

Drainage Strategy

Chicklade Services



794-ENV-EM-HYD-23905

V1

10 April 2026



TETRA TECH

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Prepared by	Prepared for
Tetra Tech	InstaVolt Ltd

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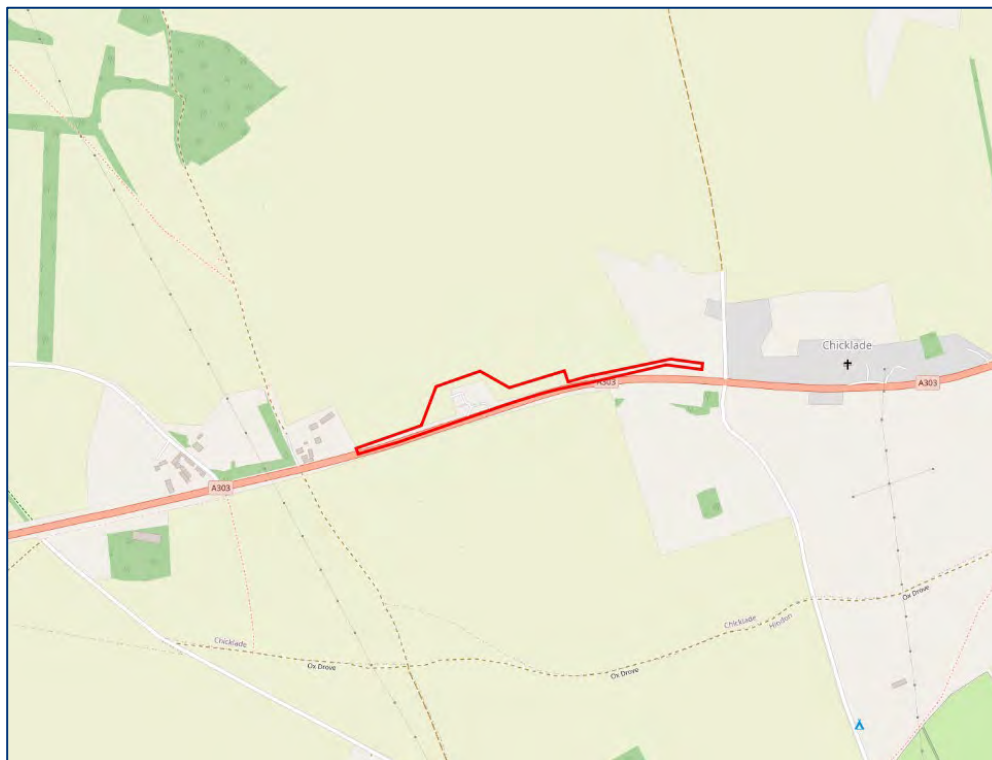
1.0 Introduction

- 1.1 Tetra Tech was commissioned to prepare a Surface Water Drainage Strategy to discharge conditions for a proposed Battery Energy Storage System (BESS), which is part of a wider redevelopment of Chicklade Services located off A303, Chicklade, SP3 5ST.
- 1.2 This drainage strategy has been prepared to address an objection dated 2nd March 2026 from the Environment Agency (EA), relating to discharge of Condition 17 of planning application PL/2022/06298.
- 1.3 This report has been prepared in accordance with guidance detailed in the National standards for sustainable drainage systems (SuDS), CIRIA SuDS manual (C753) and National Fire Chiefs Council (NFCC) Grid Scale Battery Energy Storage System planning – Guidance for fire and rescue services.
- 1.4 The proposed drainage strategy incorporates sustainable drainage techniques that mimic natural drainage, reduce flood risk, and improve water quality.
- 1.5 Details of the drainage strategy are provided to demonstrate that surface water arising from the development may be sustainably managed such that it does not pose a flood risk, either to proposed or existing development.

2.0 Site Details

Site Description

- 2.1 The site is located at National Grid Reference ST 90476 34461, is irregular in shape and occupies an area of approximately 2.22 hectares (ha). The site location is presented in Figure 1.



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Figure 1. Location Plan

- 2.2 The site is brownfield land, occupied by a service station. The southern boundary of the site follows the alignment of the A303. Agricultural land is located to the north of the site, whilst existing residential development is located to the east and west.

Proposed Development

- 2.3 Development proposals comprise the demolition of the existing service station and the erection of a new service station comprising electric vehicle charging points, shop, restaurant/café, toilets and associated infrastructure, parking and landscaping. The site layout is provided in Appendix A for reference.
- 2.4 This report focusses on the BESS infrastructure associated with the electric vehicle charging stations.

3.0 Drainage Strategy

Introduction

- 3.1 This section of the report provides details of the proposed surface water drainage strategy for the site. The aim of including this strategy is so that it can easily be seen that the Proposed Development will not adversely affect the surface water regime in the area and that overall the current situation will be improved.
- 3.2 Generally, this type of development is considered to have a design life of 40 years. A conservative approach has been taken and the upper end allowances for the 2070s epoch for both the 1% and 3.3% annual exceedance probability events will be assessed. The proposed site is located within the Avon Hampshire Management Catchment. Therefore 45% has been added to all attenuation / runoff calculations for the development to account for climate change.

Existing Drainage

- 3.3 No public sewers are located within the site or within close proximity. As illustrated on the utility survey in Appendix B, existing drainage is present on site, serving the existing service station. Existing surface water sewers convey runoff to soakaways, whilst foul water is conveyed to a sewerage treatment plant. It is understood that all existing drainage will be removed and replaced by a new drainage system post development.

Proposed Surface Water Drainage

Consideration of Drainage Hierarchy

- 3.4 The National standards for SuDS (2025) advises of the following hierarchy for the disposal of surface water;
- 3.5 Runoff from the development shall be discharged to the following final destinations, to the maximum extent practicable, in accordance with the below hierarchy:
- priority 1: collected for non-potable use
 - priority 2: infiltrated to ground
 - priority 3: discharged to an above ground surface water body
 - priority 4: discharged to a surface water sewer, or another piped surface water drainage system
 - priority 5: discharged to a combined sewer

Note 1: priority 1 is the highest priority and priority 5 is the lowest.

The drainage hierarchy has been considered as follows.

Priority 1 – Collected for non-potable use

- 3.6 Due to the nature of the development proposals, BESS units and substation, there is no scope to incorporate rainwater harvesting.

Priority 2 – Infiltrated to ground

- 3.7 Soakaway testing was undertaken at the site in accordance with BRE365, during a Phase II Site Investigation by ground&water in November 2025. An extract from the report is provided in Appendix C. The use of soakaways is feasible and the worst calculated infiltration rate from the 3 tests at TP01 has been used within the surface water calculations of 3.76×10^{-5} .

Priority 3 – Discharged to a Surface Water Body

- 3.8 Surface water will be discharged by infiltration, discharge to a surface water body has not been considered.

Priority 4 – Discharged to a Surface Water Sewer

- 3.9 Surface water will be discharged by infiltration, discharge to a surface water sewer has not been considered.

Priority 5 – Discharged to a Combined Sewer

- 3.10 Surface water will be discharged by infiltration, discharge to a combined sewer has not been considered.

Drainage Strategy

- 3.11 The Conceptual Drainage Strategy showing proposals based upon a discharge to a soakaway, are provided within Appendix D. The drainage strategy has been designed based upon the following parameters;
- Site Area = 2.224ha
 - BESS Impermeable Area = 0.031ha
 - Infiltration rate = 0.13536m/hr
 - Required storage volume for the 1 in 100 year + 45% for climate change event = 26.5m³
- 3.12 The BESS compound will be underlain by a lined 300mm gravel sub base, surface water will be collected by a perforated pipe located around the perimeter and conveyed to geocellular attenuation crates and a soakaway.
- 3.13 Surface water storage will be provided within geocellular crates, which provide a storage volume of 180.5m³ and a soakaway which provides a storage volume of 26.6m³. The 300mm gravel sub base will provide additional storage for exceedance events, providing 28.4m³ of storage. The total storage volume provided is 235.5m³. This includes 180m³ storage for firewater in the event of a fire at the BESS units, firewater management and its containment are discussed further in the following section.
- 3.14 Surface water calculations are provided in Appendix E for reference, demonstrating that the proposed drainage network can accommodate flows up to the 1 in 100 year +45% climate change storm event.
- 3.15 Standard 2 of the National standards for SuDS, 'management of everyday rainfall (interception)' requires the first 5mm of rainfall for the majority of rainfall events to not result in runoff from the site. As the site will be infiltrating using soakaways we are automatically compliant with this standard.

- 3.16 It should be noted that both the Drainage Strategy indicated within Appendix D, and supporting calculations within Appendix E, are preliminary, and as such, subject to approval by the relevant authorities. However, the designs illustrate that surface water and firewater arising from the development may be sustainably managed such that it does not pose a flood risk, either to proposed or existing development, up and including the 1:100+45% climate change storm event.

Firewater Management

- 3.17 In order to manage the risk associated with a highly unlikely fire event, the development will include both a provision for the supply of fire water via water reservoirs and/or hydrants, in addition, containment of fire water used to suppress any fire.
- 3.18 In accordance with NFCC Guidance¹, an external fire hydrant or water supply should be in close proximity to the BESS containers. The water supply should be able to provide a minimum flow rate of 25l/s for at least 120 minutes (2 hours). Therefore, the total minimum required containment volume is 180m³.
- 3.19 In the unlikely event of a fire, the unit on fire will be left to burn out, in accordance with general guidance for Battery units, whilst water will be focussed on the adjacent battery units to ensure the fire is contained. As a consequence, the runoff generated is less likely to pose a contamination risk. Runoff used to cool the units will be initially intercepted and contained within the gravel sub base and geocellular crates. This will allow a compartmentalised approach to the containment of water in the event of a fire. A mechanical penstock will be installed downstream of the geocellular crates to allow containment of potentially contaminated water for testing prior to either tanking offsite if contaminated or alternatively discharged in accordance with the approved drainage strategy via the soakaway. The gravel sub base will be lined to prevent the seepage of potentially contaminated fire water to infiltrate to groundwater, in an uncontrolled manner.

Site Specific SuDS Benefits

- 3.20 Sustainable drainage is a departure from the traditional approach to draining sites. There are some key principles that influence the planning and design process enabling SuDS to mimic natural drainage by:
- storing run-off and releasing it slowly (attenuation);
 - allowing water to soak into the ground (infiltration);
 - slowly transporting (conveying) water on the surface;
 - filtering out pollutants;
 - allowing sediments to settle out by controlling the flow of water.
- 3.21 CIRIA has produced several guidance documents covering a range of water management scenarios. A summary of the publications used as reference when the site drainage strategy was produced are listed below.

¹ [Grid scale energy storage system planning - Guidance for fire and rescue services - NFCC](#)

- Planning for SUDS – making it happen (C687)
- Site handbook for the construction of SUDS (C698)
- The SuDS Manual 2015 (C753)
- Sustainable Drainage Systems – Hydraulic, structural and water quality advice (C609)
- National standards for SuDS

Gravel sub base

- 3.22 It is proposed to include a gravel subbase under the BESS compound. The subbase will be lined to prevent the seepage of groundwater into the bases and more importantly, avoid the potential contamination of groundwater in the event of a fire. The gravel will filter out suspended sediments in the surface water.

Interceptor

- 3.23 A petrol/silt interceptor device is proposed downstream of the geocellular crates, which will provide an additional stage of surface water treatment prior to discharge into the watercourse. The interceptor will filter out pollutants and suspended sediments that may not have been removed by the gravel subbase.

Water Quality

- 3.24 Surface water run-off should be managed by SuDS that are designed to attenuate flows and to avoid water quality impacts downstream. To demonstrate that surface water arising from the development will be appropriately treated prior to discharge, the Simple Index Approach, as outlined within the SuDS Manual (CIRIA C753) has been followed.
- 3.25 As stated in the SuDS Manual 2015 (C753), the risk posed by surface water runoff to the receiving environment is a function of:
- the pollution hazard at a particular site (i.e. the pollutant source)
 - the effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels, groundwater (i.e. the pollutant pathway)
 - the sensitivity of the receiving environment (i.e. the environmental receptor).
- 3.26 During normal operation the development will have a low pollutant hazard level as per the SuDS Manual (CIRIA C753) Table 26.2, with identified pollutant hazard indices of 0.5 for Total Suspended Solids (TSS), 0.4 for Metals, and 0.4 for Liquid Hydrocarbons.
- 3.27 In the unlikely event of a fire or pollution event, the penstock would be closed to prevent any contaminated runoff from reaching the outfall. Any contaminated runoff would be tested and taken offsite.
- 3.28 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). In systems using two components or more in series a factor of 0.5 is used to account for the reduced performance of secondary components associated with already reduced inflow concentrations.

- 3.29 Table 1 provides the mitigation indices for the major SuDS components proposed for the site. This confirms that in line with the Simple Index Approach, sufficient surface water treatment is provided in advance of discharge from the site.

Table 1. Mitigation Indices

	TSS	Metals	Hydrocarbons
Pollution hazard indices	0.5	0.4	0.4
Component 1 – Gravel subbase	0.4	0.4	0.4
Component 2 – Interceptor device	(0.8*0.5 factor) 0.4	(0.6*0.5 factor) 0.3	(0.9*0.5 factor) 0.45
Total Mitigation Score	(0.4+0.4) 0.8	(0.4+0.3) 0.7	(0.4+0.45) 0.85

Maintenance and Adoption

- 3.30 The SuDS features will be managed and maintained by a specialist management company. This company will be identified at the detailed design stage and appointed to maintain the SuDS features for the lifetime of the development.
- 3.31 Tables 2 to 5, below, indicate the envisaged maintenance activities associated with the gravel sub base, geocellular crates, interceptor device, geocellular crates and soakaway, along with the approximate frequency within which they should be completed.
- 3.32 During detailed design this should be developed into a formal inspection and maintenance programme to ensure the optimum operation of the surface water drainage network is maintained for the lifetime of the development. Additional tasks or varied maintenance frequency may be instructed by the maintenance company to suit requirements. This will prevent the increased risk of flooding both on and off site in accordance with the National Planning Policy Framework (NPPF).

Table 2. Gravel Subbase Suggested Maintenance Schedule

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Remove litter (including leaf litter) and debris from gravel surface, access chambers and pre-treatment devices	Monthly (or as required)

	Inspect gravel surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional Maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

Table 3. Petrol/Silt Interceptor Suggested Maintenance Schedule

Maintenance schedule	Require Action	Typical Frequency
Routine Maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial Actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

Table 4. Soakaway Suggested Maintenance Schedule

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Inspect for sediment and debris in pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	Annually
	Cleaning of gutters and any filters on downpipes	Annually (or as required based on inspections)
	Trimming any roots that may be causing blockages	Annually (or as required)
Occasional Maintenance	Remove sediment and debris from pre-treatment components and floor of inspection tube or chamber and inside of concrete manhole rings	As required, based on inspections
Remedial Actions	Reconstruct soakaway and/or replace or clean void fill, if performance deteriorates or failure occurs	As required
	Replacement of clogged geotextile (will require reconstruction of soakaway)	As required
Monitoring	Inspect silt traps and note rate of sediment accumulation	Monthly in the first year and then annually
	Check soakaway to ensure emptying is occurring	Annually

Table 5. Soakaway Suggested Maintenance Schedule

Maintenance schedule	Require 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 pre-treatment structures and/or internal forebays	Annually, or as required
Remedial Actions	Repair/rehabilitate inlets, outlet, overflows and vents	As required

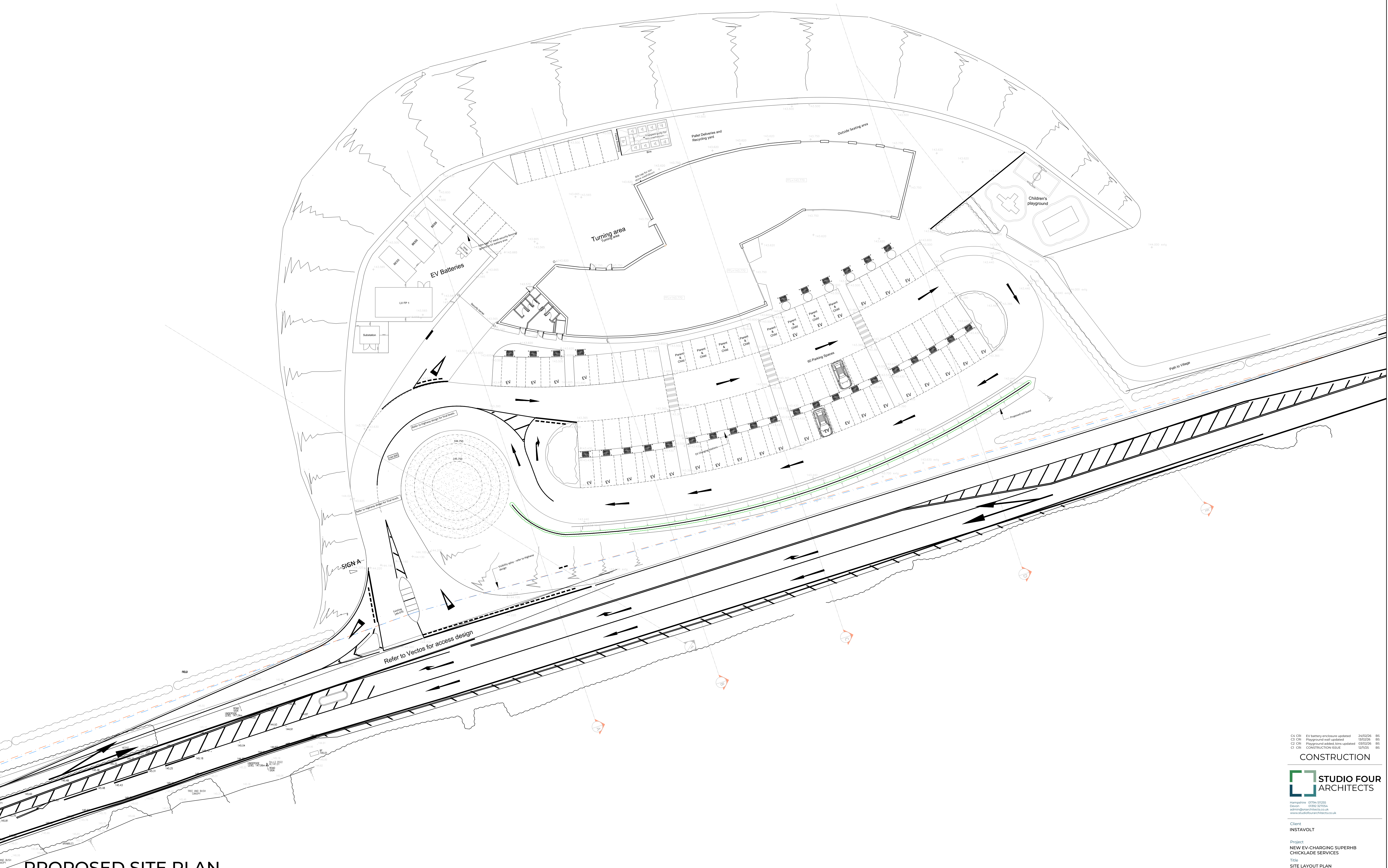
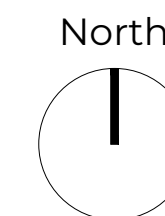
Monitoring	Survey inside of tank for sediment build-up and remove if necessary	Every 5 years or as required
	Inspect/check all inlets, outlets, vents and overflows to ensure that they are in good condition and operating as designed	Annually

4.0 Summary and Conclusions

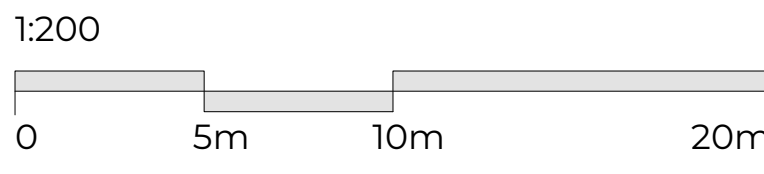
4.1 The surface water drainage strategy for the proposed BESS facility located at Chicklade Services is summarised below.

- The proposed on site drainage solution will be suitable to attenuate flows up to and including the 1 in 100 year + 45% climate change rainfall event.
- On site management of surface water will be provided by gravel subbase, geocellular crates and a soakaway.
- Treatment of surface water runoff will be provided by the gravel subbase and interceptor device.
- Surface water will be discharged into the ground via a soakaway.
- The drainage system provides capacity for the containment of firewater. A penstock valve is proposed downstream of the geocellular crates, to shut off the surface water drainage in the case of a pollution event, preventing pollution from entering the outfall.
- A specialist management company will be identified at the detailed design stage and appointed to maintain the SuDS features for the lifetime of the development.

Appendix A – Site Layout



PROPOSED SITE PLAN
SCALE 1:200



C4 CR EV battery enclosure updated 24/02/26 BS
C3 CR Playground wall updated 13/02/26 BS
C2 CR Playground added, bins updated 03/02/26 BS
C1 CR CONSTRUCTION ISSUE 12/1/25 BS

CONSTRUCTION

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Client:
INSTAVOLT

Project:
**NEW EV-CHARGING SUPERHB
CHICKLADE SERVICES**

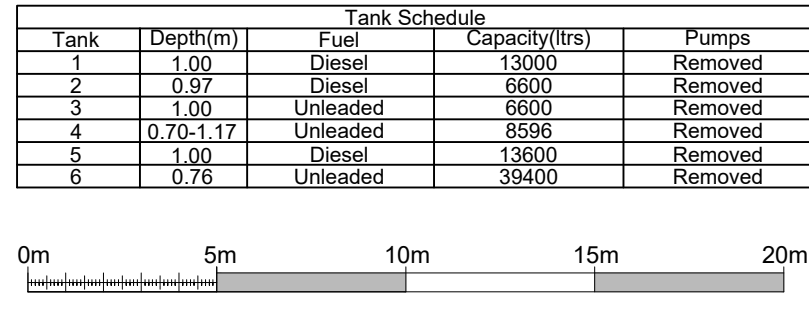
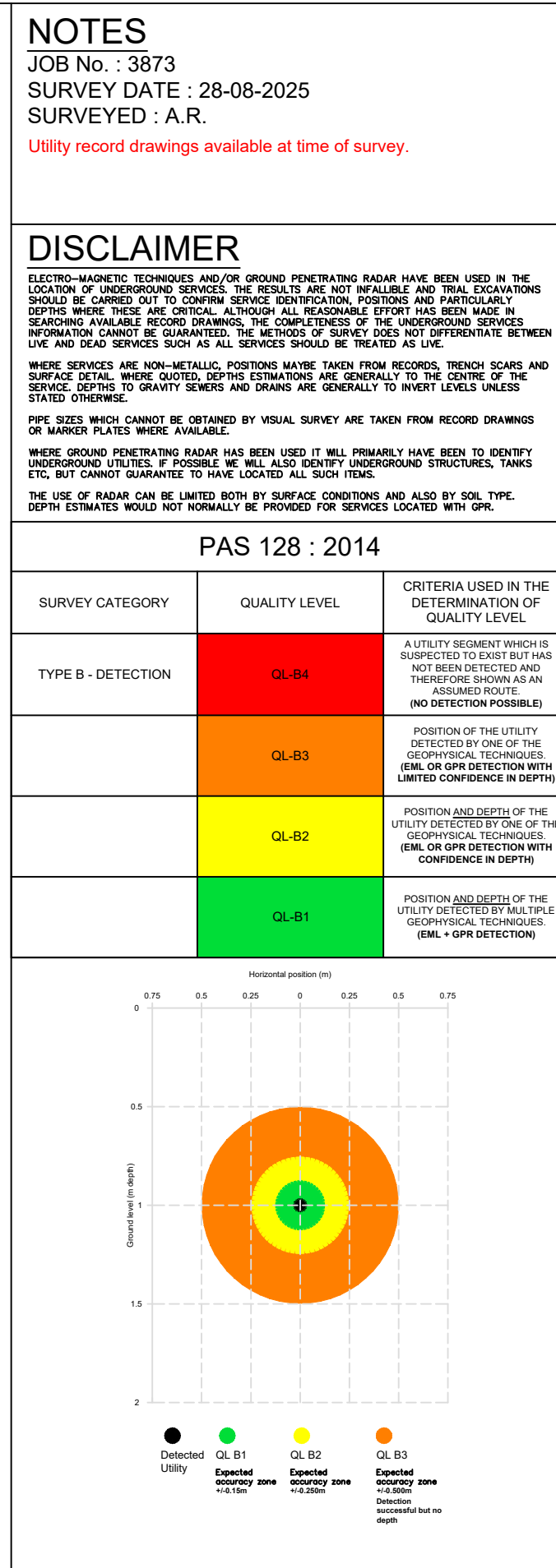
Title:
SITE LAYOUT PLAN

Date	Scale	Paper	Drawn
NOV 25	1:200	A0	CRI

Job No.	Orig. No.	Revision
45075	101	C4

45075 - Chicklade Superhub C4

Appendix B – Utility Survey



Appendix C – Soakaway Testing

	Thickness (mm)	In-situ CBR (%)	Thickness (mm)	In-situ CBR (%)	Thickness (mm)	In-situ CBR (%)	Thickness (mm)	In-situ CBR (%)	Thickness (mm)	In-situ CBR (%)
DCP01	375mm	22%	430mm	8%	-	-	-	-	-	-
DCP02	40mm	6%	125mm	25%	5mm	239%	505mm	12%	80mm	16%
DCP03	110mm	16%	50mm	32%	260mm	21%	90mm	36%	335mm	16%

6.9. Surface Water Disposal

Soakaway testing in accordance with BRE365 was undertaken within TP01 – TP08 within the Head Deposits and the results are tabulated below.

Soakage Testing Results						
Trial Hole	Test Number	Depth (m bgl)	Start Depth (m bgl)	Finish Depth (m bgl)	Time Taken (mins)	Infiltration Rate (m/sec)
TP01	1	1.00	0.60	1.00	60	4.22×10^{-5}
	2	1.00	0.18	0.88	94	3.76×10^{-5}
	3	1.00	0.40	0.93	90	4.14×10^{-5}
TP02	1	1.00	0.54	1.00	20	1.85×10^{-4}
	2	1.00	0.45	1.00	69	8.42×10^{-5}
	3	1.00	0.39	0.97	60	7.18×10^{-5}
TP03	1	1.00	0.10	1.00	50	9.90×10^{-5}
	2	1.00	0.39	0.91	70	6.02×10^{-5}
	3	1.00	0.45	0.93	90	4.36×10^{-5}
TP04	1	1.00	0.53	1.00	30	2.02×10^{-4}
	2	1.00	0.30	0.90	70	5.94×10^{-5}
	3	1.00	0.37	0.95	95	3.88×10^{-5}
TP05	1*	1.00	0.17	0.62	240	7.52×10^{-6}
	2	-	-	-	-	-
	3	-	-	-	-	-
TP06	1*	1.00	0.17	0.61	240	7.06×10^{-6}
	2	-	-	-	-	-
	3	-	-	-	-	-
TP07	1*	1.00	0.14	0.69	240	9.75×10^{-6}
	2	-	-	-	-	-
	3	-	-	-	-	-
TP08	1	1.00	0.20	1.00	39	7.56×10^{-5}
	2	1.00	0.26	1.00	53	5.87×10^{-5}
	3	1.00	0.24	0.81	85	2.38×10^{-5}
*Given the relatively slow infiltration rate encountered, only one test could be undertaken and it did not reach 75% mark.						

Any soakaways should be located sufficiently away from buildings and infrastructure, in order to prevent undermining of foundations.

The submission of a Sustainable Urban Drainage Scheme (SUDS) is likely to be required for this site due to the proposed development increasing the amounts of hardstanding.

Consultation with the Environment Agency must be sought regarding any use that may have an impact on groundwater resources, abstractions and surface water features/watercourses.

It should be noted that water discharge into the chalk may worsen / create dissolution features. Therefore, soakaways should be remote from structures and undertaken in accordance with available guidance.

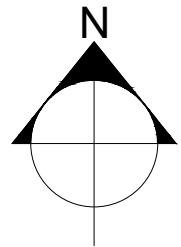
A number of published information sources make reference to an appropriate distance at which a soakaway should be sited in relation to any building foundations in the vicinity:

- The British Standard BS8301 :1985 “Code of practice for building drainage” (1985), suggests that: “A soakaway is not desirable nearer to a building than about 5 metres nor in such a position that the ground below foundations is likely to be adversely affected.”
- The Building Research Establishment Digest 365 “Soakaway design” (1991), suggests that “Soakaways should not normally be constructed closer than 5m to building foundations. In chalk or other soil and fill material subject to modification or instability, the advice of a specialist geotechnologist should be sought as to the advisability and siting of a soakaway”.

In addition, the distance a soakaway is located from any foundations can be informed by both the soakaway type and chalk density present at the site.

- The Kent County Council Soakaway Design Guide (July 2000) states that “Highway soakaways shall be situated the following minimum distances from dwellings (measured from the outside edge of the soakaway): (1) 5 metres for conventional perforated soakaway; (2) 10 metres for deep bored soakaway. In addition, adjacent soakaways of a similar type shall also be spaced a minimum of 10 metres apart.
- CIRIA 574 states that soakaways should be sited at least 5-10m away from any structure, depending on the chalk density. Where the chalk present is of low or unknown density, soakaways should be sited at least 10m from any foundations, and where the chalk is of medium density or higher, any foundations should be sited at least 5m from any foundations.

Appendix D – Drainage Strategy



0 1000 2000 3000 4000 5000 mm
SCALE 1:100



Notes

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3. This drawing should be read in conjunction with all other relevant drawings and specifications.

PRELIMINARY
SUBJECT TO DETAILED DESIGN

This drawing illustrates a sketch proposal only and as such is subject to detailed site investigation including ground conditions/contaminants, drainage, design and planning/density negotiations. The layout may be based upon an enlargement of an OS sheet or other small scale plans and its accuracy will need to be verified by Survey. Full risk analysis under the CDM Regulations has not been undertaken.

Site Area = 2.224ha
Impermeable Area = 0.031ha
Infiltration Rate = 0.13536m/hr
Storage requirement for 1 in 100 year +45% Climate Change event = 26.5m³

KEY

- SURFACE WATER PIPE AND MANHOLE
- BELOW GROUND ATTENUATION CRATE
- GRAVEL SUBBASE

P01	First Issue.		JH	JM
Rev	Description		Drn	Chk



Client
InstaVolt Ltd

Project
Chicklade Services

Title
Surface Water Drainage Strategy

Model Reference						
N/A						
TTE Project Number	Created	Drawn	Checked	Approved	Scale @A1	
794-ENV-EM-HYD-23905	April 2026	JH	JM	JM	1:100	
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Appendix E – Surface Water Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	1.000
CV	1.000	Preferred Cover Depth (m)	1.200
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)	Invert Level (m)
S1	0.009	5.00	143.574	1350	390398.525	134460.076	1.204	142.370
S2	0.022	5.00	143.565	1350	390400.972	134473.986	1.345	142.220
S3			143.527	1350	390410.614	134484.598	1.437	142.090
S4			143.556	1200	390419.862	134475.548	2.016	141.540
S5			143.648	1200	390422.462	134473.060	3.218	140.430
S6			143.574	1200	390409.327	134458.200	3.184	140.390
S7			143.539	1200	390407.013	134454.999	3.289	140.250
S8			143.551	1200	390401.638	134454.946	3.391	140.160

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.000	S1	S2	14.123	0.600	142.370	142.220	0.150	94.2	150	5.23	50.0
1.001	S2	S3	14.338	0.600	142.220	142.090	0.130	110.3	150	5.48	50.0
1.002	S3	S4	12.939	0.600	142.090	141.540	0.550	23.5	150	5.58	50.0
1.003	S4	S5	3.599	0.600	141.540	140.430	1.110	3.2	150	5.59	50.0
1.004	S5	S6	19.833	0.600	140.430	140.390	0.040	495.8	150	6.33	50.0
1.005	S6	S7	3.950	0.600	140.390	140.250	0.140	28.2	150	6.37	50.0
1.006	S7	S8	5.375	0.600	140.250	140.160	0.090	59.7	150	6.44	50.0

Pipeline Schedule

Link	Length (m)	Slope (1:X)	Dia (mm)	Link Type	US CL (m)	US IL (m)	US Depth (m)	DS CL (m)	DS IL (m)	DS Depth (m)
1.000	14.123	94.2	150	Circular	143.574	142.370	1.054	143.565	142.220	1.195
1.001	14.338	110.3	150	Circular	143.565	142.220	1.195	143.527	142.090	1.287
1.002	12.939	23.5	150	Circular	143.527	142.090	1.287	143.556	141.540	1.866
1.003	3.599	3.2	150	Circular	143.556	141.540	1.866	143.648	140.430	3.068
1.004	19.833	495.8	150	Circular	143.648	140.430	3.068	143.574	140.390	3.034
1.005	3.950	28.2	150	Circular	143.574	140.390	3.034	143.539	140.250	3.139
1.006	5.375	59.7	150	Circular	143.539	140.250	3.139	143.551	140.160	3.241

Link	US Node	Dia (mm)	Node Type	MH Type	DS Node	Dia (mm)	Node Type	MH Type
1.000	S1	1350	Manhole	Adoptable	S2	1350	Manhole	Adoptable
1.001	S2	1350	Manhole	Adoptable	S3	1350	Manhole	Adoptable
1.002	S3	1350	Manhole	Adoptable	S4	1200	Manhole	Adoptable
1.003	S4	1200	Manhole	Adoptable	S5	1200	Manhole	Adoptable
1.004	S5	1200	Manhole	Adoptable	S6	1200	Manhole	Adoptable
1.005	S6	1200	Manhole	Adoptable	S7	1200	Manhole	Adoptable
1.006	S7	1200	Manhole	Adoptable	S8	1200	Manhole	Adoptable

Manhole Schedule

Node	Easting (m)	Northing (m)	CL (m)	Depth (m)	Dia (mm)	Connections	Link	IL (m)	Dia (mm)	
S1	390398.525	134460.076	143.574	1.204	1350		0	1.000	142.370	150
S2	390400.972	134473.986	143.565	1.345	1350		1	1.000	142.220	150
							0	1.001	142.220	150
S3	390410.614	134484.598	143.527	1.437	1350		1	1.001	142.090	150
							0	1.002	142.090	150
S4	390419.862	134475.548	143.556	2.016	1200		1	1.002	141.540	150
							0	1.003	141.540	150
S5	390422.462	134473.060	143.648	3.218	1200		1	1.003	140.430	150
							0	1.004	140.430	150
S6	390409.327	134458.200	143.574	3.184	1200		1	1.004	140.390	150
							0	1.005	140.390	150
S7	390407.013	134454.999	143.539	3.289	1200		1	1.005	140.250	150
							0	1.006	140.250	150
S8	390401.638	134454.946	143.551	3.391	1200		1	1.006	140.160	150
							0			

Simulation Settings

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

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

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

Node S8 Soakaway Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Invert Level (m)	139.400	Depth (m)	1.000
Side Inf Coefficient (m/hr)	0.13536	Time to half empty (mins)	1072	Inf Depth (m)	
Safety Factor	2.0	Pit Width (m)	4.000	Number Required	1
Porosity	0.95	Pit Length (m)	7.000		

Node S5 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	140.400
Side Inf Coefficient (m/hr)	0.00000	Porosity	0.95	Time to half empty (mins)	0

Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)	Depth (m)	Area (m ²)	Inf Area (m ²)
0.000	95.0	0.0	2.000	95.0	0.0	2.001	0.0	0.0

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	S1	11	142.394	0.024	1.0	0.0341	0.0000	OK
15 minute summer	S2	10	142.268	0.048	3.4	0.0686	0.0000	OK
15 minute summer	S3	11	142.124	0.034	3.3	0.0484	0.0000	OK
15 minute summer	S4	11	141.560	0.020	3.3	0.0225	0.0000	OK
240 minute summer	S5	144	140.461	0.031	1.4	2.8123	0.0000	OK
240 minute summer	S6	148	140.405	0.015	0.7	0.0171	0.0000	OK
240 minute summer	S7	148	140.269	0.019	0.7	0.0210	0.0000	OK
2160 minute winter	S8	1620	139.630	-0.530	0.3	6.1179	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	S1	1.000	S2	1.0	0.310	0.055	0.0468
15 minute summer	S2	1.001	S3	3.3	0.861	0.198	0.0560
15 minute summer	S3	1.002	S4	3.3	1.572	0.091	0.0281
15 minute summer	S4	1.003	S5	3.4	2.542	0.034	0.0047
240 minute summer	S5	1.004	S6	0.7	0.409	0.090	0.0354
240 minute summer	S6	1.005	S7	0.7	0.655	0.021	0.0043
240 minute summer	S7	1.006	S8	0.7	0.578	0.031	0.0066
2160 minute winter	S8	Infiltration		0.1			

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	S1	10	142.416	0.046	3.8	0.0658	0.0000	OK
15 minute summer	S2	10	142.324	0.104	12.9	0.1490	0.0000	OK
15 minute summer	S3	11	142.159	0.069	12.7	0.0988	0.0000	OK
15 minute summer	S4	11	141.580	0.040	12.7	0.0455	0.0000	OK
60 minute summer	S5	41	140.496	0.066	9.2	5.9570	0.0000	OK
60 minute summer	S6	42	140.423	0.033	3.3	0.0373	0.0000	OK
60 minute summer	S7	42	140.291	0.041	3.3	0.0463	0.0000	OK
600 minute winter	S8	600	139.926	-0.234	1.2	13.9929	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	S1	1.000	S2	3.7	0.425	0.205	0.1244
15 minute summer	S2	1.001	S3	12.7	1.211	0.753	0.1500
15 minute summer	S3	1.002	S4	12.7	2.196	0.346	0.0757
15 minute summer	S4	1.003	S5	12.8	3.630	0.128	0.0127
60 minute summer	S5	1.004	S6	3.3	0.656	0.421	0.1019
60 minute summer	S6	1.005	S7	3.3	0.982	0.098	0.0133
60 minute summer	S7	1.006	S8	3.3	0.890	0.144	0.0200
600 minute winter	S8	Infiltration		0.2			

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute summer	S1	10	142.426	0.056	5.5	0.0801	0.0000	OK
15 minute summer	S2	11	142.384	0.164	18.7	0.2353	0.0000	SURCHARGED
15 minute summer	S3	12	142.175	0.085	18.0	0.1220	0.0000	OK
15 minute summer	S4	10	141.589	0.049	17.9	0.0552	0.0000	OK
60 minute summer	S5	40	140.518	0.088	13.3	7.9549	0.0000	OK
60 minute summer	S6	40	140.435	0.045	5.7	0.0507	0.0000	OK
60 minute summer	S7	40	140.305	0.055	5.7	0.0626	0.0000	OK
1440 minute winter	S8	1110	140.169	0.009	1.0	20.4630	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)
15 minute summer	S1	1.000	S2	5.5	0.449	0.298	0.1660
15 minute summer	S2	1.001	S3	18.0	1.268	1.064	0.1995
30 minute summer	S3	1.002	S4	17.2	2.397	0.468	0.0946
15 minute summer	S4	1.003	S5	17.8	3.935	0.179	0.0186
60 minute summer	S5	1.004	S6	5.7	0.764	0.729	0.1496
60 minute summer	S6	1.005	S7	5.7	1.111	0.170	0.0204
60 minute summer	S7	1.006	S8	5.7	1.025	0.248	0.0300
1440 minute winter	S8	Infiltration		0.3			

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

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m ³)	Flood (m ³)	Status
15 minute summer	S1	11	142.497	0.127	6.9	0.1813	0.0000	OK
15 minute summer	S2	11	142.480	0.260	22.2	0.3714	0.0000	SURCHARGED
15 minute summer	S3	12	142.186	0.096	21.5	0.1376	0.0000	OK
15 minute summer	S4	11	141.593	0.053	21.4	0.0599	0.0000	OK
60 minute summer	S5	39	140.536	0.106	16.9	9.6455	0.0000	OK
60 minute summer	S6	40	140.445	0.055	8.0	0.0618	0.0000	OK
1440 minute summer	S7	1020	140.393	0.143	1.8	0.1616	0.0000	OK
1440 minute summer	S8	1020	140.393	0.233	1.8	26.6726	0.0000	OK

Link Event (Velocity)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m ³)
15 minute summer	S1	1.000	S2	6.7	0.452	0.369	0.2364
15 minute summer	S2	1.001	S3	21.5	1.324	1.275	0.2117
30 minute summer	S3	1.002	S4	20.7	2.508	0.562	0.1075
15 minute summer	S4	1.003	S5	21.5	4.055	0.216	0.0242
60 minute summer	S5	1.004	S6	8.0	0.831	1.015	0.1894
60 minute summer	S6	1.005	S7	8.0	1.188	0.237	0.0266
60 minute summer	S7	1.006	S8	8.0	1.113	0.347	0.0386
1440 minute summer	S8	Infiltration		0.4			