EARBA STORAGE

A GILKES ENERGY COMPANY

Earba Pumped Storage Hydro Scheme - EIA Report

Appendix 2.2: Sustainable Design Statement

Part 1 of 2

February 2024

Loch Earba Pumped Storage Hydro
Sustainable Design Statement

EARBA-HLM-XX-XX-RP-00002

February 2024

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Notes

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Applicant
Earba Ltd
Canal Head North
Kendal
Cumbria LA9 7BZ

Planning Agent
Gilkes Energy Ltd
Festival House
177 West George Street,
Glasgow, G2 2LB

Landscape and Visual Consultant
ASH Design + Assessment Limited
Suite 2/3, Queens House
19 St Vincent Place,
Glasgow, G1 2DT

Architect
HLM Architects
Ailsa Court
121 West Regent Street,
Glasgow, G2 2SD

HLM Architects

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01
Introduction

1.1 The Proposed Development

1.1.1 Earba Limited are proposing to construct a Pumped Storage Hydroelectric Scheme "The Proposed Development" within Ardverikie Estate "the Estate". The Proposed Development is located to the south of Loch Laggan approximately mid-way between Newtonmore and Spean Bridge.

1.1.2 The function of the Proposed Development would be to create a Long Duration Electricity (/ energy) Storage (LDES) scheme with up to 1800MW generation capacity. The Proposed Development would store energy from the national grid or release it to the electricity transmission system, to help balance supply and demand for power at a national scale.

1.1.3 The Proposed Development would operate by transferring water between a lower reservoir, Lochan na h-Earba (Loch Earba) and an upper reservoir, Loch a' Bhealaich Leamhain (Loch Leamhain). The Proposed Development would be operated either in 'generating' mode, when electricity would be generated by releasing water from the upper reservoir through the reversible pump turbines and into the lower reservoir, or in 'pumping' mode, when electricity would be used to pump water through the reversible pump turbines from the lower to the upper reservoir. The maximum water level of these existing lochs would be raised by constructing dams to increase their natural storage capacity. The reservoirs would be connected by an underground waterway system including up to three headrace tunnels.

1.2 Aim of the Design Statement

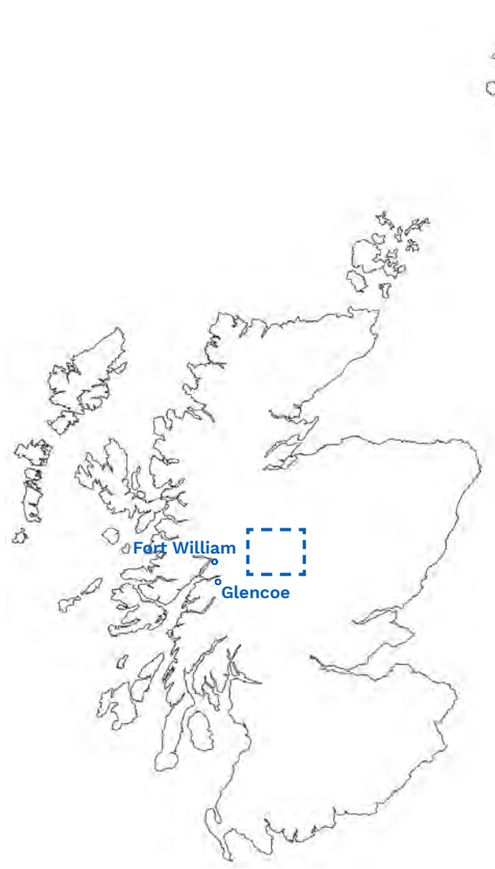
1.2.1 This Design Statement sets out the methods by which the design has been developed to take account of the site's landscape characteristics and sense of setting. Furthermore, the Design Statement sets out the sustainable design features that would be implemented in different parts of the project and how different Government targets would be met.

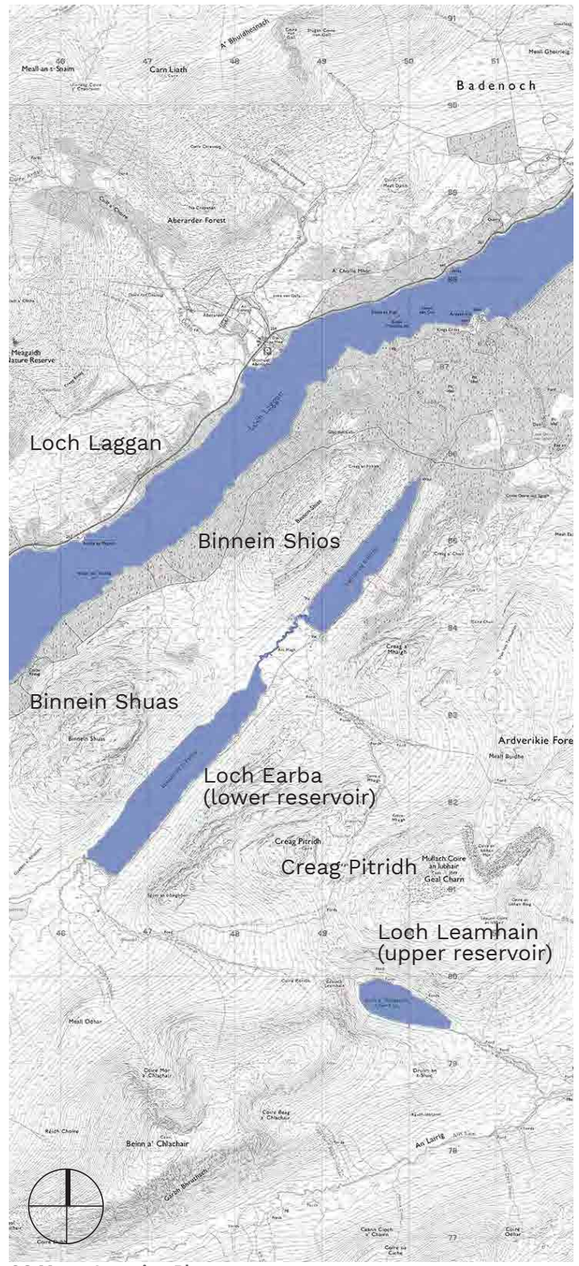
1.2.2 This document differs to The Description of Development chapter and Consideration of Alternatives and Design Evolution chapter as follows:

1.2.3 The Description of Development chapter set out the technical parameters of the pumped storage project. The Description of Development provides the reader with an understanding of the dimensions and levels of each part of the project along with construction methods proposed and the outline programme. It is intended that this document is read in advance of this Design Statement.

1.2.4 The Consideration of Alternatives and Design Evolution chapter provides the background on the process to arrive at the scheme in its current form. This process begins with an overall screening process and then looks more closely at options utilising the water bodies that have potential for pumped hydro power generation. The iteration of the design to accommodate environmental constraints, as these have been identified, is also documented in this chapter.

1.2.5 The measures outlined in this Design Statement have been considered within the Landscape and Visual Impact Assessment (LVIA) (Chapter 7 of the EIA Report) and incorporated into photomontages which support the LVIA where relevant. The Design Statement should be read in conjunction with mitigation measures which are outlined in the LVIA.





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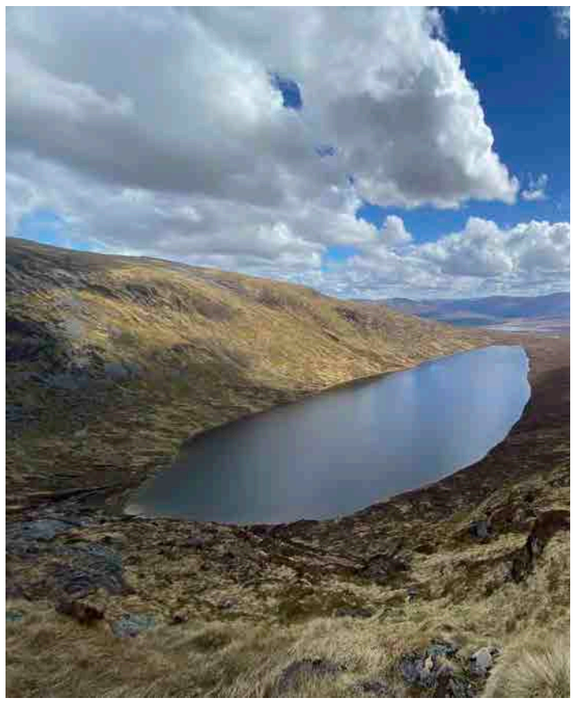
1.3 Scoping Input into the Design Statement

1.3.1 The Highland Council's (THC) Pre-Application Report clearly sets out that a Sustainable Design Statement is required.

1.3.2 In writing this Design Statement the Applicant has looked to THC's Sustainable Design Guide which provides advice and guidance on a range of sustainability topics, including design, building materials and minimising environmental impacts of development. As an Annex to this document a checklist as required by THC has been completed, please refer to Appendix B.



1.3.3 To meet the requirements of the Scoping Responses this Design and Access Statement aims to outline the design principles and concepts that have been applied to the Proposed Development by including the following:

(i) explaining the policy or approach adopted in the design and setting out the policies relating to the design have been taken into account;

(ii) describing the steps taken to appraise the context of the development and demonstrating how the design of the development takes that context into account in relation to its proposed use;

(iii) stating what, if any, consultation has been undertaken on issues relating to the design principles and concepts that have been applied to the development; and what account has been taken of the outcome of any such consultation;

(iv) demonstrating that the development in its entirety is a sustainable development. To emphasise this point we shall make reference to the three pillars of sustainable development; in addition to this a Sustainable Design Checklist has also be completed and this is included in Appendix B

(v) showing that the impact of the installation and the prospective long-term use helps to meet the ambitions of a decarbonised Scotland and in turn providing the Highlands with secure and clean electricity supplies. This project has sustainability at its core because it is designed to maximise the use of clean renewable energy by storing it when there is surplus and discharging it during high demand. Sustainability will therefore be reflected in all stages of the project most prominently in the powerhouse design. This topic will also be discussed in detail within Chapter 5 Planning and Policy Context of the EIA Report ; and

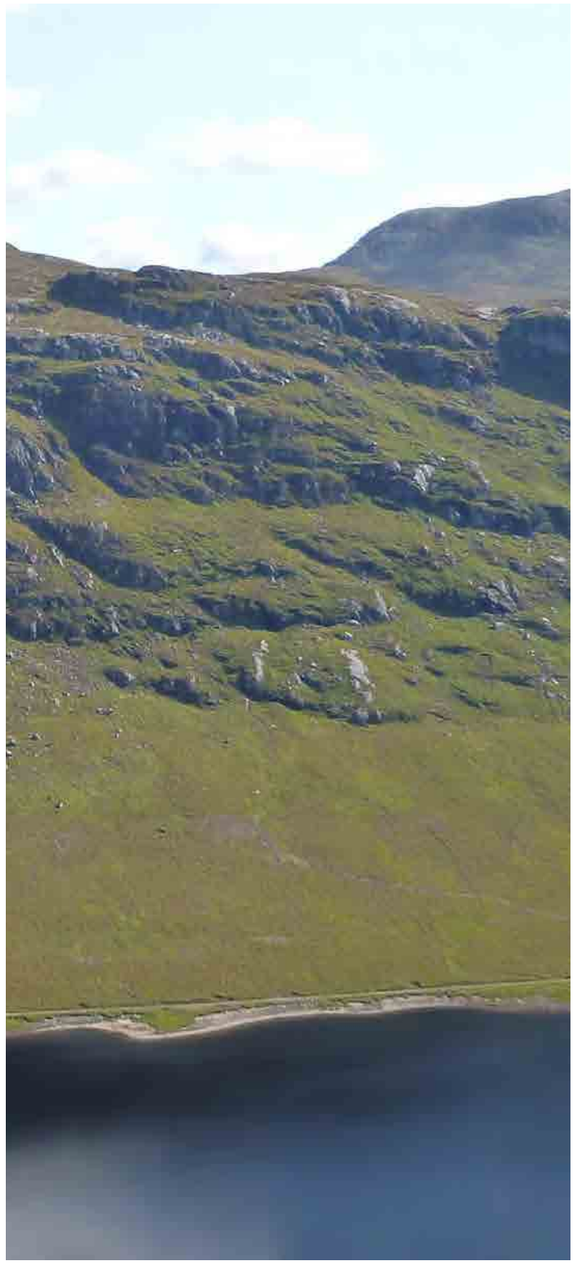
(vi) Finally, this document will include details on how the development is likely to contribute to the Scottish Government Energy Efficient Scotland Roadmap relating to building design.

1.4 Design Development

1.4.1 The elements of the Proposed Development that create a change to the landscape would be the above ground structures these are located at the upper and lower reservoir works, the powerhouse and switchyard, tunnel adits, surge shafts and the permanent access routes to all of these areas. The design development process has considered a range of factors including technological constraints, environmental constraints, economic factors, sustainability and health and safety.

1.4.2 The design development process for the Proposed Development can be broken down into the following key stages:

- Strategic design: An initial high level working layout of a pumped storage scheme was developed to allow early environmental surveys to be undertaken;
- Development of preferred layout: following site surveys for environmental and heritage features and initial landscape appraisal, the Proposed Development has been further refined to take account of potential constraints and opportunities to achieve an optimum balance between technical efficiency and an achievable minimum of environmental impact;
- Architectural and landscape input: once the preferred layout for the Proposed Development had been agreed, input from architects (HLM) and landscape architects (ASH design + assessment) was applied to refine the design and suggest appropriate finishes, detailed layout and mitigation measures to minimise adverse impact; and
- Detailed design: should the Proposed Development be consented, the indicative design would be further developed to a detailed level suitable for construction.



02
Secure + Clean Energy

2.1 Providing Secure and Clean Energy to the Highlands

2.1.1 The proposed Earba Storage project would provide not just the Highlands but Scotland and the rest of the UK with secure and clean electricity supplies. At Scoping stage the developer was requested to provide narrative on how this would be achieved within the Design and Access Statement, this is set out below:

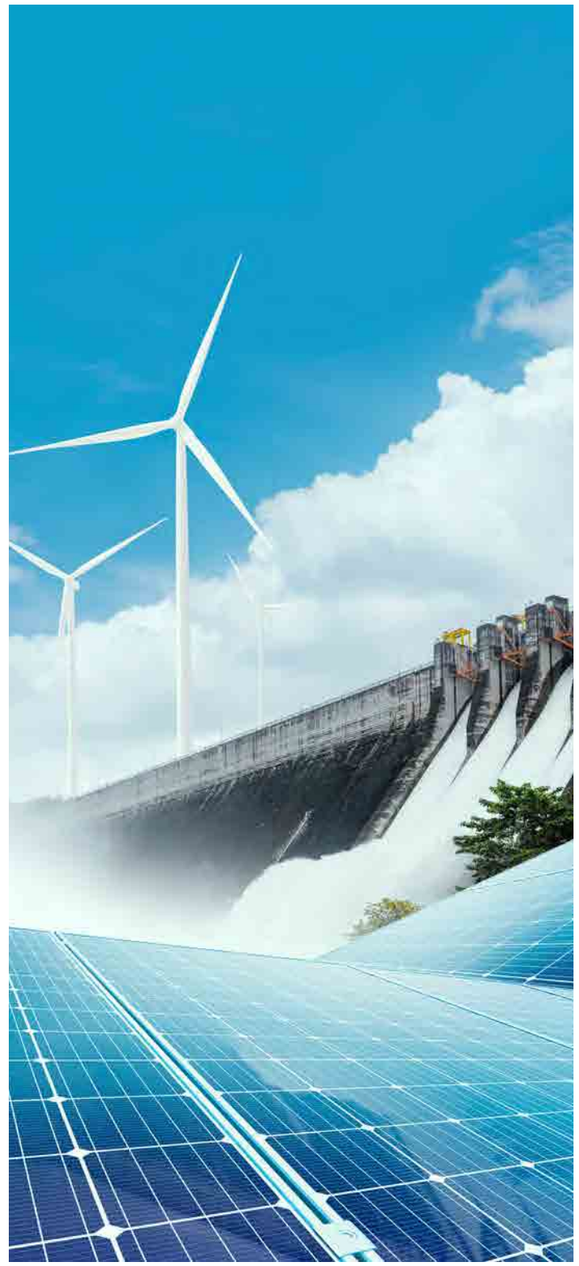
2.1.2 Pumped Storage Hydro (PSH) installations such as the Earba proposal are tried and tested, mature, long-lifespan (100yr+) technologies. Pumped Storage Hydro has the ability to deliver large capacities of energy storage for long durations.

2.1.3 Pumped Storage Hydro reduces gas generation by dispatching stored wind and solar energy to meet overall demand during periods of low renewable energy generation. This reduces the need for gas generation to provide back up during these deficits and therefore pumped hydro provides a clean power generation source. Furthermore, this reduces reliance on volatile gas supply and pricing ultimately making our energy supply more secure.

2.1.4 Pumped Storage Hydro also reduces wind energy curtailment by taking power (by pumping water uphill) during periods of surplus (currently this power will be lost forever), in doing this it benefits society as a whole because it is allowing the country to waste less wind energy in the form of curtailment and is reducing gas generation. At present, curtailment is due to Transmission constraints which often arise when the network reaches capacity so renewable energy generation must be reduced. When there is excess renewable generation in Scotland it can mean that the amount of electricity needing to be transported to demand centres in the south exceeds the network's capacity. PSH would provide a demand closer to the source minimising the risk of transmission capacity constraints and in turn reducing curtailment.

2.1.5 The Earba PSH project will store up to 40,000MWh – so the equivalent of approximately 400 typical commercial battery projects. This is why a number of large-scale, long-duration energy storage projects such as Earba PSH are required.

2.1.6 If the Earba PSH project is constructed it will allow far more renewables to be added to the UK System, displacing expensive and carbon-emitting gas generation and ultimately speeding up the transition to a clean, carbon-free economy and helping to meet Scotland's climate change target of net zero by 2045.



03
Existing Hydro Electric Sites

3.1 What can be learned from existing Hydro Electric sites

3.1.1 As a background exercise a number of similar operating conventional and pumped storage hydroelectric projects have been reviewed to understand the challenges of constructing a development of this scale. Two sites in particular are considered to provide valuable discussion points these are the Dinorwig and Foyers operational Pumped Storage Hydro Stations.

3.2 Dinorwig

3.2.1 Located in North Wales the Dinorwig pumped storage scheme is the largest in the UK and is also the most recent to have been built. Construction of this project was completed in 1984. The project is on the edge of the Snowdonia National Park and as a consequence mitigating the impact of the project on the landscape was crucial.

3.2.2 The Dinorwig upper reservoir has similar finish to the Proposed Development's lower reservoir and as such the Dinorwig upper dam construction is of particular interest. The upper dam at Dinorwig has a front face which has been vegetated by placing topsoil and then sowing with local grass and heathers. The result is a dam which is considered to assimilate well into the surrounding landscape.

Figure 01
Dinorwig Upper Dam - Marchlyn Mawr

Figure 02
Marchlyn Mawr dam face

Figure 03
Marchlyn Mawr reservoir drawn down

Figure 04
Marchlyn Mawr reservoir part full

Figure 05
Marchlyn Mawr dam from the approach road

3.3 Foyers PSH

3.3.1 Located on the banks of Loch Ness the Foyers Pumped Storage project was completed in 1974. The Foyers site comprises a powerhouse with deep shafts that go to a depth well below the surface level of Loch Ness. The Proposed Development would also require deep shafts, that go some depth beneath the current level of Loch Earba.

3.3.2 On both the Foyers PSH and the Proposed Development a large structure is required at ground level, above the deep shafts. This building has a loch side position and therefore could be a prominent feature, the Foyers powerhouse is considered to be a visible structure on the side of Loch Ness.

3.3.3 The setting behind the Foyers building of rock, trees and steep slope contrasts starkly with the light colour of the building cladding. The differing textures and colours draw the eye to the building from many locations around Loch Ness. The Earba powerhouse aims to sit within the landscape with colours and finish of similar tones, plus local planting minimising contrast and blend with the surrounding natural features.

Figure 06
Foyers PSH from Loch Ness

Figure 07
The Foyers PSH from the opposite side of Loch Ness

3.4 Quoich Dam

3.4.1 Loch Quoich Reservoir was completed in 1956 and forms part of the Garry-Moriston Hydropower Scheme by raising the level of Loch Quoich to provide head and storage for hydropower generation.

3.4.2 The Quioch dam is a 39 m high Concrete Faced Rockfill Dam.

3.4.3 Over time the rockfill face of the dam has become weathered and mosses and lichens have established. The weathering process and the growth of the moss and lichen communities have helped the dam reflect the tones and textures within the surrounding landscape which helps to reduce the prominence and contrast of the dam face. The contrast of the lower valve house roof with the rockfill face behind it draws the eye but more prominent is the intake works which extend beyond the dam crest and become a main feature of the dam breaking up the simple lines and contrasting with the more subtle weathered rock fill.

Figure 10A
Quoich Dam rockfill elevation, moss establishing on the dam face & intake protruding above the dam

Figure 08
Quoich Dam from downstream

Figure 09
Quoich Dam rockfill elevation with valve house roof & intake protruding above the dam

Figure 10
Quoich Dam from above with green mosses visible on dam face

3.5 Example Surge Shafts

3.5.1 The purpose of surge shafts in large hydroelectric schemes is to provide a water surface close to the power station at a height above the upper reservoir in order to absorb transient pressures within the tunnel system. For this reason, they can require to be located in prominent positions. These deep shafts require the necessary safety barriers but with careful design these structures can be screened from surrounding viewpoints.

3.6 Experience in best Construction Practices & Techniques

3.6.1 The team involved in the development of the Earba PSH project has worked on a number of similar large scale hydro projects and therefore understands what is required to design a large infrastructure project within rugged areas of the Scottish Highlands. The following principles are considered to be key to the Earba project:

- The use of landscaping and tree planting is considered to be an essential part of minimising the visual extent of the infrastructure, particularly at the Loch Earba part of the project;
- Where possible prominent features would be designed out or placed in semi buried or buried structures; and
- Careful routing of the access tracks would help to minimise the extent to which they could become a prominent feature, and this would be further mitigated by best practice construction using the original locally won materials to dress and reinstate, and revegetate the track edges as construction progresses.

Figure 11
Luichart Surge Shaft with bund surrounding the shaft, but fence placed on the more visible outside of the bund

Figure 12
Cluanie Surge Shaft with safety fencing

04
The Earba Pumped Storage Hydro Project

4.1 Site Context

4.1.1 The site of The Proposed Development is located Northeast of Spean Bridge and close to Loch Laggan. This is an area dominated by mountain, moorland and some forest. Local housing and development are largely limited to the within the glens and along the shores of the bigger lochs.

4.1.2 The area is popular for recreational and tourism activities with the presence of various popular mountain summits including the three Munros of Beinn a' Chlachair, Geal Chàrn & Creag Pitridh. The area is also within the Rannoch - Nevis - Mamores – Alder Wild Land Area. The Braeroy - Glenshirra - Creag Meagaidh Wild Land Area is located to the west of the Proposed Development.

4.1.3 The Ardverikie Wall is a challenging rock climb situated on the southwest side of the rounded hill of Binnein Shuas. The climbing slabs overlook Loch Earba. It is considered to be one of the best climbing routes of its grade and type in Scotland.

4.1.4 Two informal mountain walking/cycling routes cross the site. The Badger Divide is an off-road cycle route that uses the track to the south side of Loch Earba and the East Highland Way is a long distance walking route which follows the south side of Loch Laggan (but would cross the project's main access track at Moy).

4.1.5 The Estate is used for highland sports, commercial forestry, hydroelectric generation, holiday accommodation and as a filming location.

4.1.6 Appendix A contains a drawing which shows the Proposed Development along with the proximity of the nearby munros, the Ardevrickie wall, the existing hydros, the walking routes, local settlements and A86(T) trunk road.

4.1.7 The site is within the River Spean catchment upstream of Loch Laggan. Loch Earba drains to Loch Laggan via the Allt Labhrach and Loch a' Bhealaich Leamhain via the Allt Loch a' Bhealaich Leamhain, the Allt Cam and the River Pattack. The catchment is already heavily modified by the operation of the existing Ardverikie, Pattack and Lochaber Hydro Schemes all of which are discussed further below.

4.1.8 There is an existing hydroelectric scheme currently utilising the waters of Loch Earba, the Ardverikie hydro. The water levels in both Earba lochs are controlled by large structures on each natural outlet channel. These structures store water in each loch until it can be used for hydroelectric power generation. The inlet to the buried pipeline which transfers water to the turbine located next to Loch Laggan is located on the northern outlet of Loch Earba.

Figure 13
The upstream view of the structure that controls water flow between the two lochs

Figure 14
A view of the northern dam from the opposite bank - this is also the location of the Shios Dam

4.1.9 To the east of the site the Pattack hydro scheme generates electricity from the River Pattack, which is fed in part from the Leamhain reservoir catchment. Loch Pattack which is visible from Loch Leamhain is the upper storage reservoir for the Pattack scheme with one and a half meters of water storage range.

4.1.10 One of the largest hydroelectric schemes in Scotland is the Lochaber hydro scheme. The associated infrastructure of the Lochaber hydroelectric scheme influences the wider setting around the site of the Proposed Development as follows:

- Laggan dam to the west of the site is a large concrete dam.
- The Moy channel, which would be crossed to enter the site of the Proposed Development, is a large man-made channel to directly connect Loch Laggan to the Laggan Reservoir downstream.
- To the northwest of the Proposed Development sits Loch Laggan which is used as a hydro reservoir in conjunction with Laggan Reservoir at Laggan Dam via the Moy channel.
- Further to the north lies the Spey dam and heck along with the Mashie diversion these form parts of the easterly diversion structures feeding the Lochaber scheme.
- The site of the proposed development lies fully within the catchment area for the Lochaber hydro.

4.1.11 Moving away from hydro infrastructure the 400kV Beauly Denny transmission line is located to the north of the site. This was completed in 2015.

4.1.12 The Stronelairg wind farm, which lies adjacent to the Glendoe Hydro scheme and was completed in 2018, is visible from the summits of Creag Pitridh, Geal Charn and Beinn a Chlachair which are adjacent to the site of the Proposed Development.

Figure 16
The Laggan Dam

Figure 15
The Pattack Dam

4.2 The Site Setting

4.2.1 The Proposed Development would be located within Ardverikie Estate, to the north of Loch Laggan. This landscape comprises forested slopes rising from the loch shore into a complex structure of rocky crags and knolls, which transitions into a more remote upland landscape of large mountain masses and sweeping moorland valleys populated by burns and lochs. Loch a' Bhelaich Leamhain, which would comprise the upper reservoir, is located within a bowl-shaped corrie set within the prominent summits of Creag Pitridh, Geal Charn and Beinn a' Chlachair. Vegetation consists mainly of heather moorland, with areas of exposed rock, crag and scree, particular on higher ground. The lower reservoir would be located within a scooped, U-shaped valley, characterised by the two separate lochs of Loch Earba and contained by rough, rocky crags to north and south. This area shows a smaller-scale, enclosed and intimate feel with tracks and small weirs present on the lochs. The slopes surrounding Loch Earba are covered by rough grassland, with scattered mature trees accommodating a range of species.

4.2.2 The site comprises predominantly peatland, wet heath, with some smaller areas of dry heath, mire, woodland and scrub. There is a small area of scheduled ancient woodland along the shore of Loch Earba.

4.2.3 The setting and context of the powerhouse site is explored in greater detail in section 5.

Figure 17
The Loch Leamhain bowl

Figure 18
The U-shaped valley of Loch Earba

05
Proposed Development

5.1 Overview

5.1.1 The optimum design for the Proposed Development has been refined in order to achieve the most efficient pumped hydro arrangement yet keeping impacts on the natural environment to a minimum.

5.1.2 Over the course of the development the scheme design has been re-engineered following the results of site surveys and consultations with specialists.

5.1.3 The principal components of the Proposed Development would be:

- The Powerhouse and Substation
- The Leamhain Dam and Upper Reservoir
- The Shuas and Shios Dams and Lower (Earba) Reservoir
- The Underground Waterway System and Associated Structures including surge shafts
- The Pitridh and Shuas Aqueducts
- A new junction off the A86 and bridge over the River Spean / Moy Channel
- Access Tracks and Footpaths
- Temporary Construction Facilities and Borrow Pits
- Areas of Ecological Compensation and Enhancement

5.1.4 The scheme as proposed would involve three new dams creating a lower reservoir in Loch Earba and an upper reservoir at Loch Leamhain. The upper reservoir would involve the construction of a new dam at Loch Leamhain. The lower reservoirs would be formed by constructing dams at either end of Loch Earba. Control works would be located on the western end of Loch Leamhain and adjacent to the powerhouse on Loch Earba. Up to three tunnels would link the lower and upper reservoir via a shaft style powerhouse allowing water to be pumped up to store power or to flow down to generate power.

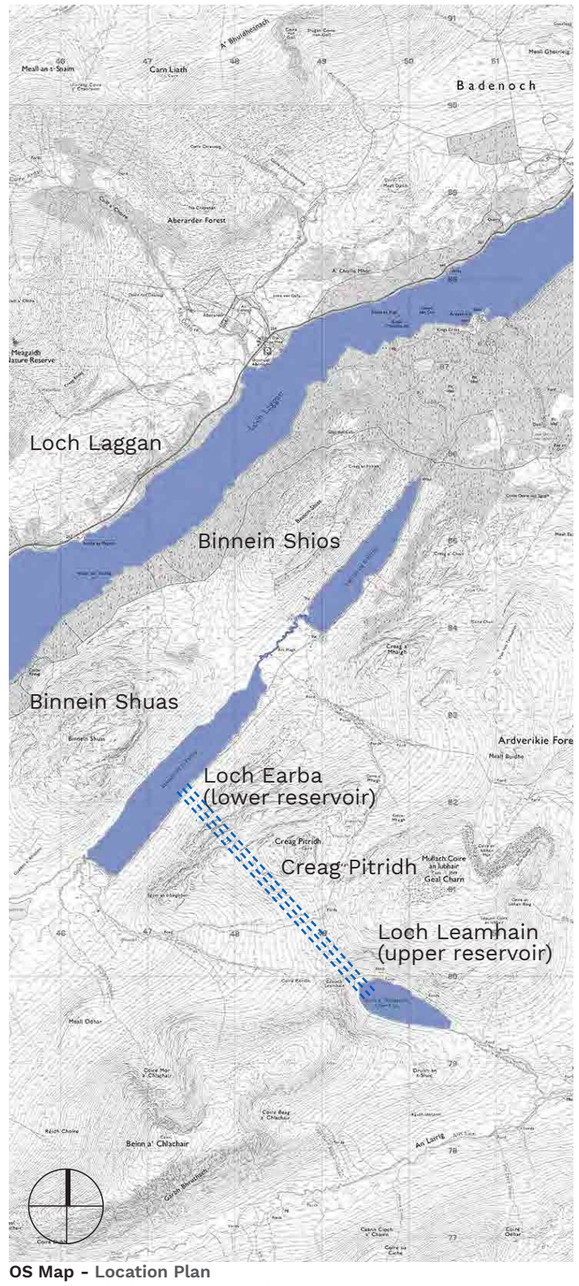
5.1.5 The powerhouse, located by the shore of Loch Earba, would comprise a series of up to six shafts approximately 70m deep. The shafts would sit beneath a surface building which would contain an overhead crane and other facilities including offices, storage, transformers and other equipment.

5.1.6 It is considered that the choice of a shaft power station reduces the requirement of large underground works, minimising the length of tunnels and avoiding an underground cavern.

5.1.7 Surge shafts from the tunnel would surface on the western side of Creag Pitridh.

5.1.8 Access to the powerhouse would be by track from the Moy channel. Access to the underground works would be facilitated by three access tunnel adits located across the site.

5.1.9 Details of the proposed design for each of the scheme components are provided on the following pages:



OS Map - Location Plan
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5.2 The Powerhouse

5.2.1 The powerhouse, located by the shore of Loch Earba, would comprise a series of up to six shafts approximately 70m deep, sunk from a floor level of 377m AOD. The approximate dimensions of the powerhouse would be 450m x 50m. The total length of the powerhouse area, including hardstanding and ancillary electrical buildings would be approximately 600m x 50m.

5.2.2 Each shaft would contain a reversible pump turbine and motor generator together with associated equipment. The shafts would sit beneath a surface building which would contain an overhead crane and other facilities including offices, storage, transformers and other equipment. The powerhouse switchyard, housing the switchgear and point of connection to the electricity transmission network, would be required to the North end of the Powerhouse. The ground level of the switchyard would be the same as that for the Powerhouse.

5.2.3 The powerhouse would be located in a "benched cutting" at 377m AOD within the sloping hillside which would be tiered, with intermediate benches which would be planted with native, upland trees and other vegetation. The powerhouse surface building would have a green roof. Its roofline would be mostly below the existing surrounding ground level and would lead to it being partially screened in views along the valley. Landform drawn up to the front of the building would be planted with native woodland species to help to further screen or filter the powerhouse in views across the loch.

5.2.4 Planting around the powerhouse would form part of a wider area of native woodland planting extending above and around the powerhouse area between 390 – 420m AOD with the aim that, over time, the powerhouse cutting would appear to be set within woodland as part of the landscape setting, rather than simply screened by smaller areas of planting which may appear out of place. Further areas of planting and encouragement of native woodland growth around other points of the Earba glen would also help to soften the appearance of drawdown (refer to architectural response on the following pages for information on design development of the powerhouse).

5.2.5 Planting would be designed as low density groups and pockets, taking into account areas of better soils between the rocky crags, to reflect natural patterns of woodland growth in similar environments. This would avoid a change in character to a more densely planted area and would allow open views of the valley to be maintained. It is intended that fencing to reduce grazing pressure would allow continued natural regeneration of woodland species to occur over time. The planting would appear different to existing trees at the northern end of Loch Earba where there is a more scattered appearance of generally mature trees with a range of native and non-native species. However, the proposed more naturalised woodland appearance would reflect a transition away from the forest at the northern end of the valley to the upland moorland landscapes at the south.

Building Design Concepts

5.2.6 Design Development

5.2.7 The powerhouse building and surrounding landform and planting areas would be further developed through detailed design stage with the aim of reducing the overall influence and prominence of the building in the landscape as far as possible and achieving a design which would contribute a positive feature as part of the wider landscape context.

5.2.8 The following pages set out the site analysis, initial design concept and the subsequent approach to the design development of the powerhouse which would be developed further during detailed design of the building.

Site Context

Constraints + Opportunities

Site Context

Location

The site for the proposed powerhouse building is located on the east bank at the southern end of the loch, at the foot of Creag Pitridh.

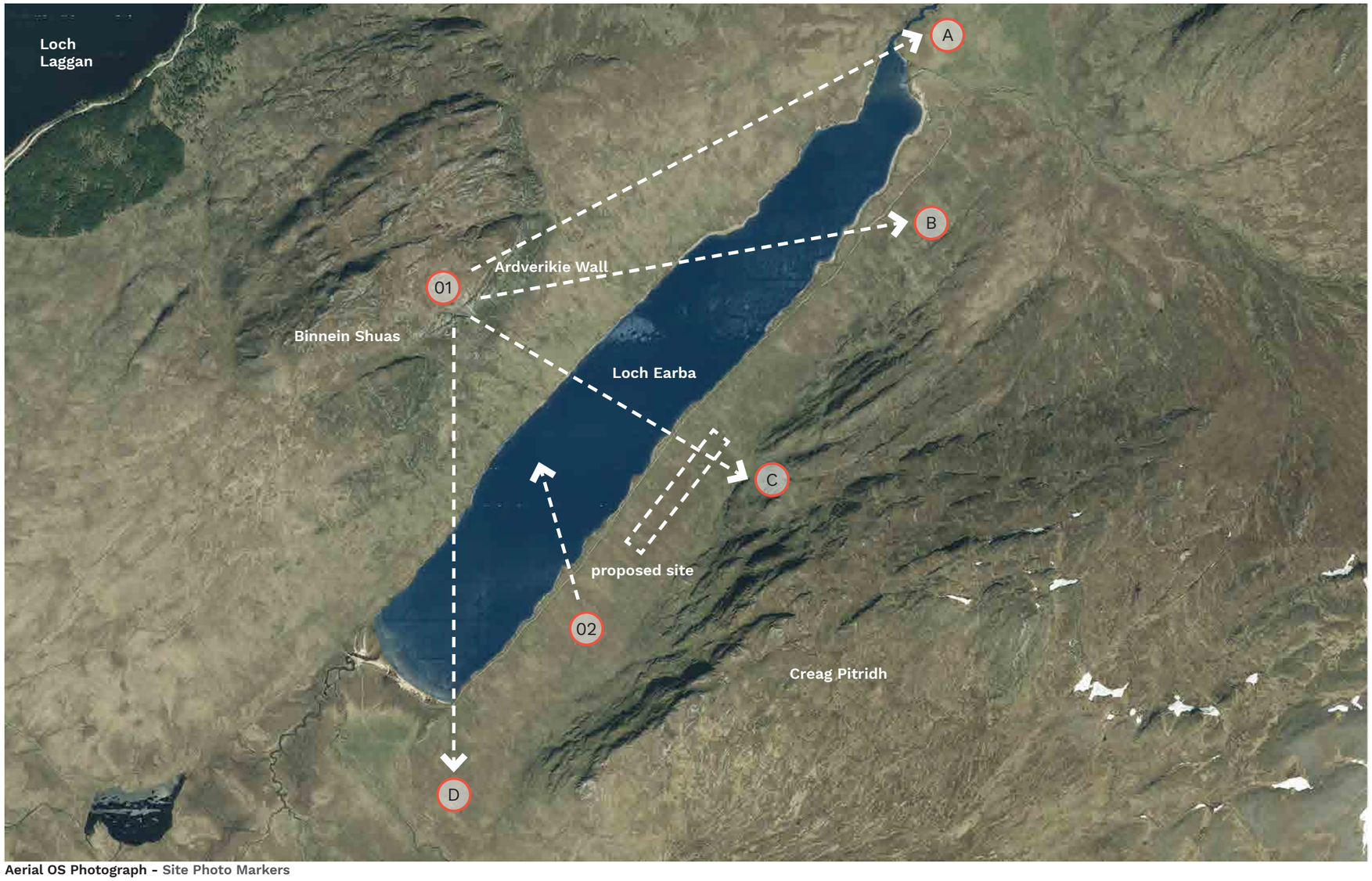
The slopes surrounding Loch Earba are covered by rough grassland, with scattered mature trees accommodating a range of species.

The lower reservoir, located on Loch Earba, is contained by rough, rocky crags to the north and south. The site comprises predominantly peatland, wet heath, with some smaller areas of dry heath, mire, woodland and scrub. There is a small area of scheduled ancient woodland along the shore of Loch Earba.

The immediate landscape around the proposed site of the powerhouse gently slopes up from the loch shore, becoming gradually steeper as it moves up the terrain, transitioning into a backdrop of rocky crags and knolls at higher level.

The wider site context and site setting has been set out in more detail in section 04.

panoramic view 01
View from Ardverikie Wall looking across Loch Earba



Aerial OS Photograph - Site Photo Markers
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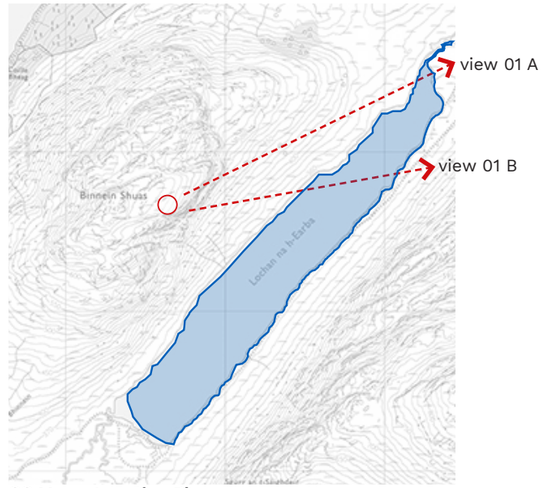
05: Proposed Development
Site Context

Location

Panoramic site views of Loch Earba taken from Binnein Shuas.



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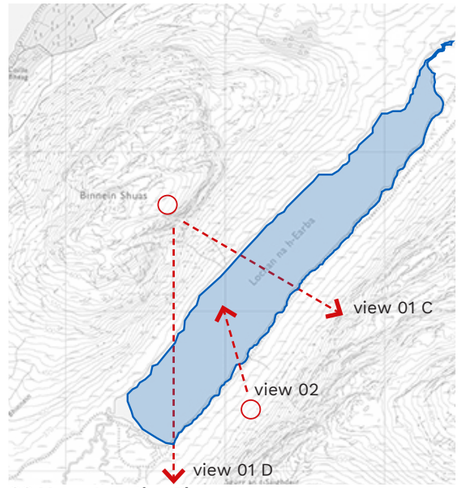
view 01 A
View from Ardverikie Wall looking North-East along Loch Earba

view 01 B
View from Ardverikie Wall looking North-East along Loch Earba

Site Context

view 02
View from the south looking north towards Ardverikie Wall



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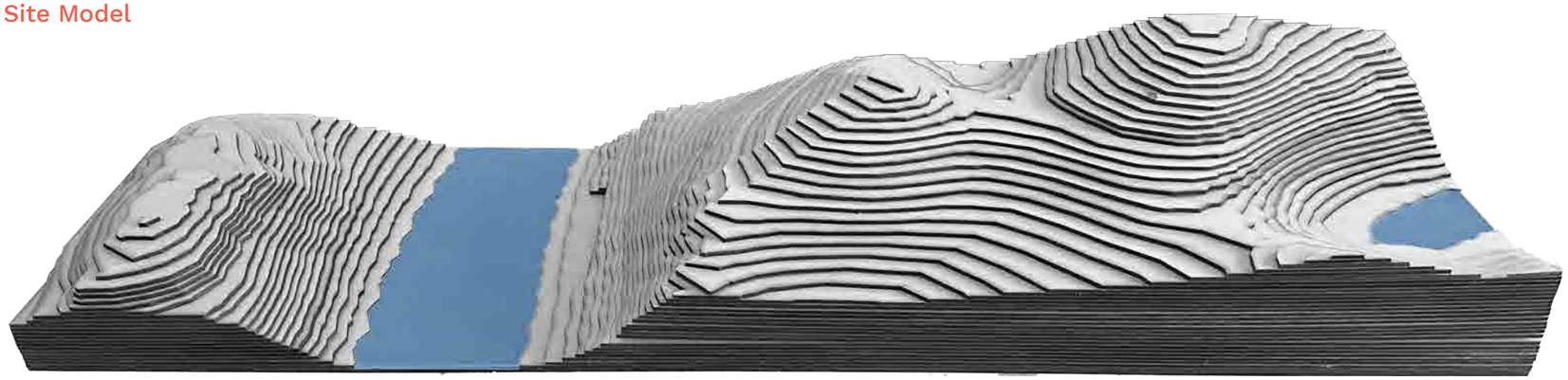
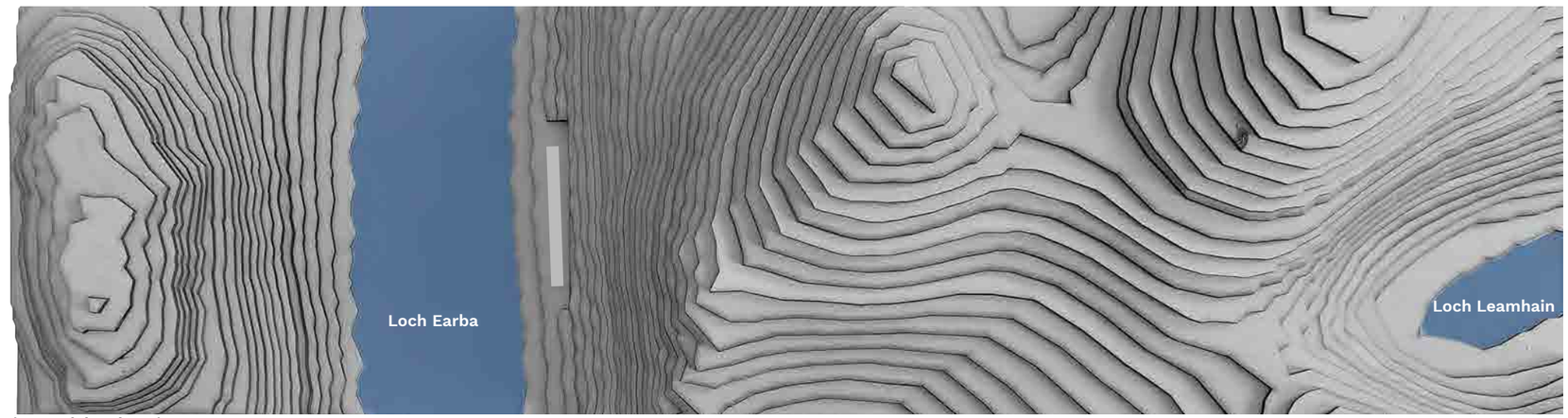
view 01 C
View from Ardverikie Wall looking East over Loch Earba towards Creag Pitridh

view 01 D
View from Ardverikie Wall looking South-West along Loch Earba

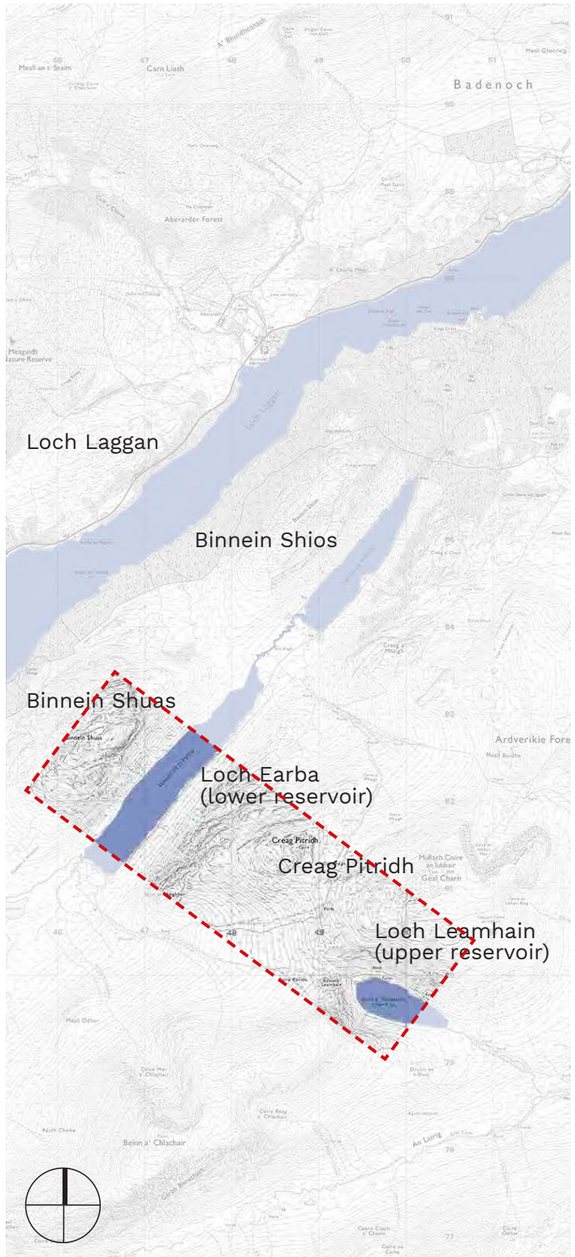
Site Model



site model - aerial view



site model - plan view



OS Map - Location Plan
Copyright OS (Ordinance Survey)

Constraints

Public Road:

The existing access track

Natural Topography

The steeply sloping craggy terrain to the east.

Visual Impact:

Impact of view across from Bennein Shuas and views along the length of the loch from the northern and southern ends.

Opportunities

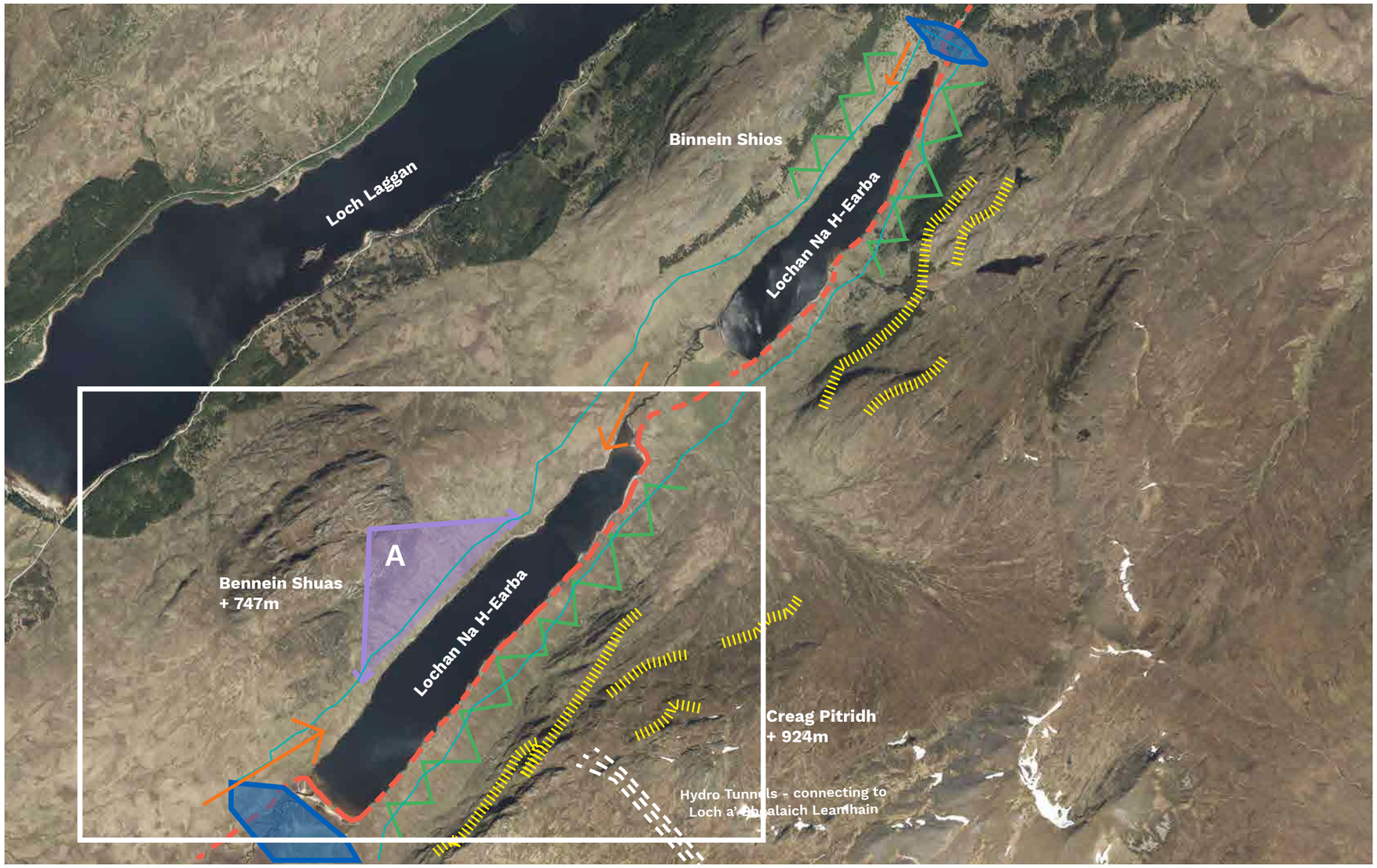
Natural Topography:

The natural topography around Loch Earba consists of a mixture of ‘smooth rounded mountains’ and ‘isolated mountain plateaus.’ The area proposed for the powerhouse is defined by the gradually sloping topography against a contrasting backdrop of steep craggy knolls.

Site Excavation Materials:

Given the large extents of excavation in order to form the pumped hydro storage facility and associated civil engineering works, there is an opportunity to use the excavated rock in the building construction, and help integrate the building into the landscape.

aerial view showing the two bodies of water that make up Loch Earba



Aerial OS Photograph
Copyright OS (Ordinance Survey)

- Access track (unclassified)
- Steep Craggy Knolls
- Possible Onlooking Views
- Proposed high water level (+376.0m)
- Sloping topography
- A — Visual impact from Bennein Shuas (Ardverikie Wall)
- Proposed Damn to south-west of Loch Earba

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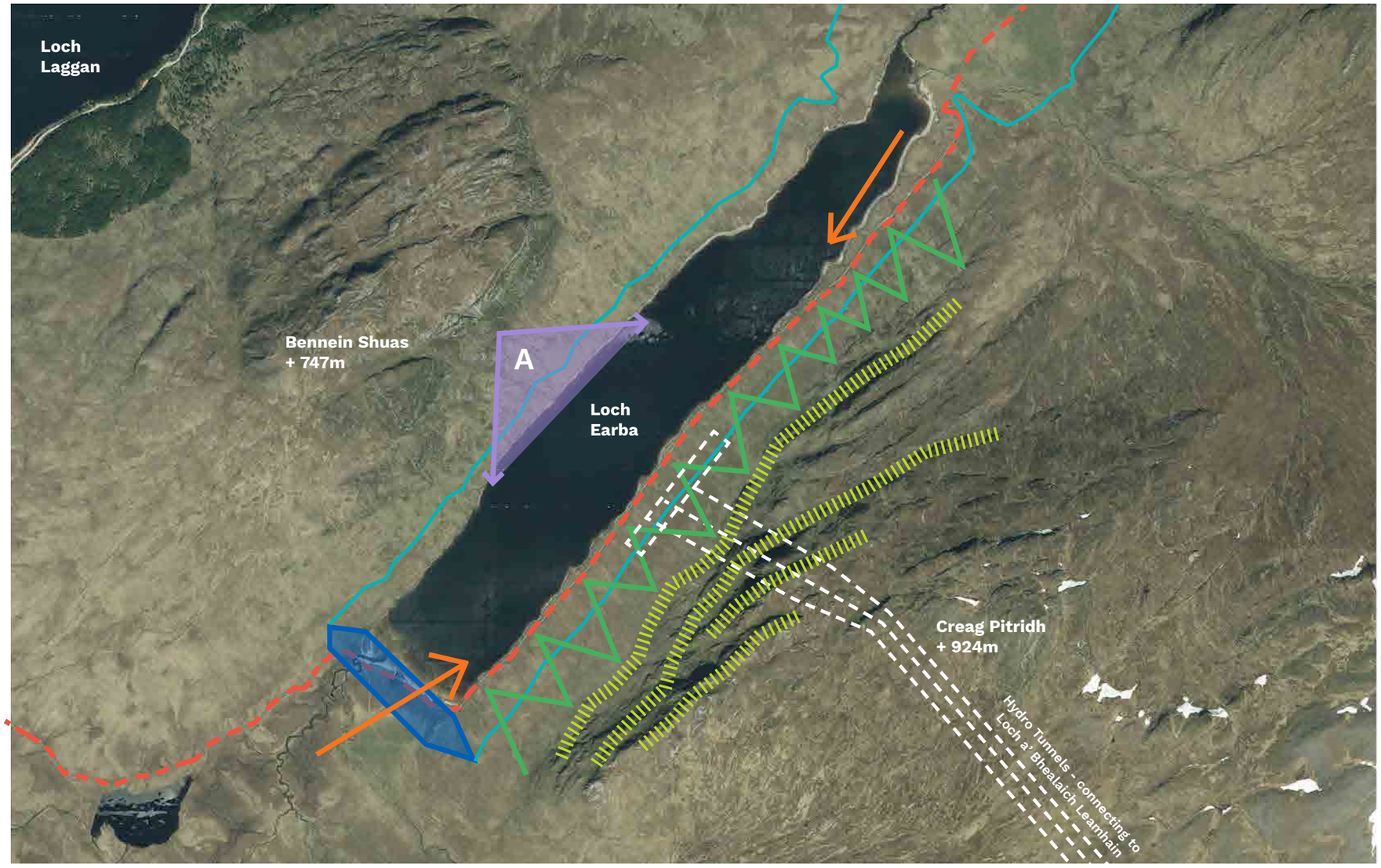
aerial view of the south-west loch of Loch Earba



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Site Response + Concept

Precedent

A Landscape Driven Response

The initial concept and design approach for the building has evolved from 3 primary influences:

Topography:

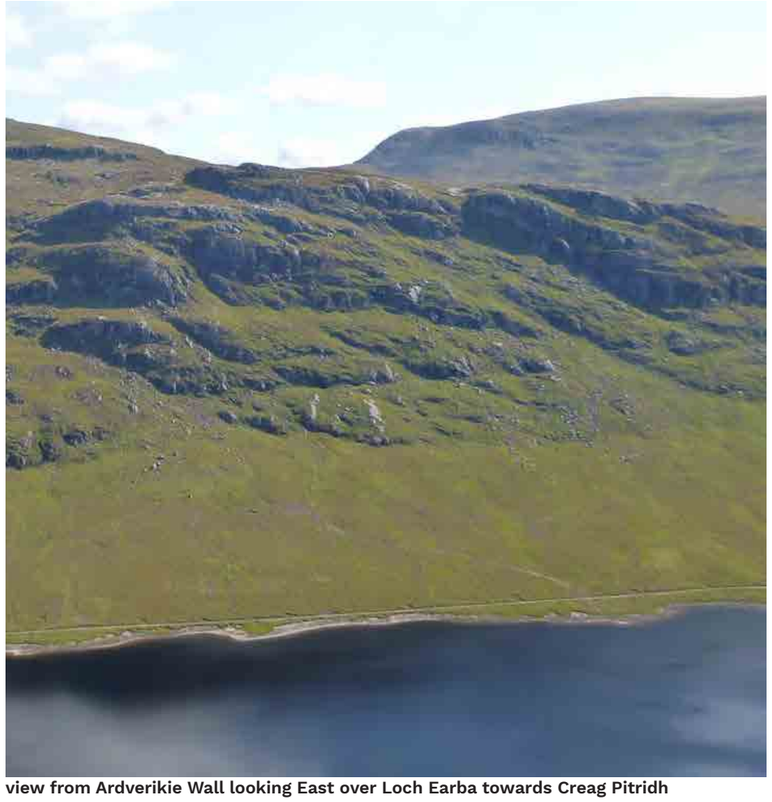
The topography of the site rises up from the loch, becoming steeper as it moves south-east, culminating in a series of rocky escarpments (or crags) which punctuate the green landscape. The new building will look to integrate within this backdrop.

Geology:

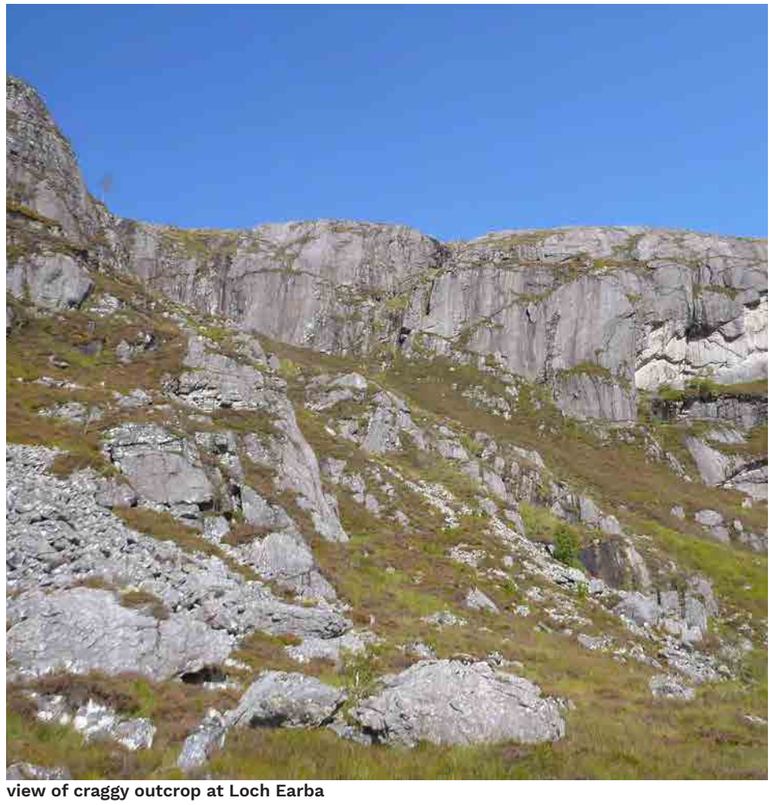
There are strong geological features around the site. The architectural response will look to reference the strong visual character of the rocky escarpment and the crags, which rise up from the sloping terrain and punctuate the green landscape.

Materiality:

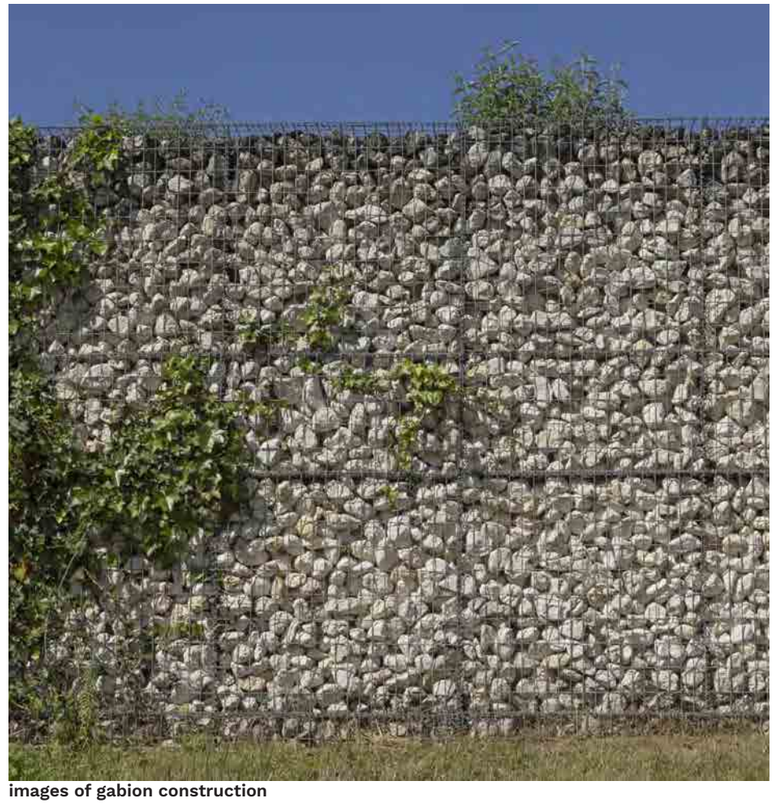
The design proposals should reflect the site context. The design approach will pursue a sustainable response using found materials, such as locally excavated rock in gabions, stone and a grass roof, which are low carbon, low impact, net zero, renewable, biodiverse, and considers whole life carbon.



view from Ardverikie Wall looking East over Loch Earba towards Creag Pitridh



view of craggy outcrop at Loch Earba



images of gabion construction

Concept

The initial concept and design approach for the building has evolved from 3 primary influences. However it is the rocky crags around the site that unite these 3 influences and provide an overarching conceptual framework for the design. The crags are an important feature of the site both physically and culturally. Not only do they provide a strong visual reference, but there are mountain names and place names in the locale with “crag” in their name, having evolved with the language of the location.

creag, craig, crag

Noun

(1) A cliff on the sea or mountain-side. (General Scots)

(2) A projecting spur of rock. (General Scots)

(3) In pl.: rocky ground.

(4) A rock used for quarrying.

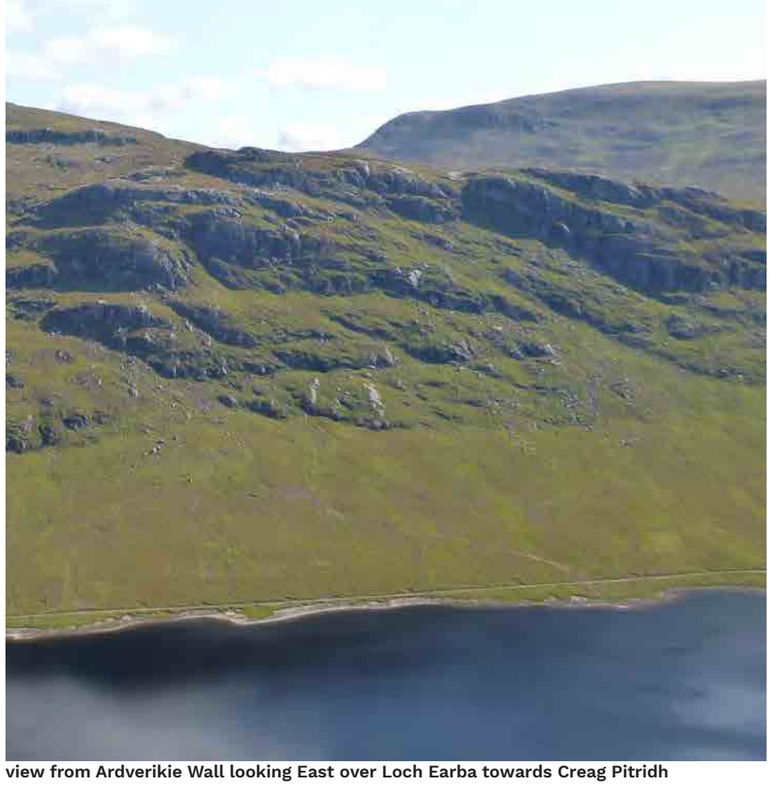
Celtic in origin, cf. Gael. and Irish creag, which is a reduced form of carraig
Ref: “Craig n.1”. Dictionary of the Scots Language. 2004.

escarpment (I’ska:pment)

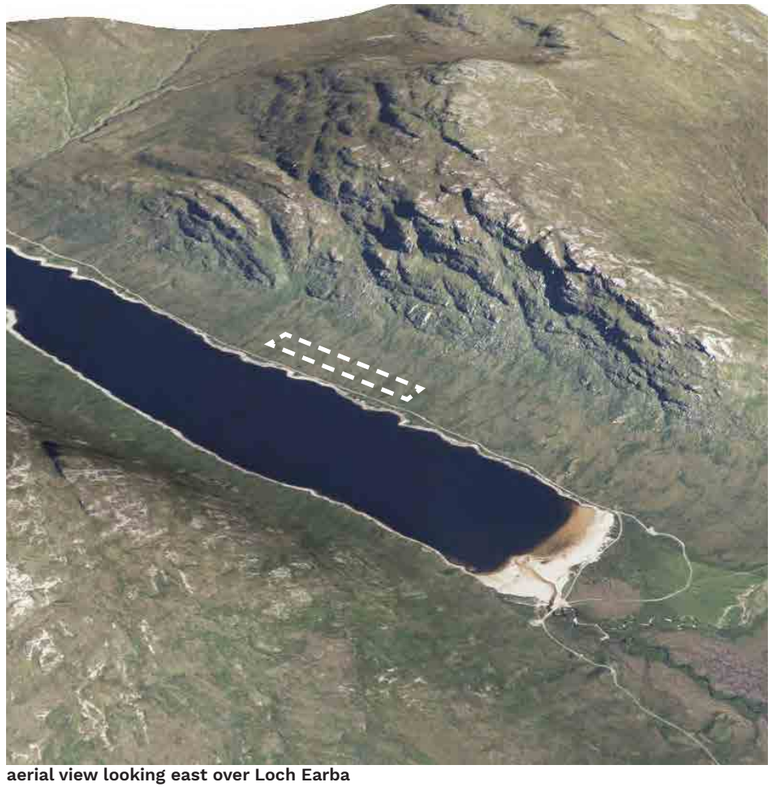
Noun

(1a) the long continuous steep face of a ridge or plateau formed by erosion; scarp

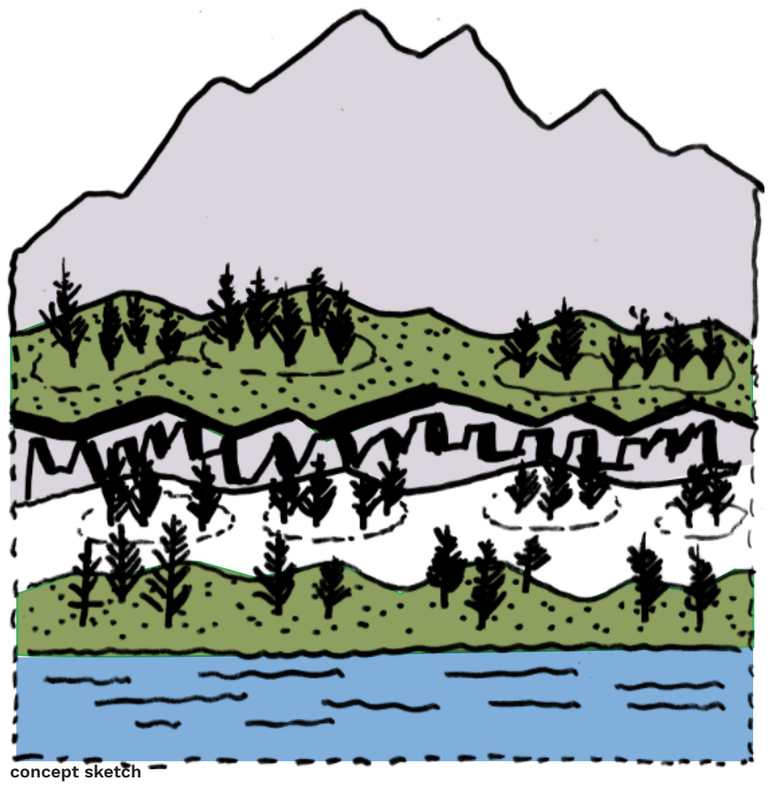
(1b) any steep slope, such as one resulting from faulting



view from Ardverikie Wall looking East over Loch Earba towards Creag Pitridh



aerial view looking east over Loch Earba



concept sketch

Character

01 context

The rocky escarpments and crags around the site provide a strong visual reference that punctuates the mountainside with the green landscape permeating between.

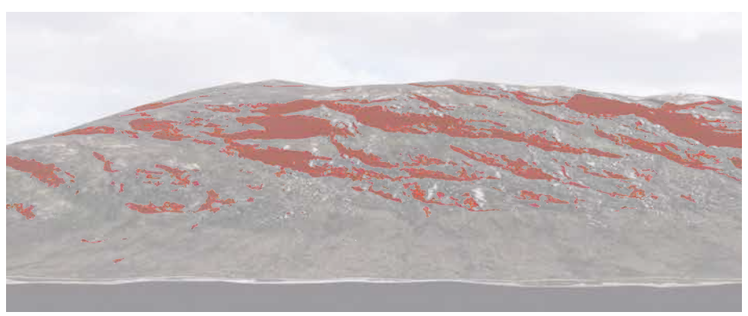
02 crags

The crags decrease in height and surface area as the sloping terrain descends down towards the loch, with their mass breaking down from years of erosian and culminating in areas of large, loose boulders and rocks on the lower slopes of the mountain.

03 abstract

It is this abstract of loose rocks on the lower slopes of the mountain, set within the wider backdrop of larger rocky crags that punctuate the green landscape, that the concept has developed from, drawing inspiration from both the topography and geology of the site.

context



crags

abstract

images from Geological Survey

Geology

the mass of the crags and rocks gradually reduces as the terrain slopes down towards the loch

+485m AoD

at approx. 485m AoD vertical exposure of rock approximately 15m to 20m high cliff. The toe of the cliff is at approx. 485m AoD.

+450m AoD

at approx. 451m AoD a detached block (2.4m x 2.8m x 1.1m) resting on the slope at the crest of an 8m high cliff.

+425m AoD

continuing to approx. 425m AoD there are several large and small boulders in this area.

+390m AoD

close to the proposed powerhouse location.

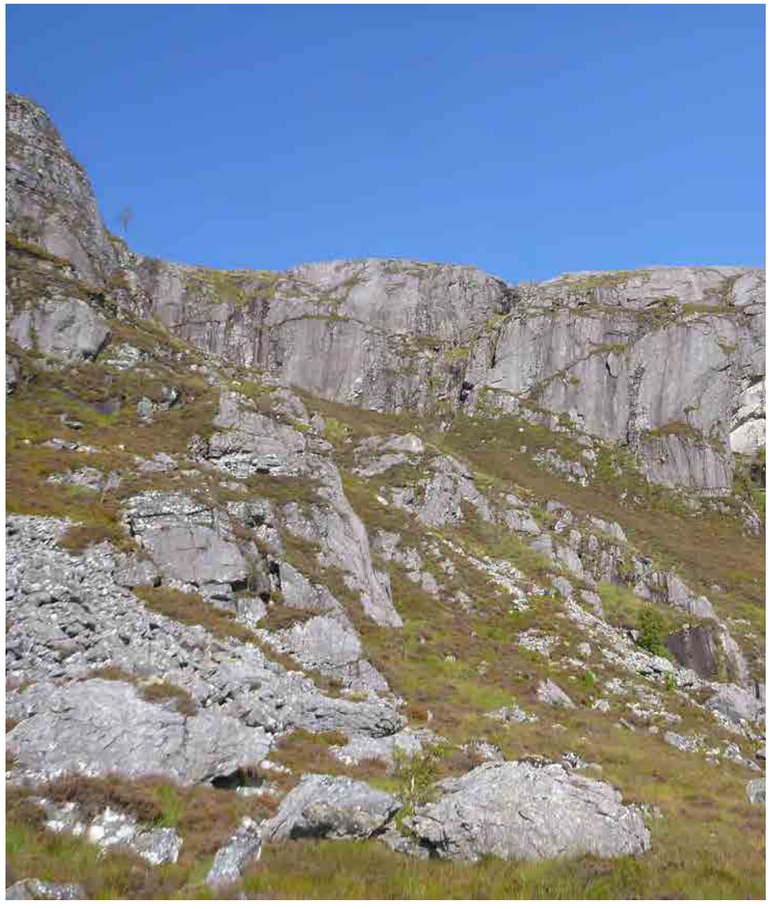
continuing down the slope to approx. 410m AoD there are many more boulders on the slope.

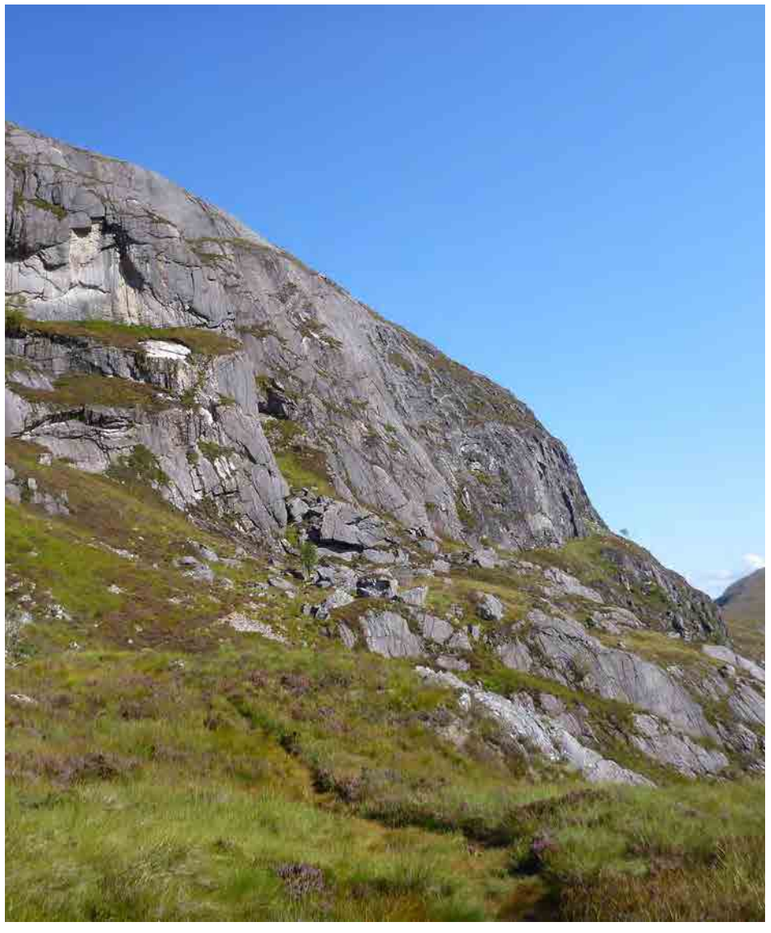
the slope at approx. 400m AoD boulders are starting to appear on the surface.

view looking east over Loch Earba towards Creag Pitridh

Character

Green landscape permeates between the grey rocky craggs





The natural materials found on the site are proposed for the new building, including rock from the civil engineering excavations and green roofs.

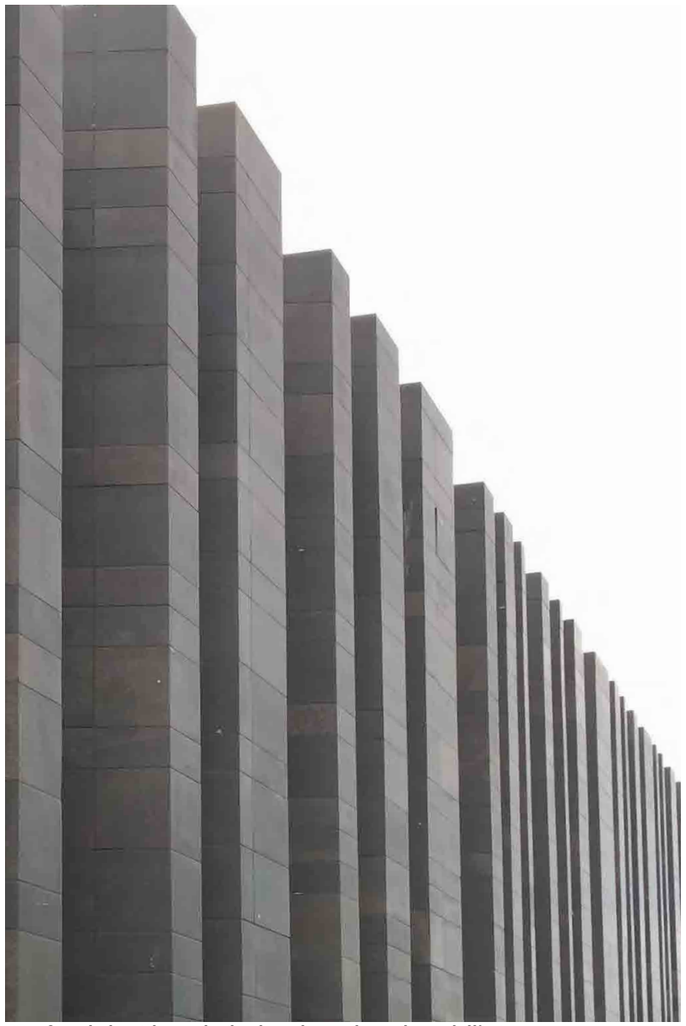
view of craggy outcrop at Loch Earba

05: Proposed Development
Precedent Images

Materials

Some precedent images which show how the proposed materials can be used, and how the length of the facade can be modelled and broken down visually to reduce the visual impact of the surface area and create more interesting areas of depth, light and shade that better reflect the rocky terrain.

01 - variation in density of gabion baskets



02 - facade length can be broken down through modelling

03 - facade length can be broken down

04 - gabion wall

05 - green roof

06 - stepping of gabion wall