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Flushing BESS

Flood Risk & Drainage Assessment Report

Client:	Harmony FL Ltd
Project/Proposal No:	GON.0510.0262
Version:	1
Date:	09/06/2025

Document Information

Project Name:	Flushing BESS
Document Title:	Flood Risk & Drainage Assessment
Client Name:	Harmony FL Ltd
Document Status:	Final for Issue
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Reviewed:	Stephen Donnan
Approved:	Stephen Donnan
Date:	09/06/2025
Version:	1
Project Number:	GON.0510.0262

Revision History

Version	Date	Authored	Reviewed	Approved	Notes
1	09/06/2025	P.Shields	S.Donnan	S.Donnan	For Issue

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1. Introduction

1.1 Preamble

This Flood Risk and Drainage Assessment (FRDA) report is prepared and submitted on behalf of Harmony FL Ltd. ('the Applicant') and in support of an application for consent under S36 of the Electricity Act 1989 ('the application') and also comprises a request that Scottish Ministers give a direction under section 57(2) of the Town and Country Planning (Scotland) Act 1997 that planning permission for the development be deemed to be granted. It addresses matters referred to in Schedule 9 to the Electricity Act, to development plan and policy guidance and to consideration of material matters.

The application comprises land within Aberdeenshire Council Area – 20.72ha ('Application Site'). A site location plan is included as Drawing FRDA-001.

The description of the proposed development which is the subject of this application is as follows:

'Construction and operation of a 400MW Battery Energy Storage System (BESS) with associated infrastructure including, access roads, sub-station buildings, supporting equipment, fencing, drainage infrastructure and landscaping.' at Land North of Longside Road, Flushing, Peterhead (GR: 405524, 847560).

This FRDA report is part of a suite of documents submitted with the application, as outlined below. These supporting documents are in addition to the formal application documents comprising the accompanying plans, sections, and elevations. The full suite of supporting documents is as follows:

- Planning Design and Access Statement (PDAS)
- Community Wealth Building Plan (CWBP)
- Pre-Application Consultation Report (PACR)
- Confidential Ecological Survey Report [note, contains sensitive information]
- Confidential Protected Species Report [note, contains sensitive information]
- Archaeological Desk-Based Assessment (ADBA)
- Landscape and Visual Impact Assessment (LVIA) and Landscape Strategy
- Noise Impact Assessment (NIA)
- Flood Risk & Drainage Assessment Report (FRDAR)
- Fire Water Management Plan (FWMP)
- Private Water Supply Impact Assessment
- Topographical Surveys
- Construction Traffic Management Plan
- Transport Statement
- Outline Battery Safety Management Plan (OBSMP)

The Electricity Works Environmental Impact Assessment (Scotland) Regulations 2017 are also relevant to the proposal as the proposal comprises development falling within Schedule 2 of those Regulations. A Screening request has been submitted to the ECU and the Decision was received on 17th March 2025. It confirmed that, "*Scottish Ministers adopt the opinion that* ***the proposal does not constitute EIA development and that the application submitted for this development does not require to be accompanied by an EIA report***."

The purpose of this report is to assess any potential flood risk to the proposed development from all possible sources in accordance with best practice and in accordance with guidance presented within the National Planning Framework for Scotland 4 (NPF4).

This report assesses the potential increase in surface water runoff attributed to the development and proposes a surface water management strategy to manage this. The strategy is in accordance with sustainable drainage principles and allows the site to remain free of flooding during design storm events, whilst ensuring no increase of flood risk to offsite receptors and ensures no deterioration of the water environment.

The site was visited by an experienced Hydrologist / Civil Engineer in June 2024 to inform this assessment.

This report provides the relevant design information for the proposed site surface water drainage / SuDS scheme taking due cognisance of national drainage design guidance (CIRIA Report C753) and Aberdeenshire Council requirements.

1.2 Site Context

The site is located on land approximately 2km east of the village of Longside and 800m north of Flushing, Aberdeenshire at National Grid Reference (NGR): NK 05495 47705.

The site is currently comprised of arable agricultural land and is bounded by further agricultural land to all extents. Access to the site is currently via an access track to the Monyruy cottages.

A site location plan is provided as Drawing FRDA-001.

1.3 Development Details

The proposed development is a Battery Energy Storage System and Substation with associated access and ancillary works. A proposed development plan is included in Appendix A.

1.4 Topography

A topographic survey of the site has been undertaken by Granite City Surveys Ltd in March 2024 and has been used to inform this assessment.

Review of the topographic survey indicates that the site has a steady fall from high ground in the southwest of the site down to the north and the east of the site. Natural ground levels within the main development area range with a maximum elevation of approximately 49mAOD in the southwest corner of the site to a minimum elevation of approximately 27mAOD in the northeast corner.

1.5 Geology and Hydrogeology

1.5.1 Geology

1.5.1.1 Superficial

Review of the British Geological Survey (BGS) online geology maps[1] shows that the majority of the site lacks superficial deposits. The northeast corner of the site is underlain by Banchory till formation comprising of gravel and sand diamiction. Close to the east boundary of the site there are glaciofluvial sheet deposits of gravel, sand and silt.

Scottish soil maps online service[2] indicates the soil type within the site area to be Humus-iron podzols.

1.5.1.2 Bedrock

Review of the British Geological Survey (BGS) online geology maps indicates the underlying bedrock of the entirety of site and surrounding area to be of the Forest of Deer Pluton formation consisting of Melgranite and Biotite.

[1] British Geological Survey (2025) GeoIndex Onshore, available at: https://www.bgs.ac.uk/map-viewers/geoindex-onshore/ (accessed on 28th May 2025)
[2] Scottish Soil Maps (2024) National Soil Map of Scotland, available at: https://soils.environment.gov.scot/maps/ (Accessed on 28th May 2025)

Review of the BGS online geology maps indicates that there are no linear features in proximity to the site.

1.5.2 Hydrogeology

Review of the BGS online hydrogeology maps indicates that the underlying bedrock unit of the entirety of the site and surrounding area is Unnamed Igneous Intrusion of Ordovician and Silurian characterised by a low productivity aquifer summarised by a 'small amounts of groundwater in near surface weathered zone and secondary fractures; rare springs'.

1.6 Local Hydrology and Existing Drainage Scheme

Review of the Flood Estimation Handbook (FEH) Web Service and other available mapping indicates that the site falls within the natural surface water catchment of the Burn of Faichfield into which surface water runoff off the site will readily shed downgradient. The Burn flows south to north approximately 200m east of the site before discharging into the River Ugie approximately 1km downstream.

A hydrological overview drawing of the site is presented as Drawing FRDA-002.

1.7 Private Water Supplies (PWS)

In accordance with SEPA Guidance on Assessing the Impacts of Development on Groundwater Abstractions (2024), all groundwater abstraction points within the distances outlined below have been identified in order to assess any potential risk:

- Within 10 m for all activities.
- Within 100 m of all excavations less than 1m in depth.
- Within 250 m of all excavations greater than 1m in depth.

As part of this assessment, potential PWS in the vicinity of the Proposed Development Site have been identified through council supplied PWS data, review of aerial imagery, Ordnance Survey (OS) mapping and Scottish Water asset mapping.

The basis for assessing risk to identified PWS is to adopt the widely recognised 'Source-Pathway-Receptor' model. Without a complete source-pathway-receptor linkage there is no potential for the Proposed Development to affect the yield or quality of a PWS source. The three elements of the model

are defined in the context of PWS risk assessment as:

- Source - Nearest Proposed Development / proposed infrastructure
- Pathway - Groundwater / surface water flow defined by catchment
- Receptor - PWS supply catchment to intake location

The 'Risk Rating' for PWS sources and associated properties has been assessed using the SEPA 2024 Guidance on Assessing the Impacts of Development on Groundwater Abstractions and based on professional judgement / experience. Risk Ratings are as follows:

- No Risk - No hydraulic connectivity / complete Source-Pathway-Receptor linkage to development areas on site.
- Low Risk - PWS source intake is located outside the SEPA advised 100m and 250m buffers to site infrastructure for groundwater supplies and >1.5km for surface water abstractions measured following the alignment of the receiving watercourse.
- At Potential Risk - PWS source intake is located within the 100m / 250m SEPA buffers and / or identified catchment areas overlap development infrastructure and / or proposed site infrastructure for surface water supplies is <1.5km measured following the alignment of the receiving watercourse to the source intake.

A freedom of information request was submitted to Aberdeenshire Council to obtain any PWS records within a 2km search radius of the Proposed Development. The results indicated that several properties to the south of the main development area are on a combination of mains supply and a borehole fed PWS. The borehole and pumphouse are understood to be located approximately 270m southeast of the main development area (National Grid Reference: NK 05759 47242), adjacent to the Burn of Faichfield. The main development area (where all excavations are to take place) drain to the north / east and thus away from the location of the borehole. The borehole location is considered not to hydraulically connected to the proposed development area and thus the proposed development poses no risk to this supply.

All other recorded PWS in the local area are considerably distanced from the site and not considered to be affected by the development. Therefore, PWS are not considered further in this assessment.

2. Planning & Policy Context

2.1 Overview

This assessment has been completed in accordance with guidance presented within National Planning Framework for Scotland 4 (NPF4) and taking cognisance of the Flood Risk Management (Scotland) Act 2009.

The assessment also references and takes due consideration of the following principal guidance and policy documents:

- CIRIA (2004) Development and Flood Risk – Guidance for the Construction Industry, Report C624;
- Scottish Environment Protection Agency (2022) Technical Flood Risk Guidance for Stakeholders (Reference: SS-NFR-P-002), June 2022;
- Scottish Environment Protection Agency (2024) Flood Risk and Land Use Vulnerability Guidance (Reference: LUPS-GU24), July 2024;
- Scottish Environment Protection Agency (2018) SEPA Development Plan Guidance Note 2a: Development Management Guidance: Flood Risk (Reference: LUPS-DM-GU2a), July 2018;
- Scottish Environment Protection Agency (2024) Climate Change Allowances for Flood Risk Assessment in Land Use Planning (Reference: LUPS-CC1) August 2024;
- Scottish Environment Protection Agency (2014) WAT-RM-08 – Sustainable Urban Drainage Systems (SuDS);
- Scottish Water (2018) – Sewers for Scotland v4;
- Aberdeenshire Council (2023) Aberdeenshire Local Development Plan, January 2023; and
- Aberdeenshire Council (2020) Aberdeenshire Strategic Flood Risk Assessment, April 2020.

It is noted that the recent release of NPF4 has resulted in potential incompatibility of current SEPA and other stakeholder guidance documents with regards to flood risk assessment in particular. SEPA have acknowledged that their current guidance documents are currently being reviewed / updated to align with NPF4 and information contained within their documents may no longer be valid.

2.2 National Planning Framework

This report has been prepared in accordance with NPF4 Policy 22 relating to Flood Risk and Water Management, which states:

2.2.1.1 Policy Intent:

To strengthen resilience to flood risk by promoting avoidance as a first principle and reducing the vulnerability of existing and future development to flooding.

2.2.1.2 Policy Outcomes:

- *"Places are resilient to current and future flood risk.*
- *Water resources are used efficiently and sustainably.*
- *Wider use of natural flood risk management benefits people and nature."*

Furthermore, NPF4 states that development proposals at risk of flooding or in a flood risk area will only be supported if they are for:

- *"Essential infrastructure where the location is required for operational reasons;*
- *Water compatible uses;*
- *Redevelopment of an existing building or site for an equal or less vulnerable use; or.*
- *Redevelopment of previously used sites in built up areas where the LDP has identified a need to bring these into positive use and where proposals demonstrate that long-term safety and resilience can be secured in accordance with relevant SEPA advice".*

2.3 SEPA Flood Risk and Land Use Vulnerability Guidance

2.3.1 Context

This guidance outlines how SEPA assess the vulnerability to flooding of different land use with the following categories:

- Most Vulnerable Uses;
- Highly Vulnerable Uses;
- Least Vulnerable Uses;
- Essential Infrastructure; and
- Water Compatible uses.

The following excerpt from the guidance is provided for context:

"This guidance supports Policy 22 of the National Planning Framework 4 (NPF4) by explaining vulnerability in a flooding context, and the relative vulnerability of different land uses to flooding. Policy 22 sets out exceptions where development can be permitted in a flood risk area. This guidance aims to support application of the first three of those exceptions, specifically the emboldened terms:

i. ***Essential infrastructure*** *where the location is required for operational reasons.*

ii. ***Water compatible uses****; and*

iii. Redevelopment of an existing building or site for ***an equal or less vulnerable use****."*

2.3.2 Proposed Development Suitability

With reference to the above guidance the proposed development is considered to fall under the **Essential Infrastructure** category. In accordance with NPF4 Policy 22, the proposed development would therefore be suitable within an area identified to be at risk of flooding provided the following criteria is demonstrated:

- all risks of flooding are understood and addressed;
- there is no reduction in floodplain capacity, increased risk for others, or a need for future flood protection schemes;
- the development remains safe and operational during floods;
- flood resistant and resilient materials and construction methods are used; and
- future adaptations can be made to accommodate the effects of climate change.

3. Flood Risk Assessment

3.1 Screening Assessment of Potential Sources of Flood Risk

3.1.1 Overview

There are a number of potential sources of flooding which should be evaluated in accordance with best practice and NPF4 such as:

- Flooding from rivers or fluvial flooding;
- Flooding from the sea or tidal / coastal flooding;
- Flooding from land;
- Flooding from groundwater;
- Flooding from sewers; and
- Flooding from reservoirs, canals, and other artificial sources.

The flood risk from each of these potential sources is discussed in the following sections and a 'screening assessment' is presented in Section 3.1.8 which confirms any potential flood risk sources requiring a more detailed analysis and specification of bespoke mitigation measures.

Flood 'risk' definitions within the screening exercise are based on a qualitative technical assessment taking into account the information reviewed, risk to site users and the proposed development itself.

3.1.2 Fluvial Flooding

Review of SEPA's Fluvial Flood Map for the site indicates that the entirety of the site is out with the mapped area at risk of fluvial flooding. There is an area of fluvial flooding associated with the Burn of Faichfield located approximately 300m east of the site.

It is noted that the South Ugie Water is subject to fluvial flooding with flooding issues noted within the village of Longside and its surrounds. The South Ugie Water poses no risk to the proposed development due to its distance from the site. Additionally, the proposed development does not pose any risk of increase to flooding within Longside or surrounding areas due to it been located downgradient. The proposed development shall also not pose any increase in flood risk to areas of the South Ugie further downstream at the proposed drainage strategy shall ensure no increase in runoff rates from the site.

Taking this into account it is considered that there is '**Low Risk**' of fluvial flooding to the site and therefore flooding from this source will not be considered further.

3.1.3 Tidal/Coastal Flooding

Review of SEPA's Coastal Flooding Map for the site indicates that the site is located sufficiently inland from tidally influenced waters and the coast, thus is not subject to tidal or coastal flood risk and designated as **'No Risk'** to the site.

Flooding from this source is therefore not considered further in the assessment.

3.1.4 Flooding from Land (Pluvial or Surface Water Flooding)

Review of SEPA's Surface Water Flood Map of the site indicates that the site is entirely out with the area of mapped surface water flood risk.

Taking the above into account, it is considered that there is **'Low Risk'** of flooding to the site from land, therefore this source will not be considered further in the assessment.

3.1.5 Groundwater Flooding

Review of SEPA's Groundwater Flood Map shows that the site and surrounding area are not located in an area identified to be at risk of groundwater flooding. As no major rivers are located in close proximity to the development, it is considered unlikely that rising groundwater levels would occur associated with fluvial flooding.

Taking the above into account it is considered that the proposed development site is at **'Low Risk'** of groundwater flooding and therefore flooding from this source is not considered further in the assessment.

3.1.6 Flooding from Sewers / Drainage Systems

Given the rural location of the development, no public sewers/drainage systems are located within the immediate vicinity of the site.

The proposed new surface water drainage for the site (set out in Section 4 of this report and shown on Drawing FRDA-003) is designed to modern day standards which inherently accounts for climate change considerations and exceedance flow paths. A Drainage Maintenance Strategy will be incorporated into the site management plan and an outline version of this is set out in Section 4.4 of the report. This will ensure the drainage systems are kept in good working order for the lifetime of the development.

Taking the above into account it is considered that there is '**Low Risk**' of flooding to the site from sewers and drainage systems and therefore this source is not considered further in the assessment.

3.1.7 Flooding from Infrastructure Failure / Blockage

Review of the SEPA Reservoir Flood Map[3] indicates that there are no significant impoundments of water immediately upgradient and in hydraulic continuity with the site which would pose a flood risk to the site in the event of failure.

There are no other known water infrastructure features at / in proximity to the site which would pose a material flood risk in the event of failure.

As such it is considered that the development site is at '**Low Risk**' of flooding from this source and therefore is not considered further in the assessment.

3.1.8 Flood Risk Screening Assessment Review

A summary of the potential flood risk to the site from the sources reviewed is presented in Table 1 below.

This 'Screening Assessment' is used to identify if any sources of flood risk are required to be investigated in more detail i.e., a 'Technical' more detailed assessment which may include consideration / specification of bespoke flood mitigation measures for the site development if considered necessary.

Table 1 Flood Risk Screening Assessment

Potential Flood Source	Screening Assessment of Flood Risk at Site[1]	Requiring Further Consideration i.e. Technical Assessment?
Fluvial flooding	Low Risk	No
Tidal flooding	No Risk	No
Flooding from land	Low Risk	No
Groundwater flooding	Low Risk	No
Flooding from sewers / artificial drains	Low Risk	No
Flooding due to infrastructure failure / blockage	Low Risk	No

Notes: [1]only Flood Risks designated as being 'medium' or 'high' warrant further investigation

The Screening Assessment shows that the area is subject to either **Low** or **No risk** of flooding from the investigation of potential sources. As such no further detailed assessment is required.

[3] SEPA (2025) Reservoir Flood Map, available at: https://map.sepa.org.uk/reservoirsfloodmap/Map.htm (accessed 5th May 2025)

3.2 Climate Change

3.2.1 Context

The most recent Climate Change (CC) projections published by The UK Climate Impacts Programme are presented in report 'UKCP18'. Central estimates published in UKCP18 indicate marked increases in winter rainfall and decreases in summer rainfall but with more intense storms under all CO2 emissions scenarios across the majority of the country.

SEPA's most recent climate change allowances were published in August 2024[4] and are based on UKCP18 findings in conjunction with The Centre for Ecology and Hydrology's (CEH) 2021 study[5].

A climate change allowance in flood risk assessment terms is a prediction of anticipated change in peak river flow, peak rainfall intensity and sea level rise caused by future climate change.

The allowances applied for sea level rise, peak river flow and peak rainfall intensity are determined by river basin regions across Scotland. SEPA have developed a web map[6] to allow any location in Scotland to be identified for its applicable river basin region and respective climate change uplift allowances.

3.2.2 Peak River Flow

With reference to SEPA's online map service, the site is located within the Northeast Scotland River basin region. The peak river allowance until 2100 for this region is a 34% uplift.

This increase in peak river flows is only considered for watercourse with a catchment area >30km^2 and is therefore not applicable to this study.

3.2.3 Peak Rainfall Intensity

With reference to SEPA's online map service, the site is located within the Northeast Scotland River basin region. The peak rainfall intensity allowance until 2100 for this region is a 37% uplift.

This increased rainfall intensity is appropriately factored into the proposed SuDS strategy / drainage design.

3.2.4 Sea Level Rise

Using SEPA's online map service, the site is located within the Northeast Scotland River basin region. The cumulative sea level rise allowance until 2100 for this region is a 0.87m uplift.

This increase in predicted Sea Level rise will not increase the coastal flood risk to the site due to the distance from the site to the closest tidally influenced waters.

4. Proposed Surface Water Drainage Design

4.1 Design Overview

The proposed drainage / SuDS scheme for the proposed development will comprise the management of surface water runoff from the battery storage development area and cut embankments.

The battery storage development area will be drained via a herringbone drainage system and perimeter filter drains conveying runoff to a proposed SuDS attenuation basin. The development platform will be constructed with semi-permeable materials to allow rainwater to infiltrate into the

[4] Scottish Environment Protection Agency (2024) Climate change allowances for flood risk assessment in land use planning
[5] Centre for Ecology & Hydrology (2021) Climate change impacts on peak river flows: Combining national-scale hydrological modelling and probabilistic projections
[6] SEPA Climate Change Allowances for Flood Risk Assessment in Land Use Planning: https://scottishepa.maps.arcgis.com/apps/webappviewer/index.html?id=2ddf84e295334f6b93bd0dbbb9ad7417 (accessed 5th May 2025)

underlying makeup where it will be intercepted by the perforated pipework. Further runoff will be captured by the perimeter filter drains. From here, the drainage will be routed to an attenuation basin that will provide suitable treatment and attenuation prior to discharge to the Burn of Faichfield 200m east of the site.

With respect to the platform embankment, runoff from the cut embankments will drain towards the development area and be captured by the perimeter filter drains and has therefore been accounted for within the design. The fill embankment will be dressed with topsoil and allowed to vegetate thus runoff from the areas will be negligible and drain overland as per the existing hydrological regime.

The proposed drainage layout is enclosed as Drawing FRDA-003 with typical drainage details included on Drawing FRDA-004.

4.2 Design Criteria

4.2.1 Drainage Discharge Locations

The hierarchy for favoured disposal options of surface water runoff from development sites is as follows:

- Infiltration to Ground;
- Discharge to Surface Waters; or

Discharge to Sewer.

Table 2 below discusses the disposal method suitability in the context of the site and proposed development.

Table 2 Suitability of Surface Water Disposal Methods

Surface Water Disposal Method	Suitability Description	Method Suitable? (Y/N)
Infiltration to Ground	Given the majority of the site is absent of superficial deposits and the underling bedrock is igneous, infiltration to ground is not considered to be viable.	N
Surface Water Discharge	The Burn of Faichfield is located downgradient of the proposed development which will allow for gravity connections to be made. This replicates the natural hydrological regime at the site albeit in a more formalised manner.	Y
Sewer Discharge	No public surface water sewers are located in proximity and downgradient of the site to enable a connection to be made.	N

Taking the above into account, it is proposed that surface water runoff from the development is discharged to the Burn of Faichfield east of the site from the SuDS basin. This replicates the existing site (natural) hydrological regime albeit in a more formalised manner.

4.2.2 Water Quantity Review

Greenfield runoff rates have been estimated through application of methodology outlined in IHR124[7] as set out within the Interim Code of Practice for SuDS (ICP).

The IH R124 method can be used to estimate Greenfield runoff release rates for a range of AEP events, or return periods, by applying regional growth curve factors to the mean annual peak runoff (i.e. QBAR).

[7] Institute of Hydrology Report No. 124 (1994) (IH R124), Flood estimation for small catchments, June 1994

The UK hydrological region for the local area is Region 1, therefore the appropriate growth curve factors for this region have been incorporated into the analysis undertaken in the MicroDrainage software suite[8].

The catchment hydrological characteristics at the site have been incorporated into the runoff modelling and results are presented in Table 3 below for a range of AEP storm events.

- Average Annual Rainfall (SAAR): 813mm/year
- Soil Index: 0.400
- UK Hydrological Region No. 1

Table 3 Estimation of the Greenfield (Pre-Development) Rate of Runoff

AEP (%)	Return Period (1 in X Years)	Unit Greenfield Runoff Rate (l/s/Ha)
50	2	3.68
QBAR		4.05
3.3	30	7.66
1	100	10.05
0.5	200	11.39
0.1	1000	14.71

In accordance with CIRIA Report C753 (the SuDS Manual) it is proposed to limit surface water discharge from the proposed development to QBAR greenfield rates for all design events up to and including the 0.5 % AEP plus 37% climate change uplift. This also ensures that there is not an increase in Runoff Volume from the site.

The total positively drained area for the proposed development substation area is **4.84ha** and accordingly a **19.6l/s** discharge rate has been applied to the proposed discharge strategy.

This is based on a runoff coefficient (CV) of 1 being applied to the proposed development area and includes any extents of cut embankments (which would drain onto the platform areas).

4.2.3 Water Quality Review (Simple Index Approach)

In accordance with CIRIA Report C753, it is necessary to undertake a 'Water Quality Risk Management' assessment to determine the suitability of SuDS methods from a water quality perspective. The approach outlined below is based on the 'Simple Index Approach' for discharge to surface waters as detailed in the SuDS Manual (Section 26.7, Tables 26.2 and 26.3).

Table 4 below compares the SuDS Mitigation Indices (MI) against the maximum Pollution Hazard Index (PI) for the proposed development based on the application of SuDS basins.

Table 4 SuDS Water Quality Design Criteria: Index Approach Review

Land Use	Pollution Hazard and SuDS Mitigation Indices Comparison					
	Total Suspended Solids (TSS)		*Metals*		*Hydro-Carbons*	
	Pollution Index	Mitigation Index	Pollution Index	Mitigation Index	Pollution Index	Mitigation Index
Other Roofs (industrial / commercial)	0.3	0.5	0.2	0.5	0.05	0.6
Low traffic roads	0.5		0.4		0.4	

[8] MicroDrainage. WinDes Drainage Design and Modelling Software (Version 2020.1.3)

The SuDS Mitigation Index offered by the proposed SuDS Detention Basin is ≥ Pollution Hazard Index for each Land Use type and therefore the water quality assessment criteria is satisfied. In addition, further pollution mitigation would be provided from the application of filter drains and drainage through the site makeup / herringbone drainage system.

4.3 SuDS Performance Review

4.3.1 Key Design Details

The SuDS system has been sized to accommodate the 1:200yr plus 37% climate change event, and details are presented on Drawing FRDA-003 and Drawing FRDA-004.

The key design parameters / geometry of the proposed SuDS basin are summarised in Table 5.

Table 5 Proposed SuDS Basin - Summary Design Details

Parameter	Unit	Value	*Notes*
Total Depth	m	2.0	*As measured from AutoCAD design*
Storage Area	m^2	4,265	*As measured from AutoCAD design*
Total Storage Volume	m^3	6,713	*As measured from MicroDrainage Source Control*
Limiting Discharge Rate	l/s	19.6	*To be provided by Hydrobrake Optimum (or similar) – limited to QBAR for all design storm events*
Side Slopes	1 in X	4	*Typical basin side slope*

4.3.2 Hydraulic Analysis

The SuDS systems have been modelled using the industry standard MicroDrainage Network software suite and a summary of the modelling results is included as Table 6.

Table 6 SuDS Basin Hydraulic Modelling Summary

Return Period Event (1 in X)	Max. Water Depth (m)	Freeboard Allowance (mm)	Maximum Design Flow (l/s)	Storage Volume (m^3)
2	0.346	1.654	18.7	918.0
10	0.486	1.514	19.5	1,318.9
30	0.614	1.386	19.6	1,696.8
100	0.789	1.211	19.6	2,237.2
200	0.912	1.088	19.6	2,911.0
200 + 37% CC	1.348	0.652	19.6	4,135.8

The results above confirm that surface water runoff generated from the proposed development can be attenuated and discharged at rates less than the greenfield Q_{BAR} for the catchment, for all design events up to and including the 200yr + 37% CC event.

Full copies of the hydraulic modelling and model details are enclosed as Appendix B.

4.3.3 Exceedance Flow Considerations

The SuDS basin has been designed to provide a flow route for storm events larger than the design event and available freeboard. The basin design will incorporate a downgradient notch in the functional crest level to channel overflow safely from the structure towards the Burn of Faichfield 200m east of the site boundary.

4.4 Drainage Maintenance Strategy

4.4.1 Overview

To ensure efficient operation of the proposed surface water management / SuDS scheme, drainage components should be inspected and maintained throughout the life of the development. Regular inspection / maintenance will ensure efficient operation and prevent potential failure / blockage of drainage components.

The following provisional maintenance plan has been developed from best practice guidance, professional experience and information provided in CIRIA Report C753 (The SuDS Manual).

All drainage components will be retained under private ownership, with the Applicant remaining responsible for ongoing maintenance. This maintenance schedule will be integrated into the overall site operating and maintenance strategy and tailored / refined over time as required.

The following sections provide maintenance actions for specific drainage elements.

4.4.2 SuDS Attenuation Basin

Table 7 below provides the inspection and maintenance recommendations set out in Table 22.1 of CIRIA Report C753.

Table 7 SuDS Basin Maintenance Requirements

Maintenance Schedule	Required Action	Typical Frequency
Regular maintenance	Remove litter and debris	Monthly
	Cut grass - for spillways and access routes	Monthly (during growing season), or as required
	Cut grass - meadow grass in and around basin	Half yearly (spring - before nesting season, and autumn)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	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, outlets and forebay	Annually (or as required)
	Manage wetland plants in outlet pool - where provided	Annually (as set out in Chapter 23)

Maintenance Schedule	Required Action	Typical Frequency
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 where 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

4.4.3 Filter Drains

Table 8 below provides the inspection and maintenance recommendations for filter drains set out in Table 16.1 of CIRIA Report C753.

Table 8 Filter Drain Maintenance Requirements

Maintenance Schedule	Required Action	Typical Frequency
Regular Maintenance	Remove litter and debris	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six Monthly
Occasional Maintenance	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
Remedial Actions	Clear perforated pipework of blockages	As required

4.4.4 Inspection Chambers and Manholes

It is recommended that the inspection chamber and manhole covers are lifted at least half yearly to check for debris / silt accumulations, and to check the drainage runs are flowing freely.

Any silt / debris accumulations should be manually removed, and jet washed where required.

4.5 Construction Phase Drainage & Water Management

4.5.1 Overview

Outlined below are recommendations for mitigation measures to be implemented during construction to control water quality impacts. These mitigation measures take due cognisance of the Water Resources Act 1991 and CIRIA Report C532 (Control of Water Pollution from Construction Sites). Good practice measures set out in the relevant Pollution Prevention Guidance (PPGs) or the updated versions (where available), Guidance for Pollution Prevention (GPPs) have been followed. The relevant guidance includes:

- GPP 6: Working at construction and demolition sites
- PPG 7: The safe operation of refuelling facilities
- GPP 13: Vehicle washing and cleaning
- GPP 21: Pollution incident response planning
- GPP 22: Dealing with spills

4.5.2 Sediment Management

Proposed mitigation for sediment management:

- Minimise use of stockpiles and/or cover and contain stockpiles and provide sediment interception measures at their bases, e.g. silt fencing or cut-off drains and check dams;
- If topsoil is to be stored, avoid constructing stockpiles more than 2m high. This will ensure anaerobic conditions do not occur and that the soil will remain fertile and capable of being re-seeded. It will also be less susceptible to erosion;
- Temporary drainage measures to be installed which provide filtration (filter drains or filter strips) and settlement (ponds/basin) to collect sediments prior to offsite discharge;
- Avoid mass overburden stripping on the site – expose parts of the site only when essential for operation;
- Temporary drainage measures and silt fencing to be installed around large areas of exposed soils;
- Ensure a robust site traffic management plan is in place to reduce sediment runoff risks. Good practices include; minimise turning of tracked vehicles where possible and manage dedicated turning areas appropriately (hard surfacing, silt fencing etc.), avoid unnecessary turning of large site plant and minimise overall routes on site to better manage sediment runoff;
- Prevent/reduce offsite sediment impacts to the public road or adjacent land. Good practices include; wheel wash facilities, site-road sweeping, formally surfaced site car park and separate access points for cars and plant/deliveries (where possible);
- Dedicated plant washing areas to control sediment runoff.

4.5.3 Excavation Management

Proposed mitigation for excavations:

- Relevant precautions to be taken to ensure no services are struck during excavations. Relevant emergency response and contacts in place in the event services are stuck which could impact the water environment, e.g. oil line, water main, sewer;
- Existing culverts/field drains to be protected to prevent potentially polluted site runoff discharging to them prior to treatment;
- Prevent site runoff entering excavations and regular de-water to prevent infiltration to groundwater; and
- Any deep excavations (e.g. boreholes, piled foundations) should be protected to prevent infiltration of site runoff and a direct pathway to groundwater.

4.5.4 Concrete Works Management

Proposed mitigation for concrete works:

- If concrete is brought to site – provide dedicated concrete washout skip/basin to prevent any uncontrolled spilling of material in-site or nearby public roads;
- Concrete washout facilities to be regular maintained and solids to be disposed of safely;
- Robust emergency response in place for any concrete spillage on site;
- Correct disposal of any waste or surplus concrete in agreed suitable locations both onsite and offsite;
- Where applicable, shuttered pours should be used to prevent any concrete losses to ground;
- Ensure excavations are sufficiently dewatered before concreting begins and that dewatering continues while concrete sets; and
- Covering of freshly poured concrete surfaces to prevent any polluted runoff attributed with wet weather.

4.5.5 Chemical, Oils and Fuels Management

Proposed mitigation for chemicals, oils and fuels:

- Assign designated refuelling areas where appropriate and site them as far as practicably possible from adjacent field drains and public sewers; and
- Dedicated site operatives responsible for checking and maintaining temporary drainage measures;
- All site operatives to be made aware of preventative measures in place e.g. traffic systems, refuelling areas, maintenance rotas, concrete washout areas;
- All pollution prevention consumables and plant to be made readily available at all times.

5. Closure

Gondolin Land and Water Ltd (Gondolin) has been appointed by Harmony FI Ltd (the Client) to prepare a Flood Risk and Drainage Assessment (FRDA) in support of a planning application for the construction of a Battery Energy Storage System (BESS) and Substation site with associated infrastructure on land north of Flushing, Aberdeenshire, AB42 4XT.

In accordance with national planning policy and guidance, all potential sources of flooding to the site have been considered. The Flood Risk Screening Assessment confirms that the site is overall of low risk or lower of flooding from all sources and thus no bespoke flood mitigation measures are required.

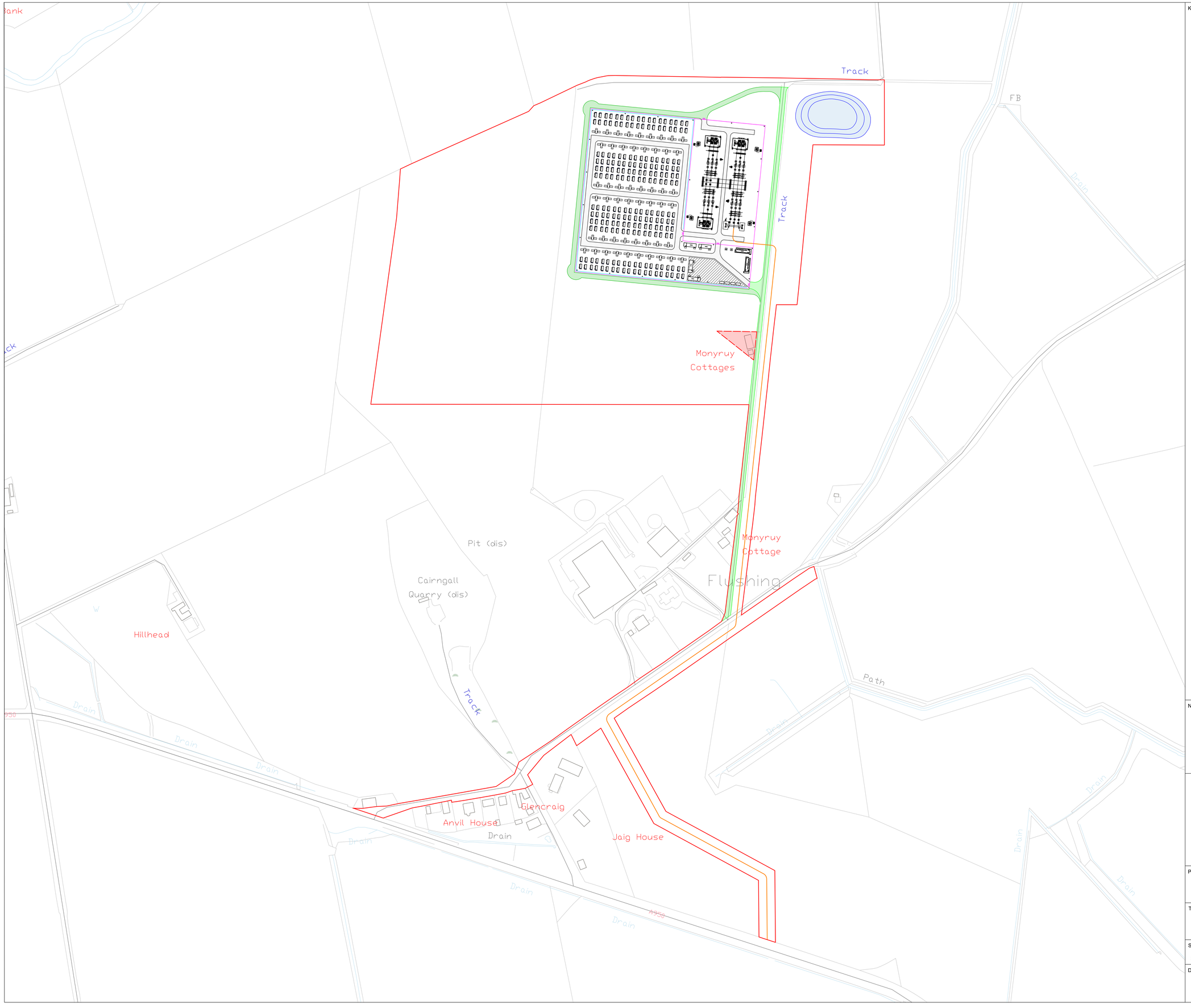
This report assesses the potential increase in surface water runoff attributed to the proposed development and proposes a surface water management strategy to manage this. The strategy is in accordance with sustainable drainage principles and allows the site to remain free of flooding during design storm events, whilst ensuring no increase of flood risk to offsite receptors and ensures no deterioration of the water environment.

Taking all of the above into account it is considered there is no impediment to the proposed development being granted permission on the grounds of flood risk or drainage provisions.

APPENDICES

Appendix A

Proposed Development Plan



KEY:

- INTERNAL BESS ROAD
- EXTERNAL EMERGENCY ACCESS
- EXISTING SITE ACCESS
- STORAGE AREA
- LANDOWNER CONTROLLED, TO BE VACANT BY CONSTRUCTION PERIOD
- SuDS ATTENUATION POND
- RED LINE BOUNDARY
- 2.4m HIGH PALISADE FENCE
- 4.5m HIGH ACOUSTIC FENCE
- INDICATIVE CABLE ROUTE
- ACCESS GATES
- AUXILIARY TRANSFORMER
- BESS / KNAN TRANSFORMER / PCS
- CONTROL ROOM
- CCTV
- HV SWITCHROOM
- STORAGE CONTAINER
- TRANSFORMER

N

0m 50m 100m 175m

NOTES:

1. DESIGN INTENDED FOR PLANNING PURPOSES ONLY. NOT FOR CONSTRUCTION.
2. OS MAPPING PROVIDED BY STREETWISE.

HARMONY ENERGY
10 St James Business Park,
Grimbald Crag Court,
Knaresborough, HG5 8QD

PROJECT: FLUSHING

TITLE: PROPOSED SITE PLAN

SCALE:	DATE:	DRAWN:	CHECKED:
A0 @ 1:1500	19/06/2025	SW	HC

DRAWING NO:	REVISION:
PA_70_PSP	C

Appendix B

MicroDrainage Modelling Extracts

	Flushing BESS SuDS Design	
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Rainfall Details

Rainfall Model	FSR	Winter Storms	Yes
Return Period (years)	2	Cv (Summer)	0.750
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	14.600	Shortest Storm (mins)	15
Ratio R	0.250	Longest Storm (mins)	10080
Summer Storms	Yes	Climate Change %	+0

Time Area Diagram

Total Area (ha) 4.840

Time (mins) From:	To:	Area (ha)
0	4	4.840

	Flushing BESS SuDS Design	
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Model Details

Storage is Online Cover Level (m) 2.000

Tank or Pond Structure

Invert Level (m) 0.000

Depth (m)	Area (m²)	Depth (m)	Area (m²)
0.000	2524.0	2.000	4265.0

Hydro-Brake® Optimum Outflow Control

Unit Reference	MD-SHE-0182-1960-2000-1960
Design Head (m)	2.000
Design Flow (l/s)	19.6
Flush-Flo™	Calculated
Objective	Minimise upstream storage
Application	Surface
Sump Available	Yes
Diameter (mm)	182
Invert Level (m)	0.000
Minimum Outlet Pipe Diameter (mm)	225
Suggested Manhole Diameter (mm)	1800

Control Points	Head (m)	Flow (l/s)
Design Point (Calculated)	2.000	19.6
Flush-Flo™	0.581	19.6
Kick-Flo®	1.231	15.6
Mean Flow over Head Range	-	17.1

The hydrological calculations have been based on the Head/Discharge relationship for the Hydro-Brake® Optimum as specified. Should another type of control device other than a Hydro-Brake Optimum® be utilised then these storage routing calculations will be invalidated

Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)	Depth (m)	Flow (l/s)
0.100	6.4	1.200	16.1	3.000	23.8	7.000	35.7
0.200	16.4	1.400	16.5	3.500	25.6	7.500	37.0
0.300	18.2	1.600	17.6	4.000	27.3	8.000	38.1
0.400	19.1	1.800	18.6	4.500	28.9	8.500	39.3
0.500	19.5	2.000	19.6	5.000	30.4	9.000	40.4
0.600	19.6	2.200	20.5	5.500	31.8	9.500	41.4
0.800	19.2	2.400	21.4	6.000	33.2		
1.000	18.3	2.600	22.2	6.500	34.5		

	Flushing BESS SuDS Design	
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Summary of Results for 2 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.091	0.091	5.5	232.9	O K
30 min Summer	0.124	0.124	9.1	317.9	O K
60 min Summer	0.161	0.161	13.1	416.9	O K
120 min Summer	0.202	0.202	16.4	524.5	O K
180 min Summer	0.224	0.224	16.9	585.7	O K
240 min Summer	0.239	0.239	17.2	625.8	O K
360 min Summer	0.262	0.262	17.6	688.0	O K
480 min Summer	0.278	0.278	17.9	731.6	O K
600 min Summer	0.290	0.290	18.0	763.8	O K
720 min Summer	0.299	0.299	18.2	788.5	O K
960 min Summer	0.311	0.311	18.3	822.1	O K
1440 min Summer	0.322	0.322	18.4	852.1	O K
2160 min Summer	0.320	0.320	18.4	847.5	O K
2880 min Summer	0.310	0.310	18.3	820.5	O K
4320 min Summer	0.284	0.284	18.0	748.1	O K
5760 min Summer	0.258	0.258	17.6	675.8	O K
7200 min Summer	0.234	0.234	17.1	612.6	O K
8640 min Summer	0.215	0.215	16.7	560.8	O K
10080 min Summer	0.200	0.200	16.4	521.1	O K
15 min Winter	0.102	0.102	6.6	260.6	O K
30 min Winter	0.138	0.138	10.7	355.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	25.958	0.0	163.7	19
30 min Summer	17.955	0.0	245.2	33
60 min Summer	12.106	0.0	392.8	62
120 min Summer	8.030	0.0	533.3	122
180 min Summer	6.257	0.0	629.5	180
240 min Summer	5.227	0.0	705.0	238
360 min Summer	4.089	0.0	832.8	300
480 min Summer	3.427	0.0	933.9	366
600 min Summer	2.986	0.0	1018.8	434
720 min Summer	2.668	0.0	1093.3	504
960 min Summer	2.234	0.0	1220.6	644
1440 min Summer	1.740	0.0	1419.6	924
2160 min Summer	1.351	0.0	1729.0	1336
2880 min Summer	1.128	0.0	1923.3	1732
4320 min Summer	0.875	0.0	2221.7	2504
5760 min Summer	0.730	0.0	2523.0	3232
7200 min Summer	0.633	0.0	2732.3	3960
8640 min Summer	0.564	0.0	2911.7	4664
10080 min Summer	0.511	0.0	3061.5	5344
15 min Winter	25.958	0.0	189.0	19
30 min Winter	17.955	0.0	281.2	33

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Summary of Results for 2 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	0.180	0.180	14.8	467.2	O K
120 min Winter	0.226	0.226	17.0	591.1	O K
180 min Winter	0.253	0.253	17.5	664.0	O K
240 min Winter	0.271	0.271	17.8	712.5	O K
360 min Winter	0.296	0.296	18.1	781.2	O K
480 min Winter	0.312	0.312	18.3	823.8	O K
600 min Winter	0.323	0.323	18.5	856.4	O K
720 min Winter	0.332	0.332	18.6	879.7	O K
960 min Winter	0.342	0.342	18.6	907.1	O K
1440 min Winter	0.346	0.346	18.7	918.0	O K
2160 min Winter	0.332	0.332	18.6	880.0	O K
2880 min Winter	0.310	0.310	18.3	820.0	O K
4320 min Winter	0.264	0.264	17.7	694.2	O K
5760 min Winter	0.225	0.225	17.0	587.6	O K
7200 min Winter	0.198	0.198	16.2	514.5	O K
8640 min Winter	0.181	0.181	14.9	470.1	O K
10080 min Winter	0.168	0.168	13.7	436.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	12.106	0.0	444.6	62
120 min Winter	8.030	0.0	602.1	120
180 min Winter	6.257	0.0	709.8	176
240 min Winter	5.227	0.0	794.4	232
360 min Winter	4.089	0.0	937.5	338
480 min Winter	3.427	0.0	1050.8	388
600 min Winter	2.986	0.0	1145.9	464
720 min Winter	2.668	0.0	1229.3	544
960 min Winter	2.234	0.0	1371.7	702
1440 min Winter	1.740	0.0	1593.9	1008
2160 min Winter	1.351	0.0	1939.8	1432
2880 min Winter	1.128	0.0	2158.3	1844
4320 min Winter	0.875	0.0	2495.7	2596
5760 min Winter	0.730	0.0	2828.3	3336
7200 min Winter	0.633	0.0	3063.5	3968
8640 min Winter	0.564	0.0	3265.8	4672
10080 min Winter	0.511	0.0	3437.2	5440

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Summary of Results for 10 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.130	0.130	9.8	335.6	O K
30 min Summer	0.177	0.177	14.5	459.5	O K
60 min Summer	0.230	0.230	17.0	599.5	O K
120 min Summer	0.286	0.286	18.0	754.1	O K
180 min Summer	0.320	0.320	18.4	846.8	O K
240 min Summer	0.343	0.343	18.7	910.2	O K
360 min Summer	0.372	0.372	18.9	990.9	O K
480 min Summer	0.390	0.390	19.0	1043.2	O K
600 min Summer	0.404	0.404	19.1	1082.7	O K
720 min Summer	0.415	0.415	19.2	1112.9	O K
960 min Summer	0.429	0.429	19.3	1154.6	O K
1440 min Summer	0.442	0.442	19.3	1191.4	O K
2160 min Summer	0.441	0.441	19.3	1189.5	O K
2880 min Summer	0.430	0.430	19.3	1157.0	O K
4320 min Summer	0.397	0.397	19.1	1062.2	O K
5760 min Summer	0.361	0.361	18.8	962.4	O K
7200 min Summer	0.328	0.328	18.5	869.9	O K
8640 min Summer	0.299	0.299	18.2	789.1	O K
10080 min Summer	0.274	0.274	17.8	719.5	O K
15 min Winter	0.146	0.146	11.5	375.5	O K
30 min Winter	0.198	0.198	16.3	514.9	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	37.516	0.0	259.0	19
30 min Summer	26.055	0.0	381.8	33
60 min Summer	17.419	0.0	582.3	62
120 min Summer	11.372	0.0	771.6	122
180 min Summer	8.810	0.0	902.2	182
240 min Summer	7.336	0.0	1005.1	240
360 min Summer	5.659	0.0	1167.1	354
480 min Summer	4.703	0.0	1295.0	412
600 min Summer	4.072	0.0	1402.2	476
720 min Summer	3.619	0.0	1495.1	542
960 min Summer	3.004	0.0	1651.2	682
1440 min Summer	2.310	0.0	1886.8	966
2160 min Summer	1.775	0.0	2279.5	1380
2880 min Summer	1.472	0.0	2518.4	1788
4320 min Summer	1.130	0.0	2882.0	2592
5760 min Summer	0.937	0.0	3243.6	3344
7200 min Summer	0.810	0.0	3500.6	4104
8640 min Summer	0.719	0.0	3720.7	4760
10080 min Summer	0.650	0.0	3905.2	5544
15 min Winter	37.516	0.0	296.8	19
30 min Winter	26.055	0.0	435.0	33

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Summary of Results for 10 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	0.257	0.257	17.6	674.1	O K
120 min Winter	0.321	0.321	18.4	850.1	O K
180 min Winter	0.360	0.360	18.8	957.4	O K
240 min Winter	0.386	0.386	19.0	1032.1	O K
360 min Winter	0.421	0.421	19.2	1130.9	O K
480 min Winter	0.442	0.442	19.3	1190.7	O K
600 min Winter	0.455	0.455	19.4	1228.3	O K
720 min Winter	0.465	0.465	19.4	1256.7	O K
960 min Winter	0.479	0.479	19.4	1296.8	O K
1440 min Winter	0.486	0.486	19.5	1318.9	O K
2160 min Winter	0.473	0.473	19.4	1282.0	O K
2880 min Winter	0.449	0.449	19.3	1210.0	O K
4320 min Winter	0.389	0.389	19.0	1040.0	O K
5760 min Winter	0.332	0.332	18.6	880.5	O K
7200 min Winter	0.283	0.283	18.0	746.4	O K
8640 min Winter	0.244	0.244	17.3	639.8	O K
10080 min Winter	0.215	0.215	16.7	559.2	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	17.419	0.0	656.9	62
120 min Winter	11.372	0.0	868.8	120
180 min Winter	8.810	0.0	1014.9	178
240 min Winter	7.336	0.0	1130.1	236
360 min Winter	5.659	0.0	1311.3	348
480 min Winter	4.703	0.0	1454.2	456
600 min Winter	4.072	0.0	1573.8	554
720 min Winter	3.619	0.0	1677.4	580
960 min Winter	3.004	0.0	1850.8	734
1440 min Winter	2.310	0.0	2109.4	1052
2160 min Winter	1.775	0.0	2555.9	1496
2880 min Winter	1.472	0.0	2823.6	1932
4320 min Winter	1.130	0.0	3234.1	2728
5760 min Winter	0.937	0.0	3635.4	3512
7200 min Winter	0.810	0.0	3924.1	4248
8640 min Winter	0.719	0.0	4172.3	4928
10080 min Winter	0.650	0.0	4382.9	5552

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Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.163	0.163	13.3	422.7	O K
30 min Summer	0.224	0.224	16.9	584.8	O K
60 min Summer	0.291	0.291	18.1	767.9	O K
120 min Summer	0.362	0.362	18.8	965.3	O K
180 min Summer	0.405	0.405	19.1	1084.3	O K
240 min Summer	0.433	0.433	19.3	1166.2	O K
360 min Summer	0.471	0.471	19.4	1273.9	O K
480 min Summer	0.493	0.493	19.5	1337.4	O K
600 min Summer	0.508	0.508	19.5	1381.6	O K
720 min Summer	0.520	0.520	19.5	1416.1	O K
960 min Summer	0.536	0.536	19.5	1463.5	O K
1440 min Summer	0.551	0.551	19.6	1508.3	O K
2160 min Summer	0.551	0.551	19.6	1509.3	O K
2880 min Summer	0.539	0.539	19.6	1473.7	O K
4320 min Summer	0.502	0.502	19.5	1363.4	O K
5760 min Summer	0.459	0.459	19.4	1240.9	O K
7200 min Summer	0.419	0.419	19.2	1124.7	O K
8640 min Summer	0.381	0.381	19.0	1018.5	O K
10080 min Summer	0.348	0.348	18.7	925.2	O K
15 min Winter	0.182	0.182	14.9	473.3	O K
30 min Winter	0.251	0.251	17.4	656.3	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	47.336	0.0	341.8	19
30 min Summer	33.158	0.0	502.5	33
60 min Summer	22.181	0.0	752.1	64
120 min Summer	14.383	0.0	985.9	122
180 min Summer	11.084	0.0	1144.4	182
240 min Summer	9.189	0.0	1267.7	242
360 min Summer	7.045	0.0	1460.4	360
480 min Summer	5.826	0.0	1610.5	470
600 min Summer	5.025	0.0	1735.0	524
720 min Summer	4.452	0.0	1841.8	592
960 min Summer	3.676	0.0	2018.7	722
1440 min Summer	2.805	0.0	2273.0	996
2160 min Summer	2.140	0.0	2751.7	1424
2880 min Summer	1.765	0.0	3022.0	1840
4320 min Summer	1.344	0.0	3430.4	2636
5760 min Summer	1.107	0.0	3835.0	3408
7200 min Summer	0.952	0.0	4118.9	4176
8640 min Summer	0.842	0.0	4360.9	4928
10080 min Summer	0.758	0.0	4563.1	5648
15 min Winter	47.336	0.0	390.0	19
30 min Winter	33.158	0.0	569.8	33

	Flushing BESS SuDS Design	
Date 25/04/2025 11:29 File Flushing BESS SuDS Desi...	Designed by steph Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 30 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	0.326	0.326	18.5	863.3	O K
120 min Winter	0.406	0.406	19.1	1087.3	O K
180 min Winter	0.453	0.453	19.4	1224.1	O K
240 min Winter	0.487	0.487	19.5	1320.0	O K
360 min Winter	0.531	0.531	19.5	1449.7	O K
480 min Winter	0.559	0.559	19.6	1531.1	O K
600 min Winter	0.576	0.576	19.6	1584.3	O K
720 min Winter	0.588	0.588	19.6	1619.0	O K
960 min Winter	0.602	0.602	19.6	1660.0	O K
1440 min Winter	0.614	0.614	19.6	1696.8	O K
2160 min Winter	0.604	0.604	19.6	1666.7	O K
2880 min Winter	0.578	0.578	19.6	1589.6	O K
4320 min Winter	0.511	0.511	19.5	1389.9	O K
5760 min Winter	0.441	0.441	19.3	1189.1	O K
7200 min Winter	0.379	0.379	19.0	1010.6	O K
8640 min Winter	0.325	0.325	18.5	860.8	O K
10080 min Winter	0.281	0.281	17.9	738.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	22.181	0.0	846.9	62
120 min Winter	14.383	0.0	1108.5	120
180 min Winter	11.084	0.0	1285.8	178
240 min Winter	9.189	0.0	1423.5	236
360 min Winter	7.045	0.0	1638.5	350
480 min Winter	5.826	0.0	1805.5	462
600 min Winter	5.025	0.0	1943.6	572
720 min Winter	4.452	0.0	2061.7	676
960 min Winter	3.676	0.0	2255.0	776
1440 min Winter	2.805	0.0	2518.9	1082
2160 min Winter	2.140	0.0	3084.0	1552
2880 min Winter	1.765	0.0	3386.4	1992
4320 min Winter	1.344	0.0	3843.2	2848
5760 min Winter	1.107	0.0	4297.7	3632
7200 min Winter	0.952	0.0	4616.6	4392
8640 min Winter	0.842	0.0	4889.4	5096
10080 min Winter	0.758	0.0	5120.3	5752

	Flushing BESS SuDS Design	
Date 25/04/2025 11:29 File Flushing BESS SuDS Desi...	Designed by steph Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.209	0.209	16.6	545.2	O K
30 min Summer	0.290	0.290	18.0	764.2	O K
60 min Summer	0.378	0.378	19.0	1007.9	O K
120 min Summer	0.467	0.467	19.4	1264.3	O K
180 min Summer	0.521	0.521	19.5	1419.4	O K
240 min Summer	0.557	0.557	19.6	1526.9	O K
360 min Summer	0.606	0.606	19.6	1672.1	O K
480 min Summer	0.636	0.636	19.6	1762.1	O K
600 min Summer	0.655	0.655	19.6	1820.0	O K
720 min Summer	0.667	0.667	19.6	1857.7	O K
960 min Summer	0.684	0.684	19.6	1910.5	O K
1440 min Summer	0.701	0.701	19.6	1961.5	O K
2160 min Summer	0.703	0.703	19.6	1967.7	O K
2880 min Summer	0.690	0.690	19.6	1929.0	O K
4320 min Summer	0.649	0.649	19.6	1801.8	O K
5760 min Summer	0.600	0.600	19.6	1654.7	O K
7200 min Summer	0.551	0.551	19.6	1508.3	O K
8640 min Summer	0.504	0.504	19.5	1371.9	O K
10080 min Summer	0.461	0.461	19.4	1246.9	O K
15 min Winter	0.234	0.234	17.1	611.0	O K
30 min Winter	0.324	0.324	18.5	857.6	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	61.074	0.0	458.5	19
30 min Summer	43.184	0.0	671.4	33
60 min Summer	28.906	0.0	991.5	64
120 min Summer	18.605	0.0	1285.3	122
180 min Summer	14.257	0.0	1480.7	182
240 min Summer	11.762	0.0	1629.9	242
360 min Summer	8.956	0.0	1860.7	362
480 min Summer	7.367	0.0	2036.8	480
600 min Summer	6.327	0.0	2180.3	600
720 min Summer	5.585	0.0	2300.8	686
960 min Summer	4.585	0.0	2491.5	800
1440 min Summer	3.470	0.0	2706.9	1066
2160 min Summer	2.626	0.0	3379.0	1472
2880 min Summer	2.152	0.0	3685.7	1900
4320 min Summer	1.624	0.0	4135.0	2720
5760 min Summer	1.328	0.0	4606.5	3512
7200 min Summer	1.136	0.0	4921.6	4256
8640 min Summer	1.000	0.0	5188.5	5016
10080 min Summer	0.898	0.0	5410.9	5752
15 min Winter	61.074	0.0	520.7	19
30 min Winter	43.184	0.0	757.6	33

	Flushing BESS SuDS Design	
Date 25/04/2025 11:29 File Flushing BESS SuDS Desi...	Designed by steph Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 100 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	0.421	0.421	19.2	1132.3	O K
120 min Winter	0.522	0.522	19.5	1423.0	O K
180 min Winter	0.582	0.582	19.6	1601.0	O K
240 min Winter	0.624	0.624	19.6	1725.8	O K
360 min Winter	0.680	0.680	19.6	1898.5	O K
480 min Winter	0.717	0.717	19.6	2010.2	O K
600 min Winter	0.741	0.741	19.6	2086.6	O K
720 min Winter	0.758	0.758	19.6	2139.7	O K
960 min Winter	0.778	0.778	19.6	2200.2	O K
1440 min Winter	0.789	0.789	19.6	2237.2	O K
2160 min Winter	0.784	0.784	19.6	2221.8	O K
2880 min Winter	0.760	0.760	19.6	2144.5	O K
4320 min Winter	0.687	0.687	19.6	1918.7	O K
5760 min Winter	0.606	0.606	19.6	1671.9	O K
7200 min Winter	0.527	0.527	19.5	1439.0	O K
8640 min Winter	0.456	0.456	19.4	1232.2	O K
10080 min Winter	0.394	0.394	19.1	1054.8	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	28.906	0.0	1114.7	62
120 min Winter	18.605	0.0	1443.0	120
180 min Winter	14.257	0.0	1660.9	180
240 min Winter	11.762	0.0	1827.0	238
360 min Winter	8.956	0.0	2082.7	354
480 min Winter	7.367	0.0	2276.3	468
600 min Winter	6.327	0.0	2431.8	582
720 min Winter	5.585	0.0	2559.6	692
960 min Winter	4.585	0.0	2749.0	906
1440 min Winter	3.470	0.0	2864.0	1142
2160 min Winter	2.626	0.0	3784.3	1604
2880 min Winter	2.152	0.0	4125.8	2076
4320 min Winter	1.624	0.0	4616.6	2940
5760 min Winter	1.328	0.0	5161.2	3752
7200 min Winter	1.136	0.0	5515.5	4544
8640 min Winter	1.000	0.0	5816.6	5280
10080 min Winter	0.898	0.0	6070.4	5960

	Flushing BESS SuDS Design	
Date 25/04/2025 11:30 File Flushing BESS SuDS Desi...	Designed by steph Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 200 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.241	0.241	17.3	631.8	O K
30 min Summer	0.336	0.336	18.6	891.7	O K
60 min Summer	0.438	0.438	19.3	1178.6	O K
120 min Summer	0.540	0.540	19.6	1476.0	O K
180 min Summer	0.600	0.600	19.6	1656.1	O K
240 min Summer	0.642	0.642	19.6	1781.0	O K
360 min Summer	0.698	0.698	19.6	1952.2	O K
480 min Summer	0.733	0.733	19.6	2060.4	O K
600 min Summer	0.756	0.756	19.6	2132.5	O K
720 min Summer	0.771	0.771	19.6	2180.5	O K
960 min Summer	0.788	0.788	19.6	2234.7	O K
1440 min Summer	0.805	0.805	19.6	2288.0	O K
2160 min Summer	0.808	0.808	19.6	2294.9	O K
2880 min Summer	0.795	0.795	19.6	2254.8	O K
4320 min Summer	0.751	0.751	19.6	2117.5	O K
5760 min Summer	0.699	0.699	19.6	1955.8	O K
7200 min Summer	0.646	0.646	19.6	1792.7	O K
8640 min Summer	0.594	0.594	19.6	1636.9	O K
10080 min Summer	0.545	0.545	19.6	1491.9	O K
15 min Winter	0.270	0.270	17.8	708.2	O K
30 min Winter	0.375	0.375	18.9	1000.5	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	70.724	0.0	540.4	19
30 min Summer	50.278	0.0	789.2	34
60 min Summer	33.667	0.0	1160.5	64
120 min Summer	21.577	0.0	1495.0	122
180 min Summer	16.480	0.0	1714.5	182
240 min Summer	13.558	0.0	1880.2	242
360 min Summer	10.283	0.0	2133.9	362
480 min Summer	8.432	0.0	2323.9	482
600 min Summer	7.224	0.0	2475.1	600
720 min Summer	6.364	0.0	2597.9	720
960 min Summer	5.207	0.0	2774.3	874
1440 min Summer	3.923	0.0	2849.4	1126
2160 min Summer	2.955	0.0	3800.6	1516
2880 min Summer	2.413	0.0	4127.8	1936
4320 min Summer	1.811	0.0	4586.7	2764
5760 min Summer	1.476	0.0	5118.4	3576
7200 min Summer	1.258	0.0	5452.2	4328
8640 min Summer	1.105	0.0	5734.0	5104
10080 min Summer	0.989	0.0	5968.1	5848
15 min Winter	70.724	0.0	611.9	19
30 min Winter	50.278	0.0	888.0	33

	Flushing BESS SuDS Design	Micro Drainage
Date 25/04/2025 11:30 File Flushing BESS SuDS Desi...	Designed by steph Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 200 year Return Period

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	0.488	0.488	19.5	1323.5	O K
120 min Winter	0.602	0.602	19.6	1660.9	O K
180 min Winter	0.670	0.670	19.6	1867.2	O K
240 min Winter	0.717	0.717	19.6	2011.8	O K
360 min Winter	0.782	0.782	19.6	2214.0	O K
480 min Winter	0.824	0.824	19.6	2346.7	O K
600 min Winter	0.853	0.853	19.6	2439.5	O K
720 min Winter	0.873	0.873	19.6	2505.8	O K
960 min Winter	0.898	0.898	19.6	2586.8	O K
1440 min Winter	0.912	0.912	19.6	2632.3	O K
2160 min Winter	0.908	0.908	19.6	2619.1	O K
2880 min Winter	0.885	0.885	19.6	2544.3	O K
4320 min Winter	0.811	0.811	19.6	2307.2	O K
5760 min Winter	0.725	0.725	19.6	2036.3	O K
7200 min Winter	0.639	0.639	19.6	1771.0	O K
8640 min Winter	0.557	0.557	19.6	1527.8	O K
10080 min Winter	0.485	0.485	19.5	1314.0	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	33.667	0.0	1303.6	62
120 min Winter	21.577	0.0	1676.8	122
180 min Winter	16.480	0.0	1921.0	180
240 min Winter	13.558	0.0	2104.4	238
360 min Winter	10.283	0.0	2382.6	354
480 min Winter	8.432	0.0	2586.4	470
600 min Winter	7.224	0.0	2741.8	584
720 min Winter	6.364	0.0	2858.0	698
960 min Winter	5.207	0.0	2975.2	920
1440 min Winter	3.923	0.0	2911.0	1326
2160 min Winter	2.955	0.0	4253.2	1664
2880 min Winter	2.413	0.0	4614.1	2128
4320 min Winter	1.811	0.0	5086.2	3024
5760 min Winter	1.476	0.0	5734.1	3864
7200 min Winter	1.258	0.0	6109.2	4680
8640 min Winter	1.105	0.0	6427.4	5440
10080 min Winter	0.989	0.0	6694.8	6152

	Flushing BESS SuDS Design	
Date 25/04/2025 11:30 File Flushing BESS SuDS Desi...	Designed by steph Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 200 year Return Period (+37%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
15 min Summer	0.327	0.327	18.5	867.7	O K
30 min Summer	0.454	0.454	19.4	1227.0	O K
60 min Summer	0.591	0.591	19.6	1626.8	O K
120 min Summer	0.729	0.729	19.6	2048.5	O K
180 min Summer	0.812	0.812	19.6	2310.0	O K
240 min Summer	0.871	0.871	19.6	2497.0	O K
360 min Summer	0.953	0.953	19.6	2764.9	O K
480 min Summer	1.008	1.008	19.6	2948.1	O K
600 min Summer	1.048	1.048	19.6	3082.9	O K
720 min Summer	1.078	1.078	19.6	3185.8	O K
960 min Summer	1.120	1.120	19.6	3328.6	O K
1440 min Summer	1.161	1.161	19.6	3468.4	O K
2160 min Summer	1.175	1.175	19.6	3519.9	O K
2880 min Summer	1.171	1.171	19.6	3505.9	O K
4320 min Summer	1.139	1.139	19.6	3393.8	O K
5760 min Summer	1.093	1.093	19.6	3234.5	O K
7200 min Summer	1.041	1.041	19.6	3059.1	O K
8640 min Summer	0.987	0.987	19.6	2877.7	O K
10080 min Summer	0.932	0.932	19.6	2696.6	O K
15 min Winter	0.365	0.365	18.9	972.6	O K
30 min Winter	0.506	0.506	19.5	1376.1	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
15 min Summer	96.892	0.0	759.6	19
30 min Summer	68.881	0.0	1087.6	34
60 min Summer	46.124	0.0	1600.2	64
120 min Summer	29.560	0.0	2051.3	124
180 min Summer	22.577	0.0	2342.1	182
240 min Summer	18.574	0.0	2555.5	242
360 min Summer	14.087	0.0	2858.3	362
480 min Summer	11.552	0.0	3032.4	482
600 min Summer	9.897	0.0	3086.3	602
720 min Summer	8.718	0.0	3069.5	722
960 min Summer	7.134	0.0	2993.1	962
1440 min Summer	5.374	0.0	2810.4	1440
2160 min Summer	4.048	0.0	5154.7	1840
2880 min Summer	3.306	0.0	5486.7	2220
4320 min Summer	2.481	0.0	5285.0	3024
5760 min Summer	2.021	0.0	7012.6	3808
7200 min Summer	1.724	0.0	7469.5	4616
8640 min Summer	1.513	0.0	7858.7	5440
10080 min Summer	1.355	0.0	8188.9	6160
15 min Winter	96.892	0.0	855.3	19
30 min Winter	68.881	0.0	1212.6	33

	Flushing BESS SuDS Design	
Date 25/04/2025 11:30 File Flushing BESS SuDS Desi...	Designed by steph Checked by	
Innovyze	Source Control 2020.1.3	

Summary of Results for 200 year Return Period (+37%)

Storm Event	Max Level (m)	Max Depth (m)	Max Control (l/s)	Max Volume (m³)	Status
60 min Winter	0.657	0.657	19.6	1825.6	O K
120 min Winter	0.810	0.810	19.6	2303.8	O K
180 min Winter	0.903	0.903	19.6	2602.4	O K
240 min Winter	0.969	0.969	19.6	2817.6	O K
360 min Winter	1.062	1.062	19.6	3130.7	O K
480 min Winter	1.126	1.126	19.6	3350.6	O K
600 min Winter	1.175	1.175	19.6	3517.7	O K
720 min Winter	1.212	1.212	19.6	3650.3	O K
960 min Winter	1.267	1.267	19.6	3843.7	O K
1440 min Winter	1.324	1.324	19.6	4048.9	O K
2160 min Winter	1.348	1.348	19.6	4135.8	O K
2880 min Winter	1.336	1.336	19.6	4092.5	O K
4320 min Winter	1.292	1.292	19.6	3934.3	O K
5760 min Winter	1.220	1.220	19.6	3677.5	O K
7200 min Winter	1.128	1.128	19.6	3357.1	O K
8640 min Winter	1.035	1.035	19.6	3038.2	O K
10080 min Winter	0.943	0.943	19.6	2731.4	O K

Storm Event	Rain (mm/hr)	Flooded Volume (m³)	Discharge Volume (m³)	Time-Peak (mins)
60 min Winter	46.124	0.0	1794.0	62
120 min Winter	29.560	0.0	2292.9	122
180 min Winter	22.577	0.0	2608.0	180
240 min Winter	18.574	0.0	2829.5	240
360 min Winter	14.087	0.0	3087.1	358
480 min Winter	11.552	0.0	3120.5	474
600 min Winter	9.897	0.0	3078.0	592
720 min Winter	8.718	0.0	3015.9	708
960 min Winter	7.134	0.0	2886.1	940
1440 min Winter	5.374	0.0	2699.9	1396
2160 min Winter	4.048	0.0	5633.8	2052
2880 min Winter	3.306	0.0	5599.5	2624
4320 min Winter	2.481	0.0	5176.8	3288
5760 min Winter	2.021	0.0	7851.2	4264
7200 min Winter	1.724	0.0	8362.1	5112
8640 min Winter	1.513	0.0	8795.7	5880
10080 min Winter	1.355	0.0	9163.6	6664

DRAWINGS

LEGEND

PLANNING BOUNDARY

REV	DATE	DESCRIPTION	BY	CHK
00	06/25	INITIAL ISSUE	GD	SD

CLIENT:
HARMONY FL LTD

PROJECT:
FLUSHING BESS

DRAWING TITLE:
SITE LOCATION PLAN

SCALE:
1:10,000 @ A3

DATE:
JUNE 2025

DRAWING NUMBER:
FRDA-001

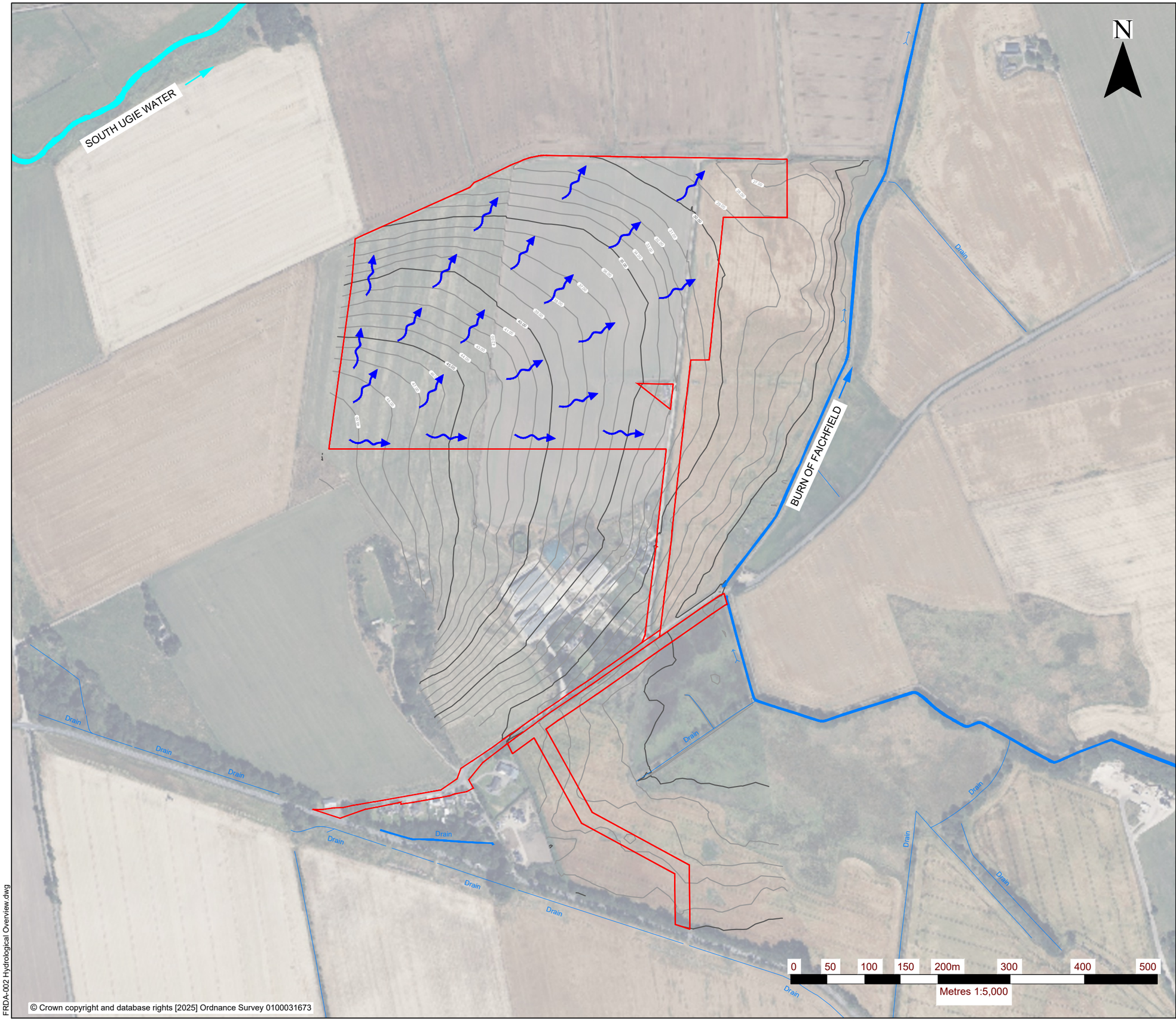
REV:
00

DRAWING STATUS:
FOR PLANNING

GONDOLIN LAND & WATER LTD
15 Quayside Street
Edinburgh
EH6 6EJ
Registered Company No. SC706920

GONDOLIN Land & Water

FRDA-001 Site Location Plan.dwg



NOTES

1. SITE BOUNDARY TAKEN FROM DRAWING 'PA_70_LP_A - LOCATION PLAN' PROVIDED BY HARMONY ENERGY.
2. TOPOGRAPHIC DATA TAKEN FROM DRAWING 'GCS7032_RAW_3D_DATA'.

LEGEND

- PLANNING BOUNDARY
- PROPOSED MAJOR CONTOURS (5.0m INTERVAL)
- PROPOSED MINOR CONTOURS (1.0m INTERVAL)
- EXISTING MINOR DRAIN
- BURN OF FAICHFIELD
- SOUTH UGIE WATER
- OVERLAND FLOWPATH

REV	DATE	DESCRIPTION	BY	CHK
00	06/25	INITIAL ISSUE	GD	SD

CLIENT: HARMONY FL LTD

PROJECT: FLUSHING BESS

DRAWING TITLE: **HYDROLOGICAL OVERVIEW**

SCALE: 1:5,000 @ A3

DATE: JUNE 2025

DRAWING NUMBER: **FRDA-002**

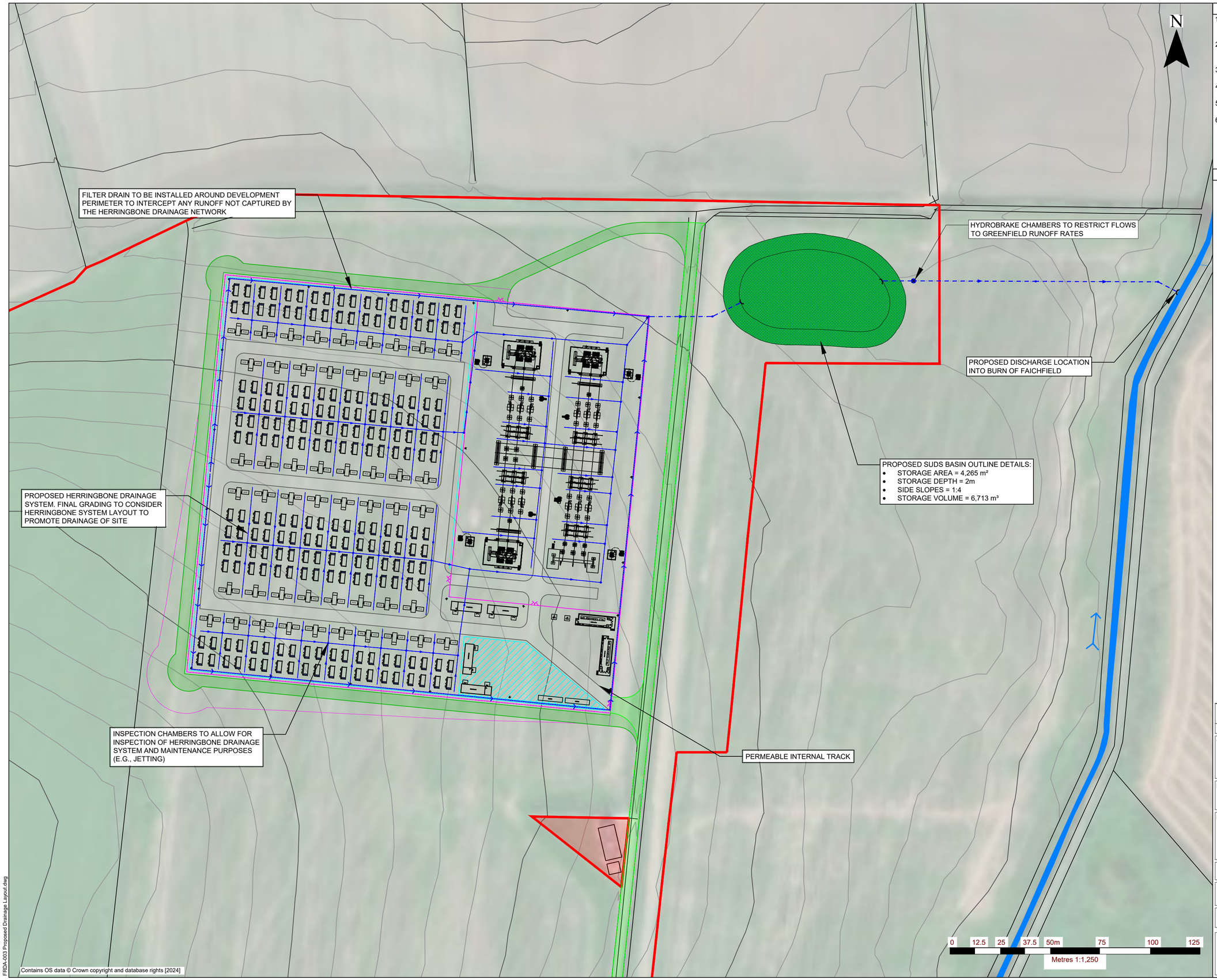
REV: **00**

DRAWING STATUS: FOR PLANNING

GONDOLIN LAND & WATER LTD
15 Quayside Street
Edinburgh
EH6 6EJ
Registered Company No. SC706920

GONDOLIN Land & Water

FRDA-002 Hydrological Overview.dwg



NOTES

1. SITE LAYOUT TAKEN FROM DRAWING 'PA_70_PSP_IR23_C - PROPOSED SITE PLAN' PROVIDED BY HARMONY ENERGY.
2. SITE BOUNDARY TAKEN FROM 'PA_70_LP_A - LOCATION PLAN' PROVIDED BY HARMONY ENERGY.
3. TOPOGRAPHIC DATA TAKEN FROM DRAWING 'GCS7032_RAW_3D_DATA'.
4. DRAWING TO BE READ IN CONJUNCTION WITH ALL OTHER SCHEME DRAWINGS.
5. REFER TO DRAWINGS FRDA-004 FOR TYPICAL DRAINAGE DETAILS.
6. DESIGN SHOULD BE CONSIDERED OUTLINE DETAIL AND NOT FOR CONSTRUCTION. FINAL LEVELS, GRADIENTS AND ALIGNMENTS TO BE CONFIRMED AT LATER DESIGN STAGES.

LEGEND

- PLANNING BOUNDARY
- EXISTING MAJOR CONTOURS (5.0m INTERVAL)
- EXISTING MINOR CONTOURS (1.0m INTERVAL)
- BURN OF FAICHFIELD
- PROPOSED PERFORATED PIPEWORK
- PROPOSED CONVENTIONAL PIPEWORK
- PROPOSED FILTER DRAIN
- PROPOSED MANHOLE / INSPECTION CHAMBER
- PROPOSED HYDROBRAKE CHAMBER
- PROPOSED SuDS BASIN
- PROPOSED HEADWALL

REV	DATE	DESCRIPTION	BY	CHK
00	06/25	INITIAL ISSUE	GD	SD

CLIENT: HARMONY FL LTD

PROJECT: FLUSHING BESS

DRAWING TITLE: **PROPOSED DRAINAGE LAYOUT**

SCALE: 1:1,250 @ A2

DATE: JUNE 2025

DRAWING NUMBER: **FRDA-003**

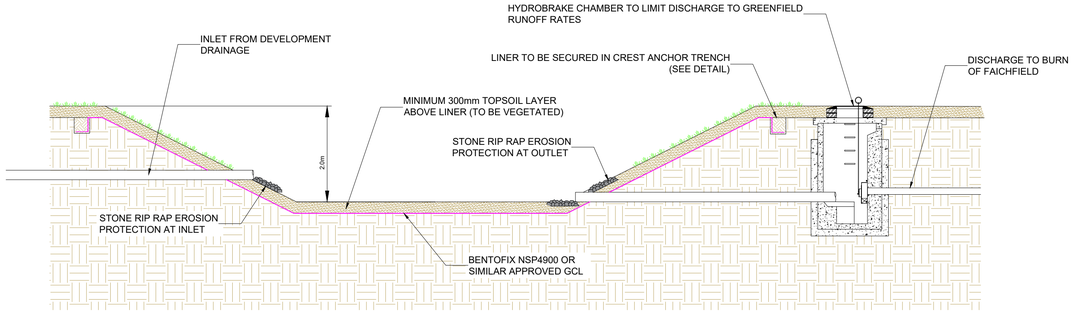
REV: **00**

DRAWING STATUS: FOR PLANNING

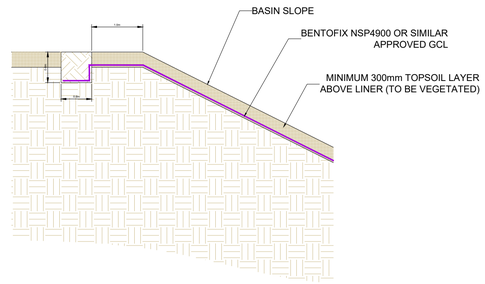
GONDOLIN LAND & WATER LTD
15 Quayside Street
Edinburgh
EH6 6EJ
Registered Company No. SC706920

GONDOLIN Land & Water

FRDA-003 Proposed Drainage Layout.dwg



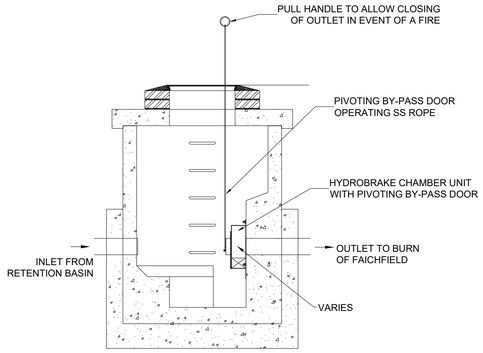
TYPICAL SECTION THROUGH ATTENUATION BASIN
NTS



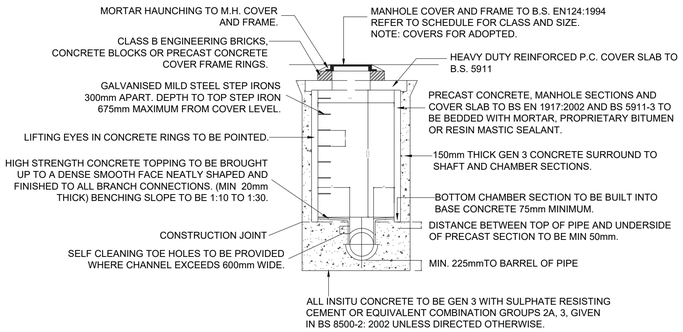
ANCHOR TRENCH DETAIL
NTS

NOTES

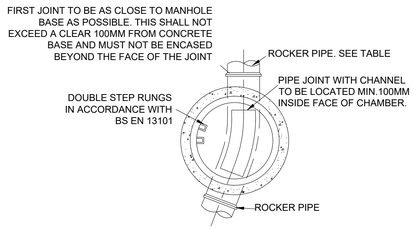
1. DO NOT SCALE THIS DRAWING.
2. THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT MANUFACTURER'S DRAWINGS AND SPECIFICATIONS.
3. ALL PIPEWORK TO BE UPVC TO BS 4660 AND BS EN 1401-1, CLASS SN4 WITH FLEXIBLE JOINTS AND KITEMARK CERTIFIED (OR SIMILAR APPROVED).
4. THE CONTRACTOR IS TO REMAIN RESPONSIBLE FOR THE TEMPORARY STABILITY OF THE SURROUNDING GROUND THROUGHOUT THE CONSTRUCTION.
5. BEDDING CLASSES REFER TO THOSE FIVEN IN DMRB VOLUME 4, SECTION 2, PART 5, HA40/01, APPENDIX B.
6. ALL RELEVANT DRAINAGE ITEMS TO BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF 'SEWERS FOR ADOPTION'.
7. FOR DRAINAGE LAYOUT SEE DRAWING FRDA-003.
8. MANHOLE COVERS IN TRAFFICKED AREAS TO BE D400 LOAD CLASSIFICATION
9. MANHOLE COVERS ON NON-TRAFFICKED AREAS CAN BE B125 OR C250 LOAD CLASSIFICATION (AT CONTRACTORS DISCRETION)



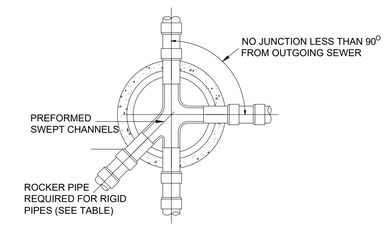
HYDROBRAKE OPTIMUM CHAMBER
NTS



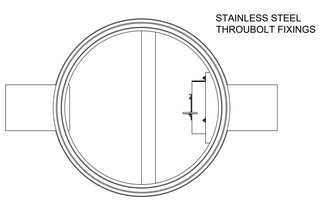
TYPICAL MANHOLE CHAMBER
NTS



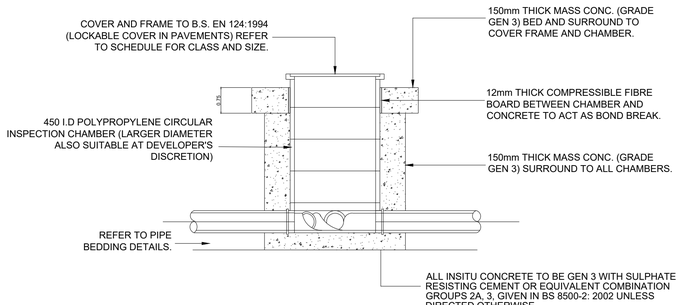
PLAN ON MANHOLE
NTS



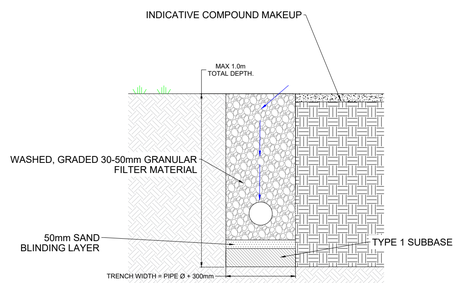
TYPICAL MANHOLE ARRANGEMENT OF PIPE JUNCTIONS
NTS



PLAN

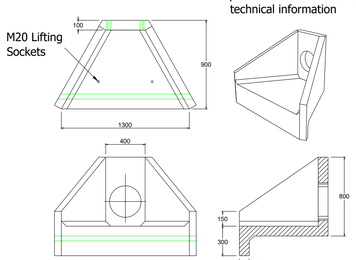


TYPICAL INSPECTION CHAMBER DETAIL
NTS



TYPICAL SECTION THROUGH CUT-OFF FILTER DRAIN AT COMPOUND EXTENTS
NTS

Note: Isometric drawing is for reference only, details may not accurately represent actual design - please see detailed views for technical information



PRECAST CONCRETE INLET HEADWALL (ATHLON H3CA OR SIMILAR) - FITTED TO SUDS BASIN INFLOW & OUTFLOW

REV	DATE	DESCRIPTION	BY	CHK
00	06/25	INITIAL ISSUE	CK	SD

CLIENT: HARMONY FL LTD

PROJECT: FLUSHING BESS

DRAWING TITLE: **TYPICAL DRAINAGE DETAILS**

SCALE: NTS @ A1

DATE: JUNE 2025

DRAWING NUMBER: **FRDA-004**

REV: **00**

DRAWING STATUS: FOR PLANNING

GONDOLIN LAND & WATER LTD
15 Quayside Street
Edinburgh
EH6 6EJ
Registered Company No. SC706920

GONDOLIN Land & Water

FRDA-004 Typical Drainage Details.dwg

GONDOLIN
Land & Water

Civil Engineering and Environmental Solutions

Gondolin Land and Water Ltd is a small environmental and engineering consultancy business based in Scotland with coverage throughout the UK.

Office Address:

15 Quayside Street, Edinburgh, EH6 6EJ, UK

Registered Company No.

SC706920

Sectors:

Onshore Renewables & Storage | Infrastructure | Mining and Minerals
Property & Urban Regeneration | Retail, Industrial & Manufacturing |
Waste Management