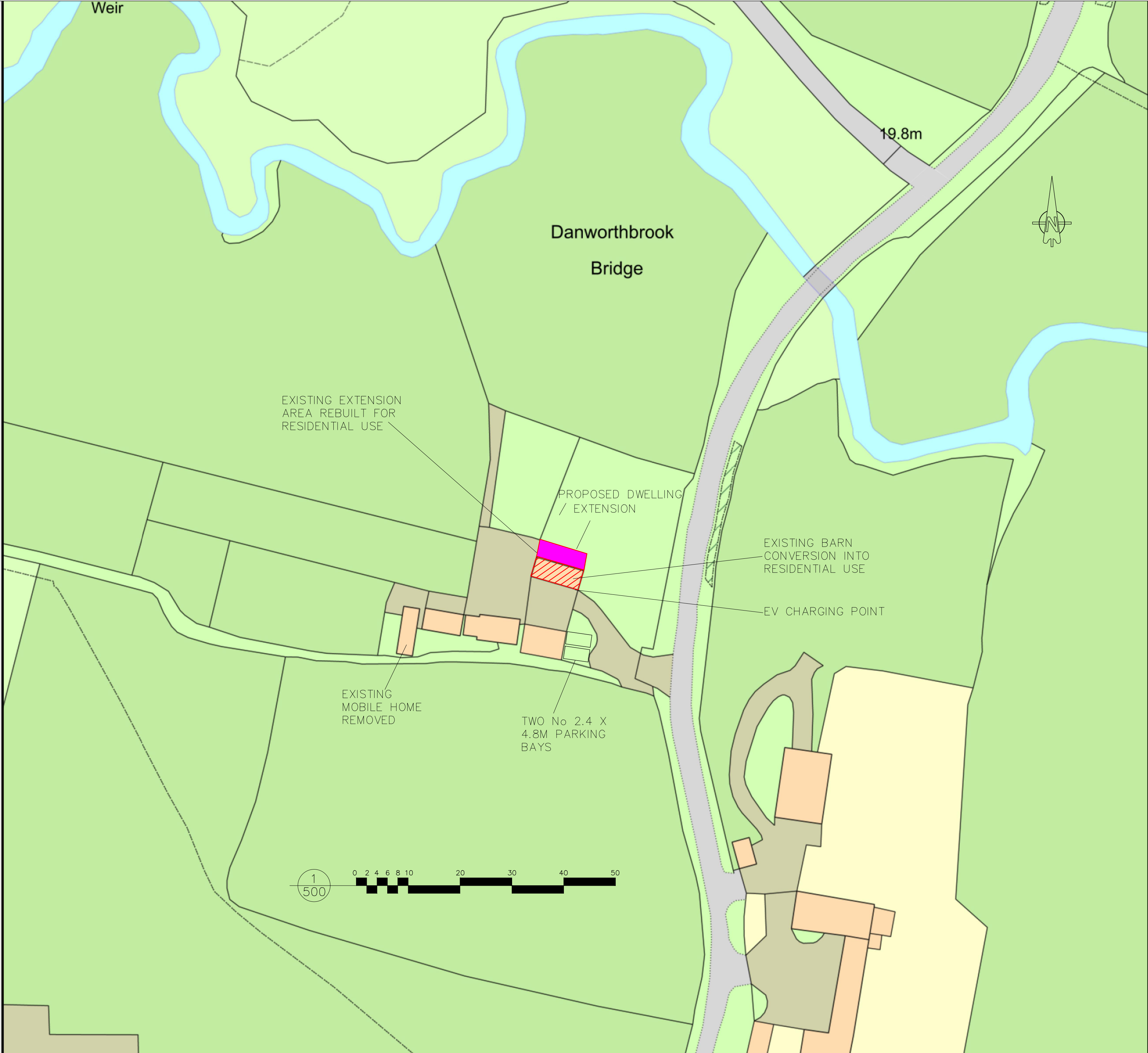
- Is less than 5m³ a day
- Utilises a sufficient treatment system
- Is not causing pollution
- Is not within 500 meters of a protected site
- Is not within 50m of any other exempt discharge

8 Summary and Conclusions

- 8.1.1 CGS Civils has been instructed to produce a Drainage statement under National Planning Policy Framework (NPPF) to support the Planning Application for the conversion and extension of an existing storage barn to form a 1-bedroom dwelling.
- 8.1.2 The Surface Water will discharge to the existing drainage ditch located to the east of the site at a restricted discharge rate of 0.5l/s. The proposed drainage network has been designed to cater for the 1 in 100-year +45% CCA + 10% Urban creep.
- 8.1.3 The Foul water is to be treated on site via a new package treatment plant prior to the discharge of treated effluent runoff into the existing drainage ditch to the east of the site alongside the surface water runoff.
- 8.1.4 This report demonstrates that the foul and surface water drainage measures proposed for this development are suitable and will adequately mitigate the risks identified.

9 Appendices

9.1 Appendix A – Site Plan



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C	RED LINE UPDATED	23/6/25	JP	
D	GENERAL REVISIONS	2/4/26	JP	
E	GENERAL REVISIONS	7/4/26	JP	
F	GENERAL REVISIONS	15/6/26	JP	
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FOR
MR. & MRS. OCKENDEN

SITE
Willow Brook, Danworth Lane,
Hurstpierpoint, BN6 9LW

TITLE

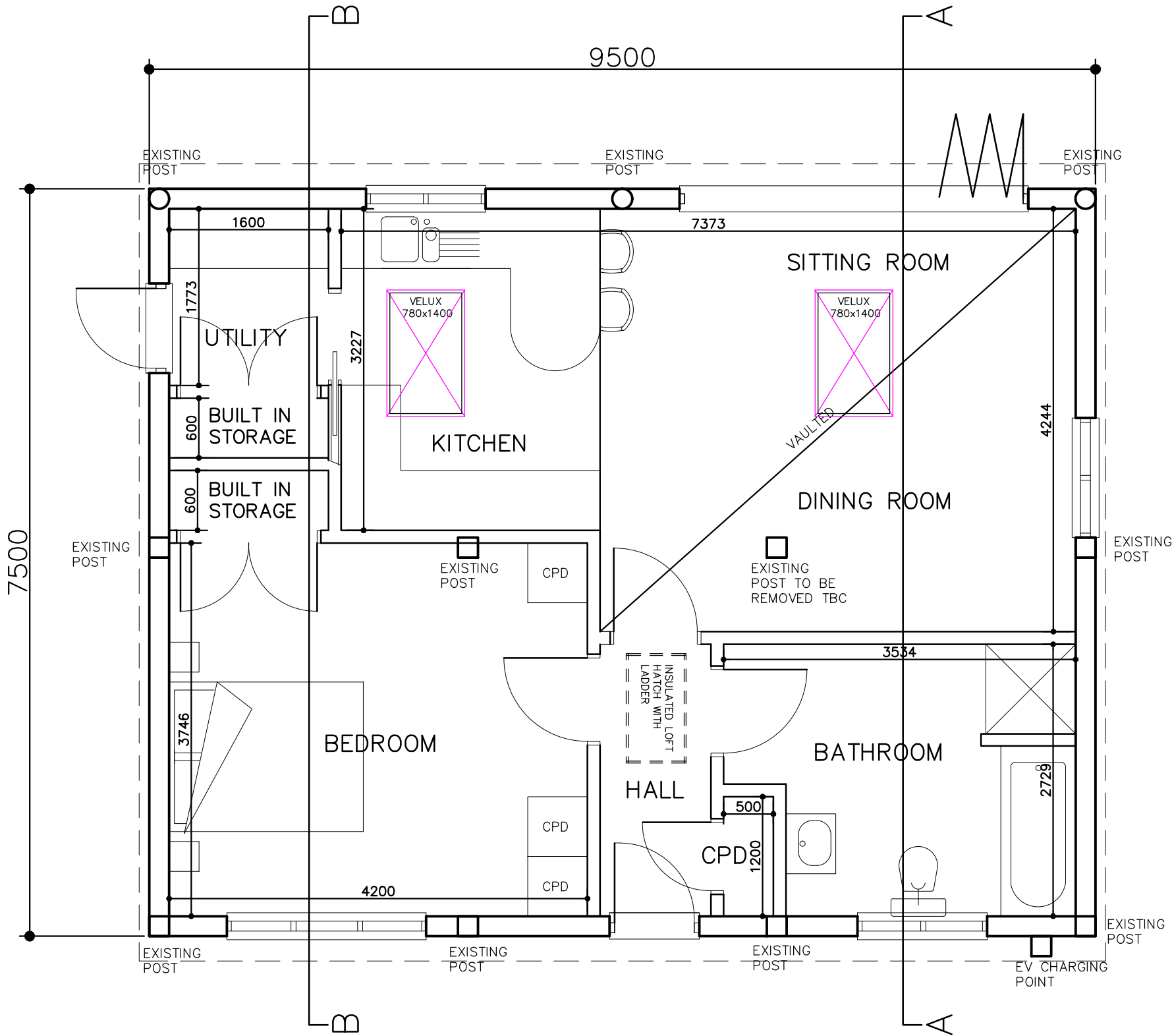
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BLOCK PLAN**

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DATE 10/22	REV G	

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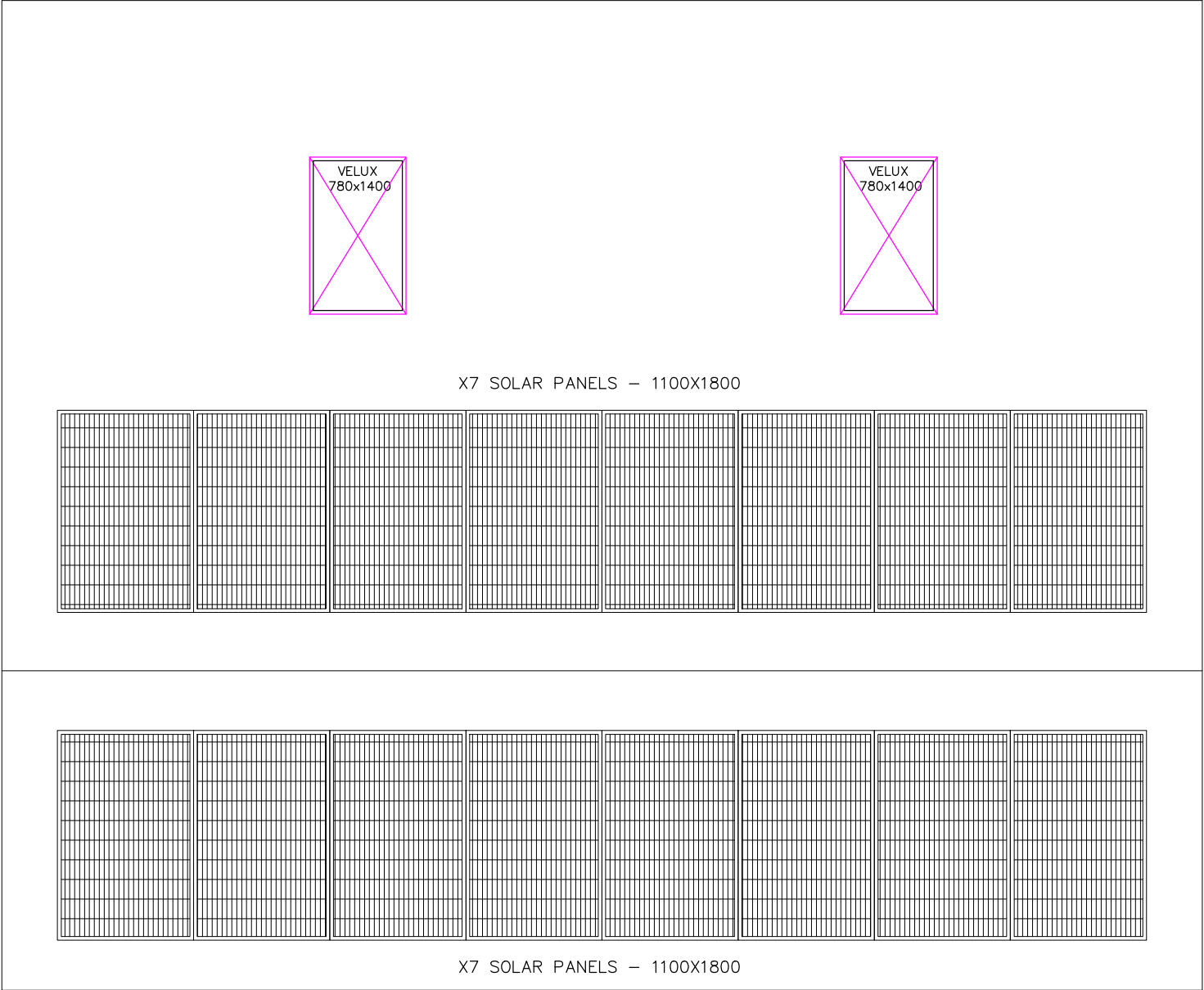
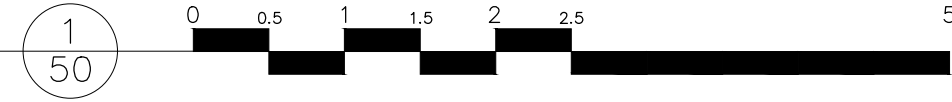
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C	GENERAL REVISIONS	15/6/26	JP	
D	GENERAL REVISIONS	23/6/26	JP	



GROUND FLOOR PLAN

EXTERNAL AREA: 71.2 M²
INTERNAL AREA: 59 M² –
INCLUDING 1.92 M² BUILT IN
STORAGE TO MEET MIN SPACE
STANDARDS OF 1.5 M²



ROOF PLAN



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FOR
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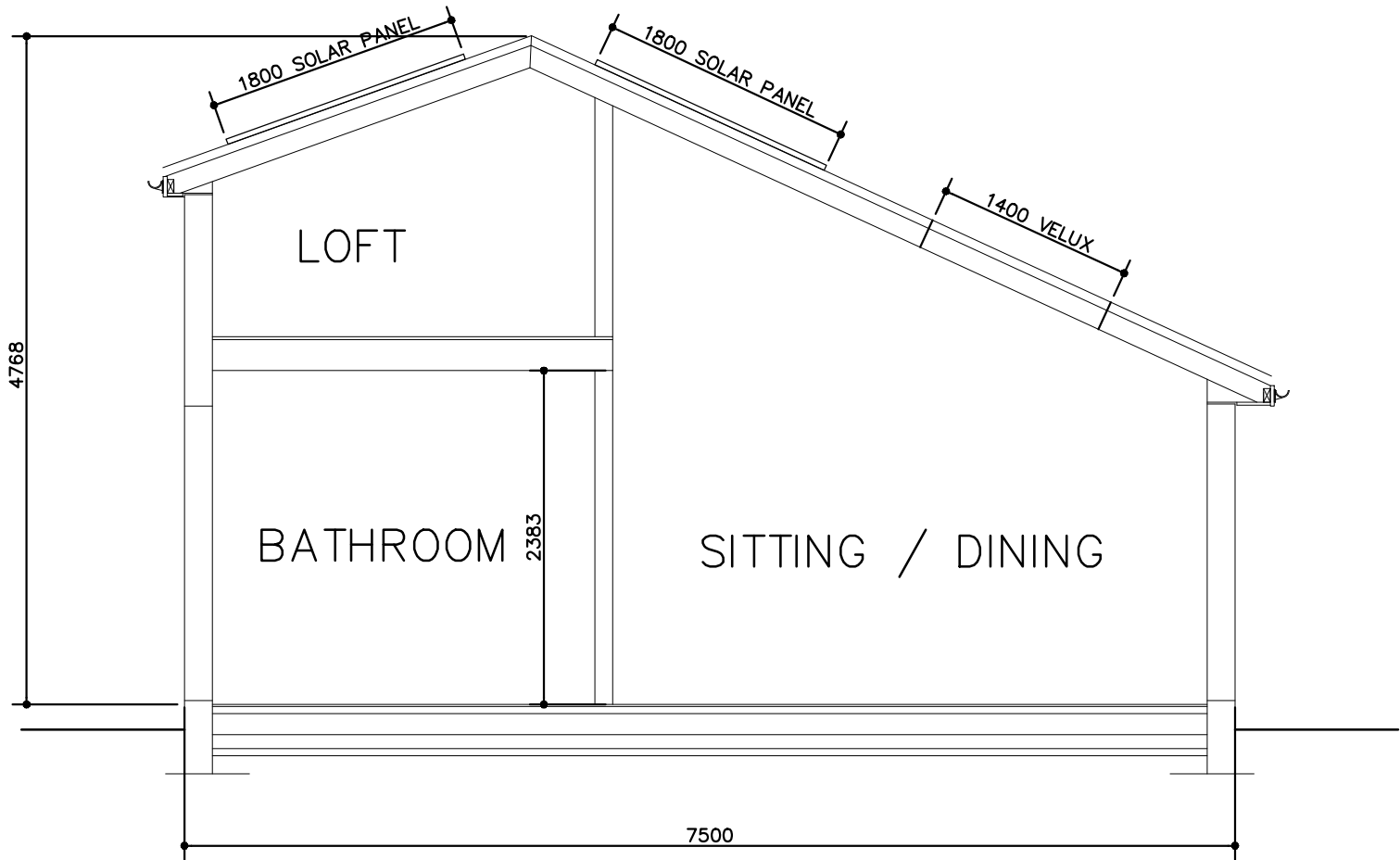
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GROUND FLOOR AND
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DATE 9/22	REV D	

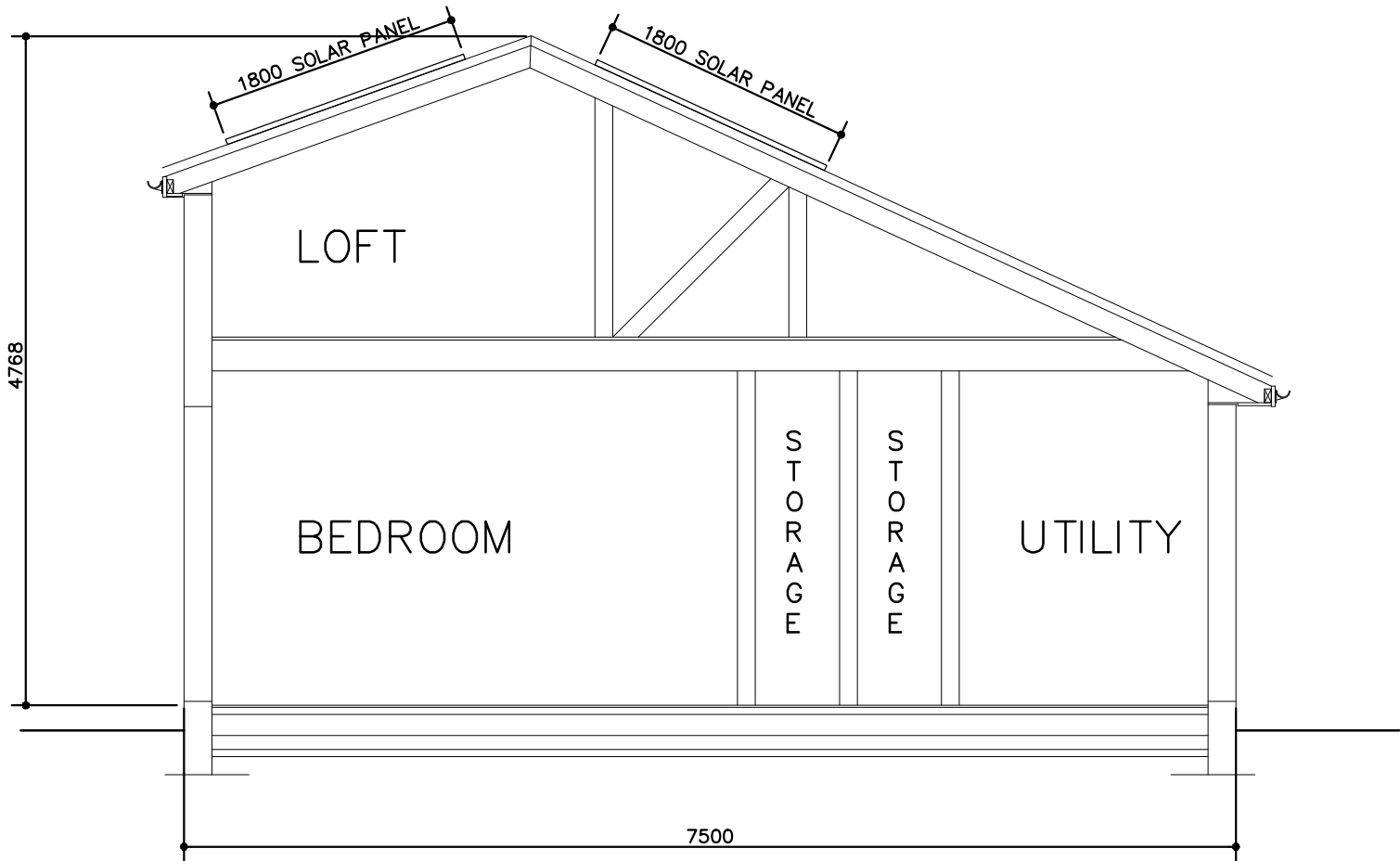
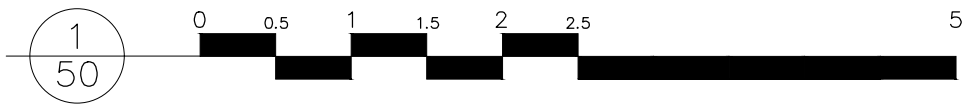
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C	GENERAL REVISIONS	12/6/26	JP	
D	GENERAL REVISIONS	15/6/26	JP	
E	GENERAL REVISIONS	23/6/26	JP	



SECTION A–A



SECTION B–B



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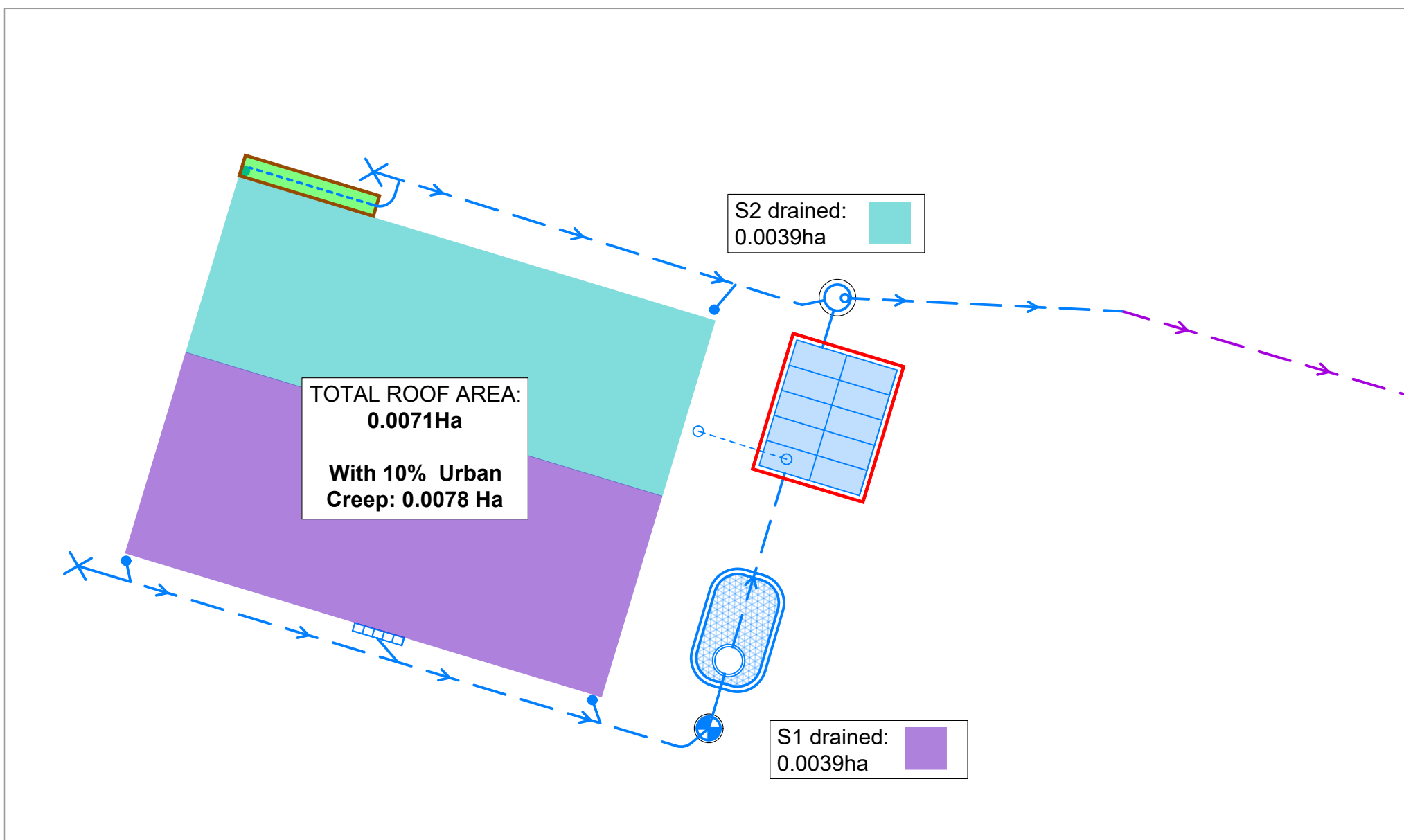
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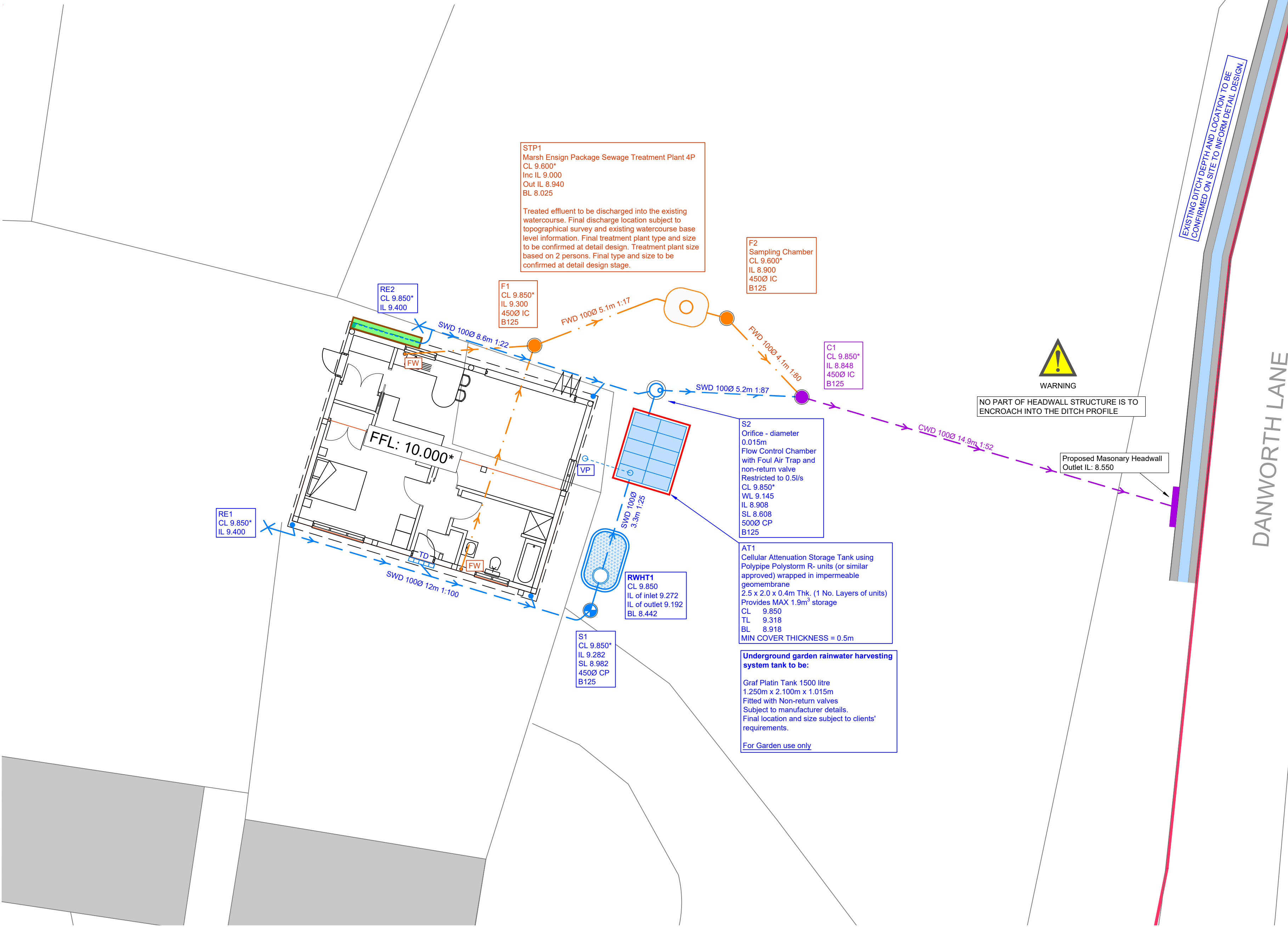
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**PROPOSED DWELLING
OUTLINE SECTION**

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DATE 9/22	REV E	

9.2 **Appendix B – Drainage Layout**



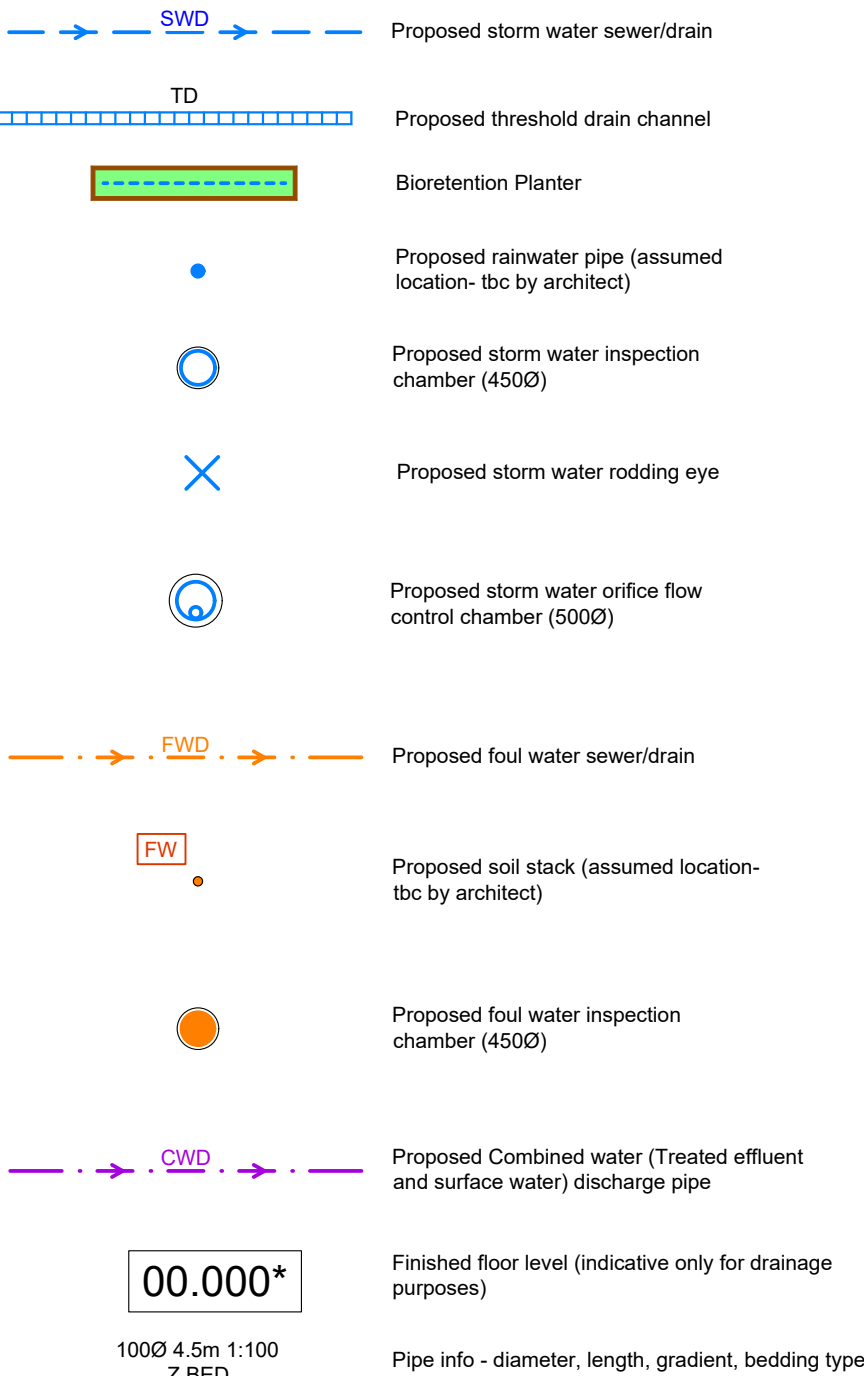
CONTRIBUTING DRAINAGE AREA PLAN (scale 1:100)



PROPOSED DRAINAGE STRATEGY (scale 1:100)

DRAINAGE LEGEND (1:100)

PROPOSED FEATURES



ABBREVIATIONS

- MH - MANHOLE
- IC - INSPECTION CHAMBER
- AC - ACCESS CHAMBER
- CP - CATCHPIT
- BC - BRAKE CHAMBER
- RE - RODDING EYE
- IL - INVERT LEVEL
- SL - SUMP LEVEL
- CL - COVER LEVEL

Site Boundary
(as taken from 'Location Plan' Plan Ref no. TOROM21221141340686, dated: 09 August 2021)

Site Specific Notes

- The proposed development will consist of the conversion of an existing storage barn to form a single 1-bedroom dwelling.
- The underlying geology is noted to be comprised of clay. Information from local boreholes indicates the presence of a clay strata and silty clay.
- Infiltration testing undertaken at the site did not achieve a rate compliant with BRE365, with excavation confirming the sub-strata being comprised of clay.
- Given the failure of the infiltration test, it is proposed that surface water runoff will be discharged to an existing drainage ditch located to the east of the site. The discharge rate is to be restricted to 0.5/s, and a geocellular attenuation tank is to be included within the drainage network to cater for the 1 in 100-year storm +45% Climate change allowance and 10% urban creep.
- Foul water will be managed on site via a new package treatment plant with treated effluent discharging into the existing drainage ditch alongside surface water runoff.

STANDARD DRAINAGE NOTES

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

- 'A15' IN ALL LANDSCAPED AREAS AND ON FOOTPATHS
- 'B125' IN ALL DRIVEWAYS
- 'C250' IN PRIVATE PARKING AREAS
- 'D400' IN CARRIAGEWAY/ACCESS ROAD

Prefix to drawing numbers shall signify the following-

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

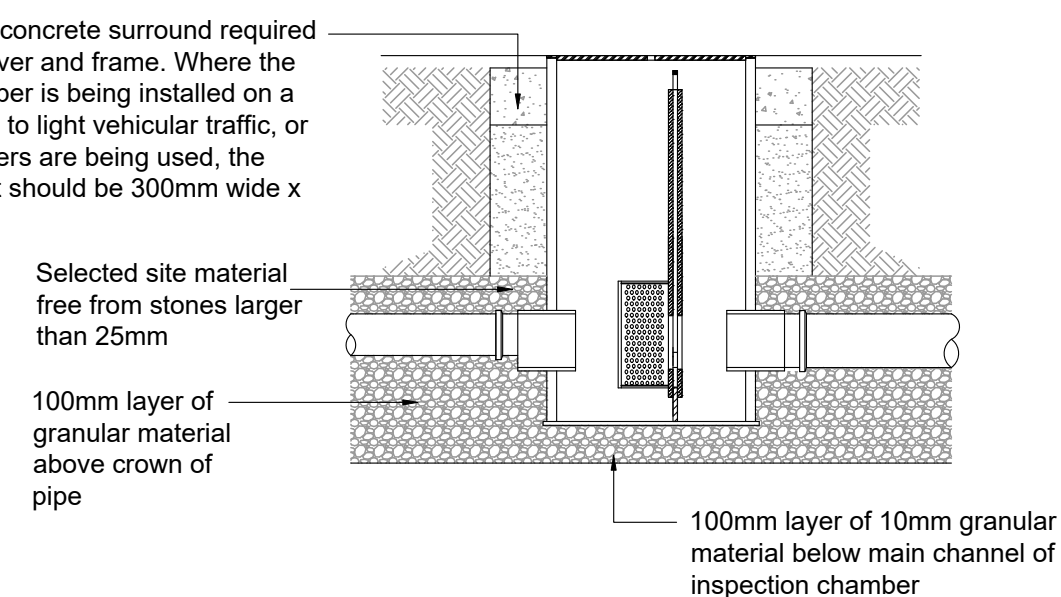
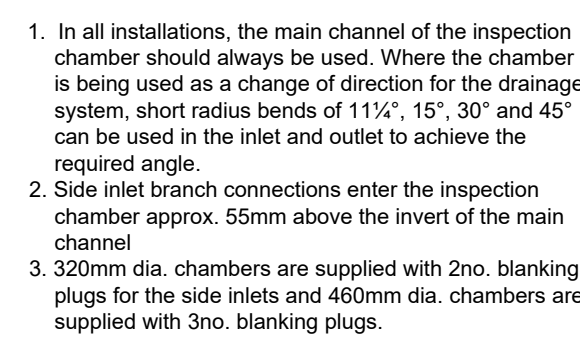
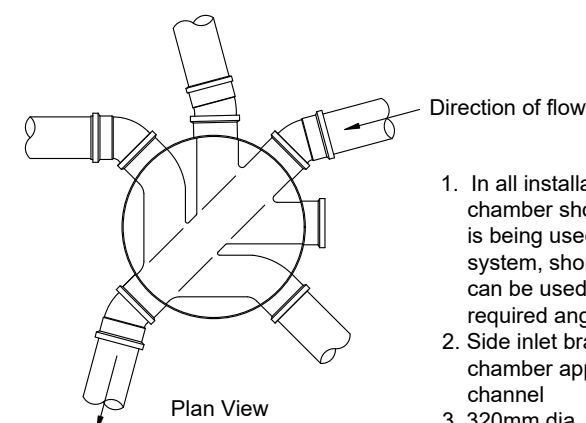
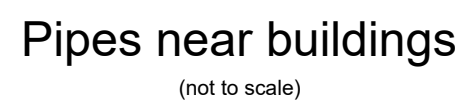
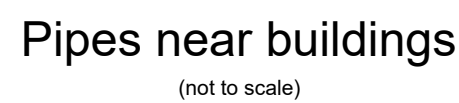
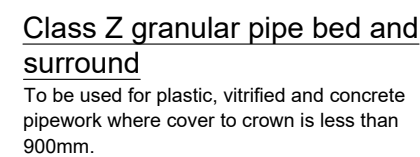
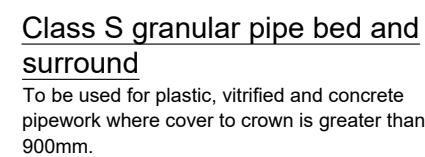
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2	02.10.26	REVISED TO LATEST NSIS	LH	CS	CS
PL1	02.12.22	UPDATED TO DRAINAGE CALCULATIONS	TZ	TZ	CS
PL	01.12.22	PRELIMINARY ISSUE	MR	TZ	CS
REV	DATE	DESCRIPTION	BY	CHK	APP

 Consulting Civil Engineers				
CLIENT MR & MRS OCKENDEN				
ARCHITECT SCANDIA HUS				
JOB TITLE WILLOWBROOK, HASSOCKS BN6, 9LW				
DRAWING TITLE PROPOSED DRAINAGE STRATEGY & CONTRIBUTING AREA PLAN				
DRAWN MR	ENGINEER TZ	CHECKED TZ	APPROVED CS	
DATE NOVEMBER 2022		SCALE @ A1 1:100		
JOB No. C2394	STATUS P	DRAWING No. 100		REV. 3

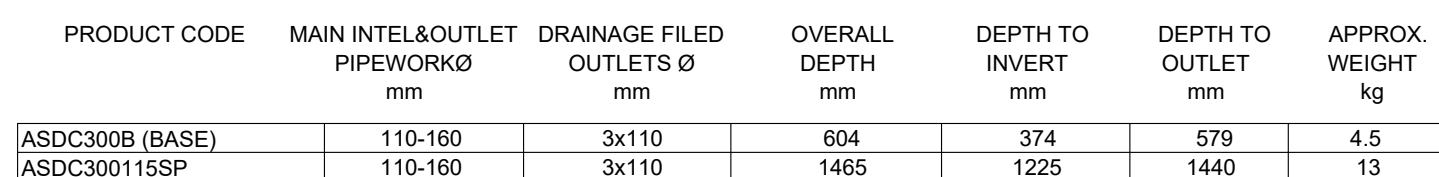
FOR PLANNING ONLY

DESIGN SUBJECT TO THE APPROVAL OF:
PLANNING AUTHORITY
BUILDING CONTROL

DESIGN SUBJECT TO THE CONFIRMATION OF:
EXTERNAL LEVELS DESIGN BY OTHERS
ORDINARY WATERCOURSE APPROVAL
LOCATION AND DEPTH OF EXISTING UTILITIES
ROOT PROTECTION AREAS
SITE LEVELS VIA TOPOGRAPHICAL SURVEY



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

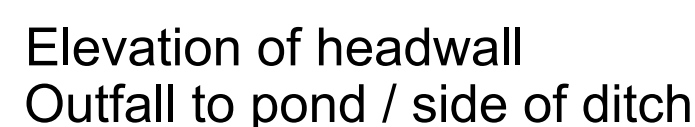


Typical Sampling & Distribution chamber
detail by Turtle Enviro
(constructed to manufacturer specification)

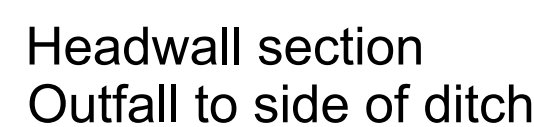


0.4m thick

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



(scale 1:20)



(scale 1:20)

Prefixed to drawing numbers shall signify the following:-	
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2	09.10.26	REVISED TO INCLUDE ATTENUATION TANK	LH	CS	CS
1	02.10.26	REVISED TO INCLUDE BIORETENTION PLANTER	LH	CS	CS
PL	01.12.22	PRELIMINARY ISSUE	MR	TZ	CS
REV	DATE	DESCRIPTION	BY	CHK	APP



CLIENT MR & MRS OCKENDEN

ARCHITECT SCANDIA HUS

WILLOWBROOK, HASSOCKS
BN6, 9LW

DRAWING TITLE

PROPOSED
TYPICAL CONSTRUCTION DETAILS

DRAWN	ENGINEER	CHECKED	APPROVED
MR	TZ	TZ	CS
DATE	SCALE @ A1		
NOVEMBER 2022	AS SHOWN		
JOB No.	STATUS	DRAWING No.	REV.
C2394	P	200	2

FOR PLANNING ONLY

9.3 **Appendix C – Surface Water Calculations**

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	2	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	0.200
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	4.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	999.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Node Type	Manhole Type	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
RE1		4.00	9.850	Manhole	Adoptable	150	6.182	6.644	0.450	9.400
S1	0.004	4.00	9.850	Manhole	Adoptable	450	17.684	3.867	0.568	9.282
RE2		4.00	9.850	Manhole	Adoptable	150	11.708	14.295	0.450	9.400
Outfall			9.000	Manhole	Adoptable	150	40.477	7.835	0.450	8.550
S3	0.004	4.00	9.850	Manhole	Adoptable	500	20.579	11.885	0.942	8.908

Links (Input)

Name	US Node	DS Node	Length (m)	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)
1.000	RE1	S1	11.832	9.400	9.282	0.118	100.0	100
2.000	RE2	S3	9.193	9.400	8.908	0.492	18.7	100
1.001	S1	S3	4.864	9.282	8.908	0.374	13.0	100
1.002	S3	Outfall	20.306	8.908	8.550	0.358	56.7	100

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	MH Type	Connections	Link	IL (m)	Dia (mm)	Link Type
RE1	6.182	6.644	9.850	0.450	150	Adoptable					
							0	1.000	9.400	100	Circular
S1	17.684	3.867	9.850	0.568	450	Adoptable					
							1	1.000	9.282	100	Circular
							0	1.001	9.282	100	Circular
RE2	11.708	14.295	9.850	0.450	150	Adoptable					
							0	2.000	9.400	100	Circular
Outfall	40.477	7.835	9.000	0.450	150	Adoptable					
							1	1.002	8.550	100	Circular
S3	20.579	11.885	9.850	0.942	500	Adoptable					
							1	2.000	8.908	100	Circular
							2	1.001	8.908	100	Circular
							0	1.002	8.908	100	Circular

Simulation Settings

Rainfall Methodology	FEH-22	Skip Steady State	x	1 year (l/s)	0.0
Rainfall Events	Singular	Drain Down Time (mins)	240	10 year (l/s)	0.1
Summer CV	1.000	Additional Storage (m³/ha)	0.0	30 year (l/s)	0.1
Winter CV	1.000	Starting Level (m)		100 year (l/s)	0.1
Analysis Speed	Normal	Check Discharge Rate(s)	✓	Check Discharge Volume	x

Storm Durations

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

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)	Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
1		0	0	30	0	0	0
10		0	0	100	45	0	0

Pre-development Discharge Rate

Site Makeup	Greenfield	QBar/QMed conversion factor	1.111	QBar	0.0
Greenfield Method	FEH	Growth Factor 1 year	0.85	Q 1 year (l/s)	0.0
Positively Drained Area (ha)	0.004	Growth Factor 10 year	1.45	Q 10 year (l/s)	0.1
SAAR (mm)	912	Growth Factor 30 year	1.95	Q 30 year (l/s)	0.1
Host	1	Growth Factor 100 year	2.48	Q 100 year (l/s)	0.1
BFIHost	0.360	Betterment (%)	0		
Region	1	QMed	0.0		

Node S3 Online Orifice Control

Flap Valve	x	Design Depth (m)	0.942	Discharge Coefficient	0.650
Replaces Downstream Link	✓	Design Flow (l/s)	0.5		
Invert Level (m)	8.900	Diameter (m)	0.015		

Node S3 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	8.908
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	68

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	5.0	5.0	0.400	5.0	8.2	0.401	0.0	8.2

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	1	9.400	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S1	10	9.295	0.013	0.6	0.0021	0.0000	OK
15 minute summer	RE2	1	9.400	0.000	0.0	0.0000	0.0000	OK
15 minute summer	Outfall	1	8.550	0.000	0.1	0.0000	0.0000	OK
240 minute summer	S3	156	9.019	0.111	0.4	0.5525	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 summer	RE1	1.000	S1	0.0	0.000	0.000	0.0035	
15 minute summer	S1	1.001	S3	0.6	0.728	0.035	0.0141	
15 minute summer	RE2	2.000	S3	0.0	0.000	0.000	0.0260	
240 minute summer	S3	Orifice	Outfall	0.2				1.2

Results for 10 year Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	1	9.400	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S1	10	9.303	0.021	1.6	0.0033	0.0000	OK
15 minute summer	RE2	1	9.400	0.000	0.0	0.0000	0.0000	OK
15 minute summer	Outfall	1	8.550	0.000	0.2	0.0000	0.0000	OK
180 minute summer	S3	120	9.223	0.315	1.0	1.5588	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 summer	RE1	1.000	S1	0.0	0.000	0.000	0.0070	
15 minute summer	S1	1.001	S3	1.6	0.786	0.095	0.0219	
15 minute summer	RE2	2.000	S3	0.0	0.000	0.000	0.0360	
180 minute summer	S3	Orifice	Outfall	0.3				3.2

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

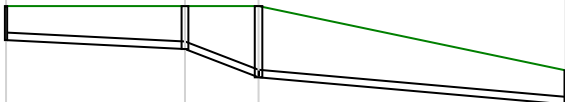
Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	RE1	1	9.400	0.000	0.0	0.0000	0.0000	OK
15 minute summer	S1	10	9.306	0.024	2.1	0.0038	0.0000	OK
15 minute summer	RE2	1	9.400	0.000	0.0	0.0000	0.0000	OK
15 minute summer	Outfall	1	8.550	0.000	0.3	0.0000	0.0000	OK
180 minute summer	S3	120	9.301	0.393	1.4	1.9485	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 summer	RE1	1.000	S1	0.0	0.000	0.000	0.0085	
15 minute summer	S1	1.001	S3	2.1	0.785	0.124	0.0225	
15 minute summer	RE2	2.000	S3	0.0	0.000	0.000	0.0360	
180 minute summer	S3	Orifice	Outfall	0.3				4.1

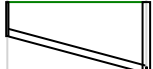
Results for 100 year +45% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
120 minute summer	RE1	90	9.833	0.433	1.1	0.0078	0.0000	FLOOD RISK
120 minute summer	S1	90	9.833	0.551	1.6	0.0877	0.0000	FLOOD RISK
120 minute summer	RE2	90	9.833	0.433	1.1	0.0078	0.0000	FLOOD RISK
15 minute summer	Outfall	1	8.550	0.000	0.4	0.0000	0.0000	OK
120 minute summer	S3	90	9.833	0.925	2.9	2.0862	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)
120 minute summer	RE1	1.000	S1	-1.1	-0.204	-0.186	0.0926	
120 minute summer	S1	1.001	S3	1.4	0.581	0.083	0.0381	
120 minute summer	RE2	2.000	S3	-1.1	-0.203	-0.080	0.0719	
120 minute summer	S3	Orifice	Outfall	0.5				6.0



Node Name	RE1	S1	S3	Outfall
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -1.000				
	Link Name	1.000	1.001	1.002
	Section Type	100mm	100mm	100mm
	Slope (1:X)	100.0	13.0	56.7
	Cover Level (m)	9.850	9.850	9.850
	Invert Level (m)	9.400	9.282	8.550
	Length (m)	11.832	4.864	20.306

Node Name	RE2	S3
A4 drawing Hor Scale 500 Ver Scale 100 Datum (m) -1.000		
Link Name	2.000	
Section Type	100mm	
Slope (1:X)	18.7	
Cover Level (m)	9.850	9.850
Invert Level (m)	9.400	8.908
Length (m)	9.193	

