BALLYROSS BATTERY ENERGY STORAGE SYSTEM (BESS)

DRAINAGE ASSESSMENT

794-NI-P&E-02964
Ballyross BESS DA
D01
June 2025

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
D01	Draft for review	D McGinnis	A Jackson	G Glasgow	June 2025

Approval for issue

D McGinnis 23 June 2025

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Prepared for:

Renewable Energy Systems Ltd (RES)

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1 INTRODUCTION

RPS were commissioned by RES to prepare a Drainage Assessment (DA) as part of a planning application for a battery energy storage system (BESS) at Ballyvallagh Road, County Antrim.

A DA is required as the development proposal exceeds the thresholds listed under Policy FLD3 'Development and Surface Water Flood Risk Outside Floodplains' of Planning Policy Statement 15 'Planning & Flood Risk'.

The approximate location of the site is shown in Figure 1-1. A detailed location map is shown in Figure 1-2 and in Appendix A.

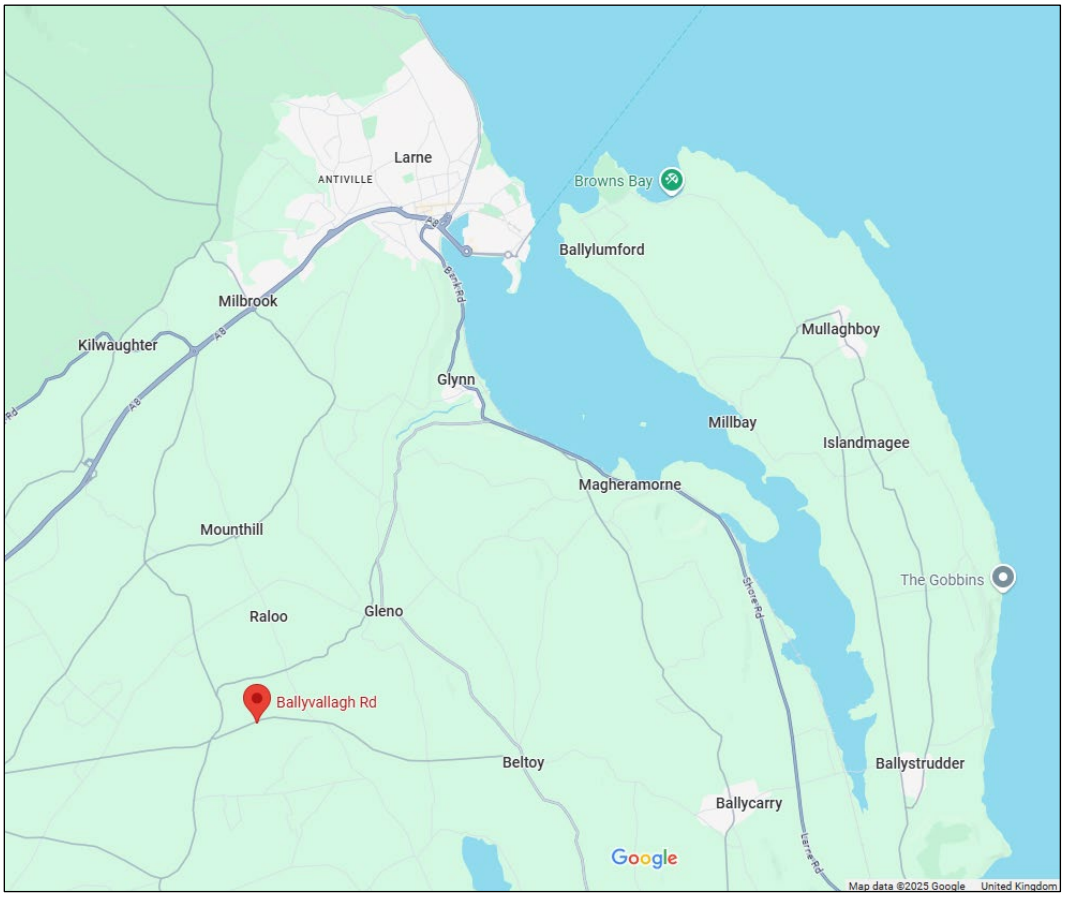

Figure 1-1 Location of site

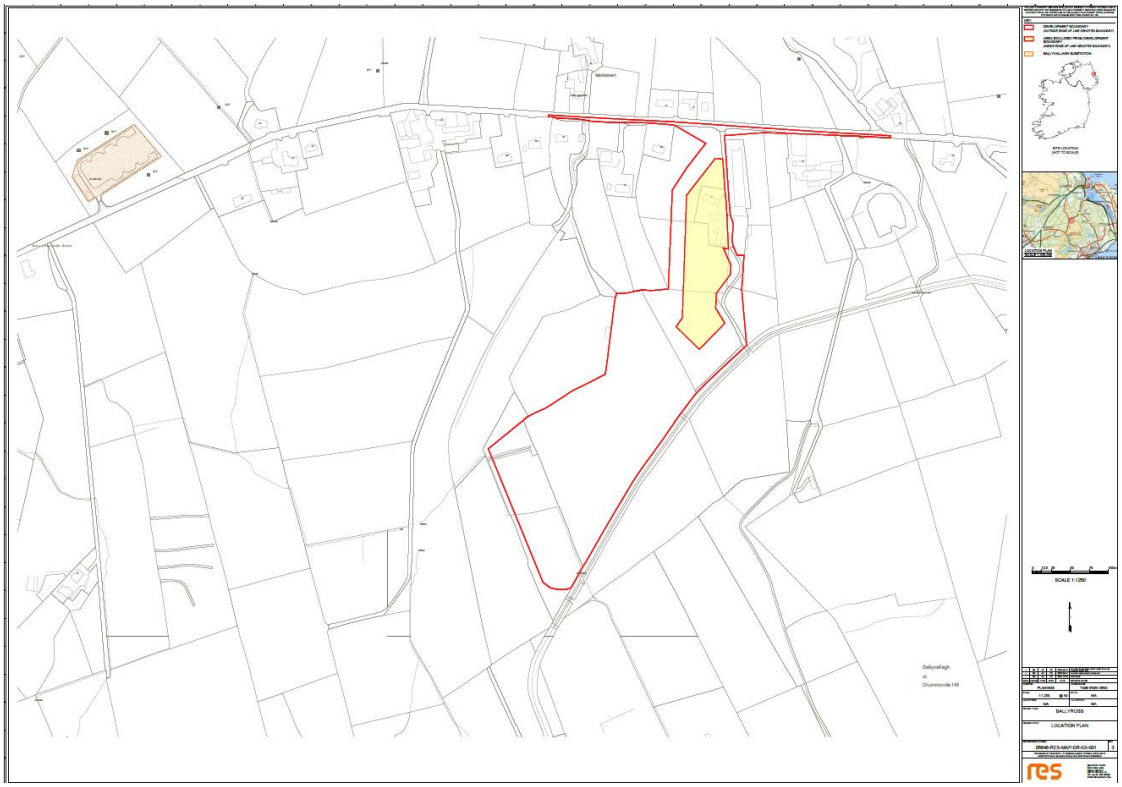

Figure 1-2 Location plan

2 OVERVIEW OF THE EXISTING SITE

The area of the site is 6.6ha. The site is accessed via 34 Ballyvallagh Road. The site currently comprises of agricultural land which is used for the grazing of cattle. An aerial photo of the existing site is shown in Figure 2-1.

Figure 2-1 Aerial photo of site

A small watercourse, the Ballyvallagh Watercourse, flows to the south of the site. A review of the available flood maps from Flood Map (NI) has shown that there is no identified river flood risk at the site. There is a very small area of potential surface water flooding within the site. An extract from Flood Mapping for Development Planning is shown in Figure 2-2. There is no historical flooding identified on Flood Map (NI).

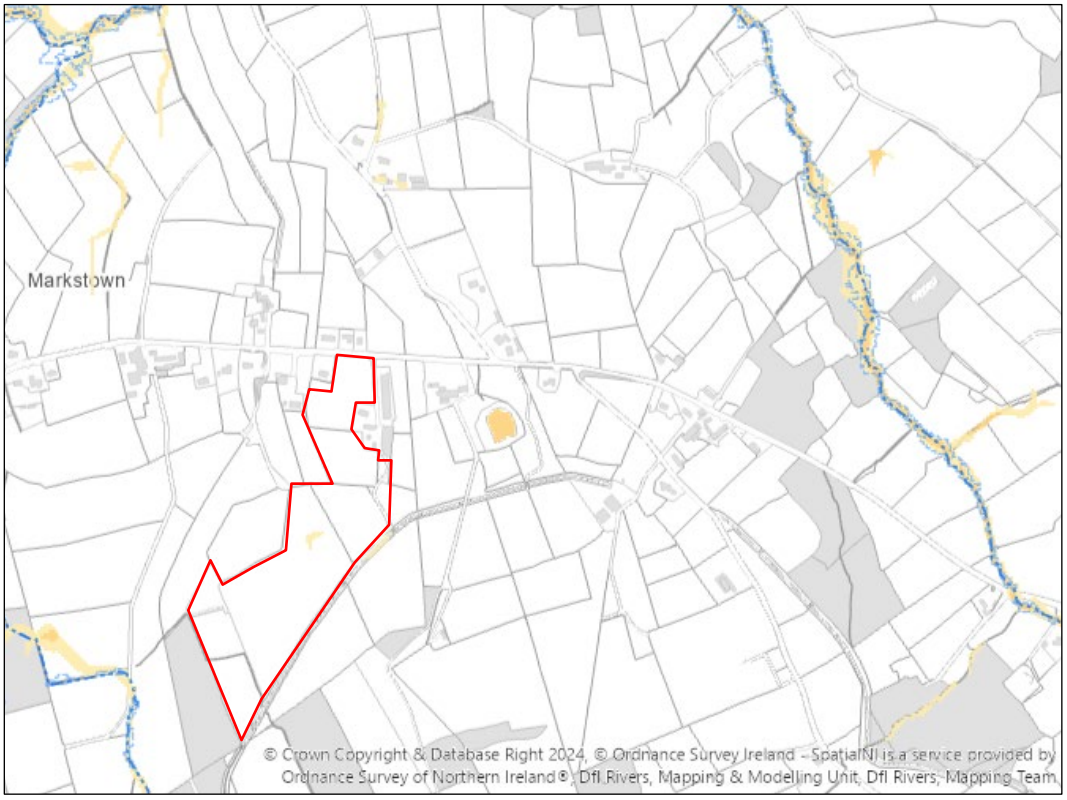

Figure 2.2 Extract from Flood Mapping for Development Planning

3 PROPOSED DEVELOPMENT

The application is for the installation of battery enclosures, PCS/ inverter units, associated substation infrastructure, access tracks, drainage system and ancillary works. The proposed layout is shown in Figure 3-1 and in Appendix B. Note that the layout includes a 10m buffer from the Ballyvallagh Watercourse.

Figure 3-1 Proposed layout

4 DRAINAGE ASSESSMENT

A Drainage Assessment is required under Policy FLD3 of the PPS15 to demonstrate that adequate drainage measures will be put in place so as to effectively mitigate the flood risk to the proposed development and from the development elsewhere.

4.1 Drainage Strategy

A Sustainable Drainage Strategy report has been prepared by RPS and this is provided in Appendix C. The strategy is based upon discharge to a nearby watercourse and has been designed based upon the following parameters:

- Total site area = 6.6ha
- Total Impermeable Area = 2.248ha
- QBAR Greenfield Runoff Rate = 18.55l/s
- Attenuation Requirement for 1:100+20%CC design storm event = 1,594m³

Surface water from the BESS compounds will be collected via percolation through the granular surface into the gravel subbase. Topsoil will be replaced with a 300mm gravel base that has a 30% porosity for surface water attenuation. The subbases will be lined to prevent the seepage of groundwater into the storage and prevent the infiltration of potentially contaminated water in the case of a fire. It is proposed to lay the subbases with a gradient of 1:500 to enable appropriate conveyance of collected surface water to the discharge point. The exact position of the discharge points will be subject to detailed design.

Surface water is to be restricted to the Q1 greenfield runoff rate prior to discharge via a suitable flow control device. Penstock valves are proposed at the outfall, which can be operated in an emergency situation (e.g., fire) to prevent contaminated water entering the watercourse. The containment solution will be finalised at the detailed design stage.

Prior to discharge from the site, surface water will be conveyed to two attenuation basins located in the east of the site. A surface water outfall is proposed to the watercourse along the eastern site boundary, at the restricted rate of 18.58l/s. An application for Schedule 6 approval for this discharge has been submitted to DfI Rivers.

Surface water storage is provided within 3 no. attenuation basins and a 300mm gravel subbase. The 3 no. attenuation basins have a combined storage capacity of 1,969m³. The 300mm gravel subbase has a surface area of 22,474m², based on a 300mm depth and 30% porosity, the gravel subbase provides an additional 2,023m³ of surface water storage. Causeway Flow calculations are provided in Appendix C of

the report, demonstrating that sufficient surface water storage has been provided to accommodate flows up to the 1 in 100 year +20% climate change storm event.

4.2 Event Exceedance

The proposed surface water drainage strategy provides storage up to the 1 in 100 year plus 20% climate change event. In an event exceeding this magnitude, the resulting above-ground flooding will be confined to temporary shallow flooding of the on-site road network and will not affect the infrastructure on site or significantly increase flood risk to off-site locations. Event exceedance planning will be undertaken as part of the final design process.

4.3 Maintenance and Adoption

Maintenance of the storm water system will be the responsibility of the BESS operator. A specialist management company will be appointed to maintain the SuDS features for the lifetime of the development. The maintenance activities envisaged for the proposed oil and sediment filters, gravel subbase and flow control manholes, along with the approximate frequency within which they should be completed are provided in the Drainage Strategy Report.

5 CONCLUSION

RPS were commissioned by RES to prepare a Drainage Assessment (DA) as part of a planning application for a battery energy storage system (BESS) at Ballyvallagh Road, County Antrim. A DA is required as the development proposal exceeds the thresholds listed under Policy FLD3 'Development and Surface Water Flood Risk Outside Floodplains' of Planning Policy Statement 15 'Planning & Flood Risk'.

Flood maps from Flood Map (NI) have shown that there is no risk of surface water flooding at the site.

The surface water drainage strategy for the proposed BESS facility is summarised below:

- The proposed-on site drainage solution will be suitable to attenuate flows up to and including the 1 in 100 year + 20% climate change rainfall event.
- On site management of surface water will be provided within 3 no. attenuation basins and 300mm deep gravel subbases.
- Surface water from the site will be restricted to the Q1 greenfield runoff rate of 18.55l/s.
- A surface water outfall is proposed to the watercourse located along the south-eastern site boundary. An application for Schedule 6 approval for this discharge has been submitted to DfI Rivers.
- A specialist management company will be appointed to maintain the SuDS features for the lifetime of the development.

Adequate measures have been included within the site design to effectively mitigate the surface water flood risk to the proposed development and from the development elsewhere. The development can therefore be considered as compliant with Policy FLD3 of PPS15.

Appendix A

Location plan

KEY:

- DEVELOPMENT BOUNDARY (OUTSIDE EDGE OF LINE DENOTES BOUNDARY)
- AREA EXCLUDED FROM DEVELOPMENT BOUNDARY (INSIDE EDGE OF LINE DENOTES BOUNDARY)
- BALLYVALLAGH SUBSTATION

SITE LOCATION
(NOT TO SCALE)

LOCATION PLAN
SCALE 1:200,000

0 12.5 25 50 75 100m

SCALE 1:1250

3	BM	AP	PD	2025-06-10	UPDATED BOUNDARIES, ADDED SUBSTATION AND CHANGED SHEET SIZE
2	BM	AP	PD	2025-03-14	UPDATED DEVELOPMENT BOUNDARY
1	BM	AP	PD	2024-12-02	FIRST ISSUE
ISSUE	DRAWN	CHKD	APPD	DATE	REVISION NOTES

PURPOSE	PLANNING
COORDINATES	TM65 IRISH GRID
SCALE	1:1,250 @ A0
DATUM	N/A
LAYOUT DWG.	N/A
T-LAYOUT NO.	N/A
PROJECT TITLE	BALLYROSS
DRAWING TITLE	LOCATION PLAN
RES DRAWING NUMBER	05646-RES-MAP-DR-XX-001
REV	3

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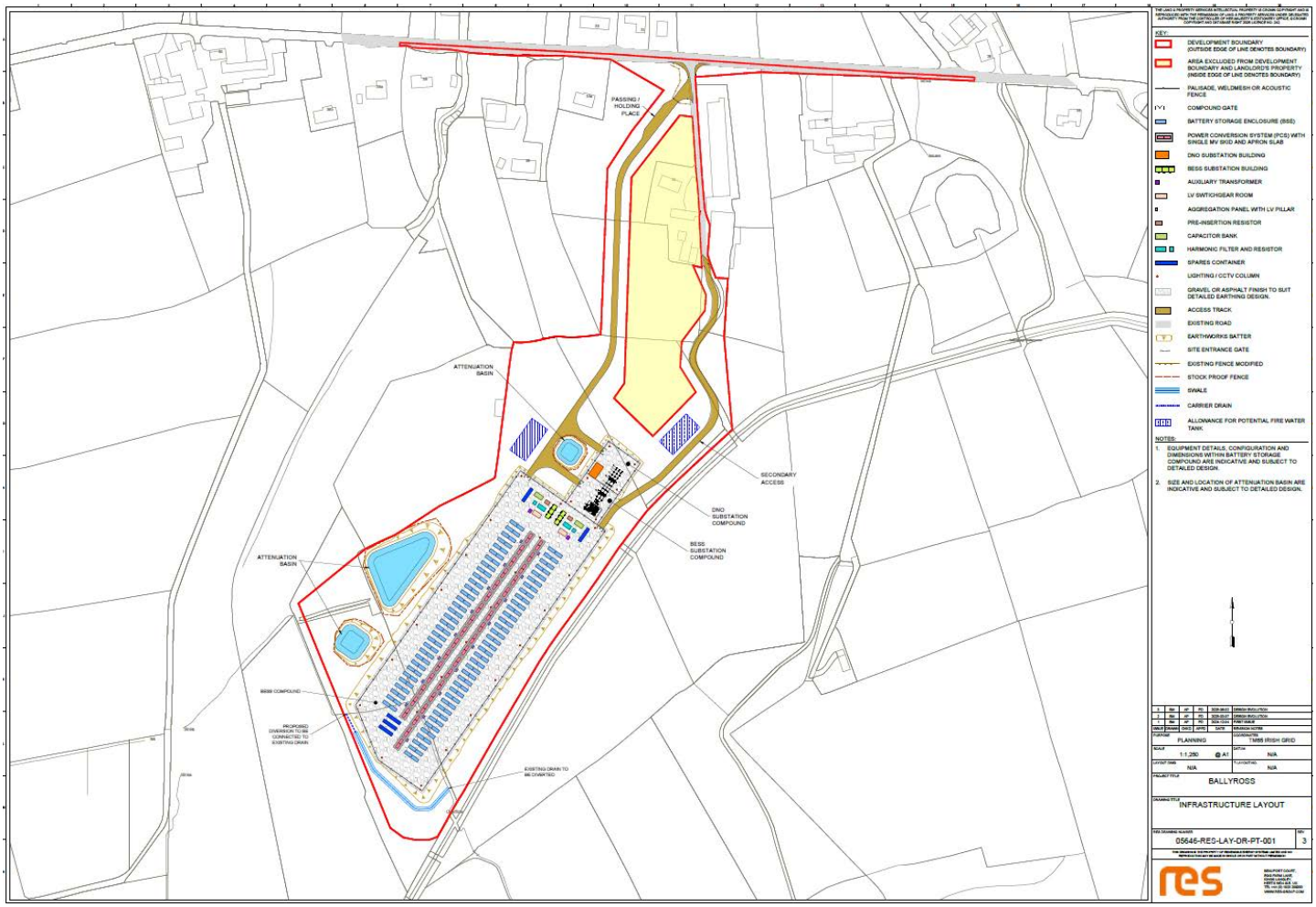
Appendix B

Proposed layout



Appendix C

Sustainable Drainage Strategy Report

BALLYROSS BESS

Sustainable Drainage Strategy

794-ENV-HYD-21833
April 2025
1

rpsgroup.com

Document status

Version	Purpose of document	Authored by	Reviewed by	Approved by	Review date
1	Draft Issue	R. Macbeth	J. Morley	J. Morley	28.04.2025
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J. Morley 28.04.2025

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Prepared for:

Renewable Energy Systems Limited

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1 INTRODUCTION

RPS Consulting Services Limited has been commissioned to prepare a Sustainable Drainage Strategy on behalf of Renewable Energy Systems Limited (RES) for a proposed Battery Storage System (BESS), located land to the south of Ballyvallagh Road, County Antrim, Northern Ireland, approximately BT40 3NA. The site is situated across an approximate 6.6ha of land

This report has been prepared to provide details regarding the proposed surface water drainage strategy, to support a planning application for the proposed development.

1.1 Site Overview

The site is shown in Figure 1 below. The site is located to the south of Ballyvallagh Road and comprises an area of approximately 6.6 hectares (ha).

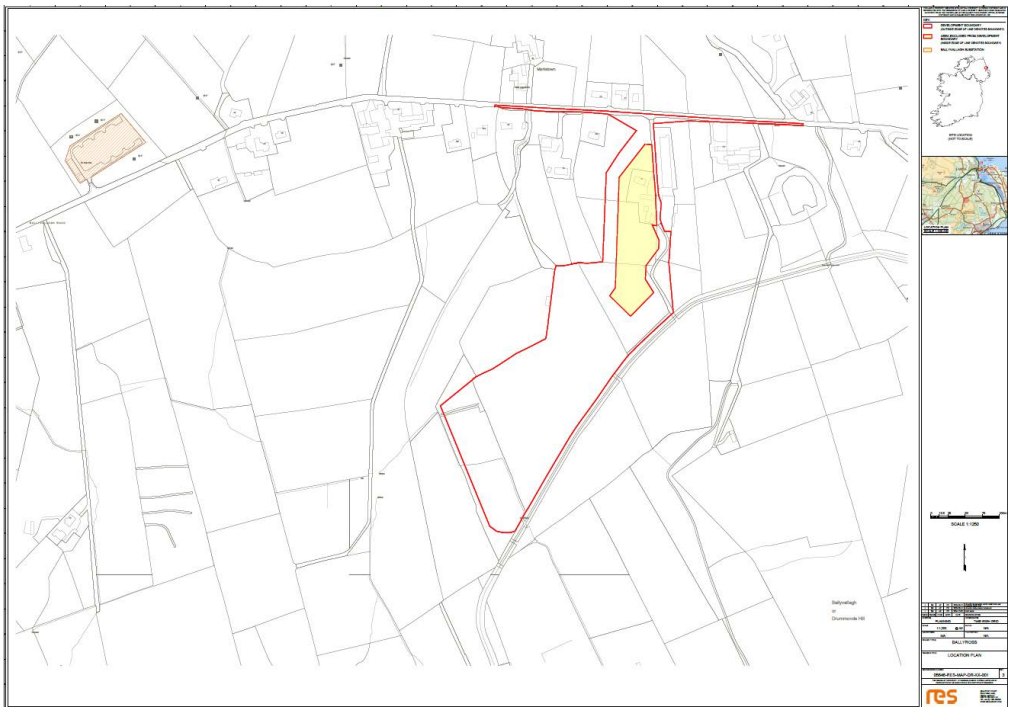


Figure 1 – Site Location Plan

Based on topographical data, the site generally falls towards the northwest, from a high point along the southeastern extent of the site boundary, of 225.50m Above Ordnance Datum (AOD) to approximately 209.67mAOD in the west along the boundary with the watercourse.

Development proposals comprise installation and operation of a Battery Energy Storage System (BESS) Facility, associated substation compound and ancillary works including boundary fencing, internal access tracks, pole mounted security cameras and associated works.

2 DRAINAGE STRATEGY

2.1 Introduction

This report provides details of the proposed surface water drainage strategy for the site. The aim of including this strategy is to demonstrate that the Proposed Development will not adversely affect the surface water regime in the area, and that overall, the current situation will be improved.

In line with the guidance set by the Northern Ireland Department for Infrastructure[1], the proposed drainage strategy is designed to accommodate the 1 in 100 year plus 20% climate change design storm event.

2.2 Greenfield Runoff Rates

Greenfield runoff rates for the site have been calculated using the FEH Statistical Method, based on the impermeable area of 2.248 ha. The calculation has been included for reference within Appendix A, and outputs are summarised within Table 1.

Return Period	Greenfield Runoff Rate (l/s)
Q1	18.55
QBar	21.07
Q30	34.75
Q100	41.27

Table 1 – Greenfield Runoff Rates (Based on a 2.248ha area)

2.3 Proposed Surface Water Drainage

2.3.1 Drainage Hierarchy

The CIRIA SuDS Manual (C753) advises the following hierarchy for the disposal of surface water;

1. Infiltration
2. Discharge to surface waters
3. Discharge to a surface water sewer, highway drain or another drainage system
4. Discharge to a combined sewer.

The drainage hierarchy has been considered as follows.

Infiltration

The nearest Geological Records (via GSNI GeoIndex), located approximately 300m west of the site, suggest that the site is underlain by superficial deposits of Till – Diamicton. Infiltration should be considered for the site during detailed design. Infiltration testing will be undertaken on site prior to

[1] Climate Change allowances, Northern Ireland Department for Infrastructure. Link: Technical Flood Risk Guidance in relation to Allowances for Climate Change in Northern Ireland | Department for Infrastructure

detailed design. Should the ground investigation demonstrate that infiltration rates are suitable, infiltration will be incorporated into the proposed drainage strategy.

To a Surface Water Body

The watercourse running along the south-western site boundary will be utilised as the surface water outfall for the site.

To a Surface Water Sewer, Highway Drain or Another Drainage System

As it is proposed to discharge to a surface water body, discharging to a surface water sewer has not been considered.

To a Combined Sewer

As it is proposed to discharge to a surface water body, discharging to a combined sewer has not been considered.

2.3.2 Drainage Strategy

The Conceptual Surface Water Drainage Strategy illustrating drainage proposals based upon a discharge to a nearby watercourse is provided within Appendix B. Rainfall data was obtained via the Northern Ireland FEH Map[2], FLOW calculations were undertaken using FEH 22 data. The strategy has been designed based upon the following parameters:

- Total Site Area = 6.6 ha
- Total Impermeable Area = 2.248 ha
- Q1 Greenfield Runoff Rate = 18.55l/s
- Attenuation Requirement for 1:100+20%CC design storm event = 1,594 m^3.

Surface water from the BESS compounds will be collected via percolation through the granular surface into the gravel subbase. Topsoil will be replaced with a 300 mm gravel base that has a 30% porosity for surface water attenuation.

The subbases will be lined to prevent the seepage of groundwater into the storage and prevent the infiltration of potentially contaminated water in the case of a fire. It is proposed to lay the subbases with a gradient of 1:500 to enable appropriate conveyance of collected surface water to the discharge point. The exact position of the discharge points will be subject to detailed design.

Surface water is to be restricted to the Q1 greenfield runoff rate prior to discharge via a suitable flow control device. Penstock valves are proposed at the outfall, which can be operated in an emergency situation (e.g., fire) to prevent contaminated water entering the watercourse. The containment solution will be finalised at the detailed design stage.

Prior to discharge from the site, surface water will be conveyed to two attenuation basins located in the east of the site. A surface water outfall is proposed to the watercourse along the eastern site boundary, at the restricted rate of 18.58l/s.

Surface water storage is provided within 3no. attenuation basins and a 300mm gravel subbase. The 3no. attenuation basins have a combined storage capacity of 1,969m^3. The 300mm gravel subbase has a surface area of 22,474m^2 , based on a 300mm depth and 30% porosity, the gravel subbase provides an additional 2,023m^3 of surface water storage. Causeway Flow calculations are provided in Appendix C, demonstrating that sufficient surface water storage has been provided to accommodate flows up to the 1 in 100 year +20% climate change storm event.

It should be noted that both the Conceptual Drainage Strategy indicated within Appendix B, and supporting calculations within Appendix C, are preliminary, and as such, subject to further detailed design and approval by the relevant authorities. However, the designs illustrate that surface water arising from the development may be sustainably managed such that it does not pose a flood risk, either to proposed or existing development, to the 1:100+20% climate change storm event.

[2] Northern Ireland FEH Map, Uk Centre for Ecology and Hydrology. Link: Map - FEH Web ServiceMap - FEH Web Service

2.4 Benefits of SuDS Measures

Sustainable drainage is a departure from the traditional approach to draining sites. There are some key principles that influence the planning and design process enabling SuDS to mimic natural drainage by:

- storing run-off and releasing it slowly (attenuation);
- allowing water to soak into the ground (infiltration);
- slowly transporting (conveying) water on the surface;
- filtering out pollutants;
- allowing sediments to settle out by controlling the flow of water.

The SuDS measures have benefits in effective flood risk reduction. The attenuation basins and gravel subbase provide a significant volume of storage capable of storing runoff from a large rainfall event. Large rainfall events can be destructive and can contribute to pollution flowing into the watercourses.

2.4.1 Attenuation Basins

The attenuation basins will take the form of depressions within the proposed development with between 1 in 3 and 1 in 4 banks (where reasonably practicable). The areas may be landscaped to provide aesthetic and amenity value. Planting can be used to improve biodiversity and attract wildlife. The attenuation basins will allow peak flow rates to be reduced and enable flows to be limited to significantly below the existing greenfield run-off rate during storm events. These SuDS features are also useful in providing water treatment predominantly through the settlement of silts and suspended sediments.

2.4.2 Gravel Subbase

It is proposed to include gravel bases under the BESS development platforms, which can be used for surface water attenuation. These subbases will be lined to prevent the seepage of groundwater into the bases and more importantly, avoid the potential contamination of groundwater in the event of a fire. The gravel will filter out suspended sediments in the surface water.

2.4.3 Petrol/Silt Interceptor

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

2.5 Pollution Mitigation

Surface water run-off should be managed by SuDS that are designed to attenuate flows and to avoid water quality impacts downstream. To demonstrate that surface water arising from the development will be appropriately treated prior to discharge, the Simple Index Approach, as outlined within the SuDS Manual (CIRIA C753) has been followed.

As stated in the SuDS Manual 2015 (C753), the risk posed by surface water runoff to the receiving environment is a function of:

- the pollution hazard at a particular site (i.e. the *pollutant source*)
- the effectiveness of SuDS treatment components in reducing levels of pollutants to environmentally acceptable levels, groundwater (i.e. the *pollutant pathway*)
- the sensitivity of the receiving environment (i.e. the *environmental receptor*).

The development is classified as sites with heavy pollution, sites where chemicals and fuels are to be delivered, handled, stored, used or manufactured, therefore the pollution hazard level is 'high'. The pollutant hazard indices for this type of development are outlined in The SuDS Manual (CIRIA C753) Table 26.2 and Table 2 below.

Table 2 – Pollution Hazard and Mitigation Indices

Land Use / SuDS Feature	Total Suspended Solids (TSS)	Metals	Hydrocarbons
Proposed Land Uses			
Sites with heavy pollution, sites where chemicals and fuels are to be delivered, handled, stored, used or manufactured.	0.8	0.8	0.9
Mitigation			
Gravel Base	0.4	0.4	0.4
Attenuation Basin	0.5	0.5	0.6
Petrol/Silt Interceptor	0.8	0.6	0.9
Total Mitigation Accounting for 50% Efficiency of Second and Third Stage			
Total Values	1.05	0.95	1.15

As illustrated in Table 2, the identified mitigation indices (The SuDS Manual, CIRIA C753, Table 26.3) of the proposed attenuation basins, petrol/silt interceptor and gravel subbase exceed the maximum anticipated pollutant hazard indices. This confirms that surface water arising from the development will receive an appropriate level of treatment in advance of discharge from site.

2.6 Event Exceedance

The proposed surface water drainage strategy provides storage up to the 1 in 100 year plus 20% climate change event. In an event exceeding this magnitude, the resulting above-ground flooding will be confined to temporary shallow flooding of the on-site road network and will not affect the infrastructure on site or significantly increase flood risk to off-site locations. Event exceedance planning will be undertaken as part of the final design process.

2.7 Fire Water Management

In order to manage the risk associated with a highly unlikely fire event, the development will include both a provision for the supply of fire water via water tanks and/or hydrants, in addition containment of fire water used to supress any fire.

In accordance with National Guidance[3], an external fire hydrant or water supply should be in close proximity of the BESS containers. The water supply should be able to provide a minimum of 1,900 l/min for at least 120 minutes (2 hours) equivalent to 228m^3.

[3] https://nfcc.org.uk/wp-content/uploads/2023/10/Grid-Scale-Battery-Energy-Storage-System-planning-Guidance-for-FRS.pdf

Fire water will be stored on site within the BESS compound area in either sectional steel panel tanks or cylindrical steel panel tanks. The fire water provision stored will total 228m³.

An onsite fire containment strategy will be incorporated into the overall site drainage design. In the unlikely event of a fire the unit on fire will be left to burn out, in accordance with general guidance for Battery units, whilst water will be focussed on the adjacent battery units to ensure the fire is contained. As a consequence, the runoff generated is less likely to pose a contamination risk. Runoff used to cool the units will be initially intercepted and contained within the gravel bases. This will allow a compartmentalised approach to the containment of water in the event of a fire and penstocks will be installed to allow further containment of potentially contaminated water for testing prior to either tanking offsite if contaminated or alternatively discharged in accordance with the approved drainage strategy.

Calculations indicate that the proposed gravel sub-base along with the attenuation basins have sufficient capacity to contain the 1 in 100 year +20% climate change storm event (1,594m³), as well as fire water (228m³).

2.8 Maintenance and Adoption

A specialist management company will be identified at the detailed design stage and appointed to maintain the SuDS features for the lifetime of the development.

Tables 3 to 6, below, indicate the envisaged maintenance activities associated with the proposed attenuation basins, petrol/silt interceptor, gravel subbase and flow control manholes, along with the approximate frequency within which they should be completed.

Table 3 – Attenuation Basin Suggested Maintenance Schedule

Maintenance schedule	Require 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), the 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

Table 4 – Gravel Subbase Suggested Maintenance Schedule

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

Table 5 – Flow Control Manhole Suggested Maintenance Schedule

Maintenance schedule	Require Action	Typical Frequency
Regular Maintenance	Inspect vegetation above and around flow control chamber and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Remove sediment from flow control chambers	Annually
	Flow control devices: Check for and clear obstructions	Quarterly
Remedial Actions	Repair of Penstock and flow control device	As required
Monitoring	Inspect structures for evidence of poor operation	Monthly/after large storm
	Inspect structures, flow control and pipework etc. for evidence of physical damage	Monthly/after large storm
	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

Table 6 – Petrol/Silt Interceptor Suggested Maintenance Schedule

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

3 SUMMARY AND CONCLUSIONS

The surface water drainage strategy for the proposed BESS facility located at land to the south of Ballyvallagh Road, County Antrim, Northern Ireland is summarised below.

- The proposed on-site drainage solution will be suitable to attenuate flows up to and including the 1 in 100 year + 20% climate change rainfall event.
- On site management of surface water will be provided within 3no. attenuation basins and 300mm deep gravel subbases.
- Surface water from the site will be restricted to the Q1 greenfield runoff rate of 18.55l/s.
- A surface water outfall is proposed to the watercourse located along the south-eastern site boundary.
- A penstock valve is proposed on the outfall, to shut off the surface water drainage in the case of a pollution event, preventing pollution from entering the watercourse.
- A specialist management company will be identified at the detailed design stage and appointed to maintain the SuDS features for the lifetime of the development.

Appendix A – Greenfield Runoff Rates

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Josh Hughes
Site name:	Ballyross BESS
Site location:	Beltoy

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	54.78137° N
Longitude:	5.85037° W
Reference:	3398160861
Date:	Jan 29 2025 12:58

Runoff estimation approach

FEH Statistical

Site characteristics

Total site area (ha): 1

Methodology

Q_{MED} estimation method:	Calculate from BFI and SAAR
BFI and SPR method:	Specify BFI manually
HOST class:	N/A
BFI / BFIHOST:	0.534
Q_{MED} (l/s):	
Q_{BAR} / Q_{MED} factor:	1.05

Hydrological characteristics

	Default	Edited
SAAR (mm):	1095	1284
Hydrological region:	11	11
Growth curve factor 1 year:	0.88	0.88
Growth curve factor 30 years:	1.65	1.65
Growth curve factor 100 years:	1.96	1.96
Growth curve factor 200 years:	2.1	2.1

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

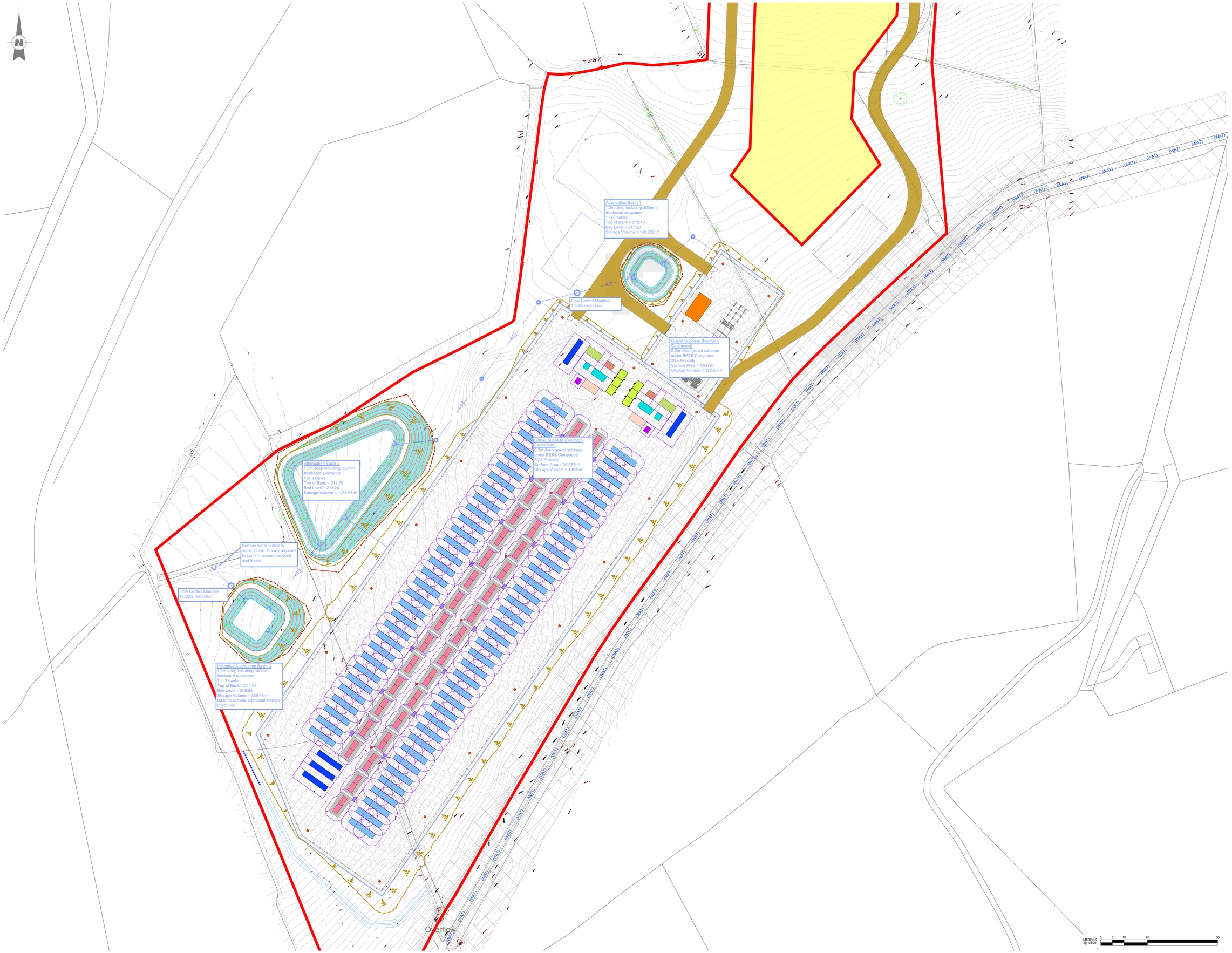
Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates

	Default	Edited

Q_{BAR} (l/s):		9.37
1 in 1 year (l/s):		8.25
1 in 30 years (l/s):		15.46
1 in 100 year (l/s):		18.36
1 in 200 years (l/s):		19.68

Appendix B – Conceptual Surface Water Drainage Strategy



Notes

1. This drawing has been prepared in accordance with the scope of RPS's appointment with its client and is subject to the terms and conditions of that appointment. RPS accepts no liability for any use of this document other than by its client and only for the purposes for which it was prepared and provided.
2. If received electronically it is the recipients responsibility to print to correct scale. Only written dimensions should be used.
3. This drawing should be read in conjunction with all other relevant drawings and specifications.

PRELIMINARY

SUBJECT TO DETAILED DESIGN

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

KEY

- Surface Water Manhole
- Surface Water Pipe Line
- Surface Water Headwall
- Gravel Subbase

METRES @ 1:500 0 5 10 20 50

Rev	Description	By	Chd	Date
D	Amended Site Boundary	RM	MP	23.10.25
C	Amended to suit climate change allowance	RM	JM	09.06.25
B	Amended to Suit Extended Site	RM	JM	15.04.25
A	Draft.	JH	JM	03.02.25

A TETRA TECH COMPANY

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Client: Renewable Energy Systems Limited

Project: Ballyross BESS

Title: Conceptual Drainage Strategy

Status	Scale	Date Created
Preliminary	1:500 @A0	03.02.25

Task Team Manager	Information Author	Task Information Manager
JM	JH	JM

Document Number: 21833-RPS-SD-ZZ-DR-D-D100

RPS Project Number: 794-ENV-HYD-21833

Revision: D

rpsgroup.com

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Appendix C – Causeway Flow Calculations

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	9.000
CV	1.000	Preferred Cover Depth (m)	1.000
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1-STORAGE	0.192	5.00	100.000	1200	1010.000	1000.000	1.500
2-FC			100.000	1500	1020.000	1000.000	1.600
3-OF			100.000	1200	1030.000	1000.000	1.700

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.001	1-STORAGE	2-FC	10.000	0.600	98.500	98.400	0.100	100.0	225	5.13	50.0
1.002	2-FC	3-OF	10.000	0.600	98.400	98.300	0.100	100.0	225	5.26	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Volume	x

Storm Durations

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

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

Node 2-FC Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	98.400	Product Number	CTL-SHE-0054-1600-1500-1600
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.6	Min Node Diameter (mm)	1200

Node 1-STORAGE Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	1080

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	46.0	0.0	1.500	217.8	0.0

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 100.00%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
1440 minute winter	1-STORAGE	1140	99.694	1.194	7.0	137.9485	0.0000	SURCHARGED
1440 minute winter	2-FC	1140	99.694	1.294	3.7	2.2866	0.0000	SURCHARGED
15 minute summer	3-OF	1	98.300	0.000	1.2	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
1440 minute winter	1-STORAGE	1.001	2-FC	3.7	0.188	0.072	0.3977	
1440 minute winter	2-FC	Hydro-Brake®	3-OF	1.5				240.1

Design Settings

Rainfall Methodology	FEH-22	Minimum Velocity (m/s)	1.00
Return Period (years)	100	Connection Type	Level Soffits
Additional Flow (%)	0	Minimum Backdrop Height (m)	9.000
CV	1.000	Preferred Cover Depth (m)	1.000
Time of Entry (mins)	5.00	Include Intermediate Ground	✓
Maximum Time of Concentration (mins)	30.00	Enforce best practice design rules	✓
Maximum Rainfall (mm/hr)	50.0		

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
1-STORAGE	2.056	5.00	100.000	1500	1010.000	1000.000	1.500
2-FC			100.000	1500	1020.000	1000.000	1.600
3-OF			100.000	1500	1030.000	1000.000	1.700

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
1.001	1-STORAGE	2-FC	10.000	0.600	98.500	98.400	0.100	100.0	525	5.07	50.0
1.002	2-FC	3-OF	10.000	0.600	98.400	98.300	0.100	100.0	525	5.15	50.0

Simulation Settings

Rainfall Methodology	FEH-22	Analysis Speed	Normal	Additional Storage (m³/ha)	0.0
Summer CV	1.000	Skip Steady State	x	Check Discharge Rate(s)	x
Winter CV	1.000	Drain Down Time (mins)	2880	Check Discharge Volume	x

Storm Durations

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

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

Node 2-FC Online Hydro-Brake® Control

Flap Valve	✓	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	98.400	Product Number	CTL-SHE-0178-1700-1500-1700
Design Depth (m)	1.500	Min Outlet Diameter (m)	0.225
Design Flow (l/s)	17.0	Min Node Diameter (mm)	1500

Node 1-STORAGE Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	98.500
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	855

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	990.0	0.0	1.500	1555.5	0.0

Results for 100 year +20% CC Critical Storm Duration. Lowest mass balance: 99.98%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
960 minute winter	1-STORAGE	900	99.696	1.196	98.1	1456.2310	0.0000	SURCHARGED
960 minute winter	2-FC	900	99.696	1.296	39.5	2.2901	0.0000	SURCHARGED
15 minute summer	3-OF	1	98.300	0.000	17.0	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
960 minute winter	1-STORAGE	1.001	2-FC	39.5	0.570	0.081	2.1603	
960 minute winter	2-FC	Hydro-Brake®	3-OF	17.0				2230.3

Drainage (Northern Ireland) Order 1973 - Schedule 6

Application for consent to undertake works to a watercourse

Application Details:-

Name:	**Ryan Macbeth**
Address:	**RPS Consulting, 90 Victoria Street, Bristol**
Postcode:	**BS1 6DP**
Tel No:	**+44 117 244 0507**
E-mail:	**ryan.macbeth@rps.tetratech.com**

Site Details (if different from Application Details):-

Name:	**Ballyross BESS**
Address:	Land South of Ballyvallagh Road, County Antrim, Northern Ireland
Postcode:	BT40 3NA (Approximate)
Tel No:	
E-mail:	BT40 3NA (Approximate)

I wish to apply for consent/approval to:-

Please tick √ all that apply

(A) Discharge storm water to a watercourse ……	√
(B) Construct a bridge across or culvert a watercourse ……..	
(C) Divert a watercourse ……	
(D) Cross under / over a watercourse ……	
(E) Other works adjacent to or affecting a watercourse ……	

Department for Infrastructure
An Roinn Bonneagair
www.infrastructure-ni.gov.uk

Drainage (Northern Ireland) Order 1973 - Schedule 6

Application for consent to undertake works to a watercourse

Applicants should note that:

In accordance with Paragraph 11 of Schedule 6 of the Drainage (NI) Order 1973, any consents/approvals given by the Department under Schedule 6 shall not affect the liability of any applicant to comply with other legislation relevant to works undertaken in pursuit of such consents/approvals

In accordance with Paragraph 3 of Schedule 6 of the Drainage (NI) Order 1973 any consents/approvals requested from the Department under Schedule 6 will be given or refused within 3 months from receiving the application.

Check List of Information To be included with each application:-

(Please tick √ all that apply)

Location Map …….. *(Scale 1: 2500)* √
Detailed Site Layout Map…. *(Scale 1: 500)* √

.....

(A) **For Discharge:** Detailed drawings/specifications of proposed works with discharge location and outlet details. Include final discharge in Litres/second (L/s). √

(B) **Bridge/Culvert construction:** ***For Farmers and/or a Private single dwelling:*** Proposed pipe/culvert sizes, length, invert level and materials. ☐
All Others: As above with detailed drawings/specifications of all proposed works including manhole details/locations and inlet/outlet details.

(C) **Divert a watercourse:** Detailed proposals with channel/culvert details. ☐

(D) **Cross Under/Over a watercourse:** Detailed drawings and specifications. ☐
For your information:

Crossing Under should be surrounded in concrete (under the bed and banks) with a minimum cover of 1.0m from the top of the concrete surround to existing solid bed level and/or culvert invert level. Permanent marker posts should be placed on each bank to indicate the position of the pipeline.

Crossing Over should include depth of foundations relative to existing solid bed or culvert invert levels and the method for bank protection at crossing points. The depth from existing solid bed level or culvert soffit level to invert level of crossing pipe should be clearly stated, and (***if applicable)*** indicate the method proposed to ensure no additional loading to existing culvert/s

(E) **Other works:** Detailed drawings and specifications ☐

Department for Infrastructure
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www.infrastructure-ni.gov.uk

Drainage (Northern Ireland) Order 1973 - Schedule 6

Application for consent to undertake works to a watercourse

Drainage (Northern Ireland) Order 1973 - Schedule 6

Application for consent to undertake works to a watercourse

Environmental Screening

Please be aware Environmental Screening will be undertaken as part of the application process. Where the proposal is situated within or is likely to impact a Natura 2000 site, a HRA may be required.

Description of works

Proposed Battery Energy Storage System (BESS)

Is the proposal:

☐ **Domestic**

☑ **Non Domestic**

Is the proposed Drainage discharge rate greater than Greenfield Runoff:
(Green field Runoff = 10L/Ha):

☐ **Yes**

☑ **No**

Is the proposal situated within or is it likely to impact a Natura 2000 site.
DAERA Map Viewer - https://www.daera-ni.gov.uk/services/natural-environment-map-viewer

☐ **Yes (A report to inform an Appropriate Assessment may be required)**

☑ **No**

Drainage (Northern Ireland) Order 1973 - Schedule 6

Application for consent to undertake works to a watercourse

Supporting approvals and documentation

Where approvals for this proposal have been received from other relevant agencies/departments, please include this evidence with your application for schedule 6. For example approvals from NIEA, Planning Authority (Planning ref no.), DAERA and Loughs Agency etc.

Please note: This will assist in supporting your application

List any supporting documents in the box below:

794-ENV-HYD-21833 Ballyross SuDS Report V0.1

Signed by: _____ **(agent)** **Date:** **04.06.2025**

***If agent: name and address of client if different from above*:**
Peter Deeney (Development Project Manager), Renewable Energy Systems Limited (res) Larne, United Kingdom. e: peter.deeney@res-group.com

For Office Use Only **Date Received** ____/____/____ **Trim Ref** _____/____/_____

Area staff checks:

Supporting documents present? **Yes** ☐

No ☐ **(If no please return to applicant)**