Allt na Moine Hydro Scheme

Proposed Dam Raise

Report No: Allt na Moine Hydro Scheme Dam Raise Non-Technical Summary R0

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Proposed dam raise - CAR/L/1119652

1 Introduction

It is proposed to augment the Allt na Moine Hydro Scheme by raising the spillway level of the dam, thus increasing the reservoir storage and efficiency of the associated production of green energy. The reservoir of Lochan Dubh is situated approximately 10km N of Applecross in Wester Ross and the development land is leased from Applecross Estate (owned by The Applecross Trust).

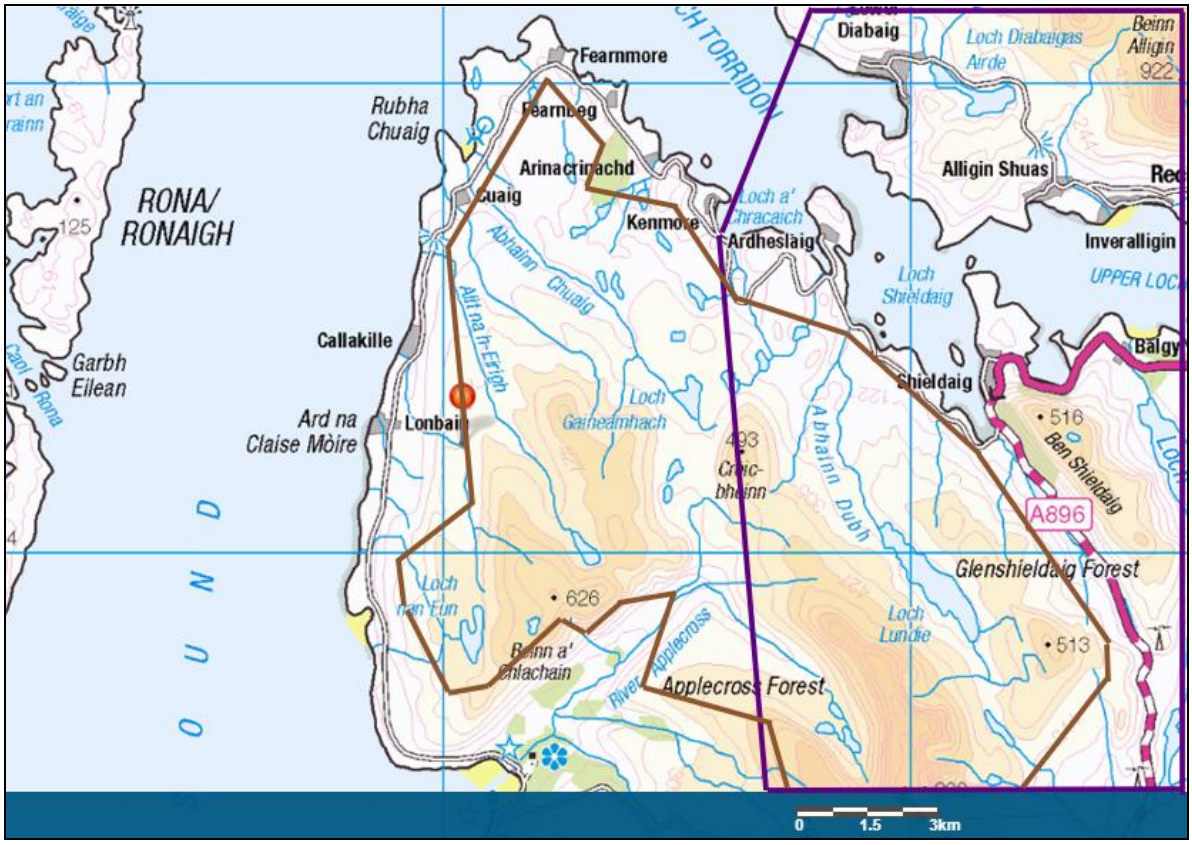


Figure 1 – Site location (red pin) at Allt na Moine Hydro Scheme Dam showing the Wester Ross National Scenic Area (NSA – purple line) 6km to the east and the Applecross Wild Land Area outlined (brown line).

The proposed development is out-with any areas with a statutory environmental designation. However, the site is approximately 6km from the western boundary of the Wester Ross National Scenic Area (NSA) and is at the western edge of the Applecross Wild Land Area (Figure 1). There are no roads or habitations in the immediate area (other than the coastal road past Lonbain) and the general character of the land to the east is wild, although the presence of the existing dam structure and reservoir inundation zone removes much of that natural feel. The area is within the Coastal Moorlands and Crofts landscape character type, typical of the west coast of Ross and Cromarty, where the high ground of low treeless moorlands is dissected by sea lochs and inlets (at small and large scale) and small isolated crofting communities are dispersed along the coast.

2 Background

The proposed works will take place at the existing dam associated with the 2MW Allt na Moine Hydro Scheme located at the outflow of Lochan Dubh. The existing dam was

completed in summer 2022 and the created reservoir conjoined the three existing lochans of Lochan Dubh, Loch Dubh Deas and Lochan an Fheoir.

The proposal of this development is to raise the existing dam (spillway) 3m higher than its present elevation and subsequently also raise the flood walls and lengthen the wing walls of the original structure.

The loch (reservoir) currently has a Top Water Level (TWL) of 247mAOD and the proposed development would raise the TWL by 3m to 250mAOD. The vertical water level range in the new reservoir would rise from 6m to 9m.

2.1 Electricity and Carbon Emissions

The existing scheme has a capacity of 2 MW and generates approximately 7,800 MWh per annum. The modified dam would increase the water availability and hence increase the annual electricity generation to approximately 7,990 MWh. This would result in an increased annual energy production of 190 MWh and an additional saving of approximately 49 tonnes of CO^2 emissions using grid electricity per annum. The total installed capacity of the scheme will remain at 2MW.

It is widely believed that burning fossil fuels, such as coal and oil, and carbon dioxide accumulation in the Earth's atmosphere is a major cause of climate change. One way of reducing carbon emissions is to replace fossil fuels with renewable energy, thus, using fewer fossil energy sources is fundamental as the UK is legally required to have reduced its greenhouse gas emissions by 100% from 1990 levels by 2050. The proposed development of the Allt na Moine hydro scheme described here would contribute to this target

2.2 Dam Configuration

The modified dam at Allt na Moine hydro will involve construction on top of the existing dam footprint as well as elsewhere. The current concrete 7m-high spillway will be raised in height by another 3m and thickened. The spillway width will remain the same at 20m and the fish plunge pools will remain broadly the same. The spillway, dam tower and associated fish plunge pool will be, for the most part, the only visible concrete infrastructure.

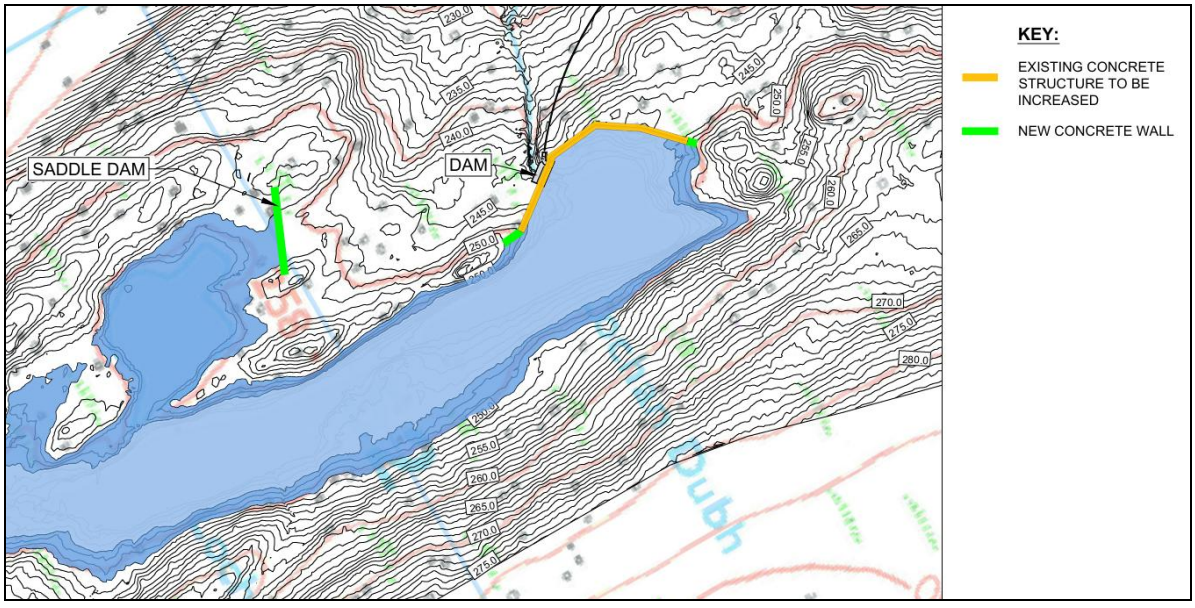


Figure 2 – showing existing and new dam elements and new reservoir inundation in darker blue shading.

The concrete embankment walls will be raised in height by 3.2m (to about 1.6m above the new spillway level) and extended in length to accommodate the raised top water level. The R-bank embankment will be extended (by 17m) from about 159m to 176m in length, while the L-bank embankment will increase (by 33m) from 51m to 84m. As with the existing dam, these walls will be backfilled and reinstated with boulder armour and local vegetation. The total length of the concrete embankment walls would increase by 22%.

An additional low 75m-long section of saddle-dam embankment will be required 300m SSW of the existing dam. This would not be constructed in concrete, but composed of earth fill, reinstated with local vegetation.

2.3 Reservoir size

The dam modification will increase the size of the reservoir: the inundation area will increase from 9.74Ha to 16.26Ha (+6.52Ha), though this includes the flooding of the small 1.28Ha lochan west of the current reservoir, so the total new inundated ground surface area by the proposal is 5.24Ha.

From a visual perspective, the waterbody area will increase from currently 11.02Ha (9.74Ha current reservoir + 1.28Ha lochan) to one waterbody of 16.26Ha which equates to a plus if 48%.

The new total volume of reservoir impounded water (at the new TWL of 250mAOD) will be about 663,000m³, an increase of about 374,000m^3 (from 289,000m^3).

3 Hydrology and authorised flow rates

As the installed capacity of the scheme of 2MW will not change also the current Maximum Abstraction Rate at the dam of 1.192m³/s will remain unchanged. The Hands-Off Flow Requirement to provide 0.010m³/s at reservoir level 241.50mAOD will remain unchanged. For the Residual Flow Requirement, it is proposed to provide 0.028m³/s at the new TWL of 250.0mAOD (instead of the level of 242.50mAOD stated in the current licence).

4 Environmental

4.1 Fish habitat

Waterside Ecology undertook surveys in both 2020 and 2026 of fish habitat on the Allt na Moine burn, small un-named lochan and reservoir tributaries and shoreline to inform on the impacts of the dam raise on fish breeding habitat.

There will already have been impacts on river and loch ecology from the existing development – notably on the trout populations (by affecting their food supplies and spawning potential), as well as degradation of the lochs' shallow shorelines because of reservoir fluctuations. It is suggested that the additional changes proposed affect only a small proportion of the remaining aquatic habitats.

In more detail:

Allt na Moine downstream of the dam is suitable for trout production in its middle reaches, but populations are likely to be limited by the presence of impassable waterfalls near the river mouth, and in the gorge below the dam.

Existing flows appear sufficient to maintain key habitat features, and alterations in flow related to proposed changes at the dam are unlikely to cause significant additional impacts to the trout population in this part of the catchment.

Raising of the of the dam height will inundate a small lochan, 170 metres in diameter, which is currently isolated to the west of the reservoir. It is not known whether this lochan currently contains trout, but it is deep and large enough, and contains the required features, including suitable spawning substrate in its littoral margins, to sustain a population. There will be loss of spawning and habitat diversity in the littoral zone of the unnamed lochan which may result in further biodiversity impacts if the lochan is currently fishless.

Access for trout to other areas and lochs in the catchment upstream will be unaffected by the proposed increase in dam height. Raising of the dam height from the current level of 247m to 250m AOD will inundate 12% of the available trout nursery habitat and 13% of the available trout spawning habitat in the main inflowing stream.

The additional impacts on trout habitat are relatively small in the context of the likely changes caused by the existing scheme.

4.2 Water Environment Mitigations

4.2.1 Compensation Flow

The compensation flow delivered at the dam will remain unchanged from the present situation as authorised in the CAR licence (CAR/L/1119652 VN2021-01). Hands-off Flow is 10 l/s at a reservoir water level of 241.5m AOD (Bottom Water Level) while the Residual Flow will pass 28 l/s at a higher water level.

4.2.2 Sediment Management

There is no specific requirement for sediment management mentioned in the current CAR licence. The existing dam is built across a breach in the natural moraine ridge which has naturally dammed a loch in this location, so the existing (and proposed) dam arrangement merely holds back a slightly greater volume of water in a pre-existing natural loch. For this reason, it is proposed that there should be no change to the current requirement for sediment management at this location.

4.2.3 Freshet Delivery

Freshets are a controlled release of water from a dam to manage river flow and support river biodiversity. The results of hydrological modelling indicate that flow variability downstream of the dam will be slightly altered, but not so much as to require artificial freshet delivery.

In addition, fisheries survey has shown that the habitat for trout in the lower Allt na Moine is relatively marginal and that the potential for migratory salmonids is removed by impassable barriers shortly above sea-level. It is therefore proposed that no artificial alterations or additions to downstream flow variability are required.

Natural spills, combined with increased compensation flows at high reservoir water levels, will be sufficient to maintain any fish and other aquatic populations in the lower Allt na Moine.