

Land west of Mount Road - Outline Surface Water Drainage Strategy

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1 Introduction

1.1 Terms of Reference

JBA Consulting were commissioned by REWE 11 to prepare an outline surface water drainage strategy in support of a planning application for a Battery Energy Storage System (BESS), at Land west of Mount Road, Aberdare.

1.2 Site Description

The site is located on Land west of Mount Road, Rhigos, Aberdare. The main site is currently greenfield in nature and approximately 5.2 ha in size. The red line boundary of the proposals encompasses a proposed cable route from the east of the site to a national grid substation via Rhigos Road which is located approximately 1.4KM from the main site. However, this report is predominantly focussed on the developable land located to the west of Mount Road.

Land surrounding the site is predominantly greenfield in nature, with a large area of woodland to the north of the site. The A465 is present to the north of the site and is the main major access road nearest to the site. Rhigos Airfield and a solar farm are present to the south-west of the site. To the east of the site is the village of Rhigos, along with a mixture of commercial and industrial development including Hirwaun Power Station and Rhigos National Grid Substation.

An existing farm track off Mount Road to the south-east of the site is proposed to be formalised as the main access road for the development.

Site details are summarised in Table 1-1 and a site location plan is shown in Figure 1-1.

Table 1-1 Site summary

Site name	Land west of Mount Road
Site area	5.2 ha
Existing land use	Greenfield
Proposal	Battery Energy Storage System
OS NGR	SN 91217 07010
SuDS Approval Body	Rhondda Cynon Taf County Borough Council
Sewerage Undertaker	Dŵr Cymru Welsh Water

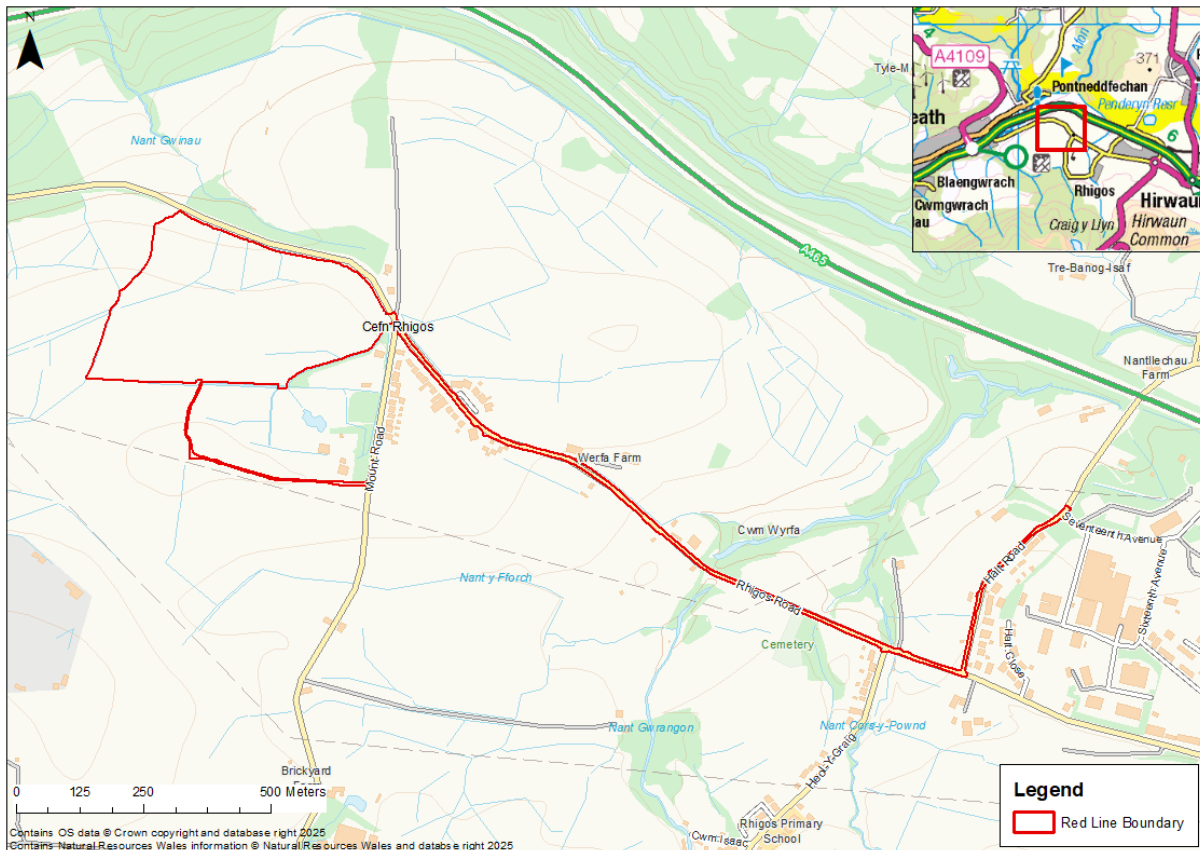


Figure 1-1 Site Location

1.3 Proposed development

The proposal is for the installation and operation of a Battery Energy Storage System (BESS), along with associated high voltage substation compound, underground cable connections, transformer stations, inverters, access and other ancillary infrastructure. The development is proposed to be located within the south-western vicinity of the red line boundary. The remaining area of the site will remain undeveloped. A masterplan for the proposed development site is contained in Appendix A.

Access for construction and operation will be from Mount Road to the south-east of the site.

The proposed BESS development comprises:

- Substation
- 28 transformers
- 8 inverters
- 120 batteries
- Access from Mount Road
- Internal access road
- Drainage infrastructure, landscaping, and ecological planting
- Security fencing and CCTV

1.4 Existing site topography

A topographic survey of the site was undertaken by Landmark Surveys in October 2024 and is provided in Appendix B. Natural Resources Wales (NRW) open source 1m Light and Detection Ranging (LiDAR), which provides an alternative illustration of the site topography is shown in Figure 1-2. Ground levels are shown to be highest in the south-west of the site at approximately 228.49mAOD. Generally, the ground declines in a northerly direction, with the lowest ground levels in the north-western corner of the site at approximately 204.61mAOD. The proposed access track is at a level of approximately 228.38mAOD at the point where it joins Mount Road in the south-east.

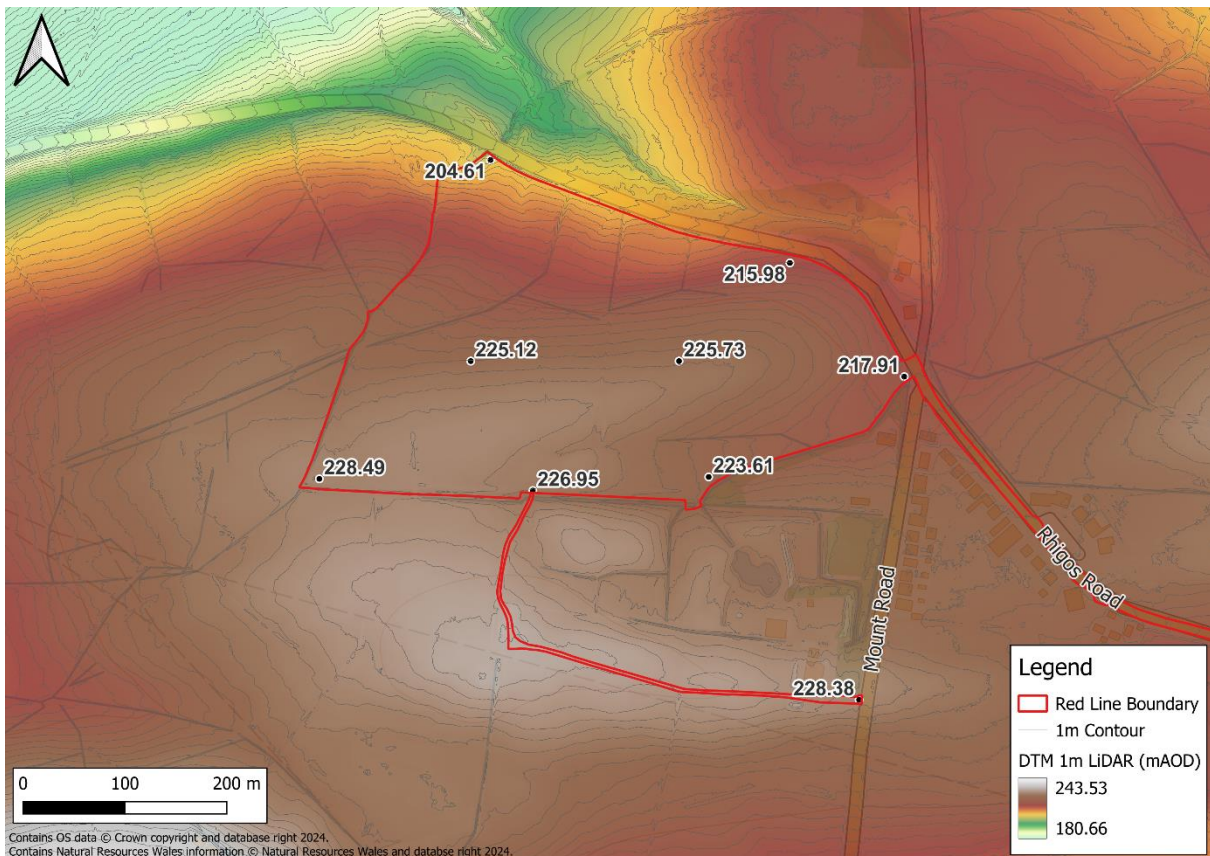


Figure 1-2 Site Topography

1.5 Nearby Watercourses

There are no NRW Main Rivers crossing the site. However, there is a network of Ordinary Watercourses and drainage ditches that cross through, and bind the site, as shown in Figure 1-3. These waterbodies ultimately flow in a northerly direction towards the Mellte River which is approximately 1KM to the north of the site.



Figure 1-3 Nearby Watercourses

1.6 Summary of Surface Water and Small Watercourse Flood Risk

Surface water flooding occurs when rain falling on saturated grounds flows overland, following local topography. Surface water flooding and subsequent overland flow can therefore pose a risk to both the development site and surrounding land. The overland flow may originate from the site itself or adjoining land at a higher elevation from which flow migrates onto the development.

The NRW Flood Risk Assessment Wales mapping for surface water and small watercourses, as shown in Figure 1-4, identifies the site as being predominantly at very low risk of surface water flooding. This means that there is a less than 0.1% AEP (1 in 1000) chance of flooding in any given year.

However, there are several drainage ditches located within the site boundary which are shown to pose a low-high risk of surface water flooding. High risk indicates a risk greater than 3.3% AEP (1 in 30), whilst a low risk presents between a 0.1% AEP to 1% AEP (1 in 1000 to 1 in 100) chance of flooding from surface water in any given year. The risk areas are however restricted to the drainage channels.

It should be noted that the mapping indicates that the site entrance is susceptible to surface water and ordinary watercourse flood risk. However, NRW National Flood Hazard Mapping suggests that flood depths are typically less than 200mm and therefore it is considered that access and egress for the site will remain operational under all conditions. Further

assessment on the impact of surface water flood risk in association with site access should be undertaken prior to detailed design stage.

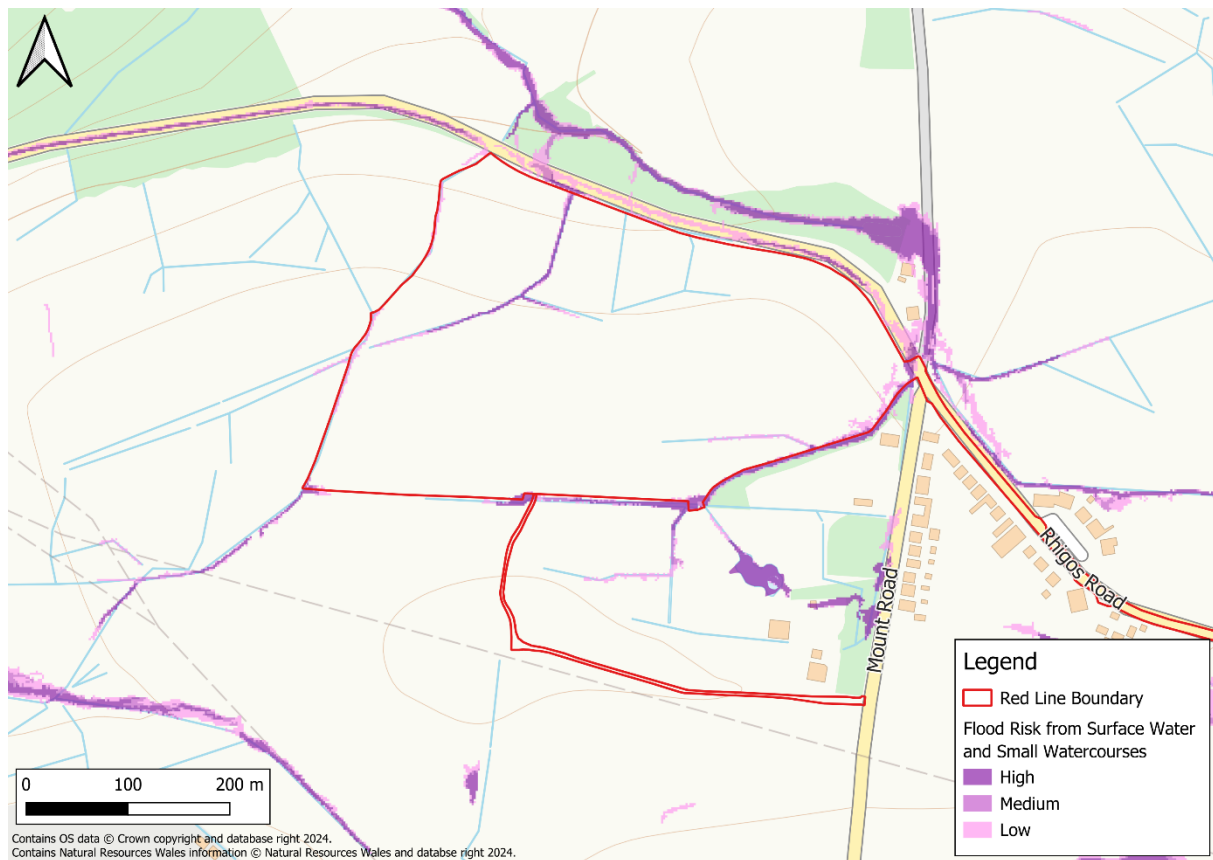


Figure 1-4 Flood Risk from Surface Water and Small Watercourses

1.7 Fluvial Flood Risk

The main development site is shown to be at very low risk of flooding from rivers, according to NRW's Flood Risk Assessment (FRAW) mapping, as shown in Figure 1-5. This means that there is a less than 0.1% AEP (1 in 1000) chance of fluvial flooding in any given year.

The proposed cable route from the site to the National Grid substation is via Rhigos Road in a general easterly direction. It is noted that a small area of Rhigos Road is located within the fluvial flood extent, at low risk of flooding. However, the cabling is proposed to be located underground and therefore the fluvial risk associated with this location shall have no impact on development proposals, and the proposed work shall have no impact on flood risk to third parties. It is therefore considered that fluvial flood risk does not need to be considered further.

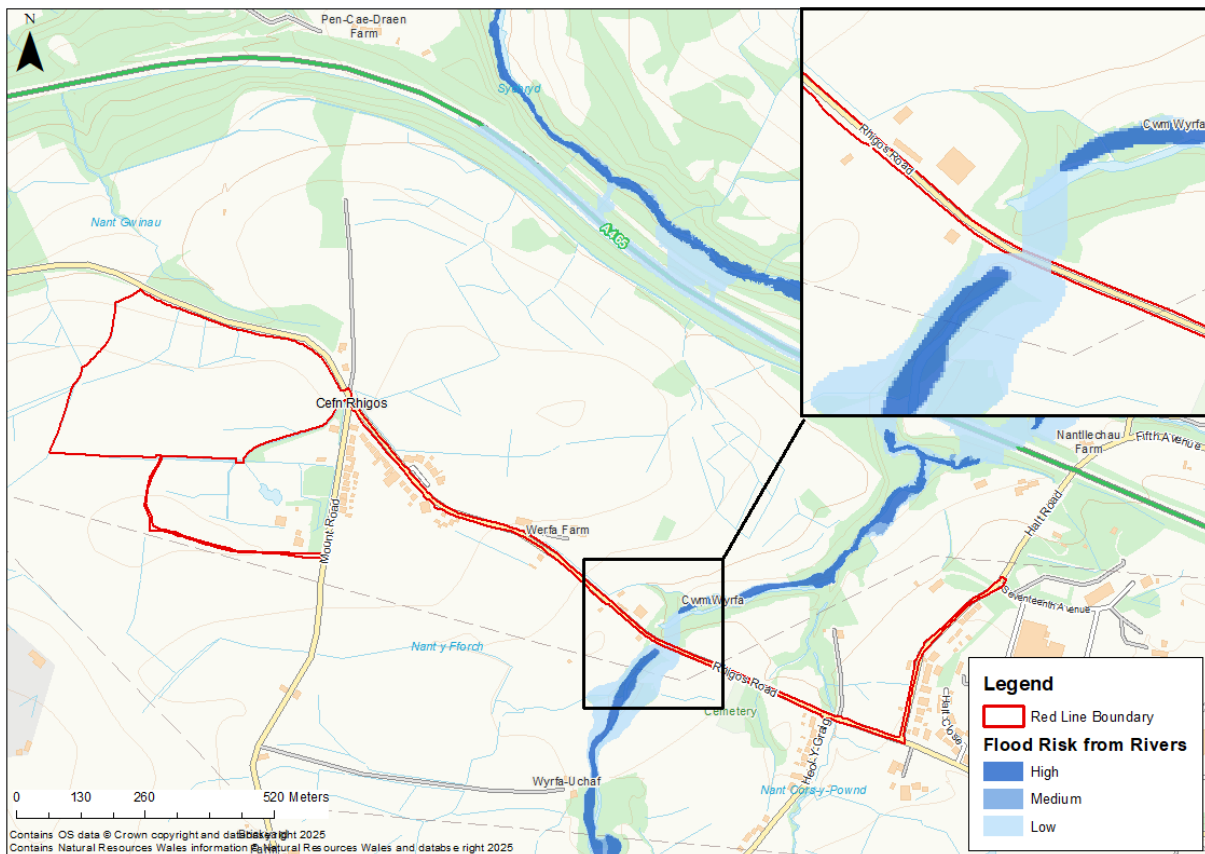


Figure 1-5 Flood Risk from Rivers

2 Existing Surface Water Drainage Regime

2.1 Existing site geology and drainage

The geology of the site has been assessed using the British Geological Survey (BGS) GeoIndex¹ which indicates that the site is underlain by South Wales Lower Coal measures Formation, comprised of mudstone, siltstone, and sandstone. Some of the site is shown to have no record of superficial deposits, with the majority of the site indicated to be underlain by Devensian Till. A small area in the south-east is shown to be underlain by Peat.

The soils on site have been assessed on the Cranfield University Soilscape² viewer and are described as slowly permeable wet very acid upland soils with a peaty surface, and impeded drainage.

Given the underlying geology and assumed soil type, along with being unaware of any existing surface water drainage infrastructure across the site, it is assumed that currently surface water drains via evapo-transpiration losses, slow infiltration into the underlying soils, and runoff towards existing drainage ditches and ordinary watercourses that are located within and around the site.

2.2 Greenfield Runoff Rates

Table 24.1 of the SuDS Manual indicates that FEH methods (FEH Statistical and ReFH) should be the preferred methods for calculating peak runoff rates. This is supported by Natural Resources Wales GN008 Flood Estimation: Technical Guidance and Environment Agency research by Faulkner et al which concluded that FEH methods are applicable across a range of catchment sizes and that they should be used in place of outdated methods, such as IH124 and ADAS 345 where possible.

The UK SuDS Tool has been used to calculate Greenfield Runoff Rates for the site's developable area (2.51 ha) using the FEH Statistical Method, as seen in Appendix C. FEH characteristics have been downloaded for the site from the FEH Web service. The calculated Greenfield Runoff Rates are shown in Table 2-1.

Table 2-1 Greenfield runoff rates

Return period	Specific runoff (l/s/ha)	Peak runoff rate (l/s)
1	25.27	63.43
QBAR	28.71	72.08
30	51.11	128.3
100	62.60	157.13

1 <https://www.bgs.ac.uk/map-viewers/geoindex-onshore/>

2 <https://www.landis.org.uk/soilscales/>

2.3 Greenfield Runoff Volumes

Runoff volumes for the developable area (2.51 ha) were also calculated for the six-hour storm event using the FSSR16 method as shown in Equation 1 below.

Equation 1:

$$\text{Runoff Volume} = \text{Site Area} \times \text{Rainfall Depth} \times \text{Percentage Runoff}$$

The rainfall depths for a six-hour 100-year storm event were extracted from the FEH Web service and are summarised in Table 2-2 with the calculated Greenfield Runoff Volumes.

Table 2-2 Greenfield runoff volumes

Return period	6-hour rainfall runoff depth (mm)	Percentage runoff	Site runoff volume (m ³)	Site runoff volume (m ³ /ha)
30	64.5	4.22	826	329
100	77.0	5.63	986	437

3 Post Development Surface Water Management

3.1 Surface Water Drainage Proposal

An outline surface water drainage proposal for the site has been developed to manage surface water runoff without increasing flood risk to other developments or impacting on water quality downstream. The development of the drainage strategy is via a number of steps where the drainage objectives and options for SuDS features are determined. Further detailed design of the drainage scheme will be undertaken once an agreement in principle has been received from the SuDS Approval Body (SAB).

This outline strategy discusses each SuDS standard in turn and details the way in which the proposed surface water drainage strategy will comply with each standard.

3.2 Sustainable Drainage Systems

Sustainable Drainage Systems (SuDS) aim to mimic the natural processes of surface water drainage by allowing water to flow along the natural flow routes ensuring that runoff rates and volumes during storm events are not increased above greenfield values. SuDS also aim to provide water treatment, biodiversity, and amenity benefits within Blue and Green corridors.

Schedule 3 of the Flood and Water Management Act 2010 was enacted in Wales in January 2019, leading to the requirements for all new developments to incorporate the four pillars of SuDS design, shown in Figure 3-1.

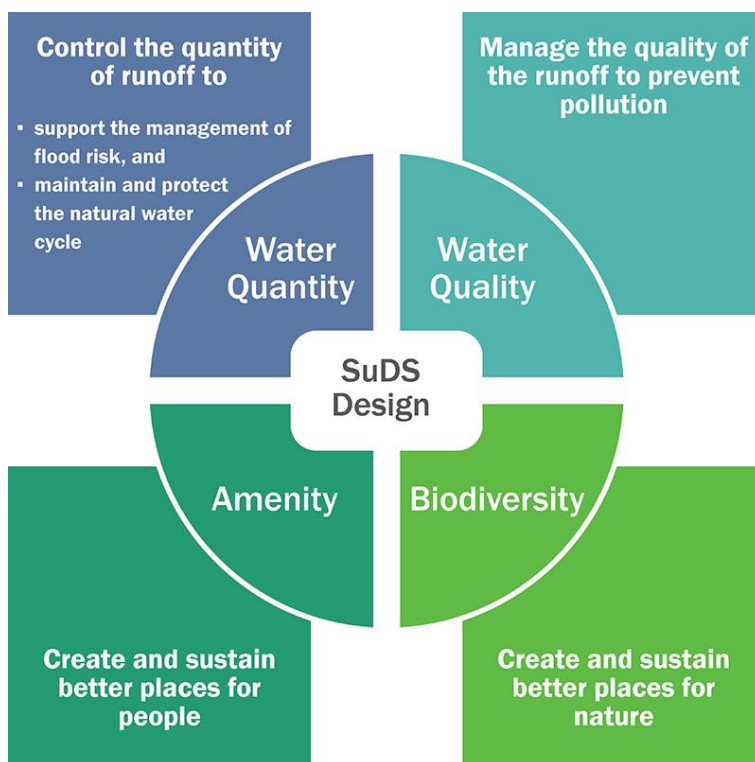


Figure 3-1 Four Pillars of SuDS Design

3.3 Design Criteria

A drainage strategy outlining the means of surface water management at the proposed development site has been produced in line with the latest guidance and design standards including:

- C753 The SuDS Manual (Ciria 2015)
- Statutory standards for sustainable drainage systems - designing, constructing, operating and maintaining surface water drainage systems (Welsh Government 2018)
- Rainfall Runoff Management for Developments - SC030219 (Environment Agency 2013)
- Planning Policy Wales (Edition 9, November 2016)
- The Building Regulations 201: Part H: Drainage and Waste Disposal

In line with Sustainable Drainage Systems Standards for Wales (2018), surface water runoff events up to the 1% AEP (1 in 100 year) plus climate change return period event should be managed to protect people and property on and adjacent to the site from flooding from the drainage system.

The Welsh SuDS standards state that attenuation storage should be utilised to limit discharge of runoff from the site with surface storage features used in preference to underground systems as they are considered more adaptable.

Rhondda Cynon Taf County Borough Council does not currently have any specific guidance related to SuDS. Should guidance be developed prior to or during the detailed design stage, it should also be consulted to inform the drainage strategy.

3.4 Principles of SuDS

The proposed surface water drainage scheme complies with the standard principles of SuDS in the following way:

- Wherever possible across the site, water is managed as close to the surface as possible using attenuation basins which will convey and attenuate water across the site.
- Rainwater is treated as a valuable natural resource across the site by keeping water as close to the surface as possible through the use of attenuation basins. SuDS assets will provide amenity and biodiversity benefits across the site.
- Rainfall will be managed across the site to ensure that the site does not flood during the 1 in 30-year event, and no buildings will flood during the 1 in 100-year event plus 40% for climate change.
- No allowance for urban creep shall be required for the site. A 40% climate change allowance will be applied to peak rainfall intensity and design inflows across the development site.
- A SuDS Management Train is included across the site as water is intercepted and attenuated via attenuation basins, before entering drainage ditches within the site by gravity, and ultimately draining into the River Mellte.

- The Simple Index Approach, in line with C753, will be used to demonstrate how surface water shall be managed to ensure that the proposed development shall not have a detrimental effect on water quality.
- Biodiversity and amenity benefits are maximised across the wider site area via the proposed SuDS features, which will aim to enhance existing habitats and ecosystems where possible.
- To ensure that the scheme performs reliably and effectively for the lifetime of the development, a maintenance plan shall be produced during detailed design stage, which shall detail the management and maintenance requirements of the system to ensure that it functions to its optimal capacity in perpetuity. Throughout the design of the system, a designer's risk assessment shall be carried out to ensure that all SuDS assets are safe and fit for purpose.

3.5 Proposed Surface Water Drainage Strategy

Due to the nature of the development proposals in regard to battery storage, the risk of a fire event has been considered as part of the drainage strategy. Fire water will result in the contamination of water which will consequently need to be contained and treated appropriately prior to discharge to its ultimate location. The management of surface water will need to reflect this risk, whilst also meeting the requirements of the statutory standards for SuDS in Wales.

In consideration of the above, surface water across the proposed development site shall be managed via two independent systems as follows:

1. The '**clean**' water network (access tracks drainage)

The proposed internal access tracks will drain into a detention basin, providing treatment and conveyance along with the provision of sufficient attenuation storage.

2. The '**contaminated**' water network (battery compounds)

The runoff from the battery compounds will be collected in linear drains or similar and routed to a detention basin providing treatment and attenuation. Penstock or similar will be installed at the basin's outfall. During normal rainfall events the runoff from the basin will be discharged into the drainage ditch to the north. During an event of a fire an automated system will be required so that the contaminated fire water will be retained in the basin and either tested and treated in place and discharged into the drainage ditch or tanked off for offsite disposal. Further details on the testing and treatment methods and requirements shall be provided at detailed design stage.

To facilitate separation of the runoff between the 'clean' and 'contaminated' networks and to ensure that no contaminated water leaves the site and poses a risk to the surrounding environment, a bund (height to be confirmed at detailed design stage) will be required around the hardstanding areas containing BESS containers.

The proposed outline drainage strategy is contained in Appendix D, with further details on how this strategy complies with the statutory standards for SuDS in Wales below.

3.6 S1: Surface Water Runoff Destination

The statutory standards for SuDS in Wales address the use of surface water by the development and where it should be discharged. It has developed a destination hierarchy which sets out the preferred routes for discharge of runoff from the site:

- Priority Level 1: Surface water runoff is collected for reuse.
- Priority Level 2: Surface water runoff is infiltrated to ground.
- Priority Level 3: Surface water runoff is discharged to a surface water body.
- Priority Level 4: Surface water runoff is discharged to a surface water sewer, highway drain, or another drainage system.
- Priority Level 5: Surface water runoff is discharged to the combined sewer.

Priority Level 1 is the preferred (highest priority) and 4 and 5 should only be used in exceptional circumstances. The following outlines how the proposed development adheres to the drainage hierarchy.

3.6.1 Priority Level 1 - Water for re-use

Given the nature of the proposal for battery energy storage purposes, the potential for surface water re-use across the development is limited and would not provide a viable means for the disposal of surface water for the site.

3.6.2 Priority Level 2 - Infiltration

Based on the current information about underlying geology, it is considered that the potential for infiltration across the site is likely to be minimal. Infiltration testing in accordance with BRE365 shall be required prior to detailed design, however for the purpose of this report it is assumed that infiltration is not viable.

In addition, due to the risk of contamination from fire water, it is considered that infiltration is not a suitable solution for surface water drainage specifically within battery compounds.

3.6.3 Priority Level 3 - Discharge to surface water body

There are two drainage ditches located within the site boundary which connect to ordinary watercourses, and ultimately the River Mellte to the north of the site.

As a suitable discharge location has been found, Priority Levels 4 and 5 do not need to be considered further.

3.7 S2: Surface Water Runoff Hydraulic Control: Proposed Discharge Rate

There are typically three design storm events which should be considered when designing the SuDS system for managing flows and volumes:

- 1 in 1-year event, on sloping sites without basements, where surcharging above soffits of any surface water drainage pipework is not permitted.
- 1 in 30-year storm event, where surface water flooding of the site does not occur at this frequency.

- 1 in 100-year storm event with allowances for future climate change, where runoff from the site should be controlled to the greenfield rate using SuDS attenuation features to manage flows and volumes within the extents of the development site.

3.7.1 Impermeable areas

Across the site, internal access tracks, the substation compound, spare parts containers, and battery storage units will be regarded as impermeable areas. Additionally, due to the consideration of fire water, all areas around components noted above are required to be located on hardstanding surfaces so that fire water can be retained and the risk of contamination to the wider environment is mitigated. Therefore, the storage attenuation volume required for the site is based on the total impermeable area of 2.51ha, as shown in Figure 3-2.

The main access road from Mount Road to the site entrance is proposed to be made up of a permeable, MOT Type 1 subbase, such as crushed aggregate, and will therefore be permeable in nature.

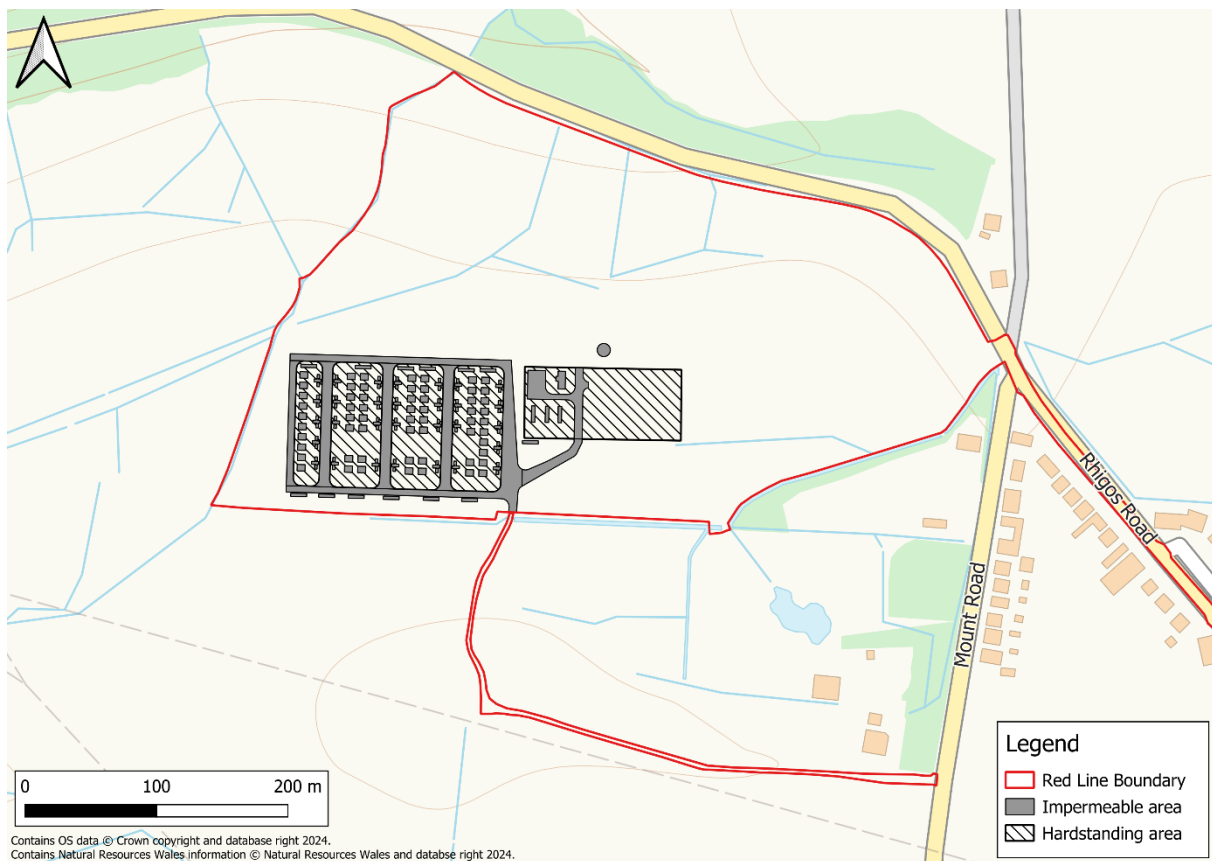


Figure 3-2 Proposed impermeable areas

3.7.2 Attenuation Storage

InfoDrainage software was used to calculate a quick storage estimate of the proposed development in order to indicate the storage volume required at the site for the 1 in 100-year plus 40% climate change event.

Catchment descriptors were extracted from the Flood Estimation Handbook Web Service. The FEH22 rainfall has been utilised for the 6 hour 100-year rainfall event.

The soil characteristics of the area are not ideal for infiltration. The CIRIA Manual states, *"All the runoff from the site for the 1:100-year event should be discharged at either a rate of 2 l/s/ha or the average annual peak flow rate (i.e. the mean annual flood, QBAR), whichever is the greater"*. This method has been adopted for sizing of the storage volume required.

The developable area is considered as all impermeable areas across the development site. Urban creep allowance has not been applied as further consideration of drainage implications will be required before further expansion would be permitted.

As noted in Section 3.7.1, the developable area has been further separated to consider the risk of contaminated fire water. As such, the impermeable area has been split to identify where surface water shall be 'clean' or 'contaminated'. The 'clean' water network comprises the internal access tracks which can be treated sufficiently by SuDS features prior to being discharged into an ordinary watercourse. The 'contaminated' water network is susceptible to contamination due to the risk of fire water, and therefore requires appropriate retention, testing, and treatment prior to being discharged of suitably.

Table 3-1 summarises the user defined variables input into the estimation tool.

Table 3-1 User defined values

Variable	Value
Site area	5.2 ha
Impermeable area	2.51 ha made up of - 0.6 ha ('clean' network) - 1.91 ha ('contaminated' network)
Climate change allowance	40%
Urban creep allowance	N/A
BFI Host	0.301
SPR Host	51.02
SAAR (mm)	1954
Discharge rate (l/s/ha)	28.71

The required 'clean' network attenuation storage has been estimated as 293-627m³, as shown in Figure 3-3. A conservative approach has been carried forward, and the upper estimate of 627m³ has been provided for the site.

Results

Quick Storage Estimate variables require approximate storage of between 293m³ - 627m³.

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

Figure 3-3 InfoDrainage quick storage estimate - 'clean'

The required 'contaminated' network attenuation storage has been estimated as 1949-3241m³, as shown in Figure 3-4. A conservative approach has been carried forward, and the upper estimate of 3241m³ provided for the site

Results

Quick Storage Estimate variables require approximate storage of between 1949m³ - 3241m³.

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

Figure 3-4 InfoDrainage quick storage estimate - 'contaminated'

In addition, 228m³ of storage is required to store fire water following a fire event. This volume has been incorporated within the 'contaminated' network, and a total of 3469m³ of storage has been provided.

The outline drainage strategy, demonstrating how the attenuation will be provided is contained in Appendix D.

3.7.3 Exceedance Events

Extreme events exceeding the design event or internal blockages / failures could occur and result in overland flows across the site. The duration of flooding, maximum depths, velocity, and route of flood flows should be established by and managed. The impact of exceedance flows onto adjacent land should also be considered.

For the proposed development site, it is envisaged that flows generated by exceedance events on internal access tracks will flow northerly towards predominantly greenfield land and existing ditches. Bunding around the hardstanding areas should be designed to contain surface water within the compound areas to mitigate the risk of contaminated water escaping the site and entering the wider environment. It is recommended that critical infrastructure such as the storage units are raised to avoid being affected by exceedance flows. Further work in regard to this should be undertaken prior to detailed design.

Potential exceedance flow routes are shown on the drainage strategy plan in Appendix D.

3.7.4 Interception

When rainfall takes place on greenfield sites there is, for the majority of rainfall events, no runoff due to evapotranspiration or groundwater recharge. Therefore, interception mechanisms are based on runoff volume reduction using evapotranspiration and infiltration

processes. Table G2.1 of the Statutory Standards for SuDS in Wales lists the interception drainage components which have assumed compliance. The proposed attenuation basins proposed for the site are deemed compliant as an interception mechanisms, as outlined below in Table 3-2.

Table 3-2 Interception mechanisms with assumed compliance

SuDS Component	Requirement
Basin	Areas drained to detention basins can be assumed to comply where the drained impermeable area is less than 5 times the vegetated surface area receiving runoff.

Table 3-3 demonstrates how the proposed drainage strategy addresses the requirements of interception.

Table 3-3 Interception compliance

Asset	Area of asset	Permissive interception area	Impermeable area draining to asset
'Clean' basin	1224m ²	6120m ²	6,000m ²
'Contaminated' basin	3825m ²	19,125m ²	19,100m ²

3.8 S3: Water Quality

To mitigate against adverse impacts on the water quality of the receiving environment the CIRIA SuDS Manual recommends the following steps to determine the required water quality management for discharges to surface waters and groundwaters.

- Plan land use to prevent runoff and associated pollutants for most rainfall events up to 5mm in depth.
- Identify the pollution hazard level associated with the given type of development.
- Select risk assessment approach based on receiving water environment and the pollution hazard level.
- Carry out the risk assessment for each outfall considering the pollution hazard level, the status of the receiving water environment and effectiveness of the proposed SuDS techniques.

Table 4.3 of the SuDS Manual advocates the use of the 'simple index approach' to determine an appropriate level of pollution mitigation for the development site. This splits pollution into three contaminant types (Total Suspended Solids, Metals, Hydrocarbons) and assigns a 'pollution hazard index' to each type. Different SuDS features are then assigned a 'SuDS Mitigation Index' and sufficient treatment is deemed to be provided if the 'SuDS Mitigation Index' is equal to or greater than the 'pollution hazard index' for each pollutant type. When more than one SuDS component is required, a multiplication factor of 0.5 is applied to mitigation indices for secondary and tertiary components to account for reduced performance.

Whilst ordinarily the highest pollution level would be considered for the entirety of a site, it is considered appropriate to manage surface water in line with catchments in accordance with contaminant levels given the high pollution hazard for areas of the site at risk of fire water contamination. Table 3-4 outlines the key areas of the site along with the designated pollution hazard for each area and subsequent pollution hazard indices.

Table 3-4 Pollution Hazard Indices

Land use	Pollution Hazard Level	Total Suspended Solids	Metals	Hydrocarbons
Internal Access Tracks	Low	0.5	0.4	0.4
Hardstanding Areas (which contain substation compound, spare parts containers, and battery storage units)	High	0.8	0.8	0.9

The SuDS Manual suggests that the simple index approach should only be considered appropriate for use in consideration of mitigation for water quality when used as part of a detailed risk assessment. When dealing with High hazard sites, the environmental regulator should be consulted for pre-permitting advice to determine the most appropriate approach to the development of design solution.

All development located within the hardstanding compounds will be classified as High risk. This is due to the risk of water contamination as a result of a fire event. It is therefore proposed to drain these hardstanding areas via the 'contaminated' network. It is proposed for surface water to be piped from each of the hardstanding compounds to a lined attenuation basin. In normal circumstances the basin will discharge to the surface water body via a flow control device. In an event of a fire the outlet will be blocked by a penstock or similar to allow retention of the contaminated water.

Further measures shall be put in place to ensure that water will be tested and treated as required, prior to being discharged into an ordinary watercourse within the site boundary or removed from the site and disposed of appropriately.

Internal access tracks across the site are classified as Low pollution hazard areas and are to be drained via a 'clean' network which uses above ground SuDS techniques prior to being discharged into a surface water body. Table 26.4 of the SuDS Manual provides indicative SuDS mitigation indices for discharges to surface water. Table 3-5 details the SuDS mitigation indices for the main components across the site in association with the 'clean' network. It indicates that the proposed surface water drainage scheme provides sufficient treatment for the proposed access tracks.

Table 3-5 Pollution hazard indices for SuDS features

SuDS Component	Total Suspended Solids	Metals	Hydrocarbons
Basin	0.5	0.5	0.6

3.9 S4 and S5: Amenity Value and Biodiversity

The design of the surface water management system should maximise amenity and biodiversity benefits across the site. SuDS components can enhance the provision of high-quality, attractive public space, which can help to provide health and wellbeing benefits, improve employee welfare, and contribute to improving the climate resilience of new developments.

As detailed in Section 3.5, the proposed outline drainage strategy is formed of the 'clean' and 'contaminated' networks. Under normal circumstances, the 'contaminated' network will provide amenity and biodiversity benefits alongside the 'clean' network. However, during the event of a fire, these benefits will be restricted to the 'clean' network only due to contaminated water requiring further testing and treatment prior to being discharged.

The ecological potential of the SuDS scheme can be maximised by utilising local planting and providing measures to enhance the existing ecosystem and/or work to mitigate against the impact of the development to its surroundings.

3.10 S6: Design for Construction, Maintenance, and Structural Integrity

The national SuDS standards state that components must be designed to ensure structural integrity of the drainage system and any adjacent structures or infrastructure under anticipated loading conditions over the design life of the development taking into account the requirement for reasonable levels of maintenance. The detailed design phase of the proposed drainage strategy will provide further information on the proposed maintenance and will include a maintenance plan and associated costs for the scheme.

3.10.1 Health and Safety

The surface water drainage system should be designed so that it minimises health and safety risks to those utilising the site. SuDS are sometimes perceived as unsafe features, but with the correct design, these risks can be mitigated. A CDM Designer's Risk Assessment for the outline drainage strategy is contained in Appendix E. This should be further developed at detailed design stage.

3.10.2 Adoption and Maintenance

Schedule 3 of the Flood and Water Management Act 2010 was implemented in Wales on the 7th January 2019. Under this legislation, only SuDS that serve multiple properties must be approved and adopted by the SuDS Approval Body (SAB) - a function performed by the Lead Local Flood Authority (LLFA) at Rhondda Cynon Taf County Borough Council.

Therefore, due to the site possessing a single landowner, the SuDS serving the site will not be adoptable and will be retained within the land ownership.

During detailed design phase, a detailed maintenance plan shall be developed to demonstrate the maintenance required to ensure that the proposed drainage system functions to optimal capacity in perpetuity.

3.10.3 Construction Environmental Management Plan and Development Phasing

With any SAB application there is a requirement to consider development phasing and to prepare and Construction Management Plan to provide a structured approach to construction activities and temporary works for constructing SuDS, ensuring that key construction site issues such as drainage, flooding, sediment control, pollution prevention, storage of materials and existing habitats are sensitively and effectively managed until site construction is complete. Further details on Construction Management and Phasing shall be supplied at detailed stage.

4 Conclusions

JBA Consulting were commissioned by REWE 11 to prepare an outline surface water drainage strategy in support of a planning application for a Battery Energy Storage System (BESS), at Land west of Mount Road, Aberdare.

The site is currently greenfield in nature and approximately 5.2 ha in size.

The proposal is for the installation and operation of a Battery Energy Storage System (BESS), along with associated high voltage substation compound, underground cable connections, transformer stations, inverters, access and other ancillary infrastructure. Access for construction and operation will be from Mount Road to the south-east of the site.

The main access road from Mount Road to the site entrance is proposed to be made up of a permeable, MOT Type 1 subbase, such as crushed aggregate, and will therefore be permeable in nature.

There are no NRW Main Rivers crossing the site. However, there is a network of Ordinary Watercourses and drainage ditches that cross through, and bind the site, which ultimately flow in a northerly direction towards the Mellte River, approximately 1KM to the north of the site.

A topographic survey of the site was undertaken by Landmark Surveys in October 2024. Ground levels are shown to be highest in the south-west of the site at approximately 228.49mAOD. Generally, the ground declines in a northerly direction, with the lowest ground levels in the north-western corner of the site at approximately 204.61mAOD. The proposed access track at the junction with Mount Road is at a level of approximately 228.38mAOD.

The NRW Flood Risk Assessment Wales mapping for surface water and small watercourses identifies the site as being predominantly at very low risk of surface water flooding. This means that there is a less than 0.1% AEP (1 in 1000) chance of flooding in any given year. However, there are several drainage ditches located within the site boundary which are shown to pose a low-high risk of surface water flooding. High risk indicates a risk greater than 3.3% AEP (1 in 30), whilst a low risk presents between a 0.1% AEP to 1% AEP (1 in 1000 to 1 in 100) chance of flooding from surface water in any given year. The risk areas are however restricted to the drainage channels.

Greenfield Runoff Rates for the site's developable area (2.51 ha) have been calculated as 28.71 l/s/ha.

InfoDrainage software was used to estimate the required 1 in 100-year plus 40% climate change attenuation storage for the two networks. The total estimated requirement for the site based on an impermeable area of 2.51 ha is 3869m³, plus an additional 228m³ to allow for the retention of fire water.

Due to the nature of the development proposals in regard to battery storage, the risk of a fire event and resulting water contamination has been considered. As such, surface water

across the proposed development site shall be managed through two systems: the 'clean' water network, and the 'contaminated' network. The proposed internal access tracks will drain via the 'clean' network which utilises a detention basin and will provide treatment and conveyance in addition to sufficient storage attenuation.

Runoff from the battery compounds will be drained via the 'contaminated' network. Water will be collected in linear drains and routed to a detention basin providing treatment and attenuation. Penstock or similar will be installed at the basin's outfall. During normal rainfall events the runoff from the basin will be discharged into the drainage ditch to the north. During an event of a fire an automated system will be required so that the contaminated fire water will be retained in the basin and either tested and treated in place and discharged into the drainage ditch or tanked off for offsite disposal. Further details on the testing and treatment methods and requirements shall be provided at detailed design stage.

A Development Proposal

B Topographic Survey

C Greenfield Runoff Rates

D Outline Surface Water Drainage Strategy

E CDM Designers Risk Assessment

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