# Flood Risk Assessment and Drainage Impact Assessment

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For: Westport Energy Storage Ltd

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# Reference of Terms

**Annual Exceedance Probability (AEP)**

The AEP is the chance or probability of a natural hazard event (usually a rainfall or flooding event) occurring annually and is usually expressed as a percentage.

**Aquifers**

Scotland's groundwater bodies are classified (and reclassified) on a regular basis, into one of five categories: high, good, moderate, poor, or bad; those bodies at risk of deteriorating status are also identified. Where the status of a groundwater body is identified as poor or at risk of deterioration, these bodies are prioritised for action to improve the situation. More details can be found in the River Basin Management Plans for Scotland (SEPA, 2009a).

- Principal Aquifers are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.
- Secondary A Aquifers are 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'.
- Secondary B Aquifers are 'predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers'.
- Secondary Undifferentiated Aquifers are assigned in 'cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'.
- Unproductive Strata are 'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'.

**Canal Failure**

Canal failure can occur due to high-intensity rainfall or structural failure and can be dangerous due to the rapid release of large volumes of water. It is typically limited to raised canal reaches and can result in a rapid peak in flow followed by a gradual reduction.

**Climate Change (CC)**

A change in global or regional climate patterns. For flood risk, CC are assessed in terms of allowances which are predictions of anticipated change for peak river flow, peak rainfall intensity, sea level rise and offshore wind speed and extreme wave height. CC scenario data exists across different epochs (time periods) to determine the needs for climate resilience measures. CC data is requested as part of an SEPA PD request. If a separate ESG Flood Risk and CC Assessment is needed, additional CC data will be required.

**Fluvial Flooding**

Fluvial flooding typically occurs when a river's capacity is exceeded, and the excess water overtops the riverbanks. It can also occur when the watercourse has a high level downstream, perhaps due to structures or blockage, thus limiting conveyance. This creates a backup of water which can overtop the banks. Typical flooding issues occur when the natural floodplain has been urbanised and the river has been confined.

**Groundwater Flooding**

Groundwater flooding is caused by the emergence of water from beneath the ground at either point or diffuse locations when the natural level of the water table rises above ground level. This can result in deep and long-lasting flooding of low-lying or below-ground infrastructure such as underpasses and basements. Groundwater flooding can cause significant damage to property, especially in urban areas, and can pose further risks to the environment and ground stability.

**Sewer Flooding**

Flooding from sewers primarily occurs when flow entering a system exceeds available capacity or if the network capacity has been reduced through blockage or collapse. In the case of surface water sewers that discharge to watercourses, the same effect can be caused as a result of high-water levels in the receiving watercourse. As a result, water can begin to surcharge the sewer network, emerging at ground level through gullies and manholes and potentially causing flooding to highways and properties. If this occurs flooding can represent a significant hazard to human health due to the potential for contaminants in flood water.

**Source Protection Zones**

Source Protection Zones (SPZs) are areas of land through which water infiltrates into a groundwater borehole, well or spring that is used for public drinking water supply. These zones show the risk of contamination from potential pollution. SPZ's have been created as public facing boundaries where discrete groundwater bodies within SPZ's have been dissolved on zone number where common boundaries and overlaps have been removed. SPZs are defined around large and public potable groundwater abstraction sites. The purpose of SPZs is to provide additional protection to safeguard drinking water quality through constraining the proximity of an activity that may impact upon a drinking water abstraction.

- Zone 1 (Inner Protection Zone) is defined by a travel time of 50-days or less from any point within the zone at, or below, the water table. Additionally, the zone has as a minimum a 50-metre radius.
- Zone 2: (Outer Protection Zone) - This zone is defined by the 400-day travel time from a point below the water table. Additionally, this zone has a minimum radius of 250 or 500 metres, depending on the size of the abstraction.
- Zone 3: (Total catchment) - This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source. A further Zone 4, or 'Zone of Special Interest' was previously defined for some groundwater sources.

**Surface Water Runoff**

Surface water runoff is defined as water flowing over the ground that has not yet entered a drainage channel or similar. It usually occurs because of an intense period of rainfall which exceeds the infiltration capacity of the ground. Typically, runoff occurs on sloping land or where the ground surface is relatively impermeable. The ground can be impermeable either naturally due to the soil type or geology, or due to development which places impervious material over the ground surface (e.g. paving and roads).

**Tidal Flooding**

Tidal flooding is caused by high tides coinciding with a low-pressure storm system which raises sea and tidal water levels, overwhelming coastal and river defences. This may be made worse by gale-force winds blowing the raised body of water up tidal river basins some distance from the coast, due to floodwater being forced up the tidal reaches of rivers and estuaries. Such flooding may become more frequent in future years due to rising sea levels.

**Reservoirs Failure**

Reservoir failure can be a particularly dangerous form of flooding as it results in the sudden release of large volumes of water that can travel at high velocity, causing deep and widespread flooding. The likelihood of this occurring is low as large reservoirs are managed in accordance with the Reservoirs (Scotland) Act 1975.

SEPA's online reservoir inundation map illustrates the maximum flood extents that could occur in the event of a reservoir.

# 1. Introduction

## 1.1 Acknowledgement

1.1.1 This report has been prepared for the sole and exclusive use of Westport Energy Storage Ltd in accordance with the scope of work presented in Mabbett & Associates Ltd (Mabbett) Letter Agreement (315449/BT/310724/2.0) dated 31 July 2024. This report is based on information and data collected by Arthian. Should any of the information be incorrect, incomplete, or subject to change, Arthian may wish to revise the report accordingly

1.1.2 Arthian have been instructed to provide a Flood Risk Assessment (FRA) and Drainage Impact Assessment (DIA) on Land at Westport, East Ayrshire, KA18 2QH.

## 1.2 Project Understanding

1.2.1 The Scottish Environment Protection Agency (SEPA) flood map shows the site to lie outside of all fluvial flood extents. There are areas of pluvial flood risk associated with the Trabboch Burn along the northern boundary.

1.2.2 The aim of this report is to assess the potential flood risk to the site, the impact of the proposed development on flood risk elsewhere, and the proposed measures which could be incorporated to mitigate the identified risk (if required). This report has been prepared in accordance with the guidance contained in Scottish Government National Planning Framework 4 (NPF4) published in February 2023.

1.2.3 East Ayrshire Council as Lead Local Flood Authority (LLFA) is a statutory consultee for major planning applications in relation to surface water drainage, requiring that all planning applications are accompanied by a Sustainable Drainage Impact Assessment. The aim of the Sustainable Drainage Impact Assessment is to identify water management measures, including Sustainable Drainage Systems (SuDS), to provide surface water runoff reduction and treatment.

1.2.4 This report takes into account the following national and local policies:

- CIRIA Guidance: The SuDS Manual (C753) (2017) ;
- SEPA Flood Risk and Land Use Vulnerability Guidance, v4, dated 10 July 2018
- Technical Flood Risk Guidance for Stakeholders – SEPA requirements for undertaking a Flood Risk Assessment, v13, dated June 2022
- SEPA Water Assessment and Drainage Assessment Guide ;
- Scottish Government National Planning Framework 4 (NPF4), dated 13 February 2023;
- East Ayrshire Council Local Development Plan dated 06 May 2022; and
- Local Flood Risk Management Plan: Ayrshire Local Plan District (2022-2028).

## 1.3 Sources of Information

1.3.1 The following sources of information have been reviewed and assessed for the purpose of this FRA and

DIA:

- SEPA online flood maps[1];
- British Geological Society (BGS) Interactive Map[2];
- MAGIC Interactive Map[3];

## 1.4 Project Limitations

1.4.1 The wider Arthian limitations are contained within Appendix A.

[1] https://map.sepa.org.uk/floodmaps
[2] http://mapapps.bgs.ac.uk/geologyofbritain/home.html
[3] http://www.magic.gov.uk/

# 2. Site Details

2.1.1 The aim of this section of the report is to outline key environmental information associated with the baseline environment.

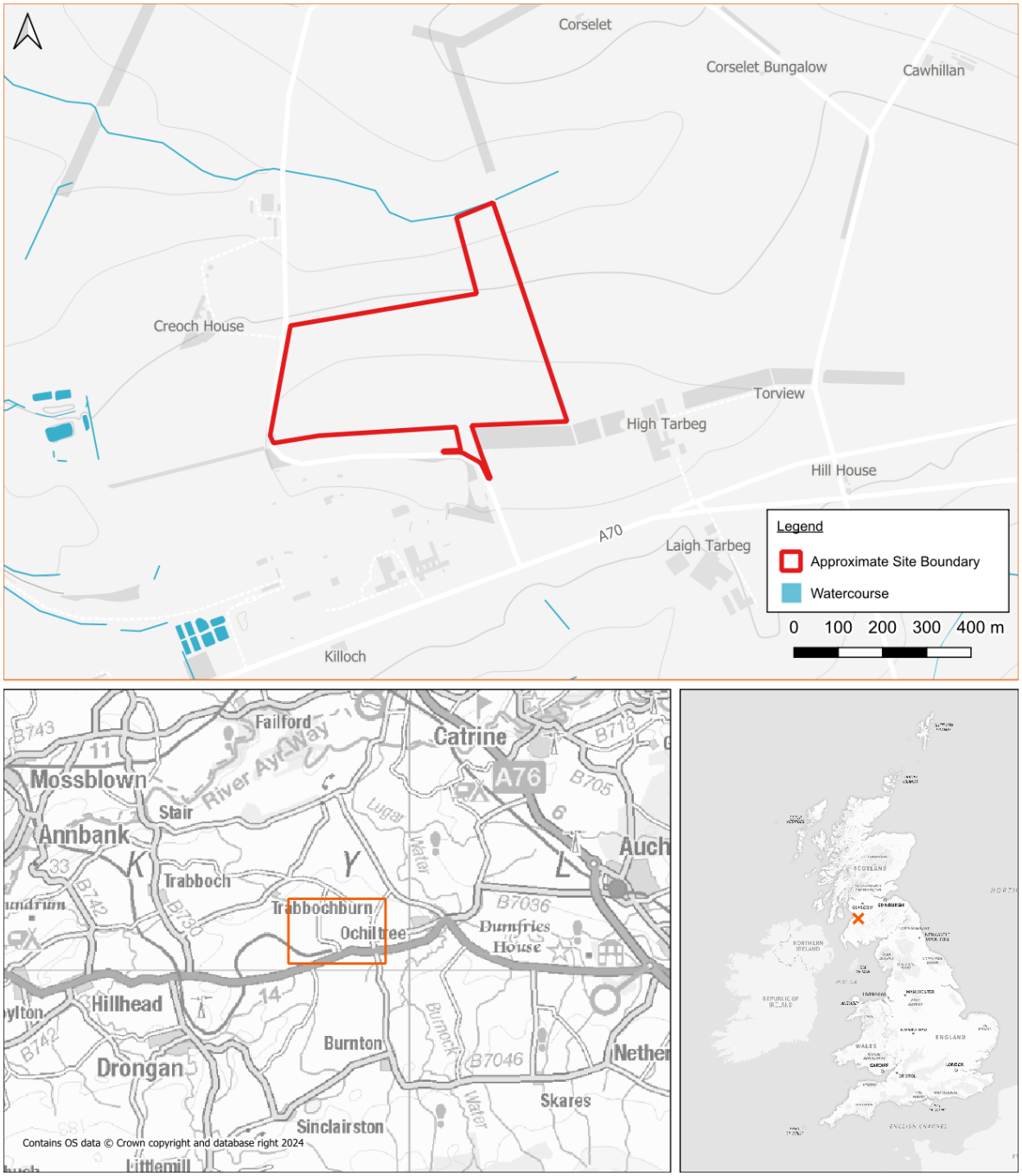



**Figure 1: Site Location**

## 2.2 Site Location

2.2.1 The site is located at Westport, East Ayrshire, KA18 2QH and is shown in Figure 1. Cumnock Town is

located approximately 7.3km south-east of the site.

## 2.3 Existing Site Conditions

2.3.1 Online mapping (including Google Maps/ Google Streetview imagery, accessed 07.10.2024) shows the site is wholly undeveloped, greenfield land. The surrounding area is characterised by a combination of agricultural, residential, industrial and recreational uses.

2.3.2 The site is bordered by a quarry to the south, and agricultural land to the north, east and west.

2.3.3 Hardstanding areas on site currently occupies 0m$^2$ (0%) of the total site area. The remaining permeable, soft landscaped areas occupy 196,000m$^2$ (100%) of the total site area.

2.3.4 Access to the site is provided from Creoch Road to the south and west, leading from the A70 (Ayr Road) to the south.

## 2.4 Topography

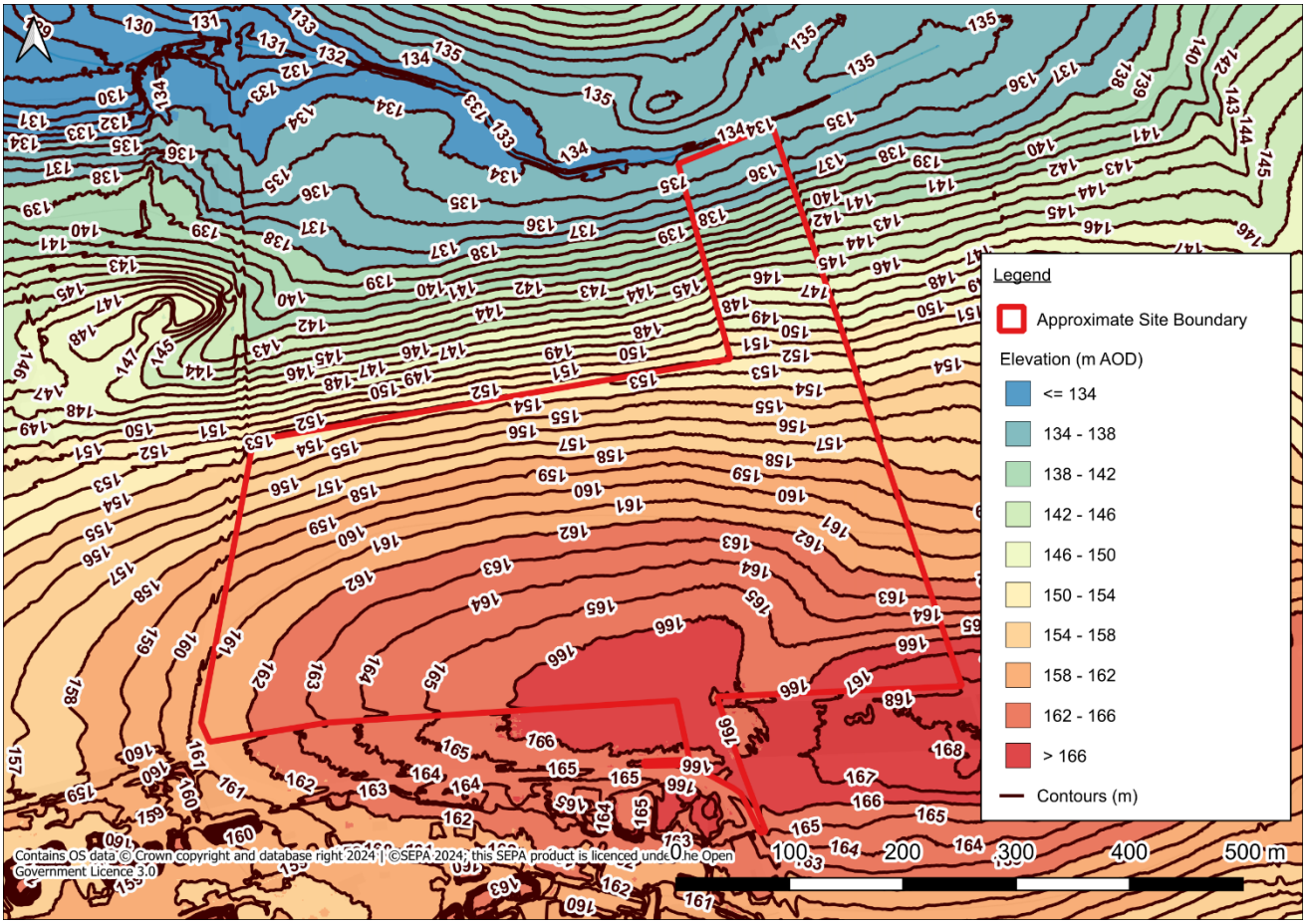



**Figure 2: LiDAR Plan**

2.4.1 A topographical survey has been undertaken by Three Sixty Group in July 2024 and is included in Appendix B. The topographical survey shows that the site slopes from approximately 168.49 metres Above Ordnance Datum (m AOD) in the south-east in the north-eastern boundary to 133.61m AOD in the

northern boundary.

2.4.2 Topographic levels to metres Above Ordnance Datum (m AOD) have also been derived from a 1m resolution Environment Agency (EA) composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM), included as Figure 2.

## 2.5 Hydrology

2.5.1 The nearest watercourse is Trabboch Burn which is located approximately 400m north of the site. The watercourse flows in a north-west direction to Glenstang Burn and outfalls to the River Ayr.

## 2.6 Geology

2.6.1 Reference to the British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the site is largely underlain by superficial deposits of Till, Devensian, generally comprising Diamicton. Although, the south-eastern extents are identified as not being underlain by any superficial deposits.

2.6.2 The underlying Bedrock Deposit is described as Mauchline Volcanic Formation, comprising Lava (basaltic).

2.6.3 The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

2.6.4 There is a historical BGS borehole record on site (NS42SE53). However, there is no information available.

2.6.5 Extracts from the BGS online maps are presented in Figure 3 and Figure 4.

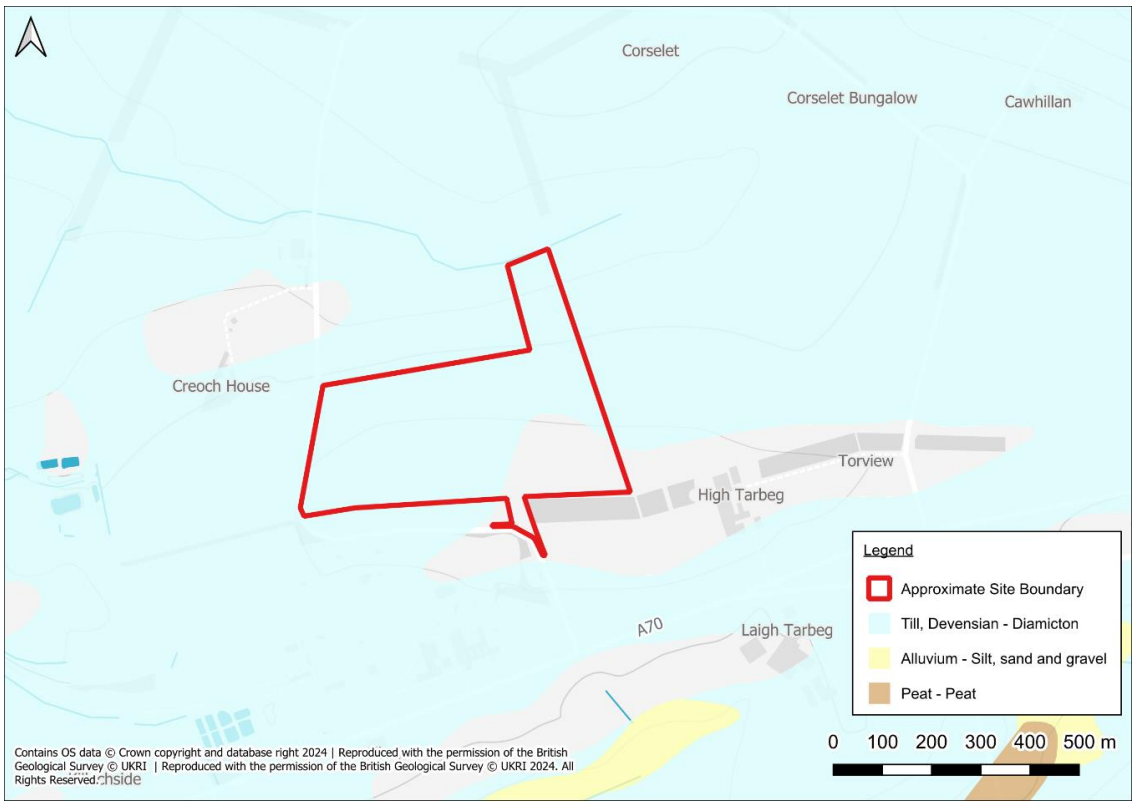


**Figure 3: Superficial Deposits**

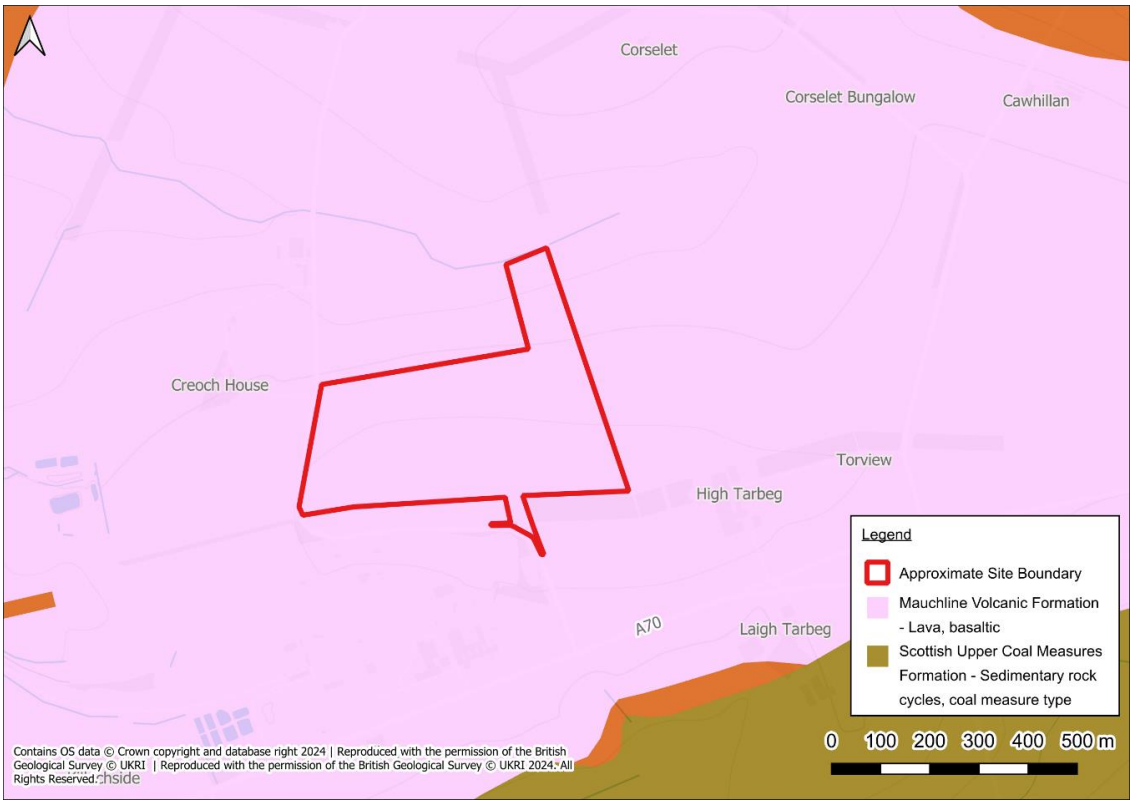



**Figure 4: Bedrock Deposits**

## 2.7 Local Drainage

2.7.1 Public sewer records have been obtained from Scottish Water and are included below in Figure 5. The public sewer records show that there are no public sewers within the immediate vicinity of the site. However, there is a 225mm diameter vitrified clay foul sewer approximately 500m south of the site along the A70.

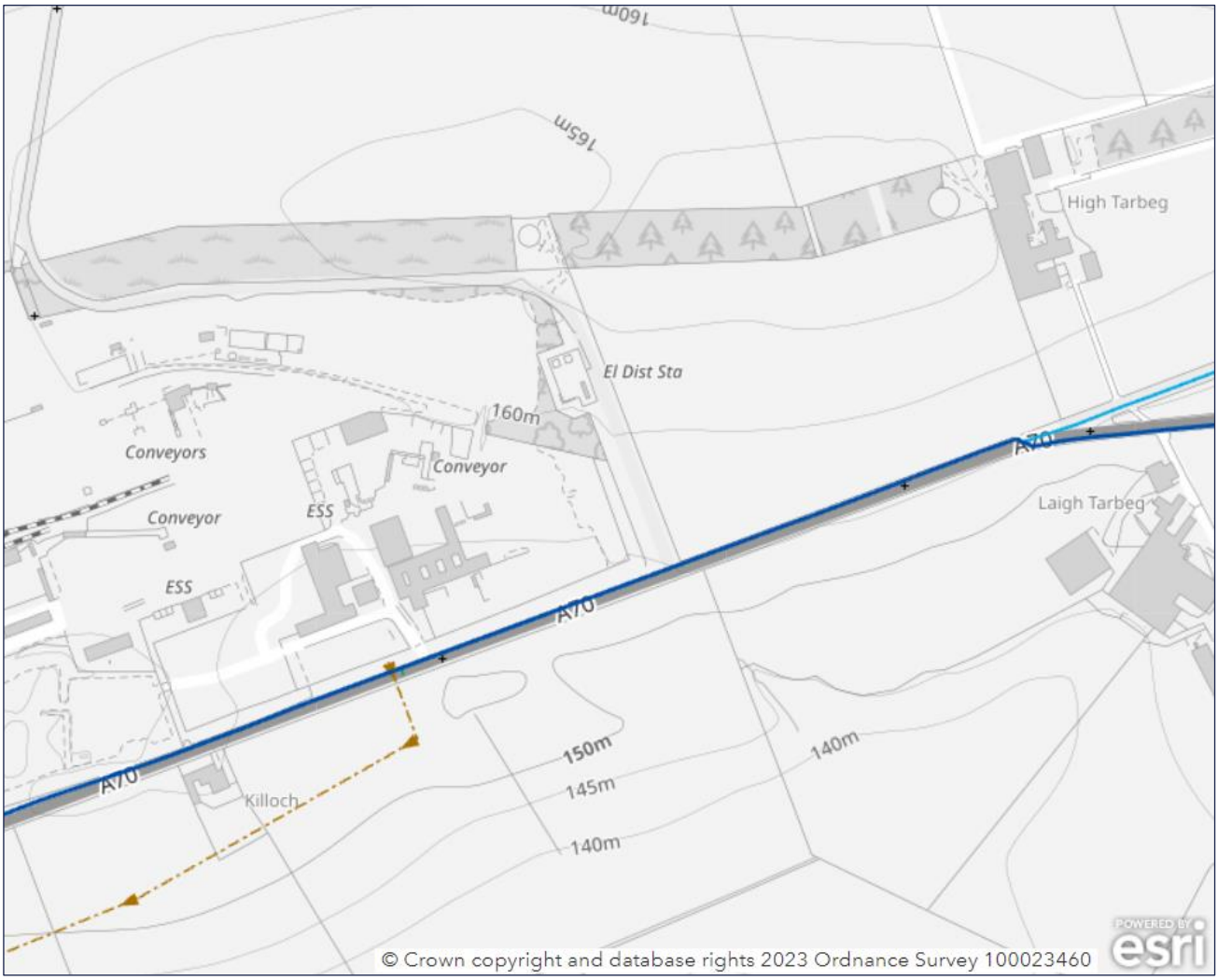



**Figure 5: Scottish Water Public Sewer Plan**

## 2.8 Development Proposals

2.8.1 The proposed development is for the following:

- 192no battery storage enclosures;
- 12no 2no power conversion systems (PCS) with twin MV skin and apron slab;
- 1no DNO substation building;
- 2no Battery Energy Storage System (BESS) substation buildings;
- 6no auxillary transformers;
- 6no LV distribution equipment;
- 24no aggregation panel with LV pillar;
- 2no pre-insertion resistor;
- 2no capacitor bank;
- 2no harmonic filter and resistor;

- 6no spares container;
- Temporary construction compound;
- Lighting/CCTV columns; and
- Security/acoustic fencing

2.8.2 The proposed development will introduce 31,247m$^2$ of hardstanding areas (this includes the BESS, the access roads and the gravelled area surrounding the BESS). The remaining permeable, soft landscaped areas will occupy 164,753m$^2$. The values have been provided by RES and may be refined during detailed design.

2.8.3 A proposed development plan, provided by RES, is included in Appendix C below.

# 3. Relevant Planning Policy and Guidance

## 3.1 Introduction

3.1.1 The aim of this section of the report is to discuss the main aspects of the local and national planning policies that are relevant to any proposed development on the site and relevant guidance and legislation.

## 3.2 Assessment of Flood Risk

3.2.1 SEPA's indicative flood maps show areas considered to have the potential of flooding from rivers (fluvial), coastal, and surface water (pluvial) sources. Whilst the nature of these maps means that they do not necessarily represent flooding in high detail at a site-specific level, they can provide an understanding of general areas that may be prone to flooding from a particular source. The table below provides the annual exceedance probability (AEP) for each probability band.

**Table 1: SEPA Flood Map Classification**

| Source of Flooding | High Probability (AEP) | Medium Probability (AEP) | Low Probability (AEP) |
|---|---|---|---|
| Fluvial<br>Present day | 10% | 0.5% | 0.1% |
| Fluvial<br>Future (2080s) | - | 0.5%<br>(incl. allowance for future climate change) | - |
| Coastal<br>Present day | 10% | 0.5% | 0.1% |
| Coastal<br>Future (2080s) | - | 0.5%<br>(incl. allowance for estimated sea level rise) | - |
| Pluvial<br>Present Day | 10% | 0.5% | 0.1% |

## 3.3 Scottish National Planning Policy Framework

3.3.1 The Scottish National Planning Framework 4 (NPF4), adopted in February 2023, is a long-term plan for Scotland that sets out where development and infrastructure is needed up to 2045. It sets out spatial principles, regional priorities, national developments, and national planning policy and replaces NPF3 and Scottish Planning Policy.

3.3.2 NPF4 requires a precautionary approach be taken towards flood risk and drainage issues to promote sustainable land use and development. Policy 11 states that development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported, including solar arrays and battery storage, subject to confirming any effects on hydrology, the water environment and flood risk and mitigation (if required).

## 3.4 Local Policy

3.4.1 East Ayrshire Council (EAC) Local Development Plan (LDP) Policy ENV11 states that a "precautionary approach to flood risk from all sources will be taken, promoting flood avoidance in the first instance". It lays out the risk framework shown in Table 2.

**Table 2: East Ayrshire Council Flood Risk Framework**

| Category of flood risk | Appropriate level of development | Requirement for Flood Risk Assessment |
|---|---|---|
| *Little or no risk (Annual chance of flooding is less than 0.1% or once in 1000 years)* | *No constraints to development* | *No* |
| *Low to medium risk (Annual chance of flooding 0.1% - 0.5% or once in 1000 to once in 200 years)* | *Suitable for most development*<br>*Generally unsuitable for civil infrastructure (hospitals, fire stations, schools, emergency depots, care homes, ground based electrical and telecoms equipment)* | *Dependent on level of flood risk and nature of proposal. Where flood risk is close to 0.5% or proposal is for essential infrastructure or vulnerable uses, FRA will be required.* |
| *Medium to high risk (Annual chance of flooding is greater than 0.5% or greater than once in 200 years)* | *Generally suitable for residential, institutional, commercial and essential infrastructure development within built-up areas, subject to appropriate flood protection measures.*<br>*Generally unsuitable for any civil infrastructure and most vulnerable uses;*<br>*Generally unsuitable for any new developments in undeveloped and sparsely developed areas.*<br>*Water resistant and resilient building materials should be used.* | *Yes* |
| *Surface water flooding* | *All developments should be designed to be free from surface water flooding in rainfall events where the annual probability of occurrence is greater than 0.5%. Mitigation measures should not have an adverse effect on the risk of flooding off site, taking account of rain falling on the site and run-off from adjacent areas.* | |

*In addition to applying the risk framework, development proposals should:*

- *Take into account the specific characteristics of the site, the proposed development and the surrounding land uses;*
- *Where appropriate, ensure that water resistant and/or resilient construction materials and measures are used;*
- *Minimise impermeable surfaces and incorporate sustainable drainage systems, with adequate maintenance arrangements, to avoid increased surface water flooding;*

- *Ensure flood protection measures allow a 'freeboard allowance', whereby additional height should be added to the predicted level of a flood to make allowances for uncertainties in the predictions. Design, solutions should also include some leeway for the unknown effects of climate change;*
- *Avoid land raising, which will only be acceptable where it has a neutral or better impact on flood risk outside of the raised area. Land raising will only be acceptable in the undeveloped or sparsely developed flood plain when it can be demonstrated that the proposed location is essential for operational reasons and a lower risk location is not available; and*
- *Be accompanied by a Drainage Assessment, to the satisfaction of the Council, where drainage is already constrained or problematic.*

### 3.4.2 SEPA Land Use Vulnerability

3.4.3 In accordance with SEPA Flood Risk and Land Use Vulnerability Guidance (July 2018), the proposed development should be considered 'Essential Infrastructure' and assessed against the 1 in 200 year flood event (0.5% AEP) for the duration of its lifetime.

### 3.4.4 SEPA Climate Change Allowances

3.4.5 SEPA's climate change allowances guidance (v4, November 2023) sets out required allowances for climate change that must be used for flood risk assessments following the adoption of NPF4 in February 2023.

3.4.6 The climate change allowances listed in the guidance are a prediction of anticipated change in peak river flow, peak rainfall intensity or sea level rise caused by future climate change. Allowances for the Clyde region are provided in Table 3.

**Table 3: SEPA Climate Change Allowances – Clyde Region**

| Source of Flooding | Climate Change Allowance |
|---|---|
| **Fluvial** | **+49%** |
| **Coastal (Sea Level Rise)** | +0.85m |
| **Rainfall Intensity** | +41% |

3.4.7 For watercourses with catchments less than 30km$^2$, the rainfall intensity allowance should be applied to the rainfall used to calculate the flows. For watercourses with a catchment area between 30-50km$^2$, the rainfall intensity allowance should be applied if the resultant flow increase is greater than using river flow uplift directly.

## 3.5 Consultation

3.5.1 Product data request was submitted to SEPA in October 2024. SEPA responded in October 2024, and their response is included in Appendix D.

3.5.2 A consultation request was submitted to the LLFA in October 2024. LLFA responded in October 2024, and their response is included in Appendix E.

# 4. Assessment of Flood Risk

## 4.1 Coastal Flood Risk

4.1.1 The site is situated at a minimum of approximately 133.61m AOD and is significantly above sea level. Therefore, there is a **Negligible** risk from coastal flooding.

## 4.2 Fluvial Flood Risk

4.2.1 The nearest watercourse is Trabboch Burn which is located along the northern boundary of the site, which flows in a north-west direction to Glenstang Burn and outfalls to River Ayr.

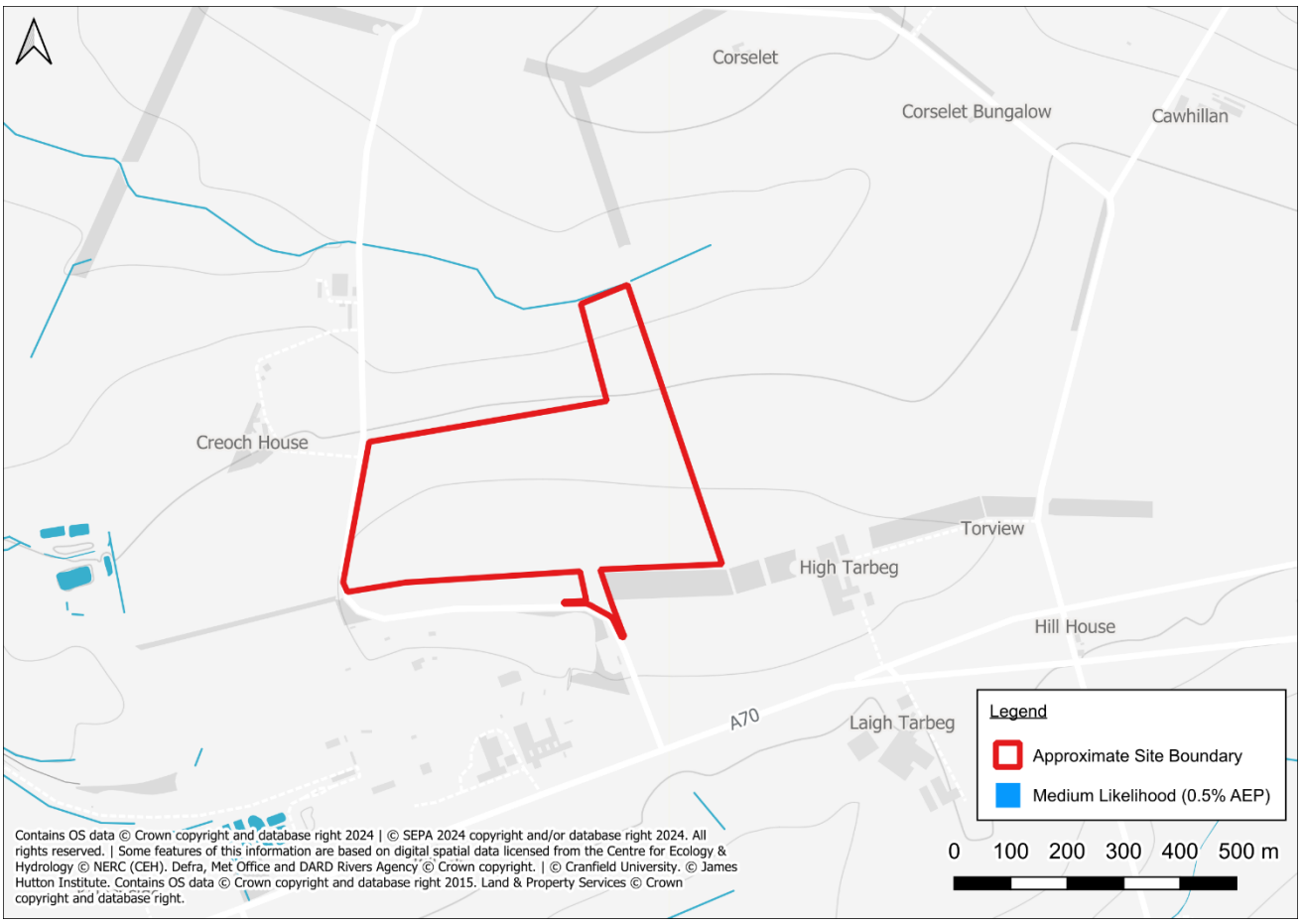



**Figure 6: SEPA's Flood Map for Planning**

4.2.2 The SEPA future fluvial flood map (Figure 6) indicates that the site lies outside of the flood risk area. However, this map does not consider watercourses with a catchment area smaller than 3km$^2$ such as the unnamed watercourse. Surface water mapping (Figure 7) may be used as a proxy to assess fluvial flood risk from smaller watercourses. Surface water mapping finds that during all flood risk scenarios, flood depths are wholly contained within the channel of Trabboch Burn. Additionally, the development is situated at a minimum of 160m AOD, the watercourse is situated at 132.60 -133m AOD and is therefore approximately 30m below the site.

4.2.3 Any out of channel flooding from the watercourse is unlikely to flow toward the site and is likely to flow to the north-west away from the site following the local topography.

4.2.4 SEPA and LLFA's consultation response, included in Appendix D and E, states that there are no reports of flooding within a 2km radius of the site.

4.2.5 There is no site-specific information within third party reports relating to fluvial flood risk.

4.2.6 The site is therefore considered to be at **Low** risk of fluvial flooding.

## 4.3 Surface Water Flood Risk

4.3.1 The SEPA surface water flood map (Figure 7) shows the area along the northern boundary to have a high likelihood (10% AEP) of flooding from surface water. The flood risk is associated with the watercourse, Trabboch Burn.

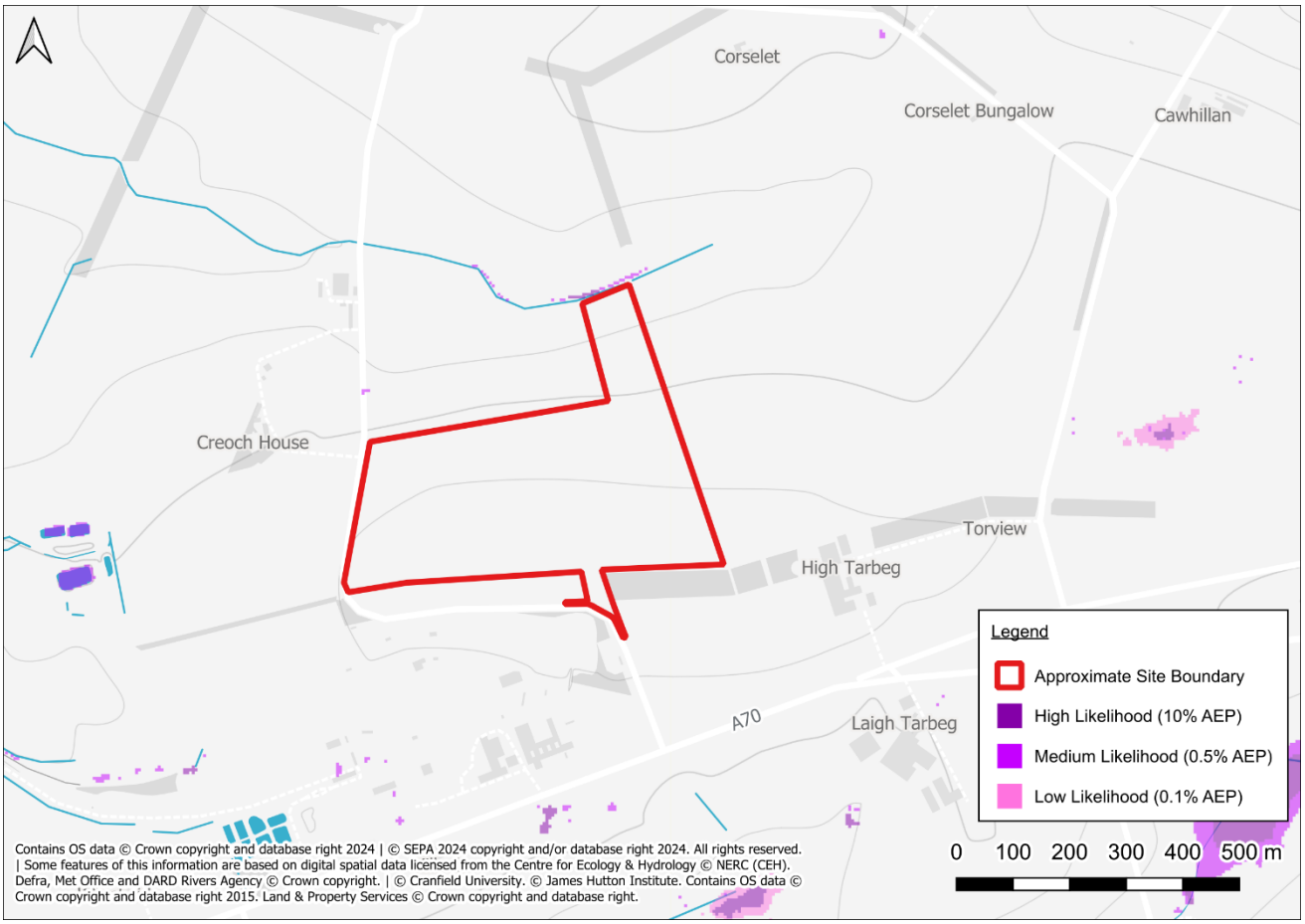



**Figure 7: SEPA's Long-Term Flood Risk Map (Flood Risk from Surface Water)**

4.3.2 Based on the topography of the area, any potential surface water flooding arising at or near to the site would be directed to the north-west towards Trabboch Burn and Glenstang Burn, away from the site. Additionally, there are no distinct flow routes which would direct any potential surface water flooding towards the site.

4.3.3 There is no site-specific information within third party reports relating to surface water flood risk.

4.3.4 Surface water flood risk on site will be managed by the SuDS associated with the proposed development.

4.3.5 It can therefore be concluded that the site is at **Low** risk of surface water flooding.

## 4.4 Groundwater Flood Risk

4.4.1 A description of the site's geology is detailed within section 2.0 of this report.

4.4.2 The superficial deposits at the surface are shown to consist of Till deposits, with an area to the south-east identified as not being underlain by any superficial deposits. There are no records of groundwater flooding at or near to the site and the development will have negligible impact on the superficial deposits.

4.4.3 The site will be predominantly hardstanding, limiting the vertical migration of groundwater.

4.4.4 There is no site-specific information within third party reports relating to groundwater flood risk.

4.4.5 It can therefore be concluded that the risk of groundwater flooding is **Low.**

## 4.5 Sewer Flooding

4.5.1 The public sewer records show that there are no public sewers within the near vicinity of the site, with the closest, a foul sewer, located approximately 500m away south of the site.

4.5.2 The LLFA indicates that there has not been any sewer flooding onsite or in the near vicinity.

4.5.3 Any potential flooding arising from the sewer in along the Ayr (A70) road would be directed away from the site, following the local topography.

4.5.4 It can therefore be concluded that the risk of sewer flooding is **Negligible**.

## 4.6 Reservoir and Canal Flooding

4.6.1 The SEPA 'Reservoirs Flood' map shows that the site is not within any potential reservoir breach/ failure extents.

4.6.2 There are no canals within the vicinity of the site therefore there is no associated flood risk.

4.6.3 It can therefore be concluded that there is **Negligible** risk of flooding from artificial sources.

## 4.7 Residual Flood Risks

4.7.1 A residual risk is an exceedance event, such as the 1 in 1000 year (0.1% AEP) flood event that would overtop Trabboch Burn and potentially impact the site. As the probability of a 1 in 1000 year flood event occurring is 0.1% in any given year, the probability is low and, therefore, no further mitigation beyond what is proposed is required.

4.7.2 In the event of the defences failing or an exceedance event occurring, the residual risk to people working

within the site can be managed through the implementation of an appropriate site management plan, which recognises the residual risks and details what action is to be taken by staff in the event of a flood to put occupants in a place of safety.

## 4.8 Safe Access and Egress

4.8.1 Safe access and egress must be provided during a flood event so that site users can be safely evacuated without any undue risk to life. Site users should not evacuate into flood water unless instructed to do so by emergency services.

4.8.2 The proposed development is considered to be at low/negligible risk of flooding from all sources. Access to/from the Creoch Road should remain possible in the unlikely event of a flood on site. It is recommended that the site occupier should sign up to flood warning services provided by SEPA as a precaution where available.

## 4.9 Summary of Flood Risk

4.9.1 It can be concluded that the site is at low risk of flooding from all sources. Therefore, no site-specific mitigation measures are considered necessary. However, in accordance with Building Regulations, equipment should be set to a minimum of 150mm above the finished floor level (FFL).

**Table 4: Summary of Risk**

| Source of Flooding | | Summary of Risk |
|---|---|---|
| **Tidal Flood Risk** | | **Negligible** |
| **Fluvial Flood Risk** | | **Low** |
| **Surface Water Flood Risk** | | **Low** |
| **Groundwater Flood Risk** | | **Low** |
| **Artificial Sources of Flood Risk** | **Sewer Flooding** | **Negligible** |
| | **Reservoir and Canal Flooding** | **Negligible** |

# 5. Drainage Impact Assessment

## 5.1 Introduction

5.1.1 The site currently comprises undeveloped land which is not formally drained and is therefore considered to be 100% permeable.

5.1.2 NPF4 requires that all development proposals will:

- Not increase the risk of surface water flooding to others, or itself be at risk;
- Manage all rain and surface water through sustainable urban drainage systems (SuDS), which should form part of and integrate with proposed and existing blue-green infrastructure. All proposals should presume no surface water connection to the combined sewer; and
- Seek to minimise the area of impermeable surface.

5.1.3 The proposed development will introduce 31,247m$^2$ of hardstanding area which includes the BESS, the access roads and the gravelled area surrounding the BESS. The remainder of the site will be landscaped and will not include any additional hardstanding, thereby continuing to drain as per the existing conditions.

5.1.4 The increase in hardstanding area will result in an increase in surface water runoff rates and volumes. In order to ensure the proposed development will not increase flood risk elsewhere, surface water discharge from the site will be controlled.

## 5.2 Drainage Hierarchy

5.2.1 The recommended surface water drainage hierarchy (East Ayrshire Council guidance, following the CIRIA C753 publication 'The SuDS Manual' (2017)) is to utilise soakaway systems or infiltration as the preferred option, followed by discharging to an appropriate watercourse. If this is not feasible, the final option is to discharge to an existing public sewer.

**Surface Water Discharge to Soakaway**

5.2.2 The first consideration for the disposal of surface water is infiltration (soakaways and permeable surfaces). As described above the site is largely underlain by superficial deposits of Till, Devensian, generally comprising Diamicton, with an area underlain by no superficial deposits in the south-east.

5.2.3 The relatively impermeable nature of the superficial deposits would likely result in a soakaway to not be an appropriate means of disposing surface water from the proposed development.

5.2.4 It can be concluded that soakaways may not be suitable for the discharge of surface water runoff.

**Surface Water Discharge to Watercourse**

5.2.5 Where soakaways are not suitable a connection to watercourse is the next consideration.

5.2.6 The nearest watercourse is Trabboch Burn which is located directly adjacent to the north-east boundary of the site. Discharge to Trabboch Burn at a limited discharge rate of would be feasible via a gravity fed connection subject to agreement of SEPA/LLFA.

**Surface Water Discharge to Sewer**

5.2.7 As described above, a connection to Trabboch Burn is feasible and therefore a connection the public surface water sewer is not required.

## 5.3 Surface Water Discharge

5.3.1 The existing greenfield runoff rates have been estimated using the IH24 method, see Appendix F. The calculated Qbar for the proposed hardstanding area (3.12Ha) is 24.96l/s. Table 5 provides a summary of the greenfield release rates for various return period rainfall events particular to the site

**Table 5: Runoff Rates**

| Return Period (Years) | Runoff Rate (l/s) |
|---|---|
| **Qbar** | 24.96 |
| **1 in 1 year** | 21.72 |
| **1 in 30 year** | 48.68 |
| **1 in 100 year** | 65.65 |
| **1 in 200 year** | 74.64 |

5.3.2 For the purposes of this assessment, it is proposed to restrict surface water runoff generated by the proposed development to the existing Qbar runoff rate, during all events up to and including the 1 in 200 year plus 41% climate change (CC) event. It is thereby proposed to restrict surface water runoff to 24.96l/s.

## 5.4 Attenuation Storage

5.4.1 Hardstanding at the BESS site will have a negligible impact on runoff given it is surrounded entirely by greenfield land. Therefore, the site will have negligible impact on the existing runoff rates, volumes, or flow routes.

5.4.2 In order to achieve a discharge rate of 24.96l/s, attenuation storage will be required. Detailed storage calculations have been provided using Causeway Flow and are included in Appendix G. An estimated storage volume is provided for the 1 in 200 year plus 41% CC event. The storage estimate is based on a flow rate of 24.96l/s, an impermeable drainage area of 31,247m$^2$ and hydro brake flow control. This storage will be accommodated within a SuDS pond to the north-east of the site allowing for controlled release to the receiving watercourse, Trabboch Burn. The key output is summarised below:

**Table 6: Attenuation Storage Volume Parameters**

| | |
|---|---|
| **Proposed Discharge Rate** | 24.96l/s |
| **Total Proposed Impermeable Area** | 31,247m$^2$ |
| **Flow Control Device** | Hydrobrake/Orifice Plate |
| **Estimated Storage Volume (1 in 200 year + 41% CC)** | 1,559.68m$^3$ |

5.4.3 An estimated storage volume of 1,559.68m$^3$ is required for the 1 in 200 year plus 41% CC event.

5.4.4 The attenuation volumes are provided for indicative purposes only and should be verified at the detailed design stage.

## 5.5 Sustainable Drainage Systems

5.5.1 Attenuation storage should be provided in the form of Sustainable Drainage Systems (SuDS) where practical. The following SuDS options have been considered:

**Soakaways**

5.5.2 As described above, the use of soakaways is unlikely to be feasible. Infiltration testing has not been undertaken due to programme constraints. Based on the BGS map and underlying geology, the use of soakaways is considered unlikely to be a viable option.

**Swales, Detention Basins and Ponds**

5.5.3 Sufficient space is available on site to utilise a pond, basin or swale as an above ground attenuation feature. In order to facilitate gravity drainage, attenuation features should be located at the north-east of the site.

5.5.4 The site will remain predominantly greenfield and will therefore continue to discharge to soils and overland flow as existing. However, sufficient space is available on site to utilise a pond, basin or swale as an above ground attenuation feature.

**Filter Drains/Strips**

5.5.5 Filter drains are trenches filled with /gravel that create temporary subsurface storage for the filtration, attenuation, and conveyance of surface water runoff. Ideally, filter drains receive lateral inflow from adjacent impermeable surfaces pretreated over a filter strip. Filter drains can help manage peak flows by naturally limiting rates of conveyance through the filter medium and by providing attenuation storage when the rate of flow at the outlet is controlled. Given the nature of the site, filter drains can be effectively integrated within the sub-base material that covers most of the site area. This approach aligns with the layout and design of the BESS facility.

**Bioretention Systems**

5.5.6 Bioretention systems (e.g., rain gardens and raised box planters) are shallow, landscaped features that reduce runoff rates, treat pollution, and enhance biodiversity. However, due to the specific requirements

of the BESS development, and the need to prioritise space for infrastructure, bioretention systems are not considered appropriate for this site.

**Rainwater Harvesting**

5.5.7 Rainwater harvesting was considered; however, the benefits are expected to be limited as attenuation would only occur when storage tanks are not full. Given the low water usage requirements of the BESS facility, incorporating rainwater harvesting is not deemed necessary.

**Porous/Permeable Surfacing**

5.5.8 Permeable surfacing could be incorporated within the access track and any hardstanding areas. Permeable surfacing such as reinforced grass, crushed stone or gravel should be used to allow surface water to infiltrate into the ground, in order to mimic the existing runoff conditions.

**Underground Attenuation Tanks**

5.5.9 Storage could be provided within underground attenuation tanks or within oversized pipes. This can be considered further at the detailed design stage.

## 5.6 Preferred Drainage Scheme

5.6.1 Surface water should be discharged to the watercourse Trabboch Burn at a discharge rate of 24.96l/s subject to approval from SEPA/LLFA. Surface water runoff from events up to the 1 in 200-year storm, including a 41% allowance for climate change, will be attenuated on-site.

5.6.2 Attenuation storage of 1,559.68m$^3$ will be provided in the form of SuDS pond to the north-east of the site. A drainage layout is provided in Appendix H.

5.6.3 The proposed surface water drainage scheme will ensure no increase in runoff over the lifetime of the development.

## 5.7 Event Exceedance

5.7.1 Storage will be provided for the 1 in 200 year plus 41% CC event in excess of that required by the SEPA Guidance.

5.7.2 Storm events in excess of the 1 in 200 year plus 41% CC event should be permitted to produce temporary shallow depth flooding within the access roads surrounding areas.

5.7.3 The proposed equipment on site will be set at a minimum of 150mm above surrounding ground levels ensuring exceedance flooding will not affect them.

## 5.8 Surface Water Treatment

5.8.1 In accordance with the CIRIA C753 publication 'The SuDS Manual' (2015), low traffic roads and other roofs have a 'low' pollution hazard level. Table 7 below shows the pollution hazard indices for each land use.

**Table 7: Pollution Hazard Indices**

| Land Use | Pollution Hazard Level | Total Suspended Solids (TSS) | Metals | Hydrocarbons |
|---|---|---|---|---|
| **Low Traffic Roads** | Low | 0.5 | 0.4 | 0.4 |
| **Other Roofs (typically commercial/industrial roofs)** | Low | 0.5 | 0.2** | 0.4 |

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 26.2
*Indices values range from 0-1.
**up to 0.8 where there is potential for metals to leach from the roof.

5.8.2 Where practical, runoff from roads and roofs should be directed to the pond. Table 8 below demonstrates this provides sufficient treatment.

**Table 8: SuDS Mitigation Indices**

| | Mitigation Indices | | |
|---|---|---|---|
| **Type of SuDS** | **Total Suspended Solids (TSS)** | **Metals** | **Hydrocarbons** |
| **Permeable Surfacing** | 0.7 | 0.6 | 0.7 |
| **Pond** | 0.7 | 0.6 | 0.7 |

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' -Table 26.3

5.8.3 It can be concluded that the inclusion of a pond and permeable surfacing would provide sufficient treatment.

## 5.9 Foul Water Drainage

5.9.1 Provision for foul drainage at the DNO substation is expected to be limited to domestic wastewater from welfare facilities. Connection to the public sewer is not anticipated based on site location, and a private solution would be required. It is proposed the effluent should be treated by way of a septic tank or an EN12566 compliant biological treatment plant and discharged to the watercourse, Trabboch Burn. This would be subject to agreement with SEPA.

5.9.2 Under the terms of the Water Environment (Controlled Activities) (Scotland) Regulations 2011, the activity of discharging sewage effluent must be authorised by SEPA and in view of the population equivalent generated from the DNO substation likely to be 50 or less, a Registration must be obtained before making a discharge from the development.

## 5.10 Freshwater Supply

5.10.1 A freshwater supply will be required for the DNO substation to support basic welfare use. This would be provided either via private connection or off-grid supply (e.g. water bowser or small tank), to be confirmed at detailed design stage.

## 5.11 Fire Water Management

5.11.1 Fire water management for the site is addressed within the Outline Fire Risk Management Plan (Ref: 05200-9593433), prepared by RES. The fire response strategy is design-led and seeks to minimise fire ignition and spread through separation distances, containerised enclosure design, passive and active fire suppression systems within enclosures, and remote monitoring.

5.11.2 The current strategy does not rely on an active water supply for firefighting. The site is being designed to be self-sufficient in the event of a fire and to allow safe access for the Fire and Rescue Service should attendance be required. However, the Outline Fire Risk Management Plan confirms that a dedicated water supply (for example via a piped hydrant or water tank) could be introduced if agreed necessary during the detailed design.

5.11.3 This approach ensures flexibility and will be finalised in consultation with the Fire and Rescue Service and the Local Planning Authority based on the selected battery technology and layout.

5.11.4 The findings of this FRA support this approach, with flood risk across the site and access routes identified as low. Emergency access is expected to remain available during all flood scenarios, which aligns with the assumptions made in the fire strategy.

## 5.12 Maintenance

5.12.1 Maintenance of drainage features such as permeable surfacing and pond will be the responsibility of the site owner. Maintenance of SuDS is necessary to ensure continued performance, and that no pollution or blockage persists unnoticed. Maintenance of surface water drainage systems can be arranged through appointment of a site management company.

5.12.2 Vehicle access should be provided to the proposed SuDS. Maintenance schedules for permeable surfacing and SuDS pond are included in Appendix I.

# 6. Conclusions and Recommendations

## 6.1 Conclusions

6.1.1 The site is considered to be at low risk of flooding from all sources and will therefore have negligible impact on flood risk elsewhere as a result.

6.1.2 The proposed development is for a BESS which will introduce impermeable drainage area in the form of equipment and access. This will result in an increase in surface water runoff. In order to ensure the increase in surface water runoff will not increase flood risk elsewhere, flow control will be used, and attenuation provided on site to accommodate storm events up to and including the 1 in 200 year plus 41% climate change event.

6.1.3 Various options of surface water discharge have been assessed. Surface water should discharge to Trabboch Burn at a limited discharge rate of 24.96l/s subject to approval from SEPA/LLFA. Attenuation storage will be required on site in order to restrict surface water discharge to 24.96l/s. The required attenuation storage will be provided in the form of a SuDS pond to the north-east of the site.

6.1.4 The proposed surface water drainage scheme will ensure no increase in runoff over the lifetime of the development.

## 6.2 Recommendations

- Set finished equipment base levels to a minimum of 150mm above the finished floor level (FFL).

# Appendices

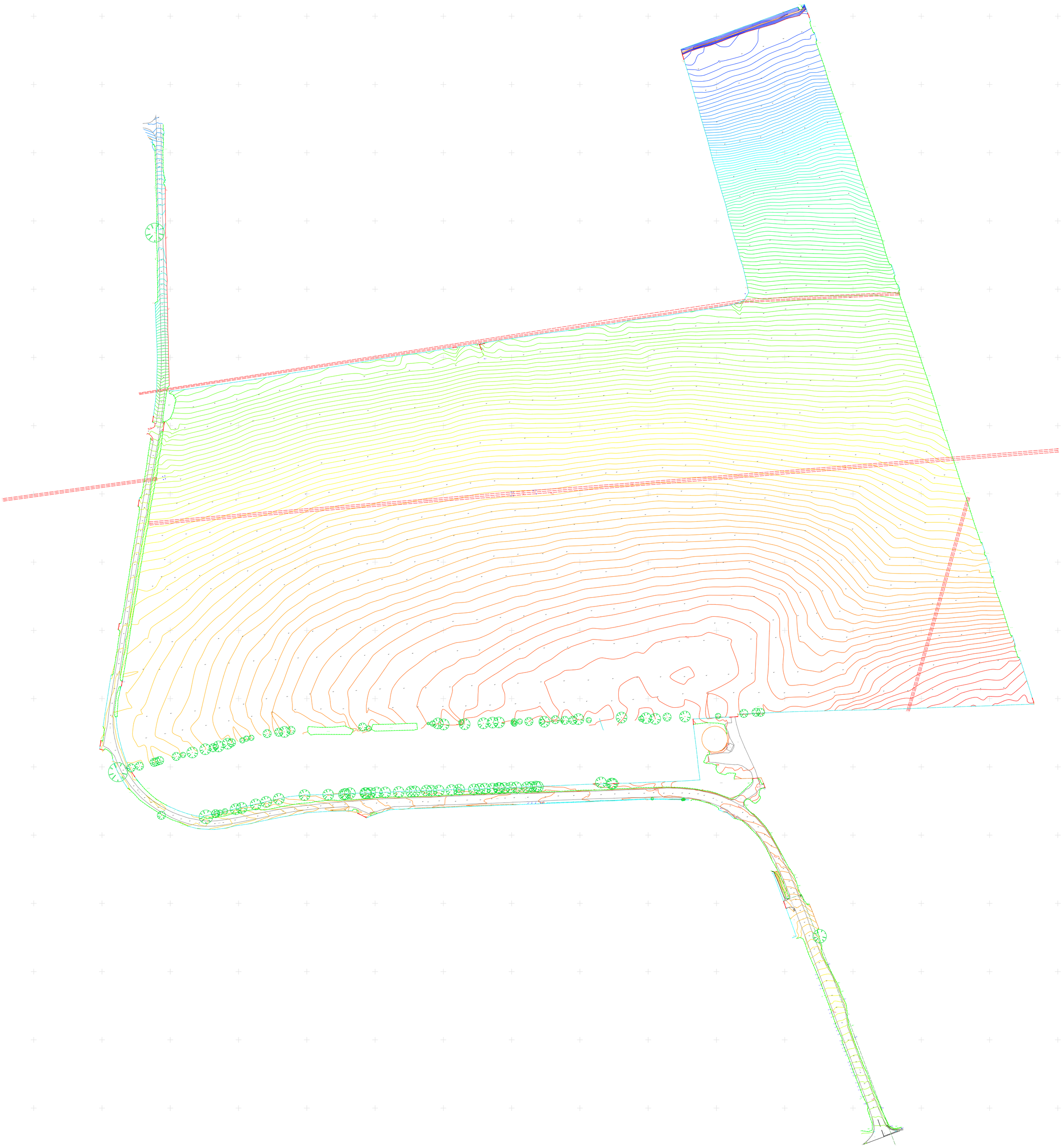
# Appendix A- Limitations

# Limitations

This report contains recommendations from Arthian, which are based on the information listed in the report and reflect the professional opinions of an experienced Environmental Consultant. Arthian obtained, reviewed, and evaluated information from the Client and others to prepare this report. The conclusions, opinions, and recommendations presented in this report are based on this information. However, Arthian does not guarantee the accuracy of the information provided and will not be held responsible for any opinions or conclusions reached based on information that is later proven to be inaccurate.

This report was prepared exclusively for the Client and for the specific purpose for which Arthian was instructed. It is not intended for use by anyone other than the Client without Arthian's written consent. Any unauthorized use of this report is at the sole risk of the user. Anyone using or relying on this report, other than the Client, agrees to indemnify and hold harmless Arthian from any claims, losses, or damages arising from the performance of the work by the Consultant.

# Appendix B – Topographic Survey



## Symbols

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| BOL | Bollard | SV CL 100.000 | Stop Valve | TP | Telegraph Pole | | Gate |
| 2.345 | Spot Level | WM CL 100.000 | Water Meter | LP | Lamp Post | MH1 CL 100.000 IL 98.000 | Manhole |
| Post | Post | AV CL 100.000 | Air Valve | EP | Electric Post | IC CL 100.000 | Inspection Chamber |
| GUL | Gully | WO CL 100.000 | Wash Out | TL | Traffic Light | CATV CL 100.000 | Cable TV Chamber |
| ER | Earth Rod | FH CL 100.000 | Fire Hydrant | FL | Floodlight | BT CL 100.000 | BT Chamber |
| GR | Gas Riser | GV CL 100.000 | Gas Valve | CTV | Cable TV IC | RG 100.000 | Road Gully |
| RWP | Rain Water Pipe | Cabinet 100.000 | Cabinet | SC | Stop Cock | | |
| RS | Road Sign | LB CL 100.000 | Electric Link Box | GV | Gas Valve | | |
| SVP | Soil Vent Pipe | MH2 CL 100.000 IL 97.500 | Circular Manhole | GV | Tree Height | | |
| S1 E=436676.617 N=546729.511 Level=25.558 | Station Control Details | MH3 CL 100.000 IL 97.500 | Triangular Manhole | GV | Hedge Height | | |
| RE | Rodding Eye | | Tree | GV | Gate Height | | |

EOS End of Signal/Unable to Trace Further

**PAS 128:2022** © The British Standards Institution 2022.

Underground utility detection, verification and location – Specification

| QUALITY LEVEL | DESCRIPTION |
|---|---|
| B3 | 2 Detection Methods ±15% of depth or ±0.15 m (whichever is greater) |
| B2 | 1 Detection Method ±15% of depth or ±0.15 m (whichever is greater) |
| B1 | Detection successful but no depth/horizontal ±0.50m |
| B4 | Detection unsuccessful assumed route |
| U | Detection unsuccessful route from records "FYR" |

Note: (P) Not fit indicates GPR post processing

| Abbreviations |
|---|
| In all circumstances, ensure that appropriate safe digging practices are in accordance with HSG47 to avoid buried service effectively is necessary before any excavation work is carried out and proceed by means of hand digs. Consultation with the relevant authorities is appropriate to ensure excavating or hand digging is the safest and most appropriate method of work and procedure. Caution should be exercised if radiofrequency detecting signals from underground services (RDF) is used. |

Please ensure this survey drawing is read in conjunction with all available statutory service records.

**Disclaimer**

Three60 Mapping Ltd cannot offer a 100% guarantee that all utilities will be located within a given area, especially those of non-metallic nature due to equipment limitations.
Due diligence must be carried out by any party prior to attempting any excavation work.
This survey is to be used as a 'guide' only and should form only part of a wider safe digging policy in line with HSG47.
Three60 Mapping Ltd cannot and will not be held liable for 'strikes' to services during the excavation process.

***Approximate National Grid North***

*and datum based upon the Trimble OSTN15 system. Scale Factor 1.000m*

N


THREE SIXTY GROUP

UNIT 3, MANDALE PARK, NORTH SHIELDS, TYNE & WEAR, NE29 7FN

0191 594 7672
ADMIN@360HQ.CO.UK

WWW.360HQ.CO.UK


### Underground Utility Linetypes

- Unknown Drainage Route
- Field Drain — Field Drain
- Aco Drain — Aco Drain
- E-TFR — Electric - Taken from Records
- E AR — Assumed Electric
- O/H E — Electric Overhead
- O/H BT — BT Overhead
- MSR — Multi Service Route
- MULTI SERVICE TRENCH — Multi Service Trench
- W-TFR — Water - Taken from Records
- W AR — Assumed Water
- GAS AR — Assumed Gas
- GAS-TFR — Gas - Taken from Records
- Survey Extents

| | |
|---|---|
| EOS | End of Signal |
| UTR | Unable to Raise |
| UTT | Unable to Trace |
| NVO | No Visible Outlet |
| UTMOCA | Unable to Make Out Chamber Attributes |

### Underground Utility Linetypes

- E — Electric
- GAS — Gas
- W — Water
- CATV — Cable TV
- CATVTFR — Cable TV TFR
- CCTV — Closed Circuit TV
- BT — British Telecom
- BTTFR — British Telecom TFR
- EMPTY — Empty Ducting
- UNK — Unknown Metallic Utility
- GPR — GPR Anomaly Possible Utility
- COM — Communications
- Foul Water Drainage Route
- Surface Water Drainage Route
- Combined Service Drainage Route

### Topographical Linetypes:

- Road
- Drop Kerb — Drop Kerb
- Steps
- Building Line
- Barrier
- Channel
- Concrete
- Chain Fence
- Metal Fence
- Post & Wire Fence
- Wooden Fence
- Top of Bank
- Bottom of Bank
- Tree Canopy Line
- Verge Line
- Wall
- Footpath

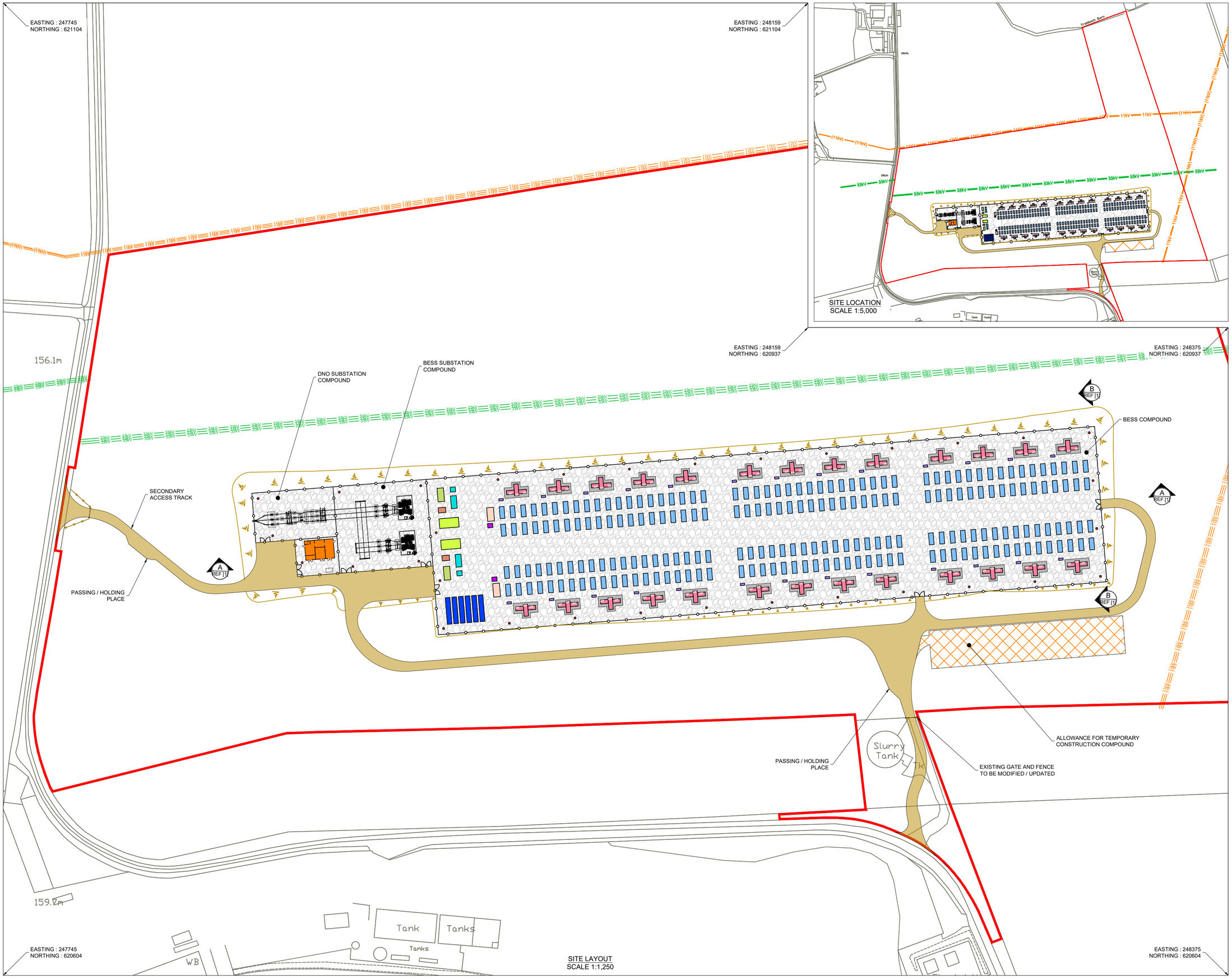
Killoch Site

Topographical Survey 2D

| | | |
|---|---|---|
| 1:1000 @ A0 | 31.07.24 | OSTN15 at Scale Factor 1 |
| BR / PR | RJ | RJ |
| 4607-360-00-KIL-TS-001-00-P01 | OVERVIEW | P01 |

res

# Appendix C – Proposed Development Plan




SITE LAYOUT
SCALE 1:1,250

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2025 LICENCE NUMBER 0100031673.

KEY:

- DEVELOPMENT BOUNDARY (OUTSIDE OF LINE DENOTES BOUNDARY)
- PALISADE, WELDMESH OR ACOUSTIC FENCE
- BATTERY STORAGE ENCLOSURE (BSE)
- 2 No. POWER CONVERSION SYSTEMS (PCS) WITH TWIN MV SKID AND APRON SLAB
- DNO SUBSTATION BUILDING
- BESS SUBSTATION BUILDING
- AUXILIARY TRANSFORMER
- LV SWITCHGEAR ROOM
- AGGREGATION PANEL WITH LV PILLAR
- PRE-INSERTION RESISTOR
- CAPACITOR BANK
- HARMONIC FILTER AND RESISTOR
- SPARES CONTAINER
- LIGHTING / CCTV COLUMN
- GRAVEL OR ASPHALT FINISH TO SUIT DETAILED EARTHING DESIGN
- ACCESS TRACK
- EARTHWORKS BATTER
- EXISTING FENCE MODIFIED
- GATE

EXISTING OVERHEAD UTILITIES

- (11kV) 22kV/11kV (SP ENERGY RECORDS)
- 11kV 22kV/11kV (SP ENERGY SURVEYED)
- (33kV) 33kV (SP ENERGY RECORDS)
- 33kV 33kV (SP ENERGY SURVEYED)

NOTES:

1. LAYOUT IS INDICATIVE AND SUBJECT TO DETAILED DESIGN.

REFERENCES:

[1] 05200-RES-LAY-DR-PT-002 - INFRASTRUCTURE LAYOUT ELEVATION VIEWS

| ISSUE | DRAWN | CHKD | APPD | DATE | REVISION NOTES |
|---|---|---|---|---|---|
| 2 | BM | JH | WM | 2025-03-03 | DESIGN EVOLUTION |
| 1 | BM | CH | JH | 2024-11-20 | FIRST ISSUE |

| | |
|---|---|
| PURPOSE: PLANNING | COORDINATES: OSGB 1936 |
| SCALE: AS SHOWN @ A2 | DATUM: N/A |
| LAYOUT DRAWING: N/A | T-LAYOUT NO: N/A |

PROJECT TITLE
WESTPORT BESS

DRAWING TITLE
INFRASTRUCTURE LAYOUT

RES DRAWING NUMBER: 05200-RES-LAY-DR-PT-001
REV: 2

THIS DRAWING IS THE PROPERTY OF RENEWABLE ENERGY SYSTEMS LIMITED AND NO REPRODUCTION MAY BE MADE IN WHOLE OR IN PART WITHOUT PERMISSION

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TEL +44 (0) 1923 299200
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# Appendix D – Consultation with SEPA

**From:** David Clark | Mabbett
**Sent:** 08 October 2024
**To:** 'Access to Information Enquiries' foi@sepa.org.uk
**Subject:** Killoch, East Ayrshire, KA18 2QH

To whom it may concern,

Mabbett & Associates Ltd have been instructed to undertake a Flood Risk Assessment in support of a proposed BESS development at Killoch, East Ayrshire, KA18 2QH. I attach a site location plan and the site details below.

**Site Details**

| | |
|---|---|
| **Site Name** | Killoch, East Ayrshire |
| **Postcode** | KA18 2QH |
| **NGR** | NS 48057 20878 |

**Data Request**

Please provide any of the following information to enable us to complete our assessment:

**Historical Flooding Information**

- Any records, photographs, flood extents from known historic events in the area

**Technical Data**

- Any hydraulic models covering the site
- Raw and processed results for the model(s) above
- Hydraulic modelling report for the model(s) above
- Hydrology report and/or flood estimation calculation records for the model(s) above
- Survey data used to build the model or inform nearby studies

**Supporting Data**

- Flood/coastal defence survey data
- Operational procedures for hydraulic structures

Please use NS 48057 20878 as a central point and 2km search radius

Please don't hesitate to contact me if you have any queries.

Thanks

David Clark, BSc (Hons)

Project Manager and Environmental Consultant

Scottish Environment Protection Agency
Buidheann Dìon Àrainneachd na h-Alba

# RESPONSE TO F0198026

## Request Timeline

| Date | Status |
|---|---|
| 08/10/2024 | EIR Request received [statutory deadline 05/11/2024] |
| 17/10/2024 | EIR Response issued |

## Requested Information

[…] Flood Risk Assessment […] at Killoch, East Ayrshire, KA18 2QH.

I attach a site location plan and the site details below.

**Site Details**

**Site Name** Killoch, East Ayrshire

**Postcode** KA18 2QH

**NGR** NS 48057 20878

**Data Request**

Please provide any of the following information to enable us to complete our assessment:

1. **Historical Flooding Information**

- Any records, photographs, flood extents from known historic events in the area

**2. Technical Data**

- Any hydraulic models covering the site
- Raw and processed results for the model(s) above
- Hydraulic modelling report for the model(s) above
- Hydrology report and/or flood estimation calculation records for the model(s) above
- Survey data used to build the model or inform nearby studies

**3. Supporting Data**

- Flood/coastal defence survey data
- Operational procedures for hydraulic structures

Please use NS 48057 20878 as a central point and 2km search radius

[…]

## Response

SEPA has handled your request under the Environmental Information (Scotland) Regulations 2004 (EIRs).

### 1) Historical Flooding Information

Our Observed Flood Event database currently holds no records of flooding within 2km of your site of interest. Regulation 10(4)(a) of the EIRs.

The Observed Flood Event database is a collection of flood event records known to SEPA at this time and does not constitute a complete record of all flooding that may have occurred in the area. This information was correct at the time of this request to the best of SEPA's knowledge.

If we do not hold any records of flooding for an area, this does not mean it has never flooded, simply that we do not have a record of it.

We recommend that you contact East Ayrshire Council who, as Flood Prevention Authority, should be able to provide further information regarding flooding and flood alleviation in the area. East Ayrshire Council contact details are provided in the 'Application of Regulations and Exceptions' section below may be able to provide further information on this aspect. Regulation 14(1)(b) applies.

**2) Technical Data**

We are unable to provide the models which underly our Flood Maps, as our maps are developed using licensed data supplied to SEPA by many providers. Whilst the published maps are available under the Open Government Licence, this is not the case for the underlying data and models used to generate the mapping due to our obligations to these data licensors. Regulation 10(5)(c) applies.

In Autumn 2022, SEPA made available the following spatial datasets under Open Government Licence (OGL): www.nationalarchives.gov.uk/doc/open-government-licence/version/3/

- Flood Hazard Maps (release version 2.0)
- Flood Risk Management (FRM) Plan district boundaries
- Potentially Vulnerable Areas
- Flood Risk Management (FRM) Target Areas.

SEPA's flood hazard maps (current version 2.1, November 2023) show the risk of flooding from rivers, the sea and surface water, and can be accessed in two ways:

- Via the flood map viewer: map.sepa.org.uk/floodmaps

- Data for use in Geographic Information Systems (GIS) can be downloaded from the Data publication page: www.sepa.org.uk/environment/environmental-data/

These datasets are now available for anyone to view, use and download for free. Please refer to the frequently asked questions (FAQs) for further information: www.sepa.org.uk/environment/water/flooding/faqs/#floodmaps

The flood map viewer has been updated to support decision making in the land use planning process and allow the public to view their flood risk at a greater scale.

The increased zoom function increases the scale of the flood maps to make it easier for users to see if their site, or property, sits within an area that is at risk of flooding. Guidance is available on how the maps should be used for land use planning: www.sepa.org.uk/media/591421/guidance-using-sepa-flood-maps-for-land-use-planning.pdf

We currently hold one record of a Flood Risk Assessment (FRA) being conducted in support of a previous planning application, which is near to the site of interest. This can be viewed on the East Ayrshire Planning Portal under reference 21/0369/PP.

This FRA was conducted 700m to the southeast of NGR NS4805720878, at NGR E248022 N620408. This does not appear to include a full hydraulic model but does include topographic survey data and surface water greenfield surface water runoff calculations.

### 3) Supporting Data

We hold no record of any flood defence survey data within 2km of NGR NS 48057 20878. Regulation 10(4)(a) applies.

For operational procedures for hydraulic structures, if a Flood Risk Assessment is to be undertaken, we typically require all hydraulic structures within any waterbody of interest is surveyed. Any culvert/bridge structures present in the watercourse and near the site of interest should also include blockage scenarios (partial and up to full depending on culvert/bridge size).

We recommend that you contact East Ayrshire Council who, as Flood Prevention Authority, should be able to provide further information regarding flooding and flood alleviation in the area. East Ayrshire Council contact details are provided in the 'Application of Regulations and Exceptions' section below may be able to provide further information on this aspect. Regulation 14(1)(b) applies.

Further information regarding the regulations and any exceptions applied to this information can be found below.

## Application of Regulations and Exceptions

### Section 39(2)

The information you are requesting is environmental information. We have applied Section 39(2) of the Freedom of Information (Scotland) Act 2002 (FOISA). We are therefore handling your request under the Environmental Information (Scotland) Regulations 2004 (EIRs).

### Regulation 10(4)(a) – Information not held

Where we have advised that we do not hold information we have applied Regulation 10(4)(a) of the EIRs, the text of which is reproduced below.

*10 (4) A Scottish public authority may refuse to make environmental information available to the extent that;- (a) it does not hold that information when an applicant's request is received.*

The exception in Regulation 10(4)(a) is subject to the public interest test in Regulation 10(1)(b) of the EIRs. As SEPA does not hold the information in question there is no conceivable public interest in requiring that the information be made available.

**Regulation 10(5)(c) – Intellectual property rights**

Flood level information and/or models which underly our Flood Maps is withheld under Regulation 10(5)(c) of the EIRs, the text of which is reproduced below.
*(5) A Scottish public authority may refuse to make environmental information available to the extent that its disclosure would, or would be likely to, prejudice substantially;- (c) Intellectual property rights;*

A public interest test was carried out in relation to this exemption. We acknowledge that there is a presumption in favour of disclosure under Regulation 10(2)(b) of the EIRs and that SEPA is a taxpayer funded public body with a duty to be open and transparent. We also acknowledge providing underlying modelling could support others to make decisions/ understand and apply to their own flood modelling, providing consistency across projects.

The release of the flood level information and/or models which underly our Flood Maps would be likely to prejudice substantially the intellectual property rights of the license holders, as well as the relationship between SEPA and the license holders. While it is in the public interest for SEPA to be open and transparent, it is not in the public interest for SEPA to compromise its access to datasets that are crucial for it to fulfil its statutory duty with regards to flood risk and forecasting.

On balance, we consider that the public interest in releasing the information is outweighed by the public interest in maintaining the exception and therefore the information is withheld under Regulation 10(5)(c) of the EIRs.

**Regulation 14(1)(b) – Other authority**

As we do not hold the information requested, but believe that [organisation] may, Regulation 14(1)(b) of the EIRs applies , the text of which is reproduced below.

*14(1) Where a Scottish public authority has received a request to make environmental information available and does not hold that information but believes that another public authority holds the information requested then it shall (b) supply the applicant with the name and address of that other authority,*

Contact details:
Freedom of information

East Ayrshire Council Headquarters

London Road

Kilmarnock

KA3 7BU

freedomofinformation@east-ayrshire.gov.uk

www.east-ayrshire.gov.uk/CouncilAndGovernment/About-the-Council/Information-and-statistics/DataProtectionAndFreedomOfInformation/How-to-make-a-Freedom-of-Information-Request.aspx

**What to expect when making a Request for Information**
Each request for information, under The Environmental Information (Scotland) Regulations 2004 or the Freedom of Information (Scotland) Act 2002, is formally logged by the authority. The request falls within a process that has two internal stages carried out by the authority; a right of appeal to the Scottish Information Commissioner followed by an appeal to the Court of Session on a point of law only.

- Stage 1 – Request for information
- Stage 2 – Formal Review
- Stage 3 – Appeal for decision by Scottish Information Commissioner (OSIC)
- Stage 4 – Appeal to the Court of Session on a point of law only.

Each enquiry will have a unique Reference Number which should be quoted when you contact us.

**How you will be kept informed**
You will receive an acknowledgement for your request and Formal Review. We aim to reply to all enquiries promptly, within 20 working days. You will receive a response along with the requested information and/or an explanation regarding any withheld information. We may also contact you if we require clarification or if we are issuing a fees notice.

**What happens once your enquiry has been responded to?**
If you are not happy with the response or have failed to receive a response, you have the right to request a Formal Review from SEPA.

Guidance on your rights and how to ask for a review is on the Scottish Information Commissioner's website; https://www.foi.scot/asking-for-a-review

We will ensure that all personal data is processed, recorded and retained in accordance with the requirements of the Data Protection Act 2018 throughout the handling of each request. You have a right to see information about yourself via submitting a Subject Access Request under the Data Protection Act 2018.

**What to do if you are not happy with how your enquiry and review were handled**
If you are unsatisfied with our Formal Review response or have failed to receive a response, you can then appeal to the Scottish Information Commissioner via the links below.

www.foi.scot/appeal
https://www.foi.scot/contact-us
Should you wish to appeal against the Scottish Information Commissioner's decision, you have the right to appeal to the Court of Session on a point of law only. Any such appeal must be made within 42 days after the date of intimation of the decision.

# Appendix E – Consultation with LLFA

**From:** David Clark | Mabbett
**Sent:** 08 October 2024
**To:** submittoplanning@east-ayrshire.gov.uk
**Subject:** Killoch, East Ayrshire, KA18 2QH

To whom it may concern,

Mabbett & Associates Ltd have been instructed to undertake a Flood Risk Assessment in support of a proposed BESS development at Killoch, East Ayrshire, KA18 2QH. I attach a site location plan and the site details below.

**Site Details**

| | |
|---|---|
| **Site Name** | Killoch, East Ayrshire |
| **Postcode** | KA18 2QH |
| **NGR** | NS 48057 20878 |

**Data Request**

Please provide any of the following information to enable us to complete our assessment:

**Historical Flooding Information**

- Any records, photographs, flood extents from known historic events in the area

**Technical Data**

- Any hydraulic models covering the site
- Raw and processed results for the model(s) above
- Hydraulic modelling report for the model(s) above
- Hydrology report and/or flood estimation calculation records for the model(s) above
- Survey data used to build the model or inform nearby studies

**Supporting Data**

- Flood/coastal defence survey data
- Operational procedures for hydraulic structures

Please use NS 48057 20878 as a central point and 2km search radius

Please don't hesitate to contact me if you have any queries.

Thanks

David Clark, BSc (Hons)

Project Manager and Environmental Consultant

**From:** Gilchrist, Bill Bill.Gilchrist@east-ayrshire.gov.uk
**Sent:** 14 October 2024
**To:** David Clark | Mabbett dclark@mabbett.eu
**Subject:** Flood risk assessment - proposed BESS, Killoch by Ochiltree [OFFICIAL]

I refer to your enquiry regarding the above, and on behalf of the Environmental Health Service I can advise that we have no records of any flood risk or other information in the search area identified.

Regards

Bill Gilchrist

Environmental Health Officer (Environmental Protection)

Goverenance (Regulatory Services)

# Appendix F – Greenfield Runoff Rate

# Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

| | |
|---|---|
| **Calculated by:** | David Clark |
| **Site name:** | Westport, East Ayrshire, KA18 2QH |
| **Site location:** | |

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:** | 55.45818° N |
| **Longitude:** | 4.40389° W |
| **Reference:** | 448687035 |
| **Date:** | Jan 23 2025 09:12 |

## Runoff estimation approach

IH124

## Site characteristics

**Total site area (ha):** 3.12

## Methodology

| | |
|---|---|
| **$Q_{BAR}$ estimation method:** | Calculate from SPR and SAAR |
| **SPR estimation method:** | Calculate from SOIL type |

## Soil characteristics

| | Default | Edited |
|---|---|---|
| **SOIL type:** | 4 | 4 |
| **HOST class:** | N/A | N/A |
| **SPR/SPRHOST:** | 0.47 | 0.47 |

## Hydrological characteristics

| | Default | Edited |
|---|---|---|
| **SAAR (mm):** | 1078 | 1078 |
| **Hydrological region:** | 2 | 2 |
| **Growth curve factor 1 year:** | 0.87 | 0.87 |
| **Growth curve factor 30 years:** | 1.95 | 1.95 |
| **Growth curve factor 100 years:** | 2.63 | 2.63 |
| **Growth curve factor 200 years:** | 2.99 | 2.99 |

## 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): | 24.96 | 24.96 |
| 1 in 1 year (l/s): | 21.72 | 21.72 |
| 1 in 30 years (l/s): | 48.68 | 48.68 |
| 1 in 100 year (l/s): | 65.65 | 65.65 |
| 1 in 200 years (l/s): | 74.64 | 74.64 |

This report was produced using the greenfield runoff tool developed by HR Wallingford and available at www.uksuds.com. The use of this tool is subject to the UK SuDS terms and conditions and licence agreement , which can both be found at www.uksuds.com/terms-and-conditions.htm. The outputs from this tool are estimates of greenfield runoff rates. The use of these results is the responsibility of the users of this tool. No liability will be accepted by HR Wallingford, the Environment Agency, CEH, Hydrosolutions or any other organisation for the use of this data in the design or operational characteristics of any drainage scheme.

# Appendix G – Causeway Flow Storage Calculations

## Design Settings

| | | | |
|---|---|---|---|
| Rainfall Methodology | FSR | Maximum Time of Concentration (mins) | 30.00 |
| Return Period (years) | 200 | Maximum Rainfall (mm/hr) | 50.0 |
| Additional Flow (%) | 0 | Minimum Velocity (m/s) | 1.00 |
| FSR Region | Scotland and Ireland | Connection Type | Level Soffits |
| M5-60 (mm) | 14.000 | Minimum Backdrop Height (m) | 0.200 |
| Ratio-R | 0.300 | Preferred Cover Depth (m) | 1.200 |
| CV | 0.750 | Include Intermediate Ground | ✓ |
| Time of Entry (mins) | 5.00 | Enforce best practice design rules | ✓ |

## Nodes

| Name | Area (ha) | T of E (mins) | Cover Level (m) | Diameter (mm) | Easting (m) | Northing (m) | Depth (m) |
|---|---|---|---|---|---|---|---|
| Storage | 3.120 | 5.00 | 100.000 | 1500 | 0.000 | 0.000 | 2.000 |

## Simulation Settings

| | | | |
|---|---|---|---|
| Rainfall Methodology | FSR | Analysis Speed | Normal |
| FSR Region | Scotland and Ireland | Skip Steady State | x |
| M5-60 (mm) | 14.000 | Drain Down Time (mins) | 240 |
| Ratio-R | 0.300 | Additional Storage (m³/ha) | 20.0 |
| Summer CV | 0.750 | Check Discharge Rate(s) | x |
| Winter CV | 0.840 | Check Discharge Volume | x |

**Storm Durations**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 30 | 60 | 120 | 180 | 240 | 360 | 480 | 600 | 720 | 960 | 1440 |

| Return Period (years) | Climate Change (CC %) | Additional Area (A %) | Additional Flow (Q %) |
|---|---|---|---|
| 200 | 41 | 0 | 0 |

## Node Storage Online Hydro-Brake® Control

| | | | |
|---|---|---|---|
| Flap Valve | x | Objective | (HE) Minimise upstream storage |
| Replaces Downstream Link | ✓ | Sump Available | ✓ |
| Invert Level (m) | 97.500 | Product Number | CTL-SHE-0219-2500-1000-2500 |
| Design Depth (m) | 1.000 | Min Outlet Diameter (m) | 0.300 |
| Design Flow (l/s) | 25.0 | Min Node Diameter (mm) | 1500 |

## Node Storage Depth/Area Storage Structure

| | | | | | |
|---|---|---|---|---|---|
| Base Inf Coefficient (m/hr) | 0.00000 | Safety Factor | 2.0 | Invert Level (m) | 98.000 |
| Side Inf Coefficient (m/hr) | 0.00000 | Porosity | 1.00 | Time to half empty (mins) | 0 |

| Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) | Depth (m) | Area (m²) | Inf Area (m²) |
|---|---|---|---|---|---|---|---|---|
| 0.000 | 3098.5 | 0.0 | 1.000 | 3098.5 | 0.0 | 1.001 | 0.0 | 0.0 |

Flow+ v10.6.234 Copyright © 1988-2025 Causeway Technologies Ltd

**Results for 200 year +41% CC Critical Storm Duration. Lowest mass balance: 83.77%**

| Node Event | US Node | Peak (mins) | Level (m) | Depth (m) | Inflow (l/s) | Node Vol (m³) | Flood (m³) | Status |
|---|---|---|---|---|---|---|---|---|
| 360 minute winter | Storage | 352 | 98.498 | 0.498 | 239.7 | 1559.6860 | 0.0000 | OK |

| Link Event (Upstream Depth) | US Node | Link | Outflow (l/s) | Discharge Vol (m³) |
|---|---|---|---|---|
| 360 minute winter | Storage | Hydro-Brake® | 25.0 | 853.3 |

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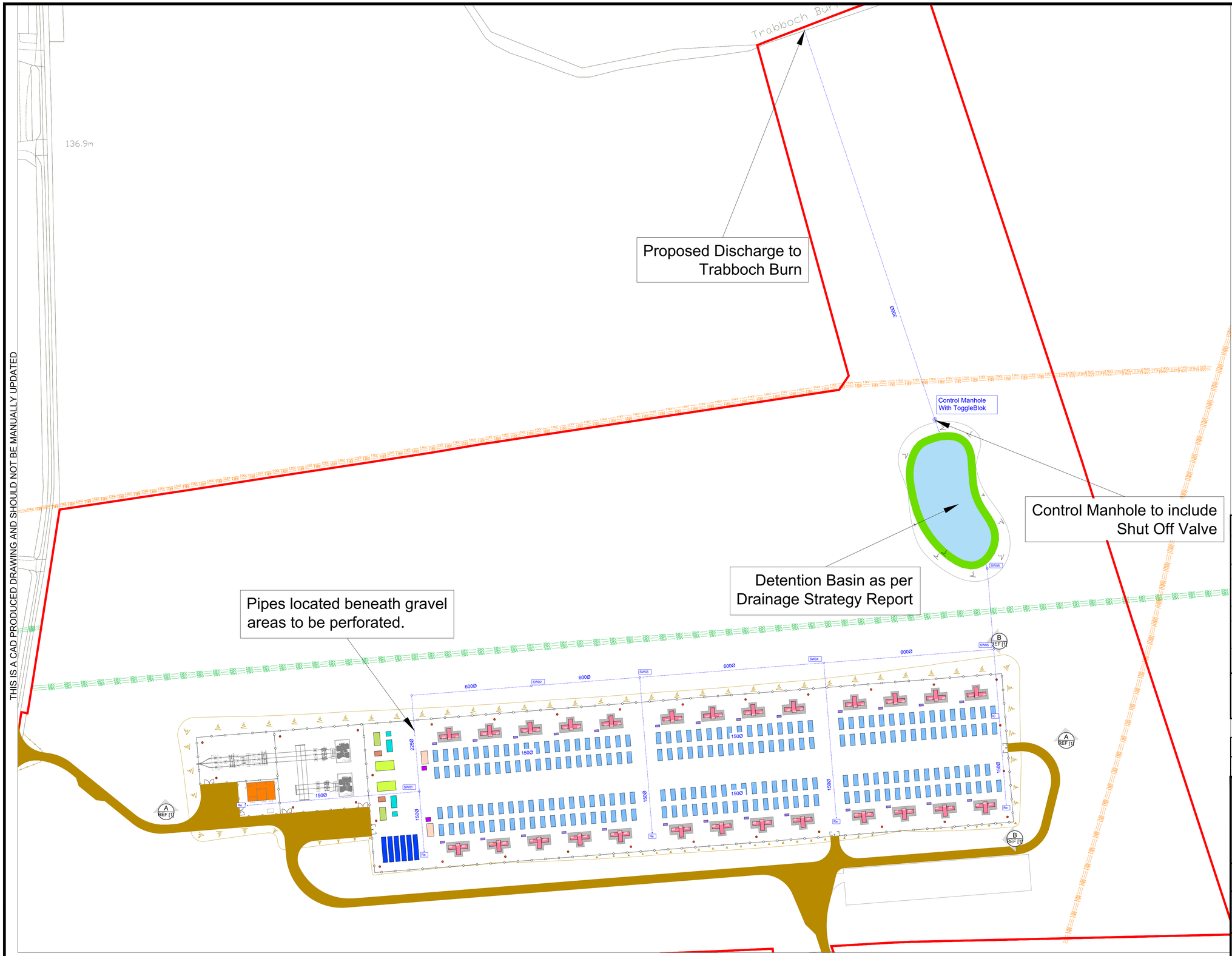
# Appendix H – Drainage Layout

THIS IS A CAD PRODUCED DRAWING AND SHOULD NOT BE MANUALLY UPDATED




EXISTING OVERHEAD UTILITIES (Info Provided by RES)

- 22kV/11kV (SP ENERGY RECORDS)
- 22kV/11kV (SP ENERGY SURVEYED)
- 33kV (SP ENERGY RECORDS)
- 33kV (SP ENERGY SURVEYED)

DRAINAGE

- Proposed Surface Water Drainage pipes sized as shown in layout
- Control Manhole
- Rodding Eye
- Surface Water Manhole/Catchpit

RESIDUAL RISK REGISTER

IN ADDITION TO THE HAZARDS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, PLEASE NOTE THE FOLLOWING :

| IDENTIFIED RISK / HAZARD | DESCRIPTION | REF. |
|---|---|---|
| – | – | – |
| IDENTIFIED RISK / HAZARD | DESCRIPTION | REF. |
| – | – | – |

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT PERSON WORKING, TO AN APPROVED SAFE SYSTEM OF WORK

STATUS

Issue

| REV | DATE | BY | CHKD | APP'D | DESCRIPTION |
|---|---|---|---|---|---|

Arthian

CLIENT
Westport Energy Store Ltd

PROJECT
Westport, East Ayrshire
KA18 2QH

DRAWING
Proposed Drainage Layout

DRAWING. No.
SU001

REV

A3

1:20- 0 200mm 400mm 600mm 800mm 1000 1200 1400
1:100- 0 1m 2m 3m 4m 5m 6m 7m
1:50- 0 1m 2m 3m
1:5- 0 100mm 200mm 300mm

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# Appendix I – Maintenance Schedules

# Pervious Pavements Maintenance Schedule

| Maintenance Schedule | Required Action | Typical Frequency |
|---|---|---|
| **Regular Maintenance** | Brushing and vacuuming (standard cosmetic sweep over whole surface) | Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment |
| **Occasional Maintenance** | Stabilise and mow contributing and adjacent areas | As required |
| | Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying | As required - once per year on less frequently used pavements |
| **Remedial Actions** | Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving | As required |
| | Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material | As required |
| | Rehabilitation of surface and upper substructure by remedial sweeping | Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging) |
| **Monitoring** | Initial inspection | Monthly for three months after installation |
| | Inspect for evidence of poor operation and/or weed growth - if required, take remedial action | Three-monthly, 48 h after large storms in first six months |
| | Inspect silt accumulation rates and establish appropriate brushing frequencies | Annually |
| | Monitor inspection chambers | Annually |

Table extract taken from the CIRIA C753 publication 'The SuDS Manual' – Table 20.15

# Pond Maintenance Schedule

| Maintenance schedule | Required action | Typical frequency |
|---|---|---|
| **Regular maintenance** | Remove litter and debris | Monthly (or as required) |
| | Cut the grass – public areas | Monthly (during growing season) |
| | Cut the meadow grass | Half yearly (spring, before nesting season, and autumn) |
| | Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years) | Monthly (at start, then as required) |
| | Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage | Monthly |
| | Inspect water body for sings of poor water quality | Monthly (May – October) |
| | Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options. | Half yearly |
| | Check any mechanical devices e.g., penstocks | Half yearly |
| | Hand cut submerged and emergent aquatic plants (at minimum of 0.1m above pond base; include max 25% of pond surface) | Annually |
| | Remove 25% of bank vegetation from water's edge to a minimum of 1m above water level. | Annually |
| | Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract) | Annually |
| | Remove sediment from any forebay | Every 1-5 years, or as required |
| | Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays. | Every 5 years, or as required |
| **Occasional maintenance** | Remove sediment from the main body of big ponds when pool volume is reduced by 20% | With effective pre-treatment, this will only be required rarely. E.g., every 25-50 years |
| **Remedial actions** | Repair erosion or other damage | As required |
| | Replant, where necessary | As required |
| | Aerate pond when signs of eutrophication are detected | As required |
| | Realign rip-rap or repair other damage | As required |
| | Repair/ rehabilitate inlets, outlets and overflows | As required |