



RAINCLOUD

KIRKBY BESS

SUDS STRATEGY

MARCH 2025

CONTROL SHEET

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RAINCLOUD

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1 INTRODUCTION

1.1 Background

Raincloud Consulting Ltd ('Raincloud') has been commissioned by Envams on behalf of Pivoted Power LLP ('the Client') to undertake a Sustainable Drainage System Strategy ('SuDS Strategy') for the proposed Battery Energy Storage Site ('the Proposed Development') located on agricultural land north of Cut Lane, 3 kilometres (km) east of Kirkby, nearest postcode is L33 3AH ('the Site').

The battery energy storage system (BESS) and associated infrastructure will connect via underground cable located into the existing National Grid Super grid transformer approximately 600 metres (m) southeast of the Site. The proposed layout of the Proposed Development is provided in Appendix A.

The Proposed Development is located wholly within the jurisdiction of Knowsley Council (KC).

This document is intended to meet the requirements of:

- National Planning Practice Guidance (2014) (as amended 2022);
- The National Planning Policy Framework (as amended December 2024);
- The Environment Act (2021);
- Non-Statutory Technical Standards for Sustainable Drainage Systems (2015);
- Environment Agency (EA) - Rural Sustainable Drainage Systems (RSuDS)¹;
- EA - Pollution Prevention Guidelines (PPG) Controlled Burn: PPG28 (archived but still relevant);
- CIRIA - Containment systems for the prevention of pollution. Secondary, tertiary and other measures for industrial and commercial premises (C736);
- National Fire Chiefs Council (NFCC) – Grid Scale Battery Energy Storage System planning – Guidance for FRS - July 2024 Revision²;
- NFPA 855 Standard for the Installation of Stationary Energy Storage Systems³;
- Department for Business and Trade - UK Battery Strategy (2023)⁴;
- KMBC Local Plan Core Strategy (2016)⁵; and
- KC Sustainable Drainage and Surface Water Management Technical Guidance for Developers (2016)⁶.

¹ <https://assets.publishing.service.gov.uk/media/5a7b956b40f0b645ba3c541b/scho0612buwh-e-e.pdf>

² <https://nfcc.org.uk/consultation/draft-grid-scale-energy-storage-system-planning-guidance/>

³ <https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=855>

⁴ <https://www.gov.uk/government/publications/uk-battery-strategy>

⁵ <https://www.knowsley.gov.uk/sites/default/files/2023-11/knowsley-local-plan-adopted-core-strategy.pdf>

⁶ [https://www.knowsley.gov.uk/sites/default/files/2023-](https://www.knowsley.gov.uk/sites/default/files/2023-11/Sustainable%20Drainage%20and%20Surface%20Water%20Management%20Technical%20Guidance%20document.pdf)

[11/Sustainable%20Drainage%20and%20Surface%20Water%20Management%20Technical%20Guidance%20document.pdf](https://www.knowsley.gov.uk/sites/default/files/2023-11/Sustainable%20Drainage%20and%20Surface%20Water%20Management%20Technical%20Guidance%20document.pdf)

1.2 Surface Water Drainage Strategy Summary

Table 1 outlines the key principles adopted for the surface water drainage strategy for the Proposed Development.

Table 1: Surface Water Drainage Strategy Summary Table

Element	Description
Current land use	Greenfield land
Development type	Essential Infrastructure
Development Lifetime	30 years
Contributing catchment	0.736 ha (BESS area)
Impermeable area	0.201 ha
Infiltration possible?	Infiltration testing was conducted and confirmed infiltration is not a viable option
Surface water disposal route	To a land drain on the neighbouring field.
Q_{BAR}	1.8 l/s
Proposed discharge rate	1.8 l/s
Attenuation structure	Lined detention basin – 232.7 m ³ capacity
Flow restriction	HydroBrake (or similar)
Climate change allowance	Lower Mersey Management Catchment – 2070s Central Allowances • 1:30 – 30 % • 1:100 – 30 % In addition, Upper End allowances as per Knowsley Council Guidance • 1:30 – 40 % • 1:100 – 45 %
Water quality safeguarding	In the event of a fire, the water used for cooling neighbouring units will be contained using a penstock on the detention basin

1.3 Development Description

A full description of the Proposed Development can be found in the Planning, Design and Access Statement which accompanies the planning application. In summary, it includes the construction of a BESS and associated infrastructure as well as a cable route connecting the Proposed Development to the existing Kirkby Substation.

The Proposed Development will involve the installation of Type 2 or 3 clean crushed aggregate on the access tracks..

The Type 2 or 3 washed aggregate access tracks will be permeable. Only occasional maintenance visits will be required following a short construction period, significantly reducing the potential for compaction over time and maintaining infiltration potential.

The cable route utilises an existing roads and has, therefore, been omitted from this assessment.

The proposed lifetime of the Proposed Development is 40 years followed by decommissioning of the infrastructure and restoring the land to its previous condition.

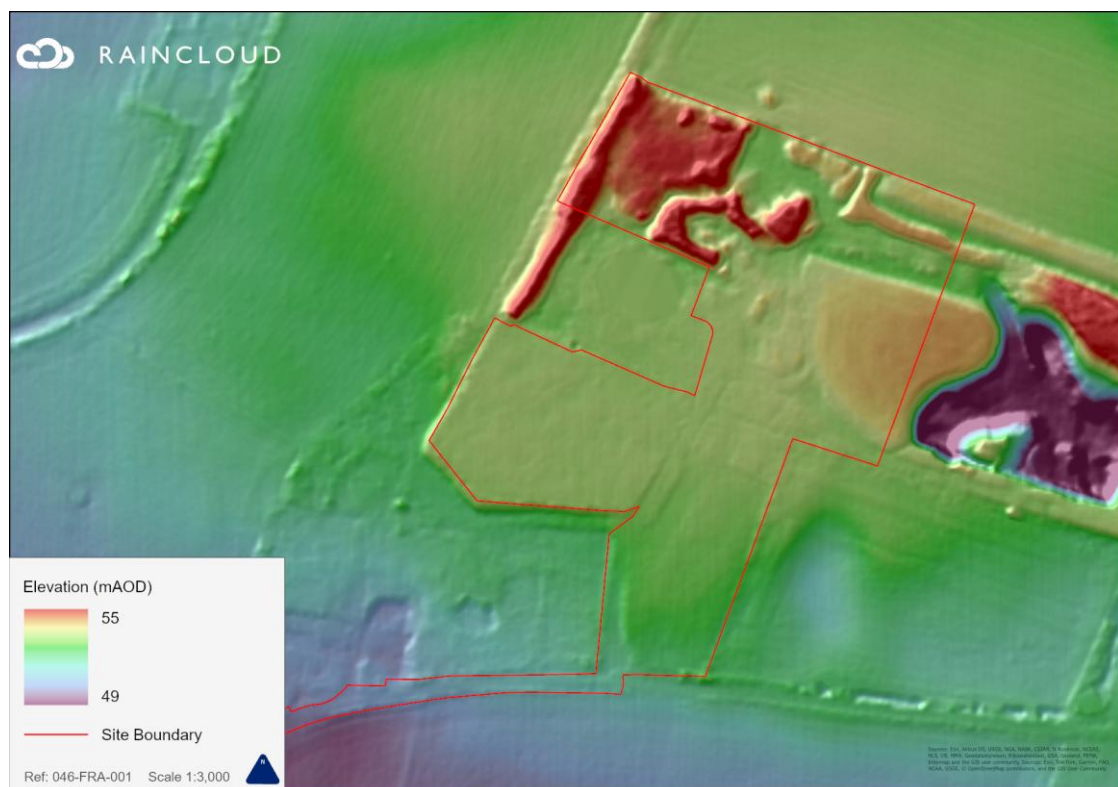
1.4 Site Characteristics

The Site is located land north of Cut Lane, approximately 3 km east of Kirkby.

The Site generally slopes from north to south from 49.75 m above ordnance datum (AOD) to 59.53 m AOD, based on the topographical survey conducted by the Client (January 2025). The topographical survey has been provided in Appendix B.

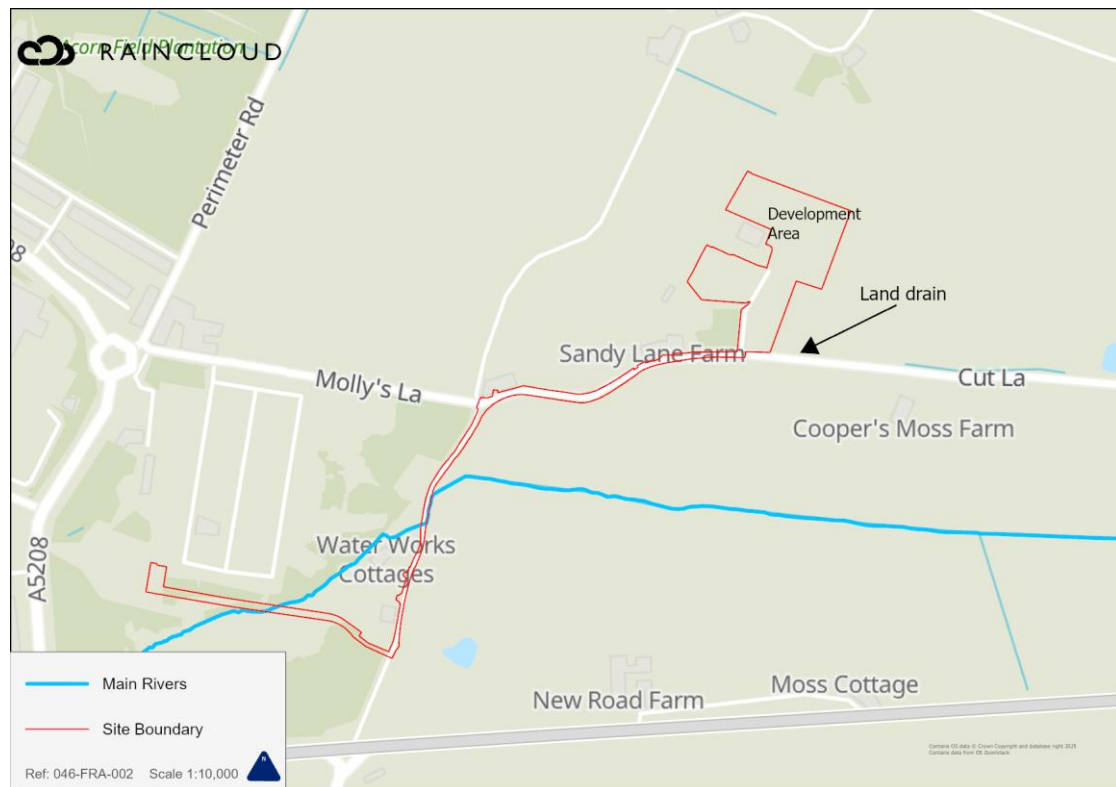
A visual representation of the Site has been provided in Plate 1 using LiDAR data.

Plate 1: Topography at the Site



No watercourses are located on the Site. An unnamed land drain is located approximately 40 m east of the Site's access. This is not shown on mapping however is visual on LiDAR hillshade (Plate 1). The land drain has been highlighted in Plate 2.

Plate 2: Unnamed tributaries of Knowsley Brook



The Proposed Development (BESS) Area will be landscaped to slope north to south at a 1:100 slope, the Site is currently undulated and unsuitable for the Development in its present form.

2 Surface Water Drainage Strategy

2.1 Geology

The British Geological Survey (BGS) geology viewer⁷ shows the Site is underlain by Till and Devensian superficial deposits and Chester Formation (Sandstone) bedrock geology.

There are no BGS boreholes within close proximity to the Site, the nearest BGS borehole is located 520 m east of the Site however it is located within different superficial deposits and bedrock geology and therefore is unlikely represent the underlying strata at the Site.

The Site is located above a Secondary A Aquifer (Superficial Drift) and Principal Aquifer (bedrock).

⁷ <https://www.bgs.ac.uk/map-viewers/bgs-geology-viewer/>

The Soilscape dataset⁸ indicates the superficial cover is classed as '*naturally wet very acid sandy and loamy soils*' (reference soilscape 15) with '*naturally wet*' drainage.

Infiltration testing was commissioned by EDF (Southwest Geotechnical, November 2024) to support the Surface Water Drainage Strategy design. The infiltration testing provided underlying strata details for the Site, highlighting clay-based strata to a depth 1 to 1.5 m below ground level followed by sand and gravel to a depth 2 to 2.5 m. Further details on infiltration testing is provided in Section 2.2.

2.2 Drainage Hierarchy

Infiltration testing was conducted by Southwest Geotechnical in October 2024, two trial pits were conducted and result in both pits unable to provide a suitable infiltration rate. The infiltration testing results are provided in Appendix C.

Infiltration is not considered a viable surface water management option for the Proposed Development given the infiltration testing results were not able to provide a suitable infiltration rate.

Additionally, in the rare event of a battery container fire, the potential for contaminated fire suppression water to enter groundwater and cause pollution also precludes infiltration as a drainage option.

As such, an attenuation basin will be used on Site to capture runoff generated by the impermeable areas on Site and discharge to the land drain located to the north of Cut Lane.

A third-party agreement will be obtained as the discharge location is located outside the Site boundary.

The proposed drainage layout for the Proposed Development is provided in Appendix D.

2.3 Rainfall Details and Greenfield Calculations

Runoff from the Proposed Development shall, in principle, replicate the quality and quantity of the runoff from the Site in its "greenfield" state, in so far as it is reasonable and practicable.

Based on a contributing area of 0.736 ha the existing greenfield average annual flood (Q_{BAR}) runoff from each area was calculated as 1.8 l/s, using the Interim Code of Practice for Sustainable Drainage Systems (ICP SuDS) Mean Annual Flood and Institute of Hydrology (IoH) 124 methods using Info Drainage software, and is shown Plate 3.

⁸ <https://magic.defra.gov.uk/magicmap.aspx>

Plate 3: InfoDrainage – Rural Runoff Calculator

UK and Ireland Rural Runoff Calculator

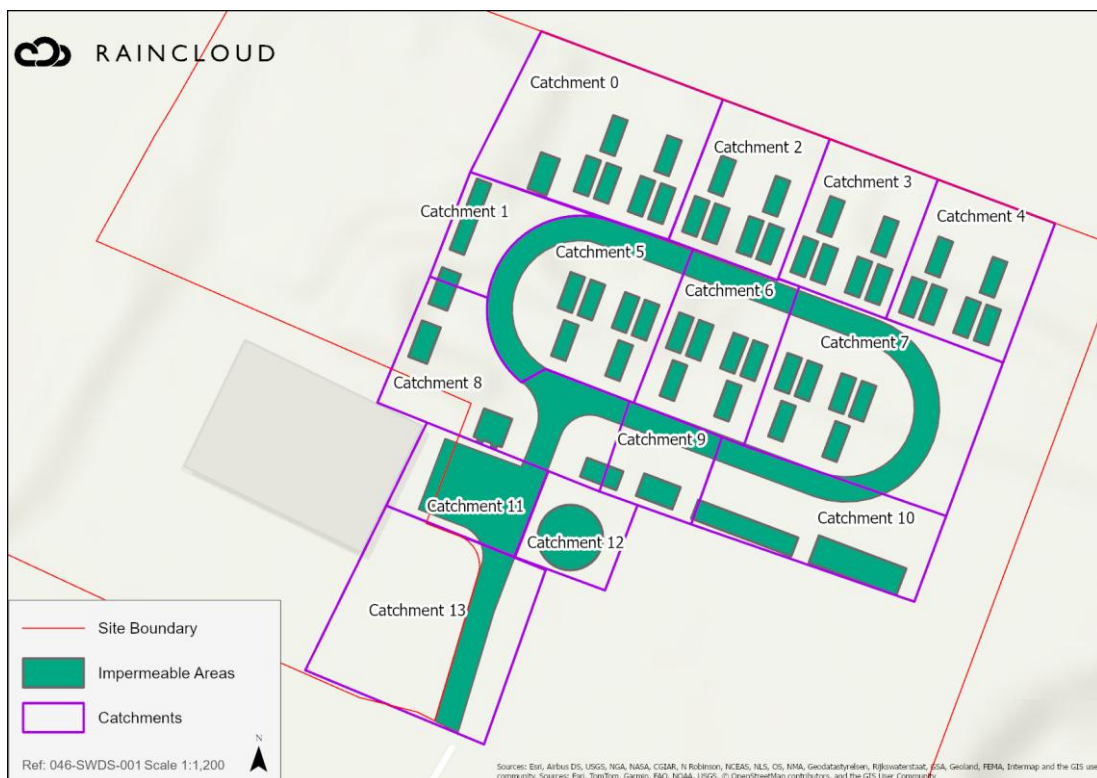
ICP SUDS / IH 124	ADAS 345	FEH	ReFH2												
Method ☒ ICP SUDS ☐ IH 124															
Area (ha) 0.736															
SAAR (mm) 894.0 Map															
Soil 0.300															
Region Region 10 ...															
Additional Options Urban 0.000 Return Period (years) 0 Growth Curve (None) Graph Table															
Calculate															
Results <table border="1"> <thead> <tr> <th>Region</th> <th>QBAR Rural (L/s)</th> <th>QBAR Urban (L/s)</th> <th>Q 1 (years) (L/s)</th> <th>Q 30 (years) (L/s)</th> <th>Q 100 (years) (L/s)</th> </tr> </thead> <tbody> <tr> <td>Region 10</td> <td>1.8</td> <td>1.8</td> <td>1.6</td> <td>3.0</td> <td>3.7</td> </tr> </tbody> </table>				Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)	Region 10	1.8	1.8	1.6	3.0	3.7
Region	QBAR Rural (L/s)	QBAR Urban (L/s)	Q 1 (years) (L/s)	Q 30 (years) (L/s)	Q 100 (years) (L/s)										
Region 10	1.8	1.8	1.6	3.0	3.7										

Impermeable areas on Site include the battery units, inverters, water tank, welfare facilities, harmonic filter and resistor, EV parking spaces, transformers, control room, BESS switchgear LV auxiliary switch room and internal track. The contributing catchments and impermeable areas are provided in Table 1 and shown in Plate 4.

Table 1: Catchment characteristics

Catchment	Area (ha)	Impermeable Area (ha)	% Impermeable
0	0.08	0.011	13.6
1	0.022	0.007	33.2
2	0.045	0.009	19.7
3	0.044	0.009	20.1
4	0.048	0.009	18.5
5	0.069	0.029	42.4
6	0.05	0.016	32.9
7	0.093	0.028	35.9
8	0.064	0.017	18.6
9	0.024	0.010	40.6
10	0.056	0.013	33
11	0.032	0.023	70.4
12	0.023	0.008	37.5
13	0.087	0.012	14
Total	0.736	0.201	-

Plate 4: Contributing Catchments



2.4 Climate Change Allowance

The Site is located within the Lower Mersey Management Catchment. The Proposed Development has a lifetime of 40 years and therefore the central 2070s epoch has been applied, a 30% climate change uplift as per the EA's Flood risk assessments: climate change allowances Guidance⁹.

The KC 'Sustainable Drainage and Surface Water Management'¹⁰ guidance states a 'range of scenarios from 'Upper End' to 'Central' should be used to examine the potential flood risk implications in the critical duration design rainfall events'. Therefore, a 40% and 45% climate change uplift has been applied to the 1 in 30-year and 1 in 100-year events, respectively, for a sensitivity analysis of the drainage design, as outlined in Table 2.

⁹ [https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#peak-rainfall-intensity-allowance:~:text=Development%20with%20a%20lifetime%20up,2050s%20epoch%20\(2022%20to%202060\).](https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances#peak-rainfall-intensity-allowance:~:text=Development%20with%20a%20lifetime%20up,2050s%20epoch%20(2022%20to%202060).)

¹⁰ <https://www.knowsley.gov.uk/sites/default/files/2023-11/Sustainable%20Drainage%20and%20Surface%20Water%20Management%20Technical%20Guidance%20document.pdf>

**Table 2: Lower Mersey Management Catchment¹¹ peak rainfall allowances:
2070s Epoch**

Return Period	Upper End Allowance %
3.33 %	40
1 %	45

An Urban Creep allowance has not been applied to calculations as the Proposed Development is a commercial site *i.e.* not residential and no further hardstanding areas will be installed during the operational phase.

2.5 Attenuation Volume

A SuDS option which utilises a piped network to drain the BESS Compound to lined attenuation basins is proposed as a way of attenuating the increase in surface water run-off rates at the Proposed Development and discharging to the existing land drain off site.

The attenuation basin requires approximately 0.25 m of water to be present all year round for Biodiversity Net Gain (BNG) purposes. The bottom 0.25 m of the proposed attenuation basin has therefore not been considered within the drainage design as it provides no attenuation capacity.

The Proposed Development (BESS) Area has been divided into fourteen (14 No.) contributing catchments to provide the inflow to the SuDS system. Positively drained areas will connect to manholes via filter drains.

A quick storage estimate for the Site's impermeable area (0.201 ha) using FEH data and a Q_{BAR} of 1.8 l/s shows the Site requires approximately 88 m³ to 131 m³, as shown in Plate 5.

¹¹ <https://environment.data.gov.uk/hydrology/climate-change-allowances/rainfall?mgmtcatid=3090>

Plate 5: InfoDrainage – Quick Storage Estimate

Quick Storage Estimate

Input

Input Type

User Input

Area (ha)

0.201

Volumetric Runoff Coefficient

0.750

Discharge Rate (L/s)

1.8

Infiltration Rate (m/hr)

0.0

Safety Factor

1.5

Quick

Calculate

Create New

From Library

All

FEH

Method

FEH

Number of Storms

108

Max. Run Time (mins)

2880

Input

Results

2D Graph

Quick Storage Estimate

Results

Quick Storage Estimate variables require approximate storage of between 88m³ - 131m³.

These values are estimates only and should not be used for final design purposes.

Input

Results

2D Graph

Pivoted Power LLP
March 2025

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In the rare event of a battery unit fire the National Fire Chief Council guidance (November, 2022) recommends the ability to capture firewater and not have uncontained releases to the hydrological environment.

Discharge will be throttled using a Hydro-Brake or similar flow restriction device.

An attenuation basin has been designed with the parameters outlined in Table 3.

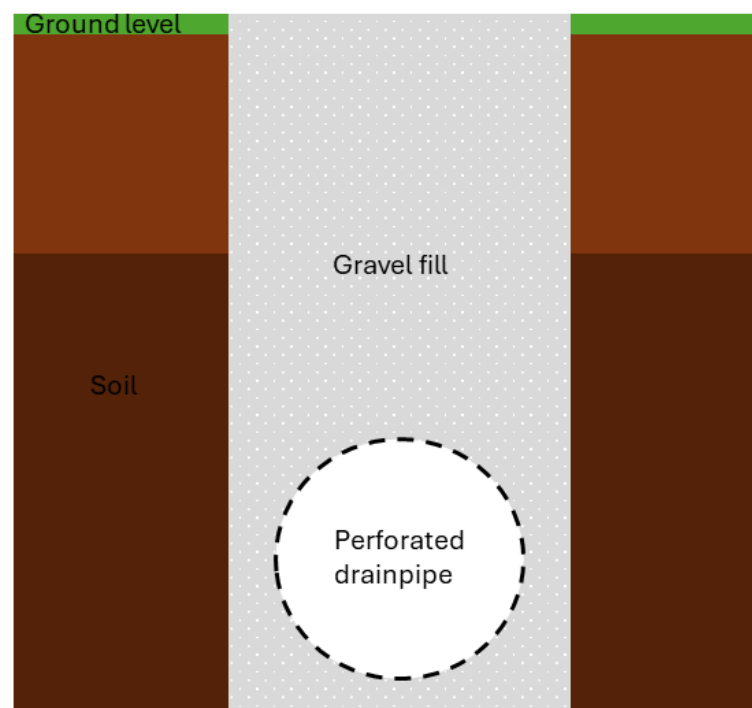
2.6 Surface Water Drainage Strategy

Surface water runoff generated from the Site will be captured via filter drains to manholes and a pipe network connecting to an attenuation basin located on Site.

The attenuation basin has a surface area of 545 m², base area 390 m² and a depth of 0.5 m. It should be noted that the full depth of the attenuation basin will be 0.75 m however the bottom 0.25 m has not been considered in the calculations as it will have no attenuation capacity due to requirements of having water present all year round for biodiversity net gain purposes. Full details regarding the attenuation basin are provided in Appendix E.

The outfall from the attenuation basin will be controlled via a Hydro-Brake (or similar device) to a discharge rate of 1.8 l/s. The outfall will be piped to a location near the access track then utilise a filter drain due to the relatively flat profile of this section of the Site. An outfall pipe would be situated at surface level due to the Site's profile and therefore not feasible. The filter drain will be as shallow as possible and have a cross section similar to that shown in Plate 6 below (Plate 6).

Plate 6: Filter Drain cross section



The filter drain will traverse the Site to the edge of the Site boundary before being piped to the outfall location on the neighbouring land's land drain (outside the Site's boundary). A third-party agreement will be obtained before any construction work takes place. This approach was deemed most viable without the need to pump to the watercourse.

The surface water drainage layout is provided in Appendix D.

Given the isolated nature of the Site and that exceedance flows would be away from the Proposed Development, a Safety Factor of 1.5 has been applied to the hydraulic design, in accordance with Table 25.2 of the SuDS Manual, where exceedance would cause "*No damage or inconvenience*".

The outline design parameters have been validated for a number of storm durations, including the 1440-minute events, during the 1 in 30 and 1 in 100 events plus climate change, and the critical event for the return periods is shown in Appendix E of this report.

2.7 Results - Critical Return period

The Critical Return period for the design event, 1 in 100-year plus 45% climate change, is a 960 (summer) minute event. The maximum depth within the attenuation basin is shown to be 0.23 m and the discharge rate is 1.8 l/s, as shown in Plate 7.

Plate 7: Critical Storm Event Results – 1 in 100-year plus 45% climate change

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Attenuation Basin	FEH: 100 years: +45 %: 960 mins: Summer	53.830	53.830	0.230	0.230	9.6	97.573	0.000	0.000	1.8	117.338	58	OK

The attenuation basin has a half drain time of 535 minutes.

Full details regarding each event and results are provided in Appendix E.

The proposed surface water management strategy has an additional 58% available capacity therefore in the event of an extreme event, the additional runoff would be captured by the attenuation basin.

2.8 The Simple Index Approach (SIA) Tool

As the Proposed Development will not be a manned facility, occasional maintenance visits will occur and these will involve significantly less than 300 traffic movements per day. Table 26.2 Pollution hazard indices for different land use classifications of the SuDS Manual identifies that the Proposed Development has a Pollution Hazard Level of Low, 'non-residential car parking with infrequent change (e.g., schools, offices) i.e., < 300 traffic movements/day', equating to a Land Use Pollution Index of 0.5 (SS), 0.4 (metals) and 0.4 (hydrocarbons).

A SIA Tool has been developed on behalf of the EA (and other Regulators such as SEPA) to support the implementation of the water quality management design methods set out in the SuDS Manual, with appropriate cross referencing to the relevant 'Design Conditions' in the tool.

The detention basin will be sufficient to effectively mitigate any suspended solids, metals and hydrocarbons held within surface water at the Proposed Development Site prior to discharging into the drain outside the Site, as the Pollution Mitigation Indices for the run-off area are 0.5 (SS), 0.4 (metals) and 0.4 (hydrocarbons).

As such, the treatment of the surface water run-off will meet the minimum requirements of the pollution mitigation indices outlined in the SIA Tool.

2.9 Outfall

The outfall from the attenuation basin will be to an existing land drain and detailed design of the outfall will be undertaken prior to construction and should form part of an appropriately worded planning condition.

The outfall is located outside the Site's boundary (planning boundary) and therefore a third-party agreement will be obtained before any construction work takes place.

As the drain is not a Main River, consent / an Environmental Permit to discharge surface water is not required from the EA. An ordinary watercourse consent may be required from the Lead Local Flood Authority (LLFA) and this will be obtained prior to the construction phase of the Proposed Development.

2.10 Responsibilities & Long-Term Management

It will be the responsibility of the Proposed Development operator to maintain effective drainage measures and rectify drainage measures that are not functioning adequately. A nominated person will also have responsibility for reporting on the functionality of drainage measures.

Where areas remain positively drained through the lifetime of the Proposed Development, the SuDS measures serving these areas will be checked on a regular basis. Should drainage measures require dredging or unblocking, this will be undertaken as soon as practicable by a local contractor engaged by the management company.

Table 3 outlines the maintenance schedule for the proposed detention basin.

Table 3: Long-term Maintenance schedule for an Attenuation Basin¹²

Maintenance Schedule	Required Action	Frequency
Regular Maintenance	Litter removal	As required
	Cut grass – for spillways and access routes	Monthly (during growing season), or as required
	Grass cutting – meadow grass in and around basin	Half yearly (spring, before nesting season, and autumn)
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect banksides, structures, pipework etc for evidence of physical damage	Monthly
	Inspect inlets and facility surface for silt accumulation. Establish appropriate silt removal frequencies	Monthly (for first year), then annually or as required
	Check any penstocks and other mechanical devices	Annually
	Tidy all dead growth before start of growing season	Annually
	Remove sediment from inlets, outlet and forebay	Annually (or as required)
	Manage wetland plants in outlet pool – where provided	Annually
Occasional Maintenance	Reseed areas of poor vegetation growth	As required
	Prune and trim any trees and remove cuttings	Every 2 years, or as required
	Remove sediment from inlets, outlets, forebay and main basin when required	Every 5 years, or as required (likely to be minimal requirements where effective upstream source control is provided)
Remedial Actions	Repair erosion or other damage by reseeding or re-turfing	As required
	Realignment of rip-rap	As required
	Repair/rehabilitation of inlets, outlets and overflows	As required
	Relevel uneven surfaces and reinstate design levels	As required

2.11 Hydrocarbon / Coolant Containment

Bunding for aspects of the Proposed Development which require coolant or lubricants will have concrete or lined earth embankments / containment walls with 110% capacity, similar to components of traditional substations, as shown in Plate 8.

¹² Based on Table 22.1 - Operation and maintenance requirements for detention basins of the SuDS Manual

Plate 8: Typical bunding at substations



The bunds shall have a penstock to ensure that, in the event of non-fugitive leaks, liquids can be contained / isolated from the drainage system.

It is expected that the final dimensions will be confirmed following the detailed design phase and should form part of an appropriately worded planning condition.

2.12 Construction Phase SuDS

Given the relatively short construction phase and gently sloping site it is not anticipated that significant amounts of sediment will be generated. The Proposed Development will adhere to a Construction Environmental Management Plan ("CEMP" - to be provided by the Construction Contractor), which will comply with the following:

- CIRIA C648 – Control of water pollution from linear construction projects¹³;
- CIRIA C532 – Control of water pollution from construction sites: Guidance for consultants and contractors¹⁴;
- CIRIA SuDS Manual (C753)¹⁵; and
- CIRIA Guidance on the construction of SuDS (C768)¹⁶.

Measures are likely to include swales, cut-off ditches and settlement lagoons to limit the potential for sediment laden water to be transferred to the hydrological environment. The CEMP should form part of a suitably worded planning condition.

¹³ CIRIA (2006) *C648: Control of water pollution from linear construction projects: Technical Guidance* [Online] Available at: <https://www.ciria.org/ProductExcerpts/C648.aspx>

¹⁴ CIRIA (2001) *C532: Control of water pollution from construction sites: Guidance for consultants and contractors* [Online] Available at: <https://www.ciria.org/ProductExcerpts/C532.aspx>

¹⁵ CIRIA (2015) *C753: The SuDS Manual*

¹⁶ CIRIA (2017) *C768: Guidance on the construction of SuDS*

3 FIRE SUPPRESSION

3.1 Procedure

The Proposed Development operator will follow the accepted strategy of allowing a battery related fire to self-consume, reducing unnecessary risk of injury to site and firefighting personnel.

Should a fire occur, the effected enclosure will be allowed to self-consume until the fire is extinguished through consumption of the combustible materials within the battery container / enclosure. The firefighting procedure will be to apply water for fire suppression to adjacent BESS enclosures as a way of reducing the temperature of the adjacent containers.

As water will not be directly applied to affected BESS containers, there is reduced potential for suppression water to become contaminated.

Water will be provided onsite via a storage tank, details of this are provided in 3.2.

3.2 Fire Suppressant Volume

Based on recommendations in NFPA 855 Standard for the Installation of Stationary Energy Storage Systems and NFCC– Grid Scale Battery Energy Storage System planning – Guidance for FRS, a burn time of 2 hours and a requirement of 1,900 l/min of fire suppression water has been used to calculate the volume of fire suppressant water required to be stored onsite in the event of a container fire.

This equates to 228 m³ of storage.

Given that the shallow detention basins serving the BESS compound (outlined in Section 2.3) have been sized to accommodate 232 m³ (combined volume), this is sufficient for storing the full fire suppressant volume.

A penstock will be placed on the outlet of the attenuation basin and would be shut off in the event of a fire suppression event. It would remain closed until testing of the captured water has taken place. Water will then either be removed offsite by tankers to a licenced facility or discharged to the unnamed field drain (subject to agreement with the EA).

It is recommended that the BESS Compound has a shallow bund or cut-off permitter drain to limit the potential for run-off to leave the Development and drain to the shallow detention basin.

Merseyside Fire and Rescue Service have ben consulted on the proposed firefighting procedure and are in agreement with the approach.

4 CONCLUSION & COMPLIANCE

The Proposed Development involves the installation of approximately 0.201 ha of impermeable hardstanding at the BESS compound *i.e.* installation of an impermeable membrane.

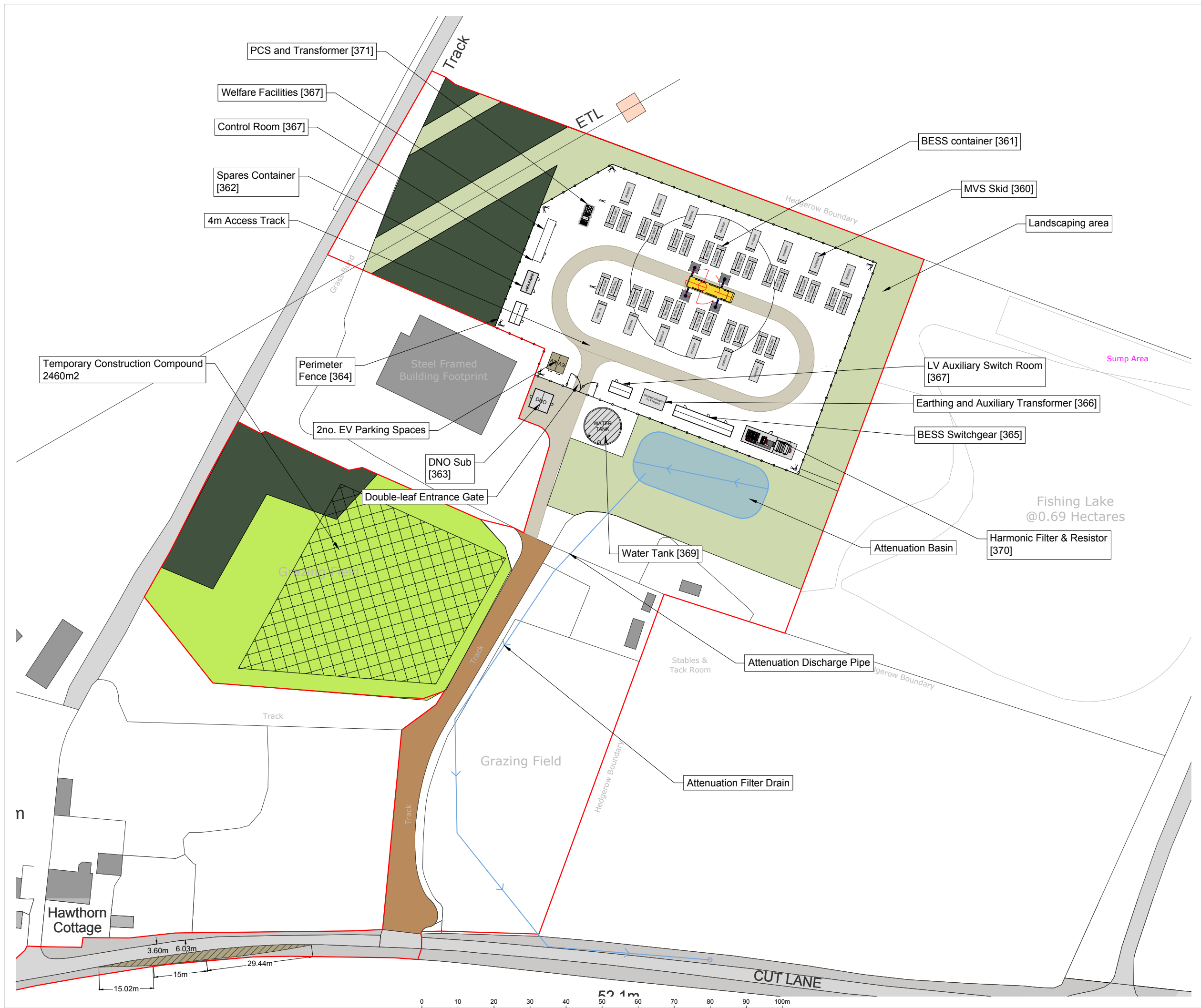
Infiltration testing was conducted and was deemed not feasible for the Site. Discharge to a land drain on neighbouring land was deemed to be the most viable option.

A pipe network will capture runoff generated from the Proposed Development and an attenuation basin will provide approximately 232.7 m³ storage for the 1 in 100 critical storm, plus a 45 % uplift for climate change, discharging to a land drain at Q_{BAR} (1.8 l/s).

The attenuation basin serving the BESS Compound will be used to contain fire suppression water in the rare event of a battery fire. The storage required for a firefighting event is 228 m³ and therefore the basins have been sized to store 232 m³ (the full fire suppressant volume), which is greater than the requirements for the 1 in 100 + 45 % climate change.

The Proposed Development will therefore be compliant with the requirements of Paragraph 182 of the National Planning Policy Framework, Planning Practice Guidance and KC SuDS Guidance.

APPENDIX A: SITE LAYOUT



NOTES

1. All details are indicative only.

LEGEND

- PLANNING APPLICATION BOUNDARY
- PERIMETER FENCE
- OTHER BROAD LEAVED WOODLAND
- OTHER NEUTRAL GRASSLAND, ENHANCED
- OTHER NEUTRAL GRASSLAND, MODERATE
- BIOSWALE

13.	Drainage attenuation updated	25.03.25	JL	SRY
12.	Drainage attenuation updated	24.03.25	JL	SRY
11.	RLB updated	20.03.25	JL	SRY
10.	Y Layout added to plan	19.03.25	JL	SRY
09.	BNG Layout added to plan	18.03.25	JL	SRY
08.	Drainage Layout added to plan	27.02.25	JL	SRY
07.	Passing places added	24.02.25	JL	SRY
06.	Site layout components updated	17.02.25	JL	SRY
05.	Temp compound moved	11.02.25	JL	SRY
04.	Site moved 5m North	05.02.25	JL	SRY
03.	Site moved 12m South	09.01.25	JL	SRY
02.	12m Landscape gap to West	20.12.24	JL	SRY
01.	Site layout updated for landscaping	12.12.24	JL	SRY
Rev	Description	Date	Checked	

Drawing No. **KIR-EDFR-BESS-CIV-PLN-300.13**

Project **Kirkby BESS**

Title **Site Layout Plan**

Scale **1:1000 @A3** Drawn by **JL** Checked **SRY** Date **19.11.24**



W: www.edf-re.uk
A: Cardinal Place, 80 Victoria Street, London SW1E 5JL

APPENDIX B: TOPOGRAPHICAL SURVEY



NOTES

1. All details are indicative only.

LEGEND

- PLANNING APPLICATION BOUNDARY
4.09HA
- BESS COMPOUND

Rev	Description	Date	Checked
Drawing No.			
KIR-EDFR-BESS-LAND-PLN-160.00			
Project			
Kirkby BESS			
Title			
Indicative Topo Layout			
Scale	1:1000 @A3	Drawn by	Checked
		JL	SRY
			Date
			30.01.25



APPENDIX C: INFILTRATION TESTING



SOUTH WEST GEOTECHNICAL

Unit 3 Brooklands Howden Road Tiverton Devon EX16 5HW
t: 01884 252444 e: mail@swgeotech.co.uk

Our ref: 16257 Kirkby, Soakaway Testing
Letter
Your ref:

EDF Renewables
Via e-mail

Attention: Sushitha Reddy Yellola

7 November 2024

Dear Sushitha

Soakaway Testing at Kirkby, Liverpool

Further to the recent soakaway testing undertaken at the above site, we write to discuss the findings of the testing.

Proposals for the site involve the construction of a battery storage facility. Large scale soakaway testing was undertaken in accordance with BRE 365 to determine the feasibility of using soakaways to dispose of surface water from the buildings and hard paved areas.

Geology

The bedrock geology at the site comprises the Chester Formation consisting of sandstone. The superficial geology on the site consists of Till Devensian. These materials typically comprise of unsorted to poorly sorted particles ranging in size from clay to boulders.

During the recent preliminary geotechnical and geo-environmental investigation undertaken by SWG (Report No 15022), significant thickness of made ground were encountered, associated with backfilling a former gravel / sand pit on the site.

Ground Conditions

Three trial pits were excavated at locations specified by the Drainage Engineer and encountered made ground overlying clayey sand soils.

TP03 was not excavated due to time constraints.

Groundwater was not encountered in any of the pits.

Soakaway Test Results

Large scale soakaway testing was undertaken in accordance with BRE 365 in the trial pits. Two pits (TPs 1 and 2) were excavated to depths requested by EDF Renewables. TP4 encountered made ground overlying sandstone bedrock which was not possible to excavate. Soakaway testing was not undertaken in TP04 as soakaways should not be formed in made ground materials.

Very low infiltration rates were recorded, with only minor reductions in induced water level over extended time periods. To comply with BRE 365, it is necessary to undertake three full tests in each pit in rapid succession in order for a minimum infiltration rate to be determined for soakaway design. The very low infiltration rates meant it was not possible to complete a full test in any of the pits.

In order to calculate an infiltration rate for a soakaway test, the induced water level must reduce by 75% (i.e. must reach 25% storage volume). Table 1 summarises the testing.

Table 1: Soakaway Test Results

Trial Pit	Test No and Infiltration Rate (m/s)
	1
1	Induced water level of 0.98m reduced to 1.18m over 204 minutes. Not possible to calculate infiltration rate
2	Induced water level of 1.4m did not reduce over 180 minutes. Not possible to calculate infiltration rate

The testing indicates that the natural soils have very low permeability as it was not possible to undertake a full test in either of the trial pits. CIRIA 156 (1996) recommends an infiltration rate of 3×10^{-6} m/s as the lower limit of acceptability for soakaway feasibility. Resulting infiltration rates on the site would be lower than this.

On this basis, soakaway will not be a suitable method of disposing surface water, and an alternative surface water drainage strategy will be required.

Conclusions

The testing indicates that the natural soils have very low permeability as it was not possible to undertake a full test in any of the trial pits. CIRIA 156 (1996) recommends an infiltration rate of 3×10^{-06} m/s as the lower limit of acceptability for soakaway feasibility. Resulting infiltration rates on the site would be lower than this.

On this basis, soakaway will not be a suitable method of disposing surface water, and an alternative surface water drainage strategy will be required.

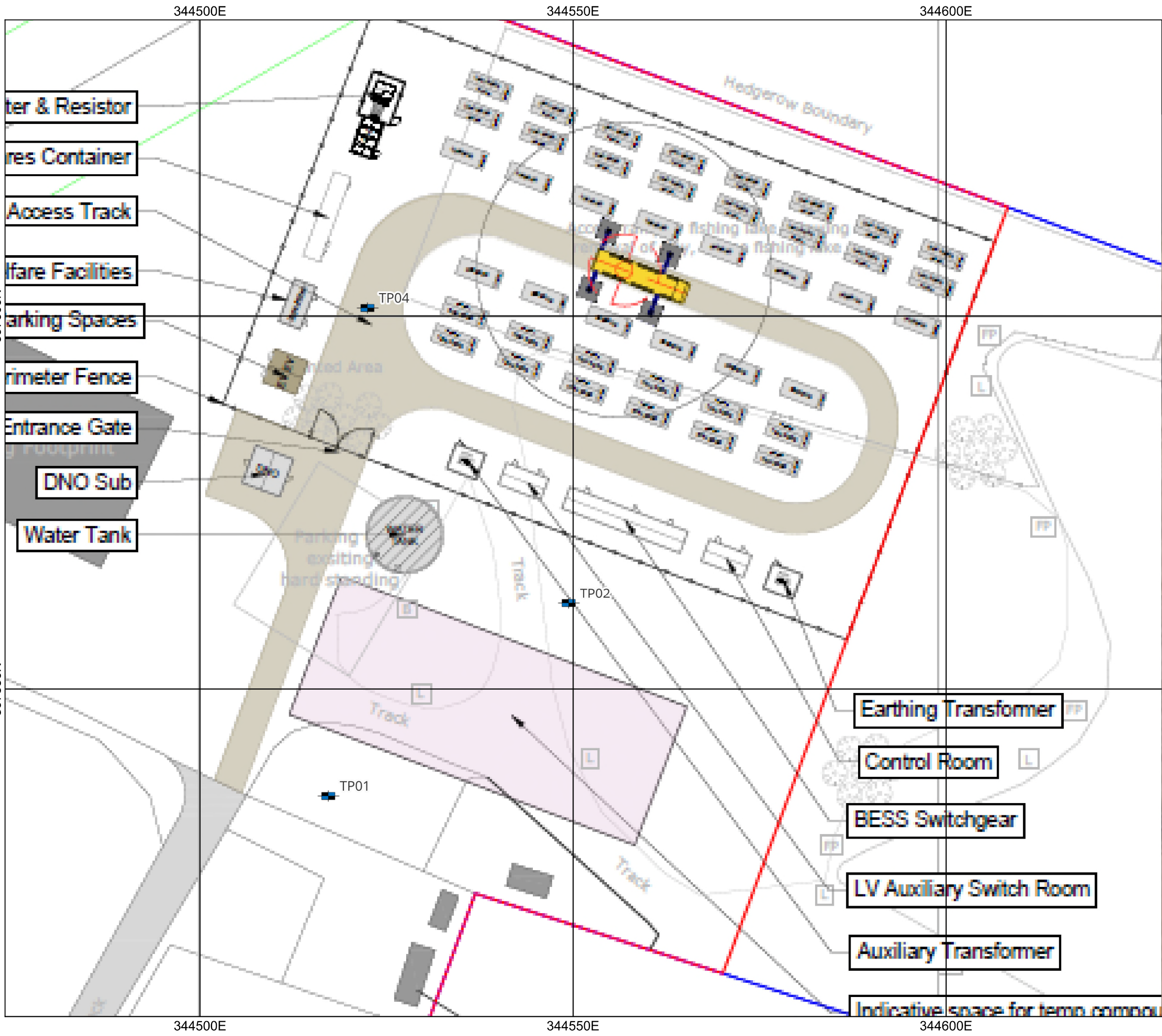
We trust this information is sufficient for your requirements, please feel free to contact us if you have any questions.

Toby Eick
BSc FGS
Graduate Engineering Geologist
Encs:

Trial Pit Logs
Soakaway Test Results
Site Plans

Ben Ogden
CGeol MSc BSc FGS
Technical Director

CIRIA Report 156, (1996). Bettess, R. Infiltration drainage – Manual of good practice.
London: CIRIA



Plan Legend:

Soakaway Test Locations

Kirkby			
Soakaway Test Location Plan			
SIZE: A3	JOB NO: 16257	DWG NO: Fig No. 1	REV: 1
SCALE: 1:500		7/11/24	SHEET 1 OF 1



SOUTH WEST GEOTECHNICAL

South West Geotechnical Ltd,
Unit 3 Brooklands, Howden Road,
Tiverton, Devon.
EX16 5HW
01884 252 444

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SOUTH WEST GEOTECHNICAL				Web: www.swgeotech.co.uk Email: mail@swgeotech.co.uk Phone: 01884 252444			Site Kirkby Infiltration Rates		Trial Pit Number TP02	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client EDF		Job Number 16257		
		Location		Dates 23/10/2024		Engineer		Sheet 1/1		
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water	
						MADE GROUND: Grass over soft to firm Black brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse quartzite, brick, sandstone, plastic and metal.				
					(1.50)	Firm.				
					1.50	orange brown slightly gravelly clayey SAND with boulder sized pockets of gravelly CLAY. Gravel is subangular to rounded fine to coarse sandstone.				
					(1.00)					
					2.50	Complete at 2.50m				
Plan					Remarks					
					Scale (approx)		Logged By		Figure No.	
					1:25		TAC			

SOUTH WEST GEOTECHNICAL				Web: www.swgeotech.co.uk Email: mail@swgeotech.co.uk Phone: 01884 252444		Site Kirkby Infiltration Rates		Trial Pit Number TP04	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client EDF		Job Number 16257	
		Location		Dates 23/10/2024		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
					(0.30)	MADE GROUND: Orange brown gravelly SAND. Gravel is subangular to rounded fine to coarse sandstone.			
					0.30	MADE GROUND: Firm brown slightly gravelly slightly sandy CLAY with low cobble and low boulder content. Gravel is subangular to subrounded fine to coarse brick, sandstone, metal, concrete, tarmac and plastic. Cobbles are subangular tarmac and concrete. Boulders are subangular concrete and tarmac.			
					(0.75)				
					1.05	Orange brown SANDSTONE.			
					1.10	Complete at 1.10m			
Plan					Remarks				
					Scale (approx)		Logged By		Figure No.
					1:25		TAC		

SOUTH WEST GEOTECHNICAL				Web: www.swgeotech.co.uk Email: mail@swgeotech.co.uk Phone: 01884 252444		Site Kirkby Infiltration Rates		Trial Pit Number TP01	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client EDF		Job Number 16257	
		Location		Dates 23/10/2024		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
					(0.20) 0.20	MADE GROUND: Soft black brown slightly gravelly slightly sandy CLAY. Gravel is subangular to subrounded fine to coarse quartzite, brick, plastic. Strong eggy odour.			
					(0.70)	MADE GROUND: Black gravelly slightly clayey SAND. Gravel is subangular to rounded fine to coarse quartzite, sandstone, brick, metal and plastic. Strong eggy odour.			
					0.90 (0.10) 1.00	Firm orange brown slightly gravelly slightly sandy CLAY. Gravel is subangular to rounded fine to coarse sandstone.			
					(1.00)	Orange brown gravelly slightly clayey SAND. Gravel is subangular to rounded fine to coarse sandstone.			
					2.00	Complete at 2.00m			
Plan					Remarks				
					Scale (approx) 1:25				
					Logged By TAC				
					Figure No.				

SOUTH WEST GEOTECHNICAL				Web: www.swgeotech.co.uk Email: mail@swgeotech.co.uk Phone: 01884 252444		Site Kirkby Infiltration Rates		Trial Pit Number TP02	
Excavation Method Trial Pit		Dimensions		Ground Level (mOD)		Client EDF		Job Number 16257	
		Location		Dates 23/10/2024		Engineer		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend	Water
						MADE GROUND: Grass over soft to firm Black brown slightly gravelly sandy CLAY. Gravel is subangular to subrounded fine to coarse quartzite, brick, sandstone, plastic and metal.			
					(1.50)	Firm.			
					1.50	orange brown slightly gravelly clayey SAND with boulder sized pockets of gravelly CLAY. Gravel is subangular to rounded fine to coarse sandstone.			
					(1.00)				
					2.50	Complete at 2.50m			
Plan					Remarks				
					Scale (approx)		Logged By		Figure No.
					1:25		TAC		

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INSITU SOAKAWAY TEST RESULTS

Page 1 of 1

Trialpit No.: TP01

Soil Profile:

Depth (m)	Description	
	From:	To:
0.00	0.20	MADE GROUND: Soft black brown gravelly sandy CLAY. Gravels of quartzite, brick and plastic.
0.20	0.90	MADE GROUND: Black gravelly clayey SAND. Gravels of quartzite, brick, metal and plastic.
0.90	1.00	Firm orange brown gravelly sandy CLAY. Gravel of sandstone.
1.00	2.00	Orange brown gravelly clayey SAND. Gravel of sandstone.

Sketch plan of test zone

Not to scale

All dimensions in metres.

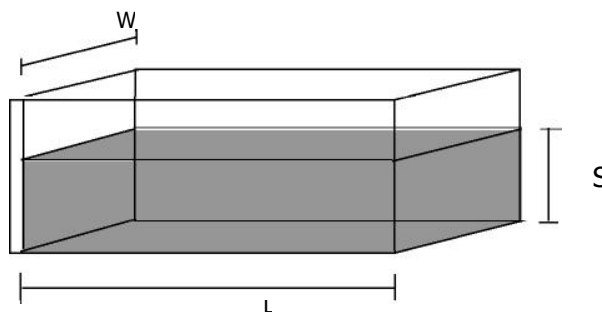
D = Depth of test pit = 2.00

W = Width of test pit = 0.75

L = Length of test pit = 1.85

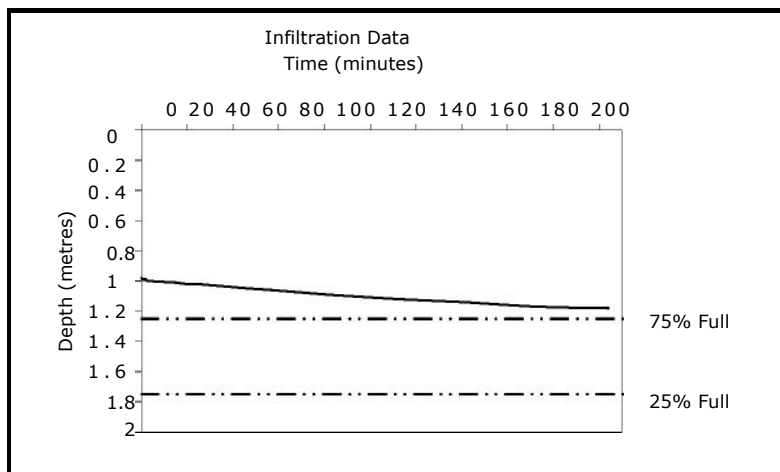
S = Storage depth (of water) = 1.00 D

N = Porosity = 1



Soakaway Test Run 1

Test Date: 23/10/2024



Time (minutes)	Depth (m)
0	0.98
1	0.99
2	0.99
3	1.00
15	1.01
20	1.02
25	1.02
47	1.05
57	1.06
82	1.09
112	1.12
142	1.14
172	1.17
204	1.18

Notes: Very little dissipation of the water added occurred over a 3.5hr period. It is therefore considered that the soils are practically impermeable. Runs 2 and 3 cancelled.

Test and analysis carried out in general accordance with BRE Digest 365 : 2016

Job No.: 16257
Site: Kirkby Infiltration Rates
Client: EDF



INSITU SOAKAWAY TEST RESULTS

Page 1 of 1

Trialpit No.: TP02

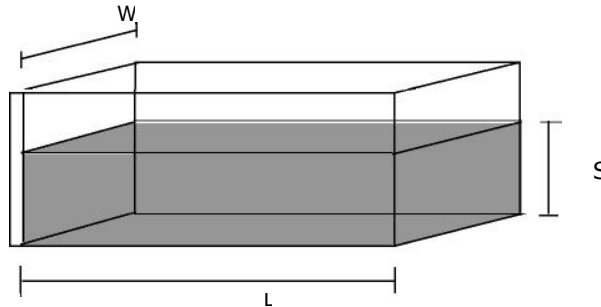
Soil Profile:

Depth (m)	Description
From:	To:
0.00	1.50 MADE GROUND: soft to firm black brown gravelly sandy CLAY. Gravels of Quartzite, brick, sandstone, plastic and metal.

Sketch plan of test zone

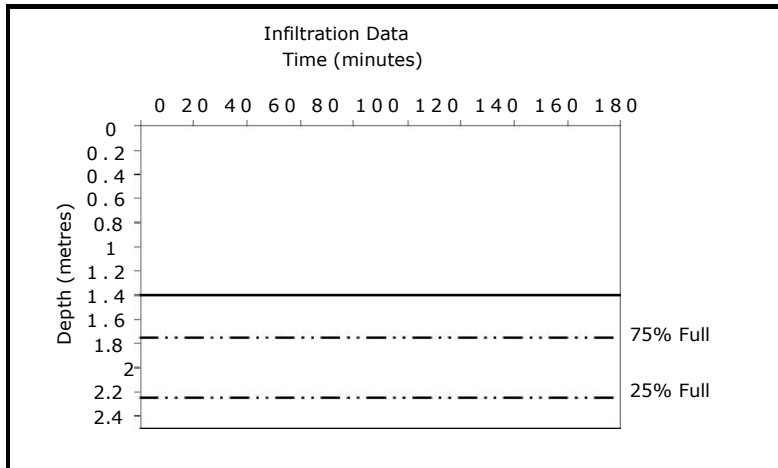
Not to scale
All dimensions in metres.

D = Depth of test pit = 2.50
W = Width of test pit = 0.80
L = Length of test pit = 1.80
S = Storage depth (of water) = 1.00 D
N = Porosity = 1



1.50 2.50 Orange brown gravelly clayey SAND. Gravels of sandstone.

Soakaway Test Run 1



Time (minutes)	Depth (m)
0	1.40
1	1.40
2	1.40
3	1.40
4	1.40
5	1.40
10	1.40
15	1.40
20	1.40
30	1.40
60	1.40
90	1.40
120	1.40
180	1.40

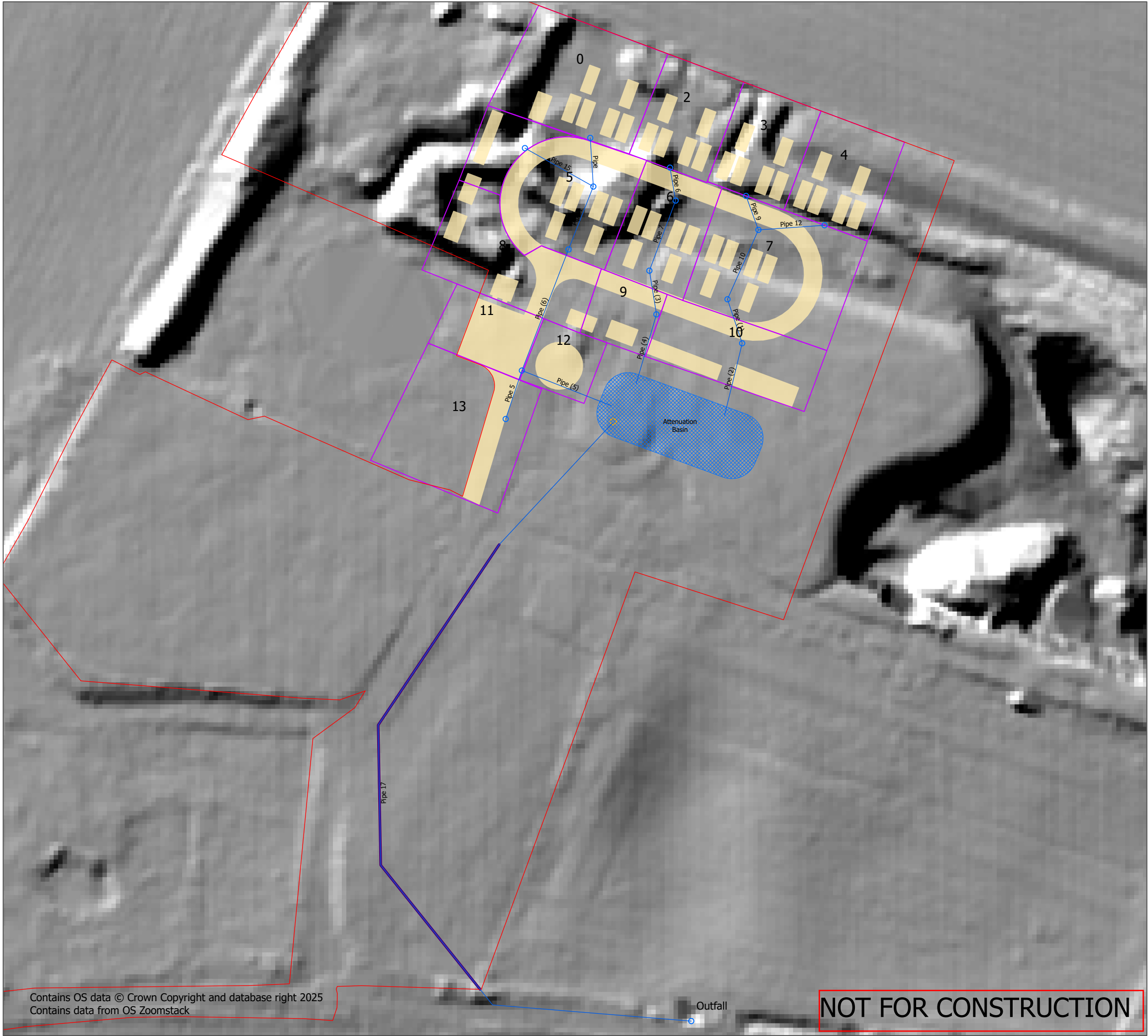
Notes: No dissipation of the water added occurred over a 3hr period. It is therefore considered that the soils are practically impermeable. Runs 2 and 3 cancelled.

Test and analysis carried out in general accordance with BRE Digest 365 : 2016

Job No.: 16257
Site: Kirkby Infiltration Rates
Client: EDF



APPENDIX D: SURFACE WATER DRAINAGE LAYOUT



- Site Boundary
- Catchments
- Hydrobrakes
- Filter Drain
- Impermeable Areas
- Manholes
- Pipe Network
- Attenuation Basin



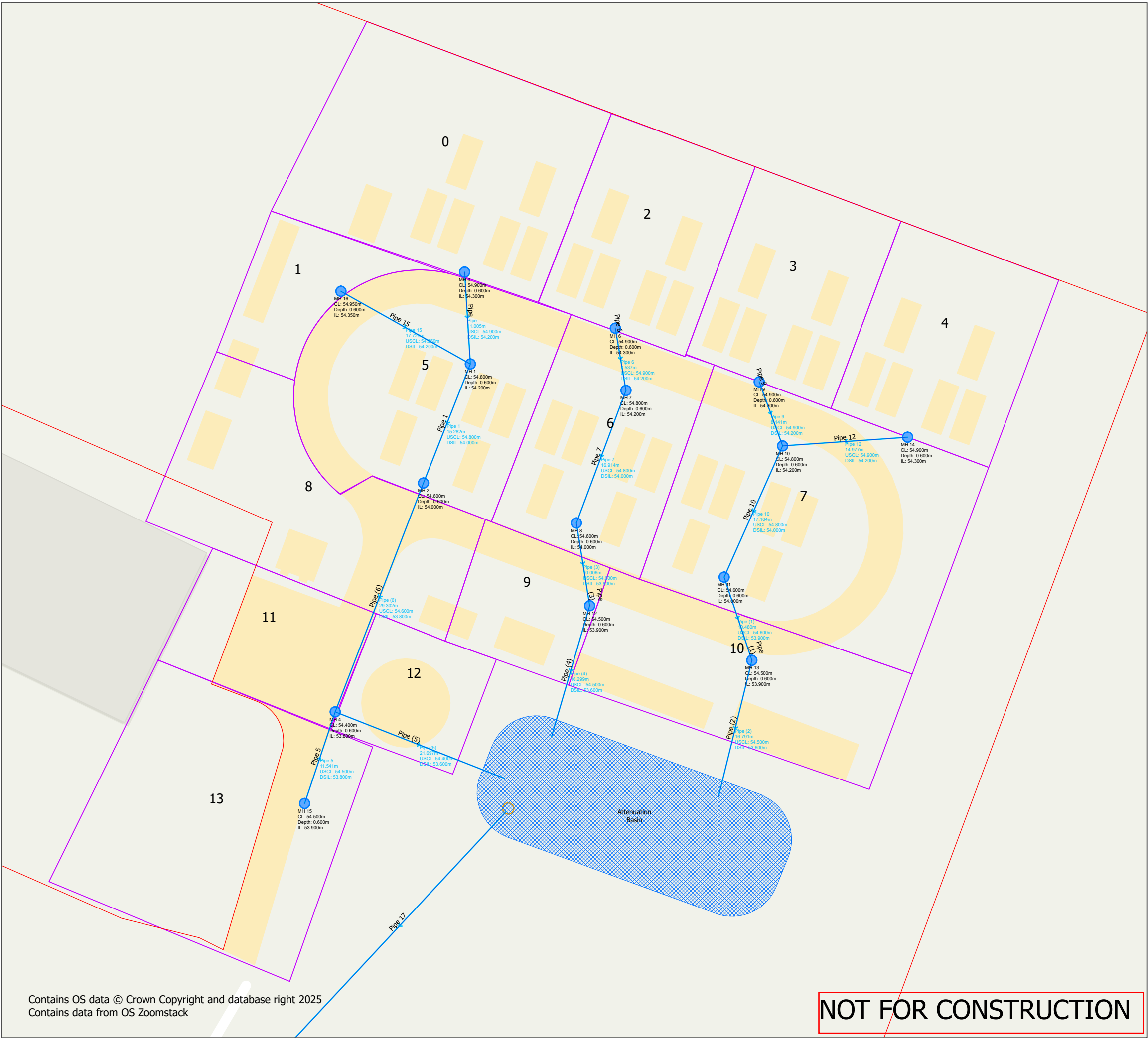
Produced By: CH	Ref: 046-SWDS-002
Checked By: LN	Date: 31/03/2025

Surface Water Drainage Layout
Appendix D

Surface Water Drainage Strategy
Kirkby BESS

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Contains data from OS Zoomstack

NOT FOR CONSTRUCTION



- Site Boundary
- Pipe Network
- Attenuation Basin
- Manholes
- Catchments
- Hydrobrakes
- Impermeable Areas



Produced By: CH	Ref: 046-SWDS-003
Checked By: LN	Date: 31/03/2025

Surface Water Drainage Layout
Appendix D

Surface Water Drainage Strategy
Kirkby BESS

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Contains data from OS Zoomstack

NOT FOR CONSTRUCTION

APPENDIX E: INFORDRAINAGE RESULTS

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





Catchment Area 0

Type : Catchment Area

Area (ha)	0.08
-----------	------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	13.6
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	13.6



Catchment Area 1

Type : Catchment Area

Area (ha)	0.022
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	33.2
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	33.3



Catchment Area 2

Type : Catchment Area

Area (ha)	0.045
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	19.7
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	19.7

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





Catchment Area 3

Type : Catchment Area

Area (ha)	0.044
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	20.1
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	19.9



Catchment Area 4

Type : Catchment Area

Area (ha)	0.048
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	18.5
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	18.3



Catchment Area 5

Type : Catchment Area

Area (ha)	0.069
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	42.4
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	42.1

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





Catchment Area 6

Type : Catchment Area

Area (ha)	0.05
-----------	------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	32.9
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	32.5



Catchment Area 7

Type : Catchment Area

Area (ha)	0.093
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	35.9
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	29.9



Catchment Area 8

Type : Catchment Area

Area (ha)	0.064
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	18.6
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	27

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





Catchment Area 9

Type : Catchment Area

Area (ha)	0.024
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	40.6
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	40.1



Catchment Area 10

Type : Catchment Area

Area (ha)	0.056
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	33
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	23.7



Catchment Area 11

Type : Catchment Area

Area (ha)	0.032
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	70.4
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	72.2

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





Catchment Area 12

Type : Catchment Area

Area (ha)	0.023
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	37.5
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	37.4



Catchment Area 13

Type : Catchment Area

Area (ha)	0.087
-----------	-------

Preliminary Sizing

Volumetric Runoff Coefficient	0.750
Percentage Impervious (%)	13.9
Time of Concentration (mins)	5

Dynamic Sizing

Runoff Method	Time of Concentration
Summer Volumetric Runoff	0.750
Winter Volumetric Runoff	0.750
Time of Concentration (mins)	5
Percentage Impervious (%)	13.9

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
	Report Details: Type: Junctions Storm Phase: Adjusted invert levels		
www.raincloud-consulting.co.uk:			 

Name	Junction Type	Easting (m)	Northing (m)	Cover Level (m)	Depth (m)	Invert Level (m)	Chamber Shape	Diameter (m)
MH 0	Manhole	344527.124	397619.940	54.900	0.600	54.300	Circular	1.200
MH 1	Manhole	344528.078	397610.716	54.800	0.600	54.200	Circular	1.200
MH 2	Manhole	344522.213	397594.736	54.600	0.600	54.000	Circular	1.200
MH 4	Manhole	344511.669	397567.397	54.400	0.600	53.800	Circular	1.200
MH 6	Manhole	344545.135	397613.226	54.900	0.600	54.300	Circular	1.200
MH 7	Manhole	344546.406	397605.797	54.800	0.600	54.200	Circular	1.200
MH 8	Manhole	344540.480	397589.955	54.600	0.600	54.000	Circular	1.200
MH 9	Manhole	344562.324	397606.819	54.900	0.600	54.300	Circular	1.200
MH 10	Manhole	344565.114	397599.171	54.800	0.600	54.200	Circular	1.200
MH 11	Manhole	344558.133	397583.492	54.600	0.600	54.000	Circular	1.200
MH 12	Manhole	344542.069	397580.076	54.500	0.600	53.900	Circular	1.200
MH 13	Manhole	344561.446	397573.549	54.500	0.600	53.900	Circular	1.200
MH 14	Manhole	344580.055	397600.210	54.900	0.600	54.300	Circular	1.200
MH 15	Manhole	344508.015	397556.449	54.500	0.600	53.900	Circular	1.200
MH 16	Manhole	344512.354	397617.638	54.950	0.600	54.350	Circular	1.200
Outfall	Manhole	344561.539	397420.376	52.500	0.500	52.000	Circular	1.200

Name	Lock
MH 0	None
MH 1	None
MH 2	None
MH 4	None
MH 6	None
MH 7	None
MH 8	None
MH 9	None
MH 10	None
MH 11	None
MH 12	None
MH 13	None
MH 14	None
MH 15	None
MH 16	None
Outfall	None

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Junctions Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		



Inlets

Junction	Inlet Name	Incoming Item(s)	Bypass Destination	Capacity Type
MH 0	Inlet	Catchment Area 0	(None)	No Restriction
MH 1	Inlet (1)	Pipe Catchment Area 5	(None)	No Restriction
	Inlet (2)	Pipe 15	(None)	No Restriction
MH 2	Inlet	Catchment Area 8	(None)	No Restriction
	Inlet (1)	Pipe 1	(None)	No Restriction
MH 4	Inlet	Catchment Area 11 Pipe 5 Catchment Area 12	(None)	No Restriction
	Inlet (2)	Pipe (6)	(None)	No Restriction
MH 6	Inlet	Catchment Area 2	(None)	No Restriction
MH 7	Inlet	Pipe 6	(None)	No Restriction
MH 8	Inlet	Catchment Area 6 Pipe 7	(None)	No Restriction
MH 9	Inlet (1)	Catchment Area 3	(None)	No Restriction
MH 10	Inlet (1)	Pipe 9 Pipe 12	(None)	No Restriction
MH 11	Inlet	Catchment Area 7 Pipe 10	(None)	No Restriction
MH 12	Inlet	Catchment Area 9	(None)	No Restriction
	Inlet (1)	Pipe (3)	(None)	No Restriction
MH 13	Inlet	Catchment Area 10	(None)	No Restriction
	Inlet (1)	Pipe (1)	(None)	No Restriction
MH 14	Inlet	Catchment Area 4	(None)	No Restriction
MH 15	Inlet	Catchment Area 13	(None)	No Restriction
MH 16	Inlet	Catchment Area 1	(None)	No Restriction
Outfall	Inlet	Pipe 17	(None)	No Restriction

Outlets

Junction	Outlet Name	Outgoing Connection	Outlet Type
MH 0	Outlet	Pipe	Free Discharge
MH 1	Outlet	Pipe 1	Free Discharge
MH 2	Outlet	Pipe (6)	Free Discharge
MH 4	Outlet	Pipe (5)	Free Discharge
MH 6	Outlet	Pipe 6	Free Discharge
MH 7	Outlet	Pipe 7	Free Discharge
MH 8	Outlet (1)	Pipe (3)	Free Discharge
MH 9	Outlet	Pipe 9	Free Discharge
MH 10	Outlet	Pipe 10	Free Discharge
MH 11	Outlet	Pipe (1)	Free Discharge
MH 12	Outlet (1)	Pipe (4)	Free Discharge
MH 13	Outlet	Pipe (2)	Free Discharge
MH 14	Outlet	Pipe 12	Free Discharge
MH 15	Outlet	Pipe 5	Free Discharge
MH 16	Outlet	Pipe 15	Free Discharge

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





Attenuation Basin

Type : Pond

Dimensions

Exceedance Level (m)	54.100
Depth (m)	0.500
Base Level (m)	53.600
Freeboard (mm)	0
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:X)	4.059
Total Volume (m³)	232.672

Depth (m)	Area (m²)	Volume (m³)
0.000	390.00	0.000
0.500	545.00	232.672

Inlets

Inlet (2)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (4)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (3)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (2)
Bypass Destination	(None)
Capacity Type	No Restriction

Inlet (4)

Inlet Type	Point Inflow
Incoming Item(s)	Pipe (5)
Bypass Destination	(None)
Capacity Type	No Restriction

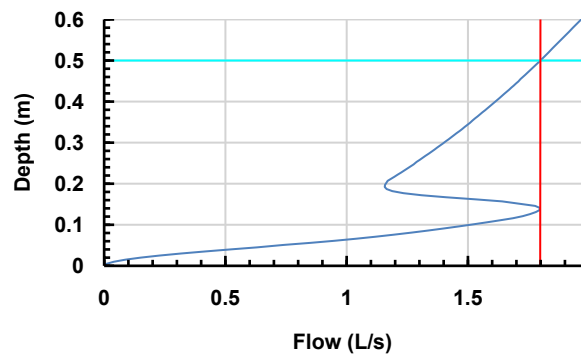
Kirkby BESS:	Date: 28/03/2025			 RAINCLOUD
	Designed by: CH	Checked by: LN	Approved By: LN	
Report Details:	www.raincloud-consulting.co.uk:			
Type: Stormwater Controls Storm Phase: Adjusted invert levels				

Outlets

Outlet

Outgoing Connection	Pipe 17
Outlet Type	Hydro-Brake®
Invert Level (m)	53.600
Design Depth (m)	0.500
Design Flow (L/s)	1.8
Objective	Minimise Upstream Storage Requirements
Application	Surface Water Only
Sump Available	☐

Unit Reference	CHE-0070-1800-0500-1800
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Advanced

Base Infiltration Rate (m/hr)	0.0
Side Infiltration Rate (m/hr)	0.0
Safety Factor	1.5
Perimeter	Circular
Length (m)	53.988
Friction Scheme	Manning's n
n	0.035

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
	Report Details: Type: Connections Storm Phase: Adjusted invert levels		
www.raincloud-consulting.co.uk:			

Name	Length (m)	Connection Type	Slope (1:X)	Manning's n	Colebrook-White Roughness (mm)	Diameter / Base Width (mm)	Upstream Cover Level (m)	Upstream Invert Level (m)
Pipe	9.273	Pipe	92.726		0.6	200	54.900	54.300
Pipe 1	17.023	Pipe	85.113		0.6	225	54.800	54.200
Pipe 5	11.541	Pipe	115.414		0.6	200	54.500	53.900
Pipe 6	7.537	Pipe	75.370		0.6	200	54.900	54.300
Pipe 7	16.914	Pipe	84.570		0.6	200	54.800	54.200
Pipe 9	8.141	Pipe	81.410		0.6	200	54.900	54.300
Pipe 10	17.164	Pipe	85.818		0.6	200	54.800	54.200
Pipe 12	14.977	Pipe	149.768		0.6	200	54.900	54.300
Pipe 15	17.180	Pipe	114.533		0.6	200	54.950	54.350
Pipe 17	213.494	Pipe	133.434		0.6	225	54.100	53.600
Pipe (1)	10.480	Pipe	104.796		0.6	200	54.600	54.000
Pipe (3)	10.006	Pipe	100.063		0.6	200	54.600	54.000
Pipe (4)	16.712	Pipe	55.707		0.6	200	54.500	53.900
Pipe (2)	17.860	Pipe	59.535		0.6	200	54.500	53.900
Pipe (5)	20.125	Pipe	100.627		0.6	225	54.400	53.800
Pipe (6)	29.302	Pipe	146.511		0.6	225	54.600	54.000

Name	Downstream Cover Level (m)	Downstream Invert Level (m)	Part Family	Lock	Flow Restriction (L/s)	Culvert Type	Culvert Entrance
Pipe	54.800	54.200		None		(None)	(None)
Pipe 1	54.600	54.000		None		(None)	(None)
Pipe 5	54.400	53.800		None		(None)	(None)
Pipe 6	54.800	54.200		None		(None)	(None)
Pipe 7	54.600	54.000		None		(None)	(None)
Pipe 9	54.800	54.200		None		(None)	(None)
Pipe 10	54.600	54.000		None		(None)	(None)
Pipe 12	54.800	54.200		None		(None)	(None)
Pipe 15	54.800	54.200		None		(None)	(None)
Pipe 17	52.500	52.000		None	1.8	(None)	(None)
Pipe (1)	54.500	53.900		None		(None)	(None)
Pipe (3)	54.500	53.900		None		(None)	(None)
Pipe (4)	54.100	53.600		None		(None)	(None)
Pipe (2)	54.100	53.600		None		(None)	(None)
Pipe (5)	54.100	53.600		None		(None)	(None)
Pipe (6)	54.400	53.800		None		(None)	(None)

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Network Design Criteria Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		



Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

FEH

Type: FEH

Site Location	GB 344100 397250 SJ 44100 97250
Return Period (years)	30.0
Rainfall Version	2022

Pipe Options

Lock Slope Options	None
Design Options	Minimise Excavation
Design Level	Level Soffits
Min. Cover Depth (m)	0.600
Min. Slope (1:X)	500.00
Max. Slope (1:X)	30.00
Min. Velocity (m/s)	1.0
Max. Velocity (m/s)	3.0
Use Flow Restriction	☐
Reduce Channel Depths	☐

Manhole Options

Apply Offset	☐
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Kirkby BESS:	Date: 28/03/2025			
	Designed by: CH	Checked by: LN	Approved By: LN	
Report Details:	www.raincloud-consulting.co.uk:			
Type: Outfall Details Storm Phase: Adjusted invert levels				

Outfalls

Outfall	Outfall Type	Gated	Fixed Surcharged Level (m)	Level Curve
Outfall	Free Discharge			

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
	Report Title: Rainfall Analysis Criteria		
www.raincloud-consulting.co.uk:			

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Shortest
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall		
FEH		Type: FEH
Site Location	GB 344100 397250 SJ 44100 97250	
Rainfall Version	2022	
Summer	☒	
Winter	☒	

Return Period

Return Period (years)	Increase Rainfall (%)
30.0	0.000
100.0	0.000
30.0	30.000
100.0	30.000
30.0	40.000
100.0	45.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
240	480
360	720
480	960
960	1920
1440	2880

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area 0	FEH: 30 years: +0 %: 15 mins: Summer	0.08	3.2	1.383
Catchment Area 1	FEH: 30 years: +0 %: 15 mins: Summer	0.02	2.1	0.915
Catchment Area 2	FEH: 30 years: +0 %: 15 mins: Summer	0.04	2.6	1.116
Catchment Area 3	FEH: 30 years: +0 %: 15 mins: Summer	0.04	2.6	1.116
Catchment Area 4	FEH: 30 years: +0 %: 15 mins: Summer	0.05	2.6	1.113
Catchment Area 5	FEH: 30 years: +0 %: 15 mins: Summer	0.07	8.5	3.705
Catchment Area 6	FEH: 30 years: +0 %: 15 mins: Summer	0.05	4.7	2.046
Catchment Area 7	FEH: 30 years: +0 %: 15 mins: Summer	0.09	8.1	3.516
Catchment Area 8	FEH: 30 years: +0 %: 15 mins: Summer	0.06	5.0	2.184
Catchment Area 9	FEH: 30 years: +0 %: 15 mins: Summer	0.02	2.8	1.215
Catchment Area 10	FEH: 30 years: +0 %: 15 mins: Summer	0.06	3.9	1.683
Catchment Area 11	FEH: 30 years: +0 %: 15 mins: Summer	0.03	6.7	2.928
Catchment Area 12	FEH: 30 years: +0 %: 15 mins: Summer	0.02	2.5	1.074
Catchment Area 13	FEH: 30 years: +0 %: 15 mins: Summer	0.09	3.5	1.527

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area 0	FEH: 100 years: +0 %: 15 mins: Summer	0.08	3.9	1.716
Catchment Area 1	FEH: 100 years: +0 %: 15 mins: Summer	0.02	2.6	1.134
Catchment Area 2	FEH: 100 years: +0 %: 15 mins: Summer	0.04	3.2	1.389
Catchment Area 3	FEH: 100 years: +0 %: 15 mins: Summer	0.04	3.2	1.389
Catchment Area 4	FEH: 100 years: +0 %: 15 mins: Summer	0.05	3.2	1.386
Catchment Area 5	FEH: 100 years: +0 %: 15 mins: Summer	0.07	10.6	4.605
Catchment Area 6	FEH: 100 years: +0 %: 15 mins: Summer	0.05	5.8	2.538
Catchment Area 7	FEH: 100 years: +0 %: 15 mins: Summer	0.09	10.1	4.371
Catchment Area 8	FEH: 100 years: +0 %: 15 mins: Summer	0.06	6.3	2.715
Catchment Area 9	FEH: 100 years: +0 %: 15 mins: Summer	0.02	3.5	1.509
Catchment Area 10	FEH: 100 years: +0 %: 15 mins: Summer	0.06	4.8	2.091
Catchment Area 11	FEH: 100 years: +0 %: 15 mins: Summer	0.03	8.4	3.645
Catchment Area 12	FEH: 100 years: +0 %: 15 mins: Summer	0.02	3.1	1.332
Catchment Area 13	FEH: 100 years: +0 %: 15 mins: Summer	0.09	4.4	1.899

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 30 years: Increase Rainfall (%): +30: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area 0	FEH: 30 years: +30 %: 15 mins: Summer	0.08	4.1	1.794
Catchment Area 1	FEH: 30 years: +30 %: 15 mins: Summer	0.02	2.7	1.188
Catchment Area 2	FEH: 30 years: +30 %: 15 mins: Summer	0.04	3.3	1.449
Catchment Area 3	FEH: 30 years: +30 %: 15 mins: Summer	0.04	3.3	1.449
Catchment Area 4	FEH: 30 years: +30 %: 15 mins: Summer	0.05	3.3	1.449
Catchment Area 5	FEH: 30 years: +30 %: 15 mins: Summer	0.07	11.1	4.818
Catchment Area 6	FEH: 30 years: +30 %: 15 mins: Summer	0.05	6.1	2.655
Catchment Area 7	FEH: 30 years: +30 %: 15 mins: Summer	0.09	10.5	4.572
Catchment Area 8	FEH: 30 years: +30 %: 15 mins: Summer	0.06	6.5	2.835
Catchment Area 9	FEH: 30 years: +30 %: 15 mins: Summer	0.02	3.6	1.581
Catchment Area 10	FEH: 30 years: +30 %: 15 mins: Summer	0.06	5.0	2.190
Catchment Area 11	FEH: 30 years: +30 %: 15 mins: Summer	0.03	8.8	3.807
Catchment Area 12	FEH: 30 years: +30 %: 15 mins: Summer	0.02	3.2	1.392
Catchment Area 13	FEH: 30 years: +30 %: 15 mins: Summer	0.09	4.6	1.989

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 100 years: Increase Rainfall (%): +30: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area 0	FEH: 100 years: +30 %: 15 mins: Summer	0.08	5.1	2.229
Catchment Area 1	FEH: 100 years: +30 %: 15 mins: Summer	0.02	3.4	1.476
Catchment Area 2	FEH: 100 years: +30 %: 15 mins: Summer	0.04	4.2	1.803
Catchment Area 3	FEH: 100 years: +30 %: 15 mins: Summer	0.04	4.2	1.809
Catchment Area 4	FEH: 100 years: +30 %: 15 mins: Summer	0.05	4.1	1.800
Catchment Area 5	FEH: 100 years: +30 %: 15 mins: Summer	0.07	13.8	5.988
Catchment Area 6	FEH: 100 years: +30 %: 15 mins: Summer	0.05	7.6	3.300
Catchment Area 7	FEH: 100 years: +30 %: 15 mins: Summer	0.09	13.1	5.682
Catchment Area 8	FEH: 100 years: +30 %: 15 mins: Summer	0.06	8.1	3.531
Catchment Area 9	FEH: 100 years: +30 %: 15 mins: Summer	0.02	4.5	1.965
Catchment Area 10	FEH: 100 years: +30 %: 15 mins: Summer	0.06	6.3	2.718
Catchment Area 11	FEH: 100 years: +30 %: 15 mins: Summer	0.03	10.9	4.737
Catchment Area 12	FEH: 100 years: +30 %: 15 mins: Summer	0.02	4.0	1.734
Catchment Area 13	FEH: 100 years: +30 %: 15 mins: Summer	0.09	5.7	2.475

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area 0	FEH: 30 years: +40 %: 15 mins: Summer	0.08	4.4	1.932
Catchment Area 1	FEH: 30 years: +40 %: 15 mins: Summer	0.02	2.9	1.275
Catchment Area 2	FEH: 30 years: +40 %: 15 mins: Summer	0.04	3.6	1.563
Catchment Area 3	FEH: 30 years: +40 %: 15 mins: Summer	0.04	3.6	1.563
Catchment Area 4	FEH: 30 years: +40 %: 15 mins: Summer	0.05	3.6	1.560
Catchment Area 5	FEH: 30 years: +40 %: 15 mins: Summer	0.07	11.9	5.187
Catchment Area 6	FEH: 30 years: +40 %: 15 mins: Summer	0.05	6.6	2.862
Catchment Area 7	FEH: 30 years: +40 %: 15 mins: Summer	0.09	11.3	4.923
Catchment Area 8	FEH: 30 years: +40 %: 15 mins: Summer	0.06	7.0	3.060
Catchment Area 9	FEH: 30 years: +40 %: 15 mins: Summer	0.02	3.9	1.701
Catchment Area 10	FEH: 30 years: +40 %: 15 mins: Summer	0.06	5.4	2.361
Catchment Area 11	FEH: 30 years: +40 %: 15 mins: Summer	0.03	9.4	4.101
Catchment Area 12	FEH: 30 years: +40 %: 15 mins: Summer	0.02	3.5	1.503
Catchment Area 13	FEH: 30 years: +40 %: 15 mins: Summer	0.09	4.9	2.145

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Inflows Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
Catchment Area 0	FEH: 100 years: +45 %: 15 mins: Summer	0.08	5.7	2.484
Catchment Area 1	FEH: 100 years: +45 %: 15 mins: Summer	0.02	3.8	1.644
Catchment Area 2	FEH: 100 years: +45 %: 15 mins: Summer	0.04	4.6	2.013
Catchment Area 3	FEH: 100 years: +45 %: 15 mins: Summer	0.04	4.6	2.013
Catchment Area 4	FEH: 100 years: +45 %: 15 mins: Summer	0.05	4.6	2.010
Catchment Area 5	FEH: 100 years: +45 %: 15 mins: Summer	0.07	15.4	6.675
Catchment Area 6	FEH: 100 years: +45 %: 15 mins: Summer	0.05	8.5	3.684
Catchment Area 7	FEH: 100 years: +45 %: 15 mins: Summer	0.09	14.6	6.339
Catchment Area 8	FEH: 100 years: +45 %: 15 mins: Summer	0.06	9.1	3.936
Catchment Area 9	FEH: 100 years: +45 %: 15 mins: Summer	0.02	5.0	2.190
Catchment Area 10	FEH: 100 years: +45 %: 15 mins: Summer	0.06	7.0	3.039
Catchment Area 11	FEH: 100 years: +45 %: 15 mins: Summer	0.03	12.2	5.283
Catchment Area 12	FEH: 100 years: +45 %: 15 mins: Summer	0.02	4.4	1.932
Catchment Area 13	FEH: 100 years: +45 %: 15 mins: Summer	0.09	6.4	2.757

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Junctions Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flooded Volume

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH 0	FEH: 30 years: +0 %: 15 mins: Summer	54.90 0	54.30 0	54.337	0.037	3.2	0.042	0.000	3.1	1.382	OK
MH 1	FEH: 30 years: +0 %: 15 mins: Summer	54.80 0	54.20 0	54.276	0.076	13.6	0.086	0.000	12.9	5.998	OK
MH 2	FEH: 30 years: +0 %: 15 mins: Summer	54.60 0	54.00 0	54.100	0.100	18.0	0.113	0.000	16.9	8.170	OK
MH 4	FEH: 30 years: +0 %: 15 mins: Summer	54.40 0	53.80 0	53.928	0.128	29.5	0.145	0.000	27.8	13.708	OK
MH 6	FEH: 30 years: +0 %: 15 mins: Summer	54.90 0	54.30 0	54.334	0.034	2.6	0.038	0.000	2.5	1.115	OK
MH 7	FEH: 30 years: +0 %: 15 mins: Summer	54.80 0	54.20 0	54.232	0.032	2.5	0.036	0.000	2.4	1.111	OK
MH 8	FEH: 30 years: +0 %: 15 mins: Summer	54.60 0	54.00 0	54.060	0.060	7.1	0.068	0.000	6.7	3.155	OK
MH 9	FEH: 30 years: +0 %: 15 mins: Summer	54.90 0	54.30 0	54.334	0.034	2.6	0.038	0.000	2.5	1.115	OK
MH 10	FEH: 30 years: +0 %: 15 mins: Summer	54.80 0	54.20 0	54.245	0.045	4.9	0.051	0.000	4.6	2.220	OK
MH 11	FEH: 30 years: +0 %: 15 mins: Summer	54.60 0	54.00 0	54.085	0.085	12.7	0.097	0.000	12.2	5.733	OK
MH 12	FEH: 30 years: +0 %: 15 mins: Summer	54.50 0	53.90 0	53.960	0.060	9.5	0.068	0.000	9.2	4.375	OK
MH 13	FEH: 30 years: +0 %: 15 mins: Summer	54.50 0	53.90 0	53.984	0.084	16.1	0.095	0.000	15.6	7.423	OK
MH 14	FEH: 30 years: +0 %: 15 mins: Summer	54.90 0	54.30 0	54.338	0.038	2.6	0.043	0.000	2.4	1.112	OK
MH 15	FEH: 30 years: +0 %: 15 mins: Summer	54.50 0	53.90 0	53.941	0.041	3.5	0.046	0.000	3.4	1.526	OK
MH 16	FEH: 30 years: +0 %: 15 mins: Summer	54.95 0	54.35 0	54.381	0.031	2.1	0.035	0.000	2.0	0.913	OK
Outfall	FEH: 30 years: +0 %: 15 mins: Summer	52.50 0	52.00 0	52.018	0.018	0.6	0.000	0.000	0.6	0.448	OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Junctions Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flooded Volume

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH 0	FEH: 100 years: +0 %: 15 mins: Summer	54.90 0	54.30 0	54.341	0.041	3.9	0.047	0.000	3.8	1.715	OK
MH 1	FEH: 100 years: +0 %: 15 mins: Summer	54.80 0	54.20 0	54.287	0.087	16.9	0.099	0.000	16.1	7.450	OK
MH 2	FEH: 100 years: +0 %: 15 mins: Summer	54.60 0	54.00 0	54.115	0.115	22.4	0.130	0.000	21.0	10.153	OK
MH 4	FEH: 100 years: +0 %: 15 mins: Summer	54.40 0	53.80 0	53.946	0.146	36.4	0.165	0.000	34.3	17.041	OK
MH 6	FEH: 100 years: +0 %: 15 mins: Summer	54.90 0	54.30 0	54.338	0.038	3.2	0.043	0.000	3.1	1.388	OK
MH 7	FEH: 100 years: +0 %: 15 mins: Summer	54.80 0	54.20 0	54.236	0.036	3.1	0.041	0.000	3.0	1.384	OK
MH 8	FEH: 100 years: +0 %: 15 mins: Summer	54.60 0	54.00 0	54.068	0.068	8.8	0.077	0.000	8.4	3.920	OK
MH 9	FEH: 100 years: +0 %: 15 mins: Summer	54.90 0	54.30 0	54.338	0.038	3.2	0.043	0.000	3.1	1.389	OK
MH 10	FEH: 100 years: +0 %: 15 mins: Summer	54.80 0	54.20 0	54.250	0.050	6.2	0.057	0.000	5.8	2.765	OK
MH 11	FEH: 100 years: +0 %: 15 mins: Summer	54.60 0	54.00 0	54.098	0.098	15.9	0.111	0.000	15.2	7.134	OK
MH 12	FEH: 100 years: +0 %: 15 mins: Summer	54.50 0	53.90 0	53.968	0.068	11.9	0.077	0.000	11.5	5.436	OK
MH 13	FEH: 100 years: +0 %: 15 mins: Summer	54.50 0	53.90 0	53.995	0.095	20.0	0.107	0.000	19.4	9.234	OK
MH 14	FEH: 100 years: +0 %: 15 mins: Summer	54.90 0	54.30 0	54.343	0.043	3.2	0.049	0.000	3.0	1.385	OK
MH 15	FEH: 100 years: +0 %: 15 mins: Summer	54.50 0	53.90 0	53.955	0.055	4.4	0.062	0.000	3.9	1.898	OK
MH 16	FEH: 100 years: +0 %: 15 mins: Summer	54.95 0	54.35 0	54.385	0.035	2.6	0.039	0.000	2.5	1.132	OK
Outfall	FEH: 100 years: +0 %: 15 mins: Summer	52.50 0	52.00 0	52.021	0.021	0.8	0.000	0.000	0.8	0.663	OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Junctions Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 30 years: Increase Rainfall (%): +30: Critical Storm Per Item: Rank By: Max. Flooded Volume

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH 0	FEH: 30 years: +30 %: 15 mins: Summer	54.90 0	54.30 0	54.342	0.042	4.1	0.048	0.000	4.0	1.793	OK
MH 1	FEH: 30 years: +30 %: 15 mins: Summer	54.80 0	54.20 0	54.290	0.090	17.7	0.101	0.000	16.9	7.795	OK
MH 2	FEH: 30 years: +30 %: 15 mins: Summer	54.60 0	54.00 0	54.118	0.118	23.4	0.134	0.000	22.0	10.618	OK
MH 4	FEH: 30 years: +30 %: 15 mins: Summer	54.40 0	53.80 0	53.950	0.150	38.0	0.170	0.000	35.9	17.819	OK
MH 6	FEH: 30 years: +30 %: 15 mins: Summer	54.90 0	54.30 0	54.339	0.039	3.3	0.044	0.000	3.3	1.448	OK
MH 7	FEH: 30 years: +30 %: 15 mins: Summer	54.80 0	54.20 0	54.237	0.037	3.3	0.041	0.000	3.1	1.444	OK
MH 8	FEH: 30 years: +30 %: 15 mins: Summer	54.60 0	54.00 0	54.070	0.070	9.2	0.079	0.000	8.8	4.097	OK
MH 9	FEH: 30 years: +30 %: 15 mins: Summer	54.90 0	54.30 0	54.339	0.039	3.3	0.044	0.000	3.2	1.449	OK
MH 10	FEH: 30 years: +30 %: 15 mins: Summer	54.80 0	54.20 0	54.251	0.051	6.4	0.058	0.000	6.1	2.888	OK
MH 11	FEH: 30 years: +30 %: 15 mins: Summer	54.60 0	54.00 0	54.101	0.101	16.6	0.114	0.000	15.9	7.458	OK
MH 12	FEH: 30 years: +30 %: 15 mins: Summer	54.50 0	53.90 0	53.969	0.069	12.4	0.078	0.000	12.1	5.685	OK
MH 13	FEH: 30 years: +30 %: 15 mins: Summer	54.50 0	53.90 0	53.998	0.098	21.0	0.110	0.000	20.3	9.658	OK
MH 14	FEH: 30 years: +30 %: 15 mins: Summer	54.90 0	54.30 0	54.344	0.044	3.3	0.050	0.000	3.2	1.448	OK
MH 15	FEH: 30 years: +30 %: 15 mins: Summer	54.50 0	53.90 0	53.959	0.059	4.6	0.067	0.000	4.0	1.988	OK
MH 16	FEH: 30 years: +30 %: 15 mins: Summer	54.95 0	54.35 0	54.386	0.036	2.7	0.040	0.000	2.6	1.186	OK
Outfall	FEH: 30 years: +30 %: 15 mins: Summer	52.50 0	52.00 0	52.022	0.022	0.9	0.000	0.000	0.9	0.715	OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Junctions Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 100 years: Increase Rainfall (%): +30: Critical Storm Per Item: Rank By: Max. Flooded Volume

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH 0	FEH: 100 years: +30 %: 15 mins: Summer	54.900	54.300	54.347	0.047	5.1	0.053	0.000	5.0	2.228	OK
MH 1	FEH: 100 years: +30 %: 15 mins: Summer	54.800	54.200	54.303	0.103	22.0	0.117	0.000	21.0	9.688	OK
MH 2	FEH: 100 years: +30 %: 15 mins: Summer	54.600	54.000	54.137	0.137	29.1	0.155	0.000	27.5	13.206	OK
MH 4	FEH: 100 years: +30 %: 15 mins: Summer	54.400	53.800	53.974	0.174	47.3	0.197	0.000	44.6	22.169	OK
MH 6	FEH: 100 years: +30 %: 15 mins: Summer	54.900	54.300	54.343	0.043	4.2	0.049	0.000	4.1	1.803	OK
MH 7	FEH: 100 years: +30 %: 15 mins: Summer	54.800	54.200	54.241	0.041	4.1	0.046	0.000	3.9	1.798	OK
MH 8	FEH: 100 years: +30 %: 15 mins: Summer	54.600	54.000	54.080	0.080	11.5	0.090	0.000	11.0	5.096	OK
MH 9	FEH: 100 years: +30 %: 15 mins: Summer	54.900	54.300	54.344	0.044	4.2	0.049	0.000	4.0	1.809	OK
MH 10	FEH: 100 years: +30 %: 15 mins: Summer	54.800	54.200	54.258	0.058	8.0	0.065	0.000	7.6	3.599	OK
MH 11	FEH: 100 years: +30 %: 15 mins: Summer	54.600	54.000	54.116	0.116	20.7	0.131	0.000	19.9	9.278	OK
MH 12	FEH: 100 years: +30 %: 15 mins: Summer	54.500	53.900	53.979	0.079	15.5	0.089	0.000	15.0	7.070	OK
MH 13	FEH: 100 years: +30 %: 15 mins: Summer	54.500	53.900	54.011	0.111	26.1	0.126	0.000	25.4	12.009	OK
MH 14	FEH: 100 years: +30 %: 15 mins: Summer	54.900	54.300	54.350	0.050	4.1	0.056	0.000	4.0	1.800	OK
MH 15	FEH: 100 years: +30 %: 15 mins: Summer	54.500	53.900	53.981	0.081	5.7	0.092	0.000	4.9	2.474	OK
MH 16	FEH: 100 years: +30 %: 15 mins: Summer	54.950	54.350	54.390	0.040	3.4	0.045	0.000	3.2	1.474	OK
Outfall	FEH: 100 years: +30 %: 15 mins: Summer	52.500	52.000	52.025	0.025	1.2	0.000	0.000	1.2	0.984	OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Junctions Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flooded Volume

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH 0	FEH: 30 years: +40 %: 15 mins: Summer	54.90 0	54.30 0	54.344	0.044	4.4	0.050	0.000	4.3	1.931	OK
MH 1	FEH: 30 years: +40 %: 15 mins: Summer	54.80 0	54.20 0	54.294	0.094	19.1	0.106	0.000	18.2	8.389	OK
MH 2	FEH: 30 years: +40 %: 15 mins: Summer	54.60 0	54.00 0	54.124	0.124	25.2	0.140	0.000	23.8	11.436	OK
MH 4	FEH: 30 years: +40 %: 15 mins: Summer	54.40 0	53.80 0	53.958	0.158	41.0	0.178	0.000	38.7	19.200	OK
MH 6	FEH: 30 years: +40 %: 15 mins: Summer	54.90 0	54.30 0	54.340	0.040	3.6	0.045	0.000	3.5	1.563	OK
MH 7	FEH: 30 years: +40 %: 15 mins: Summer	54.80 0	54.20 0	54.238	0.038	3.5	0.043	0.000	3.3	1.558	OK
MH 8	FEH: 30 years: +40 %: 15 mins: Summer	54.60 0	54.00 0	54.073	0.073	9.9	0.083	0.000	9.5	4.418	OK
MH 9	FEH: 30 years: +40 %: 15 mins: Summer	54.90 0	54.30 0	54.340	0.040	3.6	0.046	0.000	3.5	1.563	OK
MH 10	FEH: 30 years: +40 %: 15 mins: Summer	54.80 0	54.20 0	54.253	0.053	6.9	0.060	0.000	6.6	3.113	OK
MH 11	FEH: 30 years: +40 %: 15 mins: Summer	54.60 0	54.00 0	54.105	0.105	17.9	0.119	0.000	17.2	8.033	OK
MH 12	FEH: 30 years: +40 %: 15 mins: Summer	54.50 0	53.90 0	53.972	0.072	13.4	0.082	0.000	13.0	6.127	OK
MH 13	FEH: 30 years: +40 %: 15 mins: Summer	54.50 0	53.90 0	54.002	0.102	22.6	0.115	0.000	21.9	10.405	OK
MH 14	FEH: 30 years: +40 %: 15 mins: Summer	54.90 0	54.30 0	54.346	0.046	3.6	0.052	0.000	3.4	1.559	OK
MH 15	FEH: 30 years: +40 %: 15 mins: Summer	54.50 0	53.90 0	53.966	0.066	4.9	0.074	0.000	4.3	2.144	OK
MH 16	FEH: 30 years: +40 %: 15 mins: Summer	54.95 0	54.35 0	54.387	0.037	2.9	0.042	0.000	2.8	1.273	OK
Outfall	FEH: 30 years: +40 %: 15 mins: Summer	52.50 0	52.00 0	52.023	0.023	1.0	0.000	0.000	1.0	0.804	OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Junctions Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		







FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Flooded Volume

Junction	Storm Event	Cover Level (m)	Invert Level (m)	Max. Level (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Status
MH 0	FEH: 100 years: +45 %: 15 mins: Summer	54.90 0	54.30 0	54.350	0.050	5.7	0.056	0.000	5.6	2.483	OK
MH 1	FEH: 100 years: +45 %: 15 mins: Summer	54.80 0	54.20 0	54.311	0.111	24.6	0.125	0.000	23.6	10.798	OK
MH 2	FEH: 100 years: +45 %: 15 mins: Summer	54.60 0	54.00 0	54.148	0.148	32.6	0.168	0.000	30.7	14.720	OK
MH 4	FEH: 100 years: +45 %: 15 mins: Summer	54.40 0	53.80 0	53.990	0.190	52.7	0.215	0.000	49.6	24.711	OK
MH 6	FEH: 100 years: +45 %: 15 mins: Summer	54.90 0	54.30 0	54.346	0.046	4.6	0.052	0.000	4.5	2.013	OK
MH 7	FEH: 100 years: +45 %: 15 mins: Summer	54.80 0	54.20 0	54.243	0.043	4.5	0.049	0.000	4.3	2.008	OK
MH 8	FEH: 100 years: +45 %: 15 mins: Summer	54.60 0	54.00 0	54.085	0.085	12.8	0.096	0.000	12.3	5.689	OK
MH 9	FEH: 100 years: +45 %: 15 mins: Summer	54.90 0	54.30 0	54.346	0.046	4.6	0.053	0.000	4.5	2.013	OK
MH 10	FEH: 100 years: +45 %: 15 mins: Summer	54.80 0	54.20 0	54.261	0.061	9.0	0.069	0.000	8.5	4.013	OK
MH 11	FEH: 100 years: +45 %: 15 mins: Summer	54.60 0	54.00 0	54.125	0.125	23.1	0.141	0.000	22.2	10.349	OK
MH 12	FEH: 100 years: +45 %: 15 mins: Summer	54.50 0	53.90 0	53.984	0.084	17.3	0.095	0.000	16.8	7.890	OK
MH 13	FEH: 100 years: +45 %: 15 mins: Summer	54.50 0	53.90 0	54.020	0.120	29.2	0.135	0.000	28.3	13.402	OK
MH 14	FEH: 100 years: +45 %: 15 mins: Summer	54.90 0	54.30 0	54.353	0.053	4.6	0.060	0.000	4.4	2.010	OK
MH 15	FEH: 100 years: +45 %: 15 mins: Summer	54.50 0	53.90 0	53.996	0.096	6.4	0.109	0.000	5.4	2.757	OK
MH 16	FEH: 100 years: +45 %: 15 mins: Summer	54.95 0	54.35 0	54.392	0.042	3.8	0.048	0.000	3.6	1.642	OK
Outfall	FEH: 100 years: +45 %: 15 mins: Summer	52.50 0	52.00 0	52.026	0.026	1.3	0.000	0.000	1.3	1.125	OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		







FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Attenuation Basin	FEH: 30 years: +0 %: 960 mins: Summer	53.722	53.722	0.122	0.122	5.4	49.687	0.000	0.000	1.4	67.854	415	78.645

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		




Status
OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		







FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Attenuation Basin	FEH: 100 years: +0 %: 960 mins: Summer	53.748	53.748	0.148	0.148	6.7	60.678	0.000	0.000	1.7	84.707	418	73.921

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		




Status
OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
	Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels		
www.raincloud-consulting.co.uk:		 	



FEH: 30 years: Increase Rainfall (%): +30: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Attenuation Basin	FEH: 30 years: +30 %: 960 mins: Summer	53.756	53.756	0.156	0.156	7.1	64.468	0.000	0.000	1.8	90.305	424	72.292

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		


RAINCLOUD

Status
OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		







FEH: 100 years: Increase Rainfall (%): +30: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Attenuation Basin	FEH: 100 years: +30 %: 960 mins: Summer	53.797	53.797	0.197	0.197	8.6	82.512	0.000	0.000	1.8	110.123	467	64.537

Kirkby BESS:	Date: 28/03/2025			
	Designed by:	Checked by:	Approved By:	
	CH	LN	LN	
Report Details:	www.raincloud-consulting.co.uk:			
Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels				

Status

OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		







FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Attenuation Basin	FEH: 30 years: +40 %: 960 mins: Summer	53.768	53.768	0.168	0.168	7.6	69.630	0.000	0.000	1.8	97.515	418	70.074

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		




Status

OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		







FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Resident Volume

Stormwater Control	Storm Event	Max. US Level (m)	Max. DS Level (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Half Drain Down Time (mins)	Percentage Available (%)
Attenuation Basin	FEH: 100 years: +45 %: 960 mins: Summer	53.830	53.830	0.230	0.230	9.6	97.335	0.000	0.000	1.8	117.987	531	58.166

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Stormwater Controls Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		



Status
OK

Kirkby BESS:	Date: 28/03/2025			
	Designed by:	Checked by:	Approved By:	
	CH	LN	LN	
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:			



FEH: 30 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 0	MH 1	54.900	54.337	0.057	1.382	0.4	0.08	3.1	OK
Pipe 1	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 1	MH 2	54.800	54.276	0.088	5.998	0.9	0.23	12.9	OK
Pipe 5	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 15	MH 4	54.500	53.941	0.084	1.526	0.3	0.1	3.4	OK
Pipe 6	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 6	MH 7	54.900	54.334	0.033	1.115	0.7	0.06	2.5	OK
Pipe 7	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 7	MH 8	54.800	54.232	0.046	1.111	0.4	0.06	2.4	OK
Pipe 9	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 9	MH 10	54.900	54.334	0.039	1.115	0.6	0.06	2.5	OK
Pipe 10	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 10	MH 11	54.800	54.245	0.065	2.220	0.5	0.11	4.6	OK
Pipe 12	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 14	MH 10	54.900	54.338	0.042	1.112	0.5	0.08	2.4	OK
Pipe 15	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 16	MH 1	54.950	54.381	0.054	0.913	0.3	0.06	2.0	OK
Pipe 17	FEH: 30 years: +0 %: 960 mins: Summer	Pipe	Attenuation Basin	Outfall	54.100	53.722	0.028	67.793	0.5	0.03	1.4	OK
Pipe (1)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 11	MH 13	54.600	54.085	0.085	5.733	1.0	0.33	12.2	OK
Pipe (3)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 8	MH 12	54.600	54.060	0.060	3.155	0.8	0.18	6.7	OK
Pipe (4)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 12	Attenuation Basin	54.500	53.960	0.058	4.375	1.2	0.18	9.2	OK
Pipe (2)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 13	Attenuation Basin	54.500	53.984	0.070	7.423	1.6	0.31	15.6	OK

Kirkby BESS:				Date: 28/03/2025				I DRN  RAINCLOUD					
				Designed by:		Checked by:						Approved By:	
				CH		LN						LN	
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels				www.raincloud-consulting.co.uk:									
Pipe (5)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 4	Attenuati on Basin	54.400	53.928	0.092	13.708	1.8	0.54	27.8	OK	
Pipe (6)	FEH: 30 years: +0 %: 15 mins: Summer	Pipe	MH 2	MH 4	54.600	54.100	0.114	8.170	0.8	0.39	16.9	OK	

Kirkby BESS:	Date: 28/03/2025			
	Designed by:	Checked by:	Approved By:	
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels	CH	LN	LN	
	www.raincloud-consulting.co.uk:			



FEH: 100 years: Increase Rainfall (%): +0: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 0	MH 1	54.900	54.341	0.064	1.715	0.4	0.1	3.8	OK
Pipe 1	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 1	MH 2	54.800	54.287	0.101	7.450	0.9	0.29	16.1	OK
Pipe 5	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 15	MH 4	54.500	53.955	0.100	1.898	0.2	0.11	3.9	OK
Pipe 6	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 6	MH 7	54.900	54.338	0.037	1.388	0.8	0.07	3.1	OK
Pipe 7	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 7	MH 8	54.800	54.236	0.052	1.384	0.5	0.07	3.0	OK
Pipe 9	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 9	MH 10	54.900	54.338	0.044	1.389	0.6	0.07	3.1	OK
Pipe 10	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 10	MH 11	54.800	54.250	0.074	2.765	0.5	0.14	5.8	OK
Pipe 12	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 14	MH 10	54.900	54.343	0.047	1.385	0.5	0.1	3.0	OK
Pipe 15	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 16	MH 1	54.950	54.385	0.061	1.132	0.3	0.07	2.5	OK
Pipe 17	FEH: 100 years: +0 %: 960 mins: Summer	Pipe	Attenuation Basin	Outfall	54.100	53.748	0.030	84.636	0.5	0.04	1.7	OK
Pipe (1)	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 11	MH 13	54.600	54.098	0.096	7.134	1.0	0.41	15.2	OK
Pipe (3)	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 8	MH 12	54.600	54.068	0.068	3.920	0.9	0.22	8.4	OK
Pipe (4)	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 12	Attenuation Basin	54.500	53.968	0.066	5.436	1.3	0.23	11.5	OK
Pipe (2)	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 13	Attenuation Basin	54.500	53.995	0.080	9.234	1.7	0.39	19.4	OK

Kirkby BESS:				Date: 28/03/2025									
				Designed by:	Checked by:	Approved By:							
				CH	LN	LN							
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels				www.raincloud-consulting.co.uk:									
Pipe (5)	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 4	Attenuati on Basin	54.400	53.946	0.105	17.041	1.9	0.66	34.3	OK	
Pipe (6)	FEH: 100 years: +0 %: 15 mins: Summer	Pipe	MH 2	MH 4	54.600	54.115	0.130	10.153	0.9	0.49	21.0	OK	

Kirkby BESS:	Date: 28/03/2025			
	Designed by:	Checked by:	Approved By:	
	CH	LN	LN	
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:			



FEH: 30 years: Increase Rainfall (%): +30: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 0	MH 1	54.900	54.342	0.066	1.793	0.4	0.1	4.0	OK
Pipe 1	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 1	MH 2	54.800	54.290	0.104	7.795	0.9	0.3	16.9	OK
Pipe 5	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 15	MH 4	54.500	53.959	0.104	1.988	0.2	0.11	4.0	OK
Pipe 6	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 6	MH 7	54.900	54.339	0.038	1.448	0.8	0.07	3.3	OK
Pipe 7	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 7	MH 8	54.800	54.237	0.053	1.444	0.5	0.07	3.1	OK
Pipe 9	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 9	MH 10	54.900	54.339	0.045	1.449	0.6	0.08	3.2	OK
Pipe 10	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 10	MH 11	54.800	54.251	0.076	2.888	0.6	0.15	6.1	OK
Pipe 12	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 14	MH 10	54.900	54.344	0.048	1.448	0.6	0.1	3.2	OK
Pipe 15	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 16	MH 1	54.950	54.386	0.063	1.186	0.3	0.07	2.6	OK
Pipe 17	FEH: 30 years: +30 %: 960 mins: Summer	Pipe	Attenuation Basin	Outfall	54.100	53.756	0.030	90.232	0.5	0.04	1.8	OK
Pipe (1)	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 11	MH 13	54.600	54.101	0.099	7.458	1.0	0.43	15.9	OK
Pipe (3)	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 8	MH 12	54.600	54.070	0.070	4.097	0.9	0.23	8.8	OK
Pipe (4)	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 12	Attenuation Basin	54.500	53.969	0.068	5.685	1.3	0.24	12.1	OK
Pipe (2)	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 13	Attenuation Basin	54.500	53.998	0.082	9.658	1.7	0.41	20.3	OK

Kirkby BESS:				Date: 28/03/2025							I DRN  RAINCLOUD			
				Designed by:		Checked by:		Approved By:						
				CH		LN		LN						
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels				www.raincloud-consulting.co.uk:										

Pipe (5)	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 4	Attenuati on Basin	54.400	53.950	0.108	17.819	1.9	0.69	35.9	OK
Pipe (6)	FEH: 30 years: +30 %: 15 mins: Summer	Pipe	MH 2	MH 4	54.600	54.118	0.134	10.618	0.9	0.51	22.0	OK

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		





FEH: 100 years: Increase Rainfall (%): +30: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 0	MH 1	54.900	54.347	0.075	2.228	0.5	0.13	5.0	OK
Pipe 1	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 1	MH 2	54.800	54.303	0.120	9.688	1.0	0.37	21.0	OK
Pipe 5	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 15	MH 4	54.500	53.981	0.128	2.474	0.2	0.14	4.9	OK
Pipe 6	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 6	MH 7	54.900	54.343	0.042	1.803	0.8	0.09	4.1	OK
Pipe 7	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 7	MH 8	54.800	54.241	0.060	1.798	0.5	0.09	3.9	OK
Pipe 9	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 9	MH 10	54.900	54.344	0.051	1.809	0.6	0.1	4.0	OK
Pipe 10	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 10	MH 11	54.800	54.258	0.087	3.599	0.6	0.18	7.6	OK
Pipe 12	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 14	MH 10	54.900	54.350	0.054	1.800	0.6	0.13	4.0	OK
Pipe 15	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 16	MH 1	54.950	54.390	0.071	1.474	0.3	0.09	3.2	OK
Pipe 17	FEH: 100 years: +30 %: 120 mins: Summer	Pipe	Attenuation Basin	Outfall	54.100	53.772	0.031	18.810	0.6	0.04	1.8	OK
Pipe (1)	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 11	MH 13	54.600	54.116	0.114	9.278	1.1	0.53	19.9	OK
Pipe (3)	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 8	MH 12	54.600	54.080	0.079	5.096	1.0	0.29	11.0	OK
Pipe (4)	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 12	Attenuation Basin	54.500	53.979	0.077	7.070	1.4	0.29	15.0	OK
Pipe (2)	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 13	Attenuation Basin	54.500	54.011	0.093	12.009	1.8	0.51	25.4	OK

Kirkby BESS:				Date: 28/03/2025								
				Designed by:	Checked by:	Approved By:						
				CH	LN	LN						
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels				www.raincloud-consulting.co.uk:								

Pipe (5)	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 4	Attenuati on Basin	54.400	53.974	0.125	22.169	2.0	0.86	44.6	OK
Pipe (6)	FEH: 100 years: +30 %: 15 mins: Summer	Pipe	MH 2	MH 4	54.600	54.137	0.156	13.206	0.9	0.64	27.5	OK

Kirkby BESS:	Date: 28/03/2025			
	Designed by:	Checked by:	Approved By:	
	CH	LN	LN	
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:			



FEH: 30 years: Increase Rainfall (%): +40: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 0	MH 1	54.900	54.344	0.069	1.931	0.5	0.11	4.3	OK
Pipe 1	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 1	MH 2	54.800	54.294	0.109	8.389	1.0	0.32	18.2	OK
Pipe 5	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 15	MH 4	54.500	53.966	0.112	2.144	0.2	0.12	4.3	OK
Pipe 6	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 6	MH 7	54.900	54.340	0.039	1.563	0.8	0.08	3.5	OK
Pipe 7	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 7	MH 8	54.800	54.238	0.056	1.558	0.5	0.08	3.3	OK
Pipe 9	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 9	MH 10	54.900	54.340	0.047	1.563	0.6	0.08	3.5	OK
Pipe 10	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 10	MH 11	54.800	54.253	0.079	3.113	0.6	0.16	6.6	OK
Pipe 12	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 14	MH 10	54.900	54.346	0.050	1.559	0.6	0.11	3.4	OK
Pipe 15	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 16	MH 1	54.950	54.387	0.065	1.273	0.3	0.08	2.8	OK
Pipe 17	FEH: 30 years: +40 %: 960 mins: Summer	Pipe	Attenuation Basin	Outfall	54.100	53.768	0.031	97.437	0.6	0.04	1.8	OK
Pipe (1)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 11	MH 13	54.600	54.105	0.104	8.033	1.0	0.46	17.2	OK
Pipe (3)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 8	MH 12	54.600	54.073	0.073	4.418	0.9	0.25	9.5	OK
Pipe (4)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 12	Attenuation Basin	54.500	53.972	0.071	6.127	1.3	0.25	13.0	OK
Pipe (2)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 13	Attenuation Basin	54.500	54.002	0.085	10.405	1.7	0.44	21.9	OK

Kirkby BESS:				Date: 28/03/2025									
				Designed by:	Checked by:	Approved By:							
				CH	LN	LN							
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels				www.raincloud-consulting.co.uk:									
Pipe (5)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 4	Attenuati on Basin	54.400	53.958	0.113	19.200	1.9	0.75	38.7	OK	
Pipe (6)	FEH: 30 years: +40 %: 15 mins: Summer	Pipe	MH 2	MH 4	54.600	54.124	0.141	11.436	0.9	0.55	23.8	OK	

Kirkby BESS:	Date: 28/03/2025			
	Designed by:	Checked by:	Approved By:	
	CH	LN	LN	
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:			



FEH: 100 years: Increase Rainfall (%): +45: Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Level (m)	Max. US Water Level (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
Pipe	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 0	MH 1	54.900	54.350	0.080	2.483	0.5	0.14	5.6	OK
Pipe 1	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 1	MH 2	54.800	54.311	0.129	10.798	1.0	0.42	23.6	OK
Pipe 5	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 15	MH 4	54.500	53.996	0.143	2.757	0.2	0.15	5.4	OK
Pipe 6	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 6	MH 7	54.900	54.346	0.045	2.013	0.9	0.1	4.5	OK
Pipe 7	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 7	MH 8	54.800	54.243	0.064	2.008	0.5	0.1	4.3	OK
Pipe 9	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 9	MH 10	54.900	54.346	0.054	2.013	0.7	0.11	4.5	OK
Pipe 10	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 10	MH 11	54.800	54.261	0.093	4.013	0.6	0.21	8.5	OK
Pipe 12	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 14	MH 10	54.900	54.353	0.057	2.010	0.6	0.14	4.4	OK
Pipe 15	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 16	MH 1	54.950	54.392	0.076	1.642	0.3	0.1	3.6	OK
Pipe 17	FEH: 100 years: +45 %: 480 mins: Winter	Pipe	Attenuation Basin	Outfall	54.100	53.825	0.031	66.972	0.6	0.04	1.8	OK
Pipe (1)	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 11	MH 13	54.600	54.125	0.122	10.349	1.1	0.6	22.2	OK
Pipe (3)	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 8	MH 12	54.600	54.085	0.084	5.689	1.0	0.32	12.3	OK
Pipe (4)	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 12	Attenuation Basin	54.500	53.984	0.082	7.890	1.4	0.33	16.8	OK
Pipe (2)	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 13	Attenuation Basin	54.500	54.020	0.100	13.402	1.8	0.57	28.3	OK

Kirkby BESS:				Date: 28/03/2025									
				Designed by:	Checked by:	Approved By:							
				CH	LN	LN							
Report Details: Type: Connections Summary Storm Phase: Adjusted invert levels				www.raincloud-consulting.co.uk:									
Pipe (5)	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 4	Attenuati on Basin	54.400	53.990	0.135	24.711	2.0	0.96	49.6	OK	
Pipe (6)	FEH: 100 years: +45 %: 15 mins: Summer	Pipe	MH 2	MH 4	54.600	54.148	0.169	14.720	1.0	0.72	30.7	OK	

Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Phase Management Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		

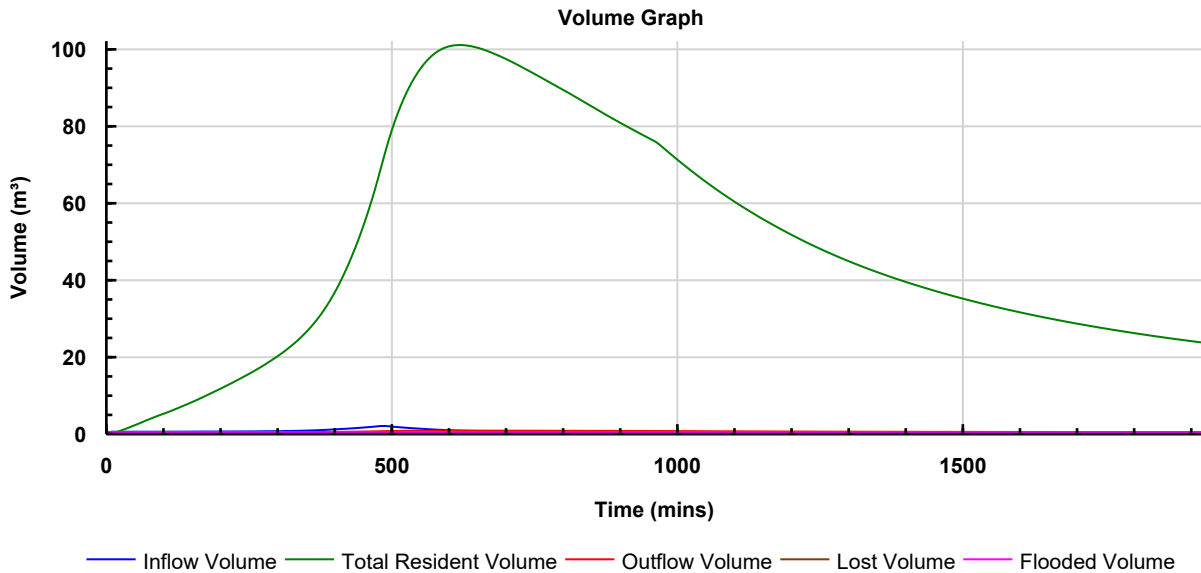
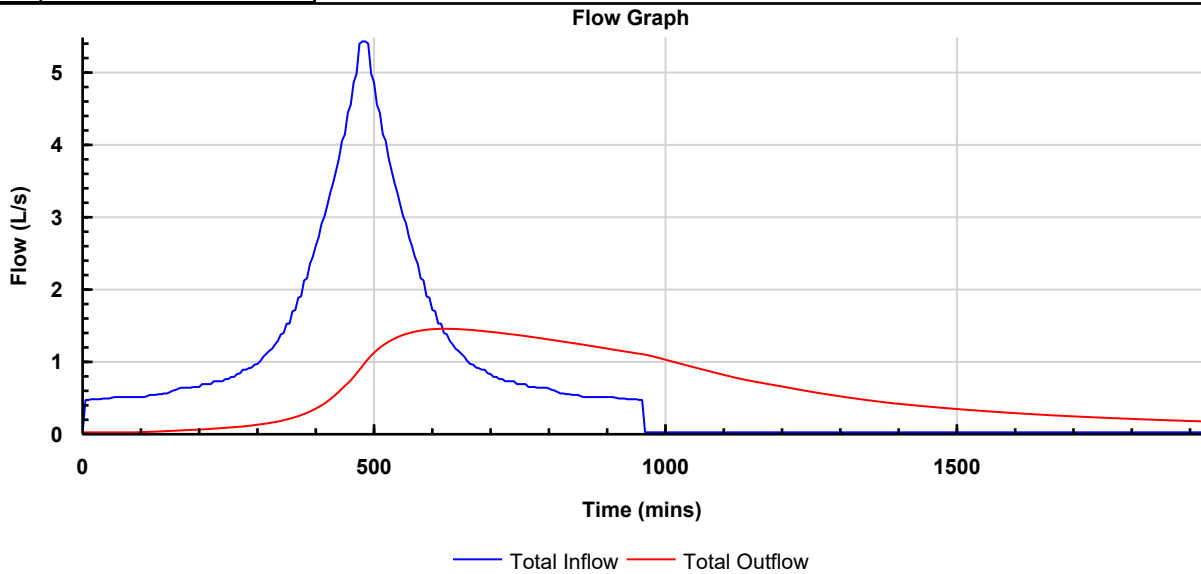


Adjusted invert levels
FEH: 30 years: Increase Rainfall (%): +0: 960 mins: Summer

Tables

Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Outfall			1.4	67.793
TOTAL	5.4	79.692	1.4	67.793

Graphs



Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Phase Management Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		



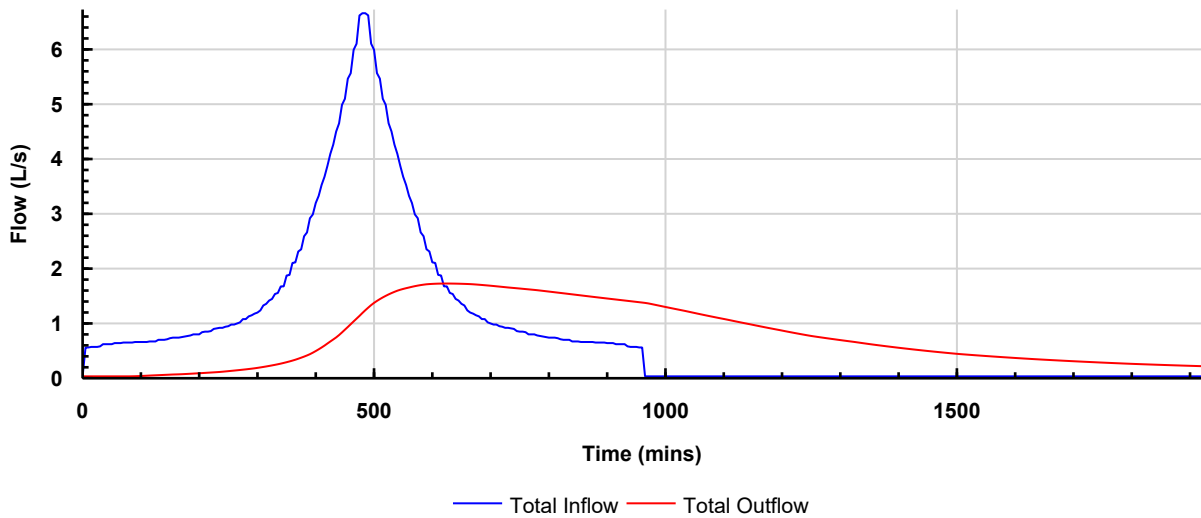
Adjusted invert levels
FEH: 100 years: Increase Rainfall (%): +0: 960 mins: Summer

Tables

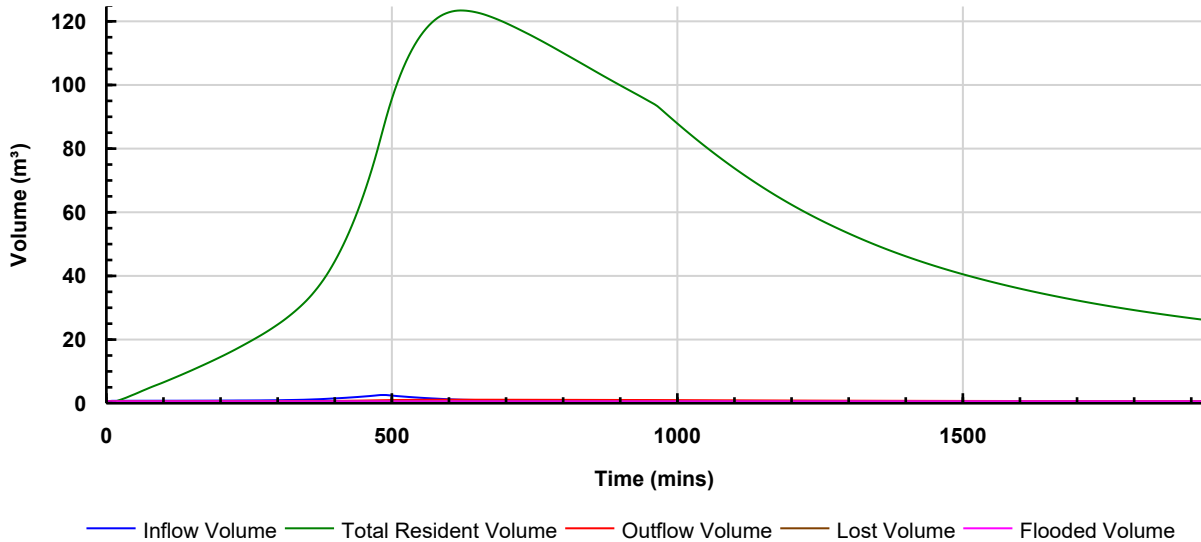
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Outfall			1.7	84.636
TOTAL	6.7	97.734	1.7	84.636

Graphs

Flow Graph



Volume Graph



Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Phase Management Storm Phase: Adjusted invert levels		www.raincloud-consulting.co.uk:	



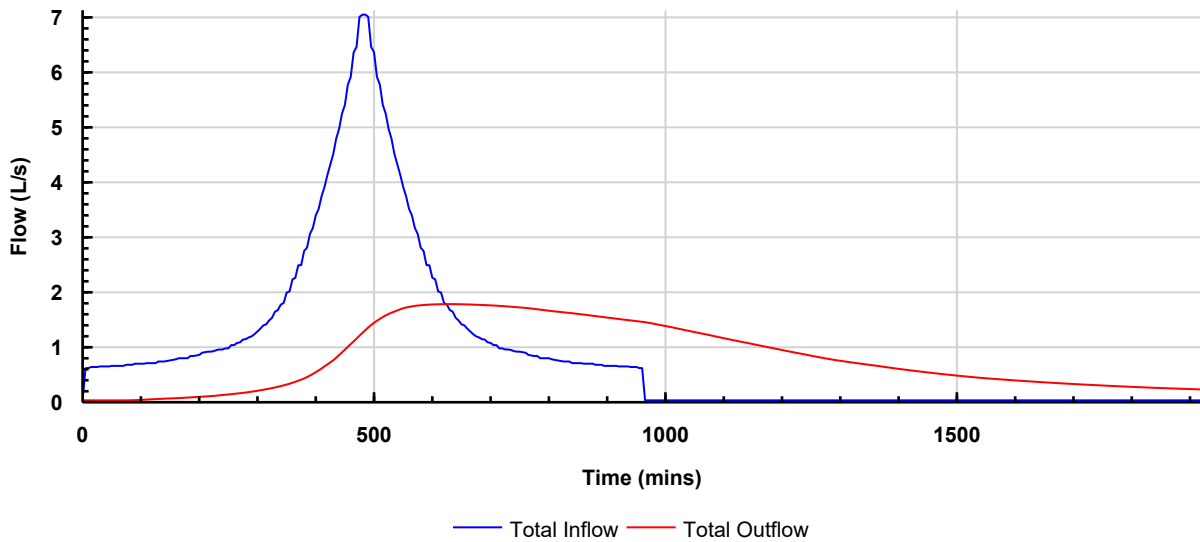
Adjusted invert levels
FEH: 30 years: Increase Rainfall (%): +30: 960 mins: Summer

Tables

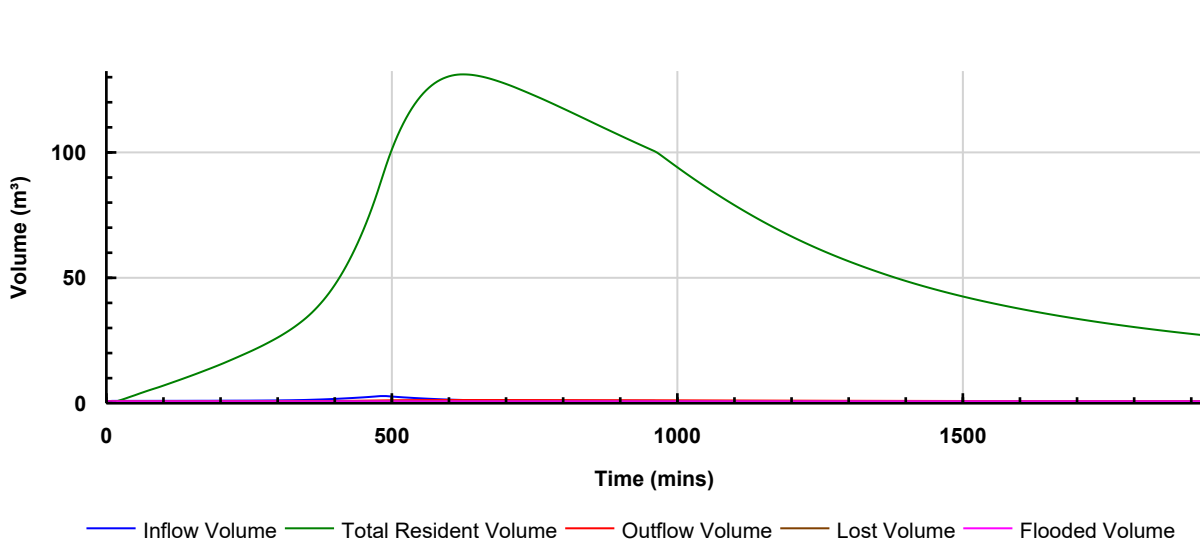
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Outfall			1.8	90.232
TOTAL	7.1	103.770	1.8	90.232

Graphs

Flow Graph



Volume Graph



Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Phase Management Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		



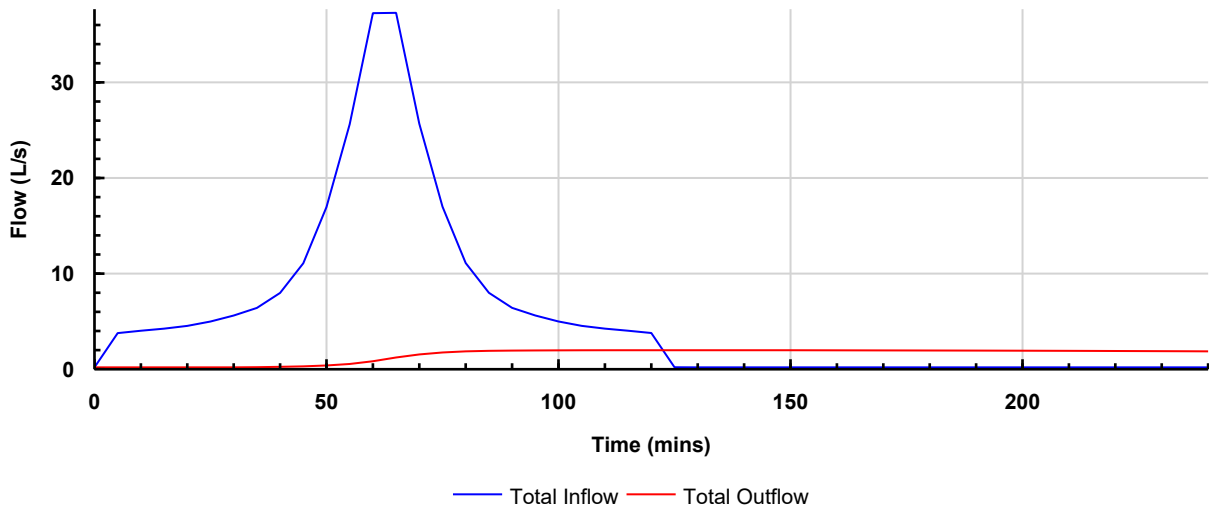
Adjusted invert levels
FEH: 100 years: Increase Rainfall (%): +30: 120 mins: Summer

Tables

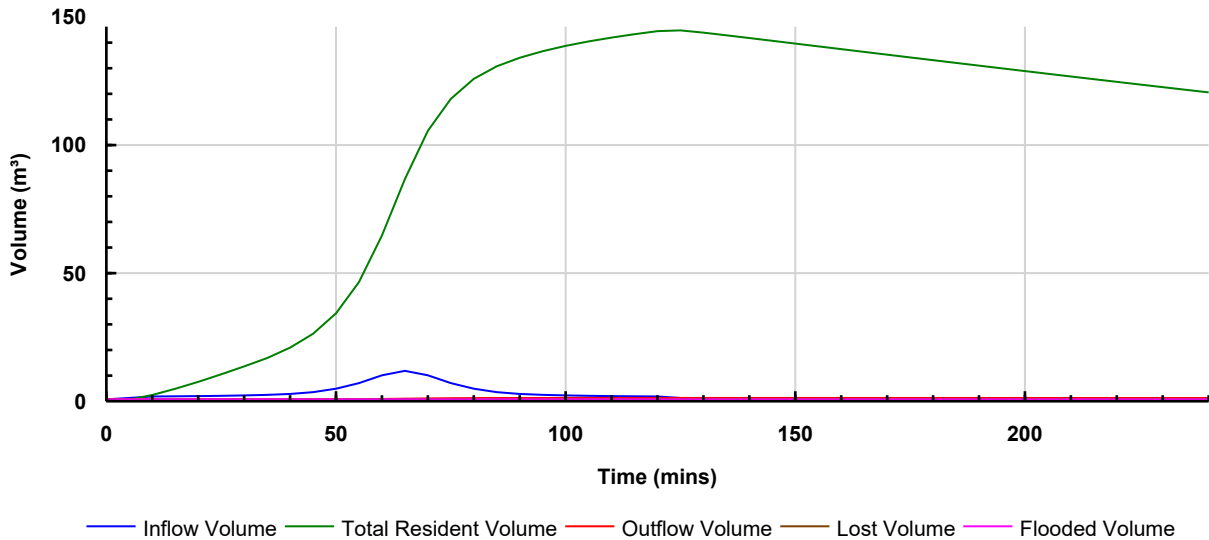
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Outfall			1.8	18.810
TOTAL	37.3	78.546	1.8	18.810

Graphs

Flow Graph



Volume Graph



Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Phase Management Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		



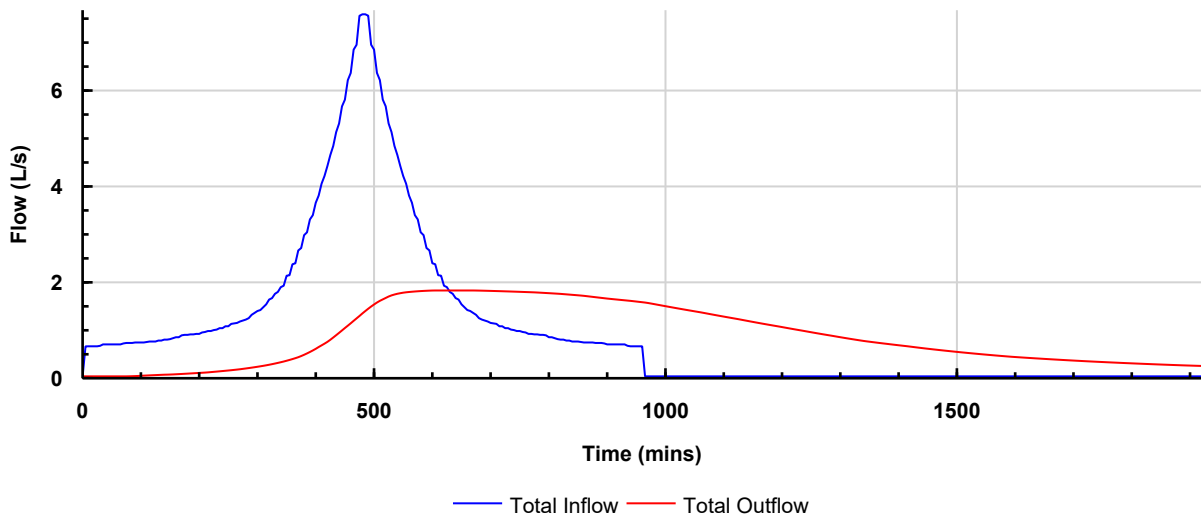
Adjusted invert levels
FEH: 30 years: Increase Rainfall (%): +40: 960 mins: Summer

Tables

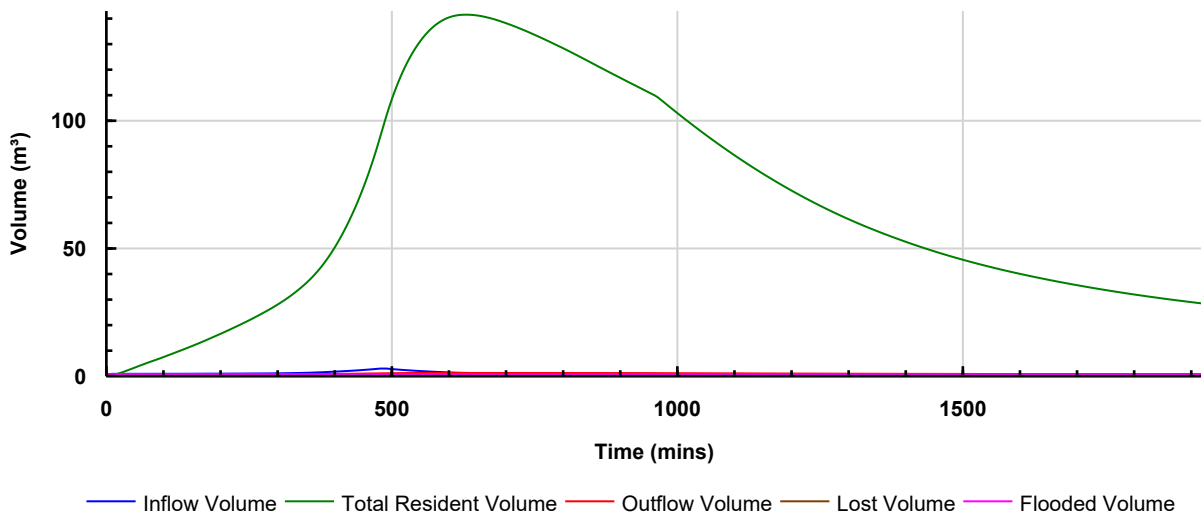
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Outfall			1.8	97.437
TOTAL	7.6	111.624	1.8	97.437

Graphs

Flow Graph



Volume Graph



Kirkby BESS:	Date: 28/03/2025		
	Designed by: CH	Checked by: LN	Approved By: LN
Report Details: Type: Phase Management Storm Phase: Adjusted invert levels	www.raincloud-consulting.co.uk:		



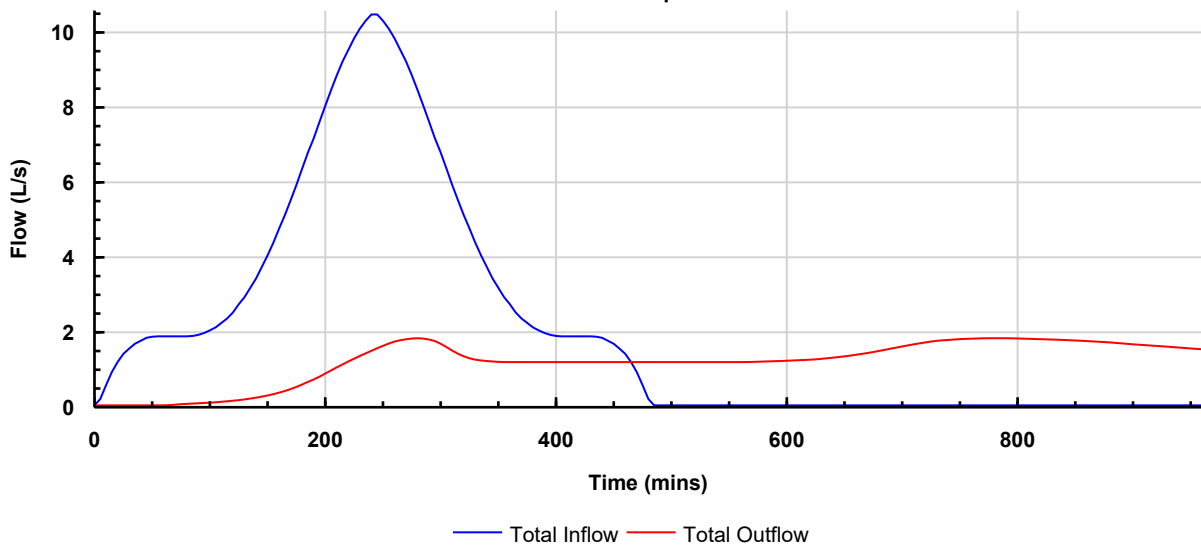
Adjusted invert levels
FEH: 100 years: Increase Rainfall (%): +45: 480 mins: Winter

Tables

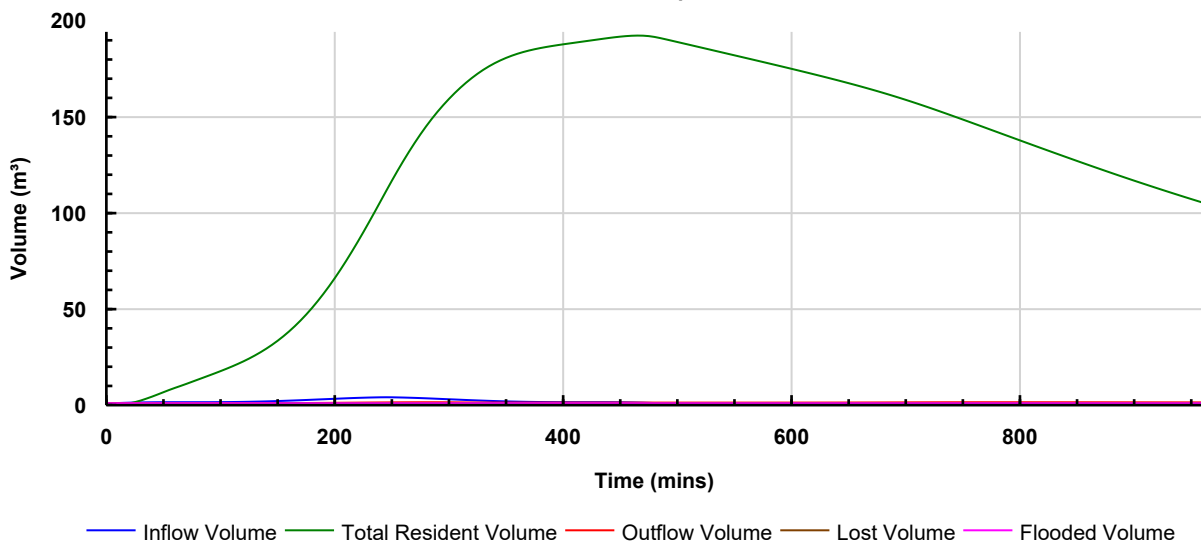
Name	Max. Inflow (L/s)	Total Inflow Volume (m³)	Max. Outflow (L/s)	Total Outflow Volume (m³)
Outfall			1.8	66.972
TOTAL	10.5	119.286	1.8	66.972

Graphs

Flow Graph



Volume Graph





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SuDS



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