March 2025

Glen Earrach Pumped Storage Hydro

Environmental Impact Assessment Report

Volume 5: Appendices
Appendix 10.3: Geomorphic Baseline and Watercourse Crossings

Glen Earrach Energy Ltd

Glen Earrach AECOM

Quality information

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Issue History

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Table of Contents

Tables

1. Introduction

1.1 Several Temporary and Permanent Access Tracks are proposed as part of the Proposed Development. This report details the existing and proposed watercourse crossings following field and desktop surveys. Where there are existing access tracks, with associated watercourse crossings, these may require upgrading to widen the track, resulting in a longer length of culvert at each of these crossings in line with the standard detail **Figure 2.33 Water Crossing Detail (Volume 3: Figures)**. Where new Temporary and Permanent Access Tracks are required, new bottomless watercourse crossings will be created in line with the standard detail **Figure 2.33 Water Crossing Detail (Volume 3: Figures)**.

1.2 The routes of the access tracks have been selected to minimise watercourse crossings, whilst balancing other considerations including but not limited to the presence of peat, topography, buildability, ornithology and terrestrial and hydro-geomorphological habitat.

1.3 New crossings should be sized appropriately to allow bank/riparian habitat to remain under the crossing. Where this cannot be achieved or may be routinely impassable for mammals, a mammal ledge or alternative tunnel near the watercourse crossing should be incorporated into the watercourse crossing design.

1.4 Mapping of existing and proposed watercourse crossings was undertaken using Geographic Information Systems (GIS) software at the intersections of mapped watercourses with access track routes. **Figure 10.4 Watercourse Crossings (Volume 3: Figures)** shows the crossing locations. A walkover survey was undertaken in September 2024 and a number of existing and proposed watercourse crossing locations were photographed and notes taken of geomorphological characteristics. **Table 1-1 Watercourse Crossings** was created describing these features, with the National Grid Reference (NGR) noted and photographs taken where appropriate. The proposed crossing type in line with **Figure 2.33 Water Crossing Detail (Volume 3: Figures)** is also outlined in this table and listed below:

- Type 1: Small closed pipe culvert – internal diameter ≤ 700 mm.
- Type 2: Large closed pipe culvert – internal diameter ≥ 700 mm.
- Type 3: Pre-cast bottomless culvert.
- Type 4: Clear span bridge.

1.5 This document also lists the breaches of the 50 m buffer zone set around each of the water features. By applying a suitable buffer distance around water features direct physical impacts can be avoided and pollution risks can be substantially reduced (by the distance but also by existing vegetation and other barriers that may exist).

1.6 The only breaches include water crossings (listed within **Table 1-1 Watercourse Crossings)** and works associated with the Headpond, Lower Control Works and one small permanent compound for the valve house that needs to be located close to the watercourse (**Table 1-2 Other Breaches of the 50 m buffer**). For these large spatial design components, it is not practically possible to keep to the 50 m buffer zone.

Water Crossings

Colour key for Table 1-1:

Existing crossing upgrade	
Proposed new crossing	

Table 1-1 Watercourse Crossings

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW27 Crossing 1 NH 45056 29803 Type 3 – Bottomless Culvert	New temporary water crossing on Old Mill Lade for Mill of Tore for use during the construction phase. The channel was seen to be completely dry during the survey; however, it is shown to be wet under flood conditions on SEPA Flood Mapping. Gravel and cobbles were visible in the channel bed.	*No Associated Photographs*	

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW19 Crossing 1 NH 44995 29817 Type 4 – Bailey Bridge	New temporary watercourse crossing (bridge) over the River Enrick which has a High WFD status for morphology. The crossing will be a single spanning structure with abutments for use during the construction phase. Located approximately 1km downstream of the outflow of Loch Meiklie. Large, stable cobbles were visible along the outer edges of this fast-flowing watercourse. Trees and dense vegetation line the riverbanks.		*No Associated Photographs*
SW20 Crossing 1 NH45183 29549 Type 3 – Bottomless Culvert	Existing watercourse crossing (a concrete bottomless box culvert) at Allt Creag an Fhithich approx. 25m upstream of the confluence with the River Enrick. The crossing is located on the existing Forestry and Land Scotland (FLS) access track. The watercourse in this location has a stable bedrock and step pool typology. Some stable cobbles have been deposited both upstream and downstream of the structure.		

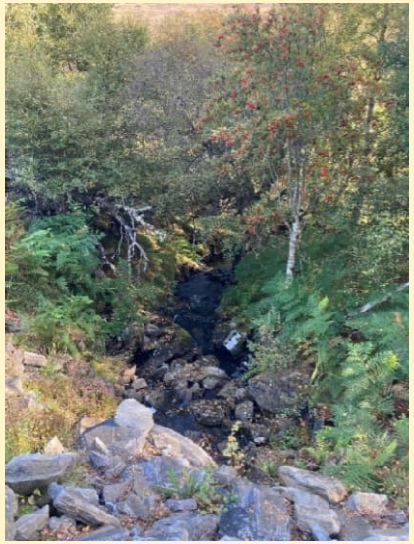
ID, NGR and Crossing Type	Description	Upstream	Downstream
SW21 Crossing 1 NH45255 29549 Type 1/Type 2 – Closed Pipe	Existing watercourse crossing of Caochan na Ruighe Duibhe, a tributary to River Enrick. The crossing is a corrugated plastic pipe, located on the existing FLS access track. The channel upstream of the crossing is subject to extensive gravel deposition. This is likely due to the constraint created by the existing culvert inlet which is set above the bed, leading to a drop in energy and the formation of a pool. The channel downstream was heavily vegetated at the time of the site visit and therefore difficult to view, however the culvert outlet also appears to sit at a higher invert level than the bed which may cause a scouring effect during high flows.	 	

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW28 Crossing 1 NH45477 29475 Type 1/Type 2 – Closed Pipe	Crossing of unnamed watercourse / drainage ditch. The crossing is a corrugated plastic pipe, located on the existing FLS access track. The crossing is located on a ditch which had no flow during the time of survey.		
SW22 Crossing 1 NH45741 29415 Type 3 – Bottomless Culvert	Existing watercourse crossing of Allt na Criche. The crossing is a single culvert with stone surround and is located on the existing FLS access track. The channel upstream and downstream of this structure is subject to extensive gravel and cobble deposition, likely related to the constriction created by the culvert. The channel is wide and flows steeply downhill with large stable boulders evident.		

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW23 Crossing 1 NH46498 29484 Type 1/Type 2 – Closed Pipe	Existing watercourse crossing of unnamed tributary to the River Enrick. The crossing is a corrugated plastic pipe, located on the existing FLS access track. Upstream, the channel is steep, flowing through commercial forestry. There is extensive gravel and cobble deposition, likely related to the constriction created by the culvert.		
SW24 Crossing 1 NH46924 29606 Type 1/Type 2 – Closed Pipe	Existing watercourse crossing of Allt Luirg nam Broc. The crossing is a corrugated plastic pipe within a stone surround, located on the existing FLS access track. Upstream of the crossing, the channel flows over bedrock with step pool formations and small waterfall features. There are large boulders and cobbles contained within the channel. Downstream the channel bed also appears to consist of bedrock.		

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW29 Crossing 1 NH47010 29652 Type 1/Type 2 – Closed Pipe	Existing watercourse crossing of an unnamed tributary to Allt Luirg nam Broc. The crossing is a corrugated pipe, located on the existing FLS access track. The small tributary channel appears relatively natural in form, flowing down the steep hillside with small gravel visible in the bed.		*No Associated Photographs*
SW30 Crossing 1 NH47599 29698 Type 1/Type 2 – Closed Pipe	Existing watercourse crossing of a small unnamed watercourse. The crossing is a corrugated pipe, located on the existing FLS access track. The watercourse here is very small with very little flow seen on the day of inspection. The channel appears relatively natural in form, with small gravel contained in the bed.		*No Associated Photographs*

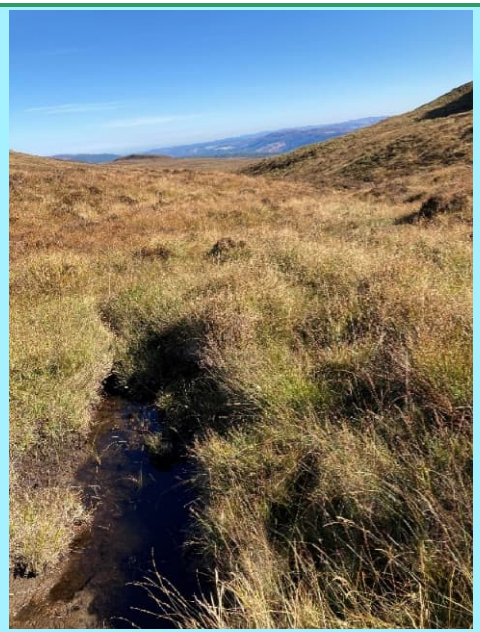
ID, NGR and Crossing Type	Description	Upstream	Downstream
SW25 Crossing 1 NH47940 29438 Type 1/Type 2 – Closed Pipe	Existing watercourse crossing of Drumclune Burn. The crossing is located on the existing FLS access track. The channel banks were heavily vegetated at the time of the site visit and therefore the channel was difficult to view. From what was visible, the channel contained small gravels and flowed naturally down the hillside.		*No Associated Photographs*
SW26 Crossing 1 NH49374 29433 Type 1/Type 2 – Closed Pipe	Existing watercourse crossing of unnamed tributary to the River Enrick. The crossing is located on the existing FLS access track and appears to be a relatively small pipe. The watercourse flows through an area of dense forestry plantation. The channel banks were heavily vegetated at the time of the site visit and therefore the channel was difficult to view. Little flow was visible passing through the culvert. Large, felled trees have been placed at the roadside on top of the inlet and outlet structure.		

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW18 Crossing 1 NH47412 27489 Type 1/Type 2 – Closed Pipe	Existing watercourse crossing of unnamed tributary to the River Coiltie. The crossing is located on the existing FLS access track. The channel banks were heavily vegetated at the time of the site visit and therefore the channel was difficult to view. From what was visible, the channel appeared to contain small gravel and flowed from the steep valley side.		*No Associated Photographs*
SW17 Crossing 1 NH46691 27021 Type 1/Type 2 – Closed Pipe	Existing watercourse crossing of Caochan an Loch Dhuibh. The crossing is a corrugated plastic pipe, located on the existing FLS access track. Both upstream and downstream of the culvert the channel banks are heavily vegetated with trees on the banks. Large angular material is visible in the channel around the inlet which is part of the road construction.		

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW9 Crossing 1 NH46489 26715 Type 3 – Bottomless Culvert	Proposed watercourse crossing to replace the existing ford on the River Coiltie. Upstream of this area is an impoundment structure for a run of river hydropower scheme, which alters the natural flow regime in the affected reach. The channel is relatively unconfined in the vicinity of the crossing. The gradient steepens downstream and there is bedrock and large stable boulders and cobbles present within the channel bed. The banks are lined with moorland vegetation and trees.		*No Associated Photographs*
SW12-C Crossing 1 NH 46026 26415 Type 3 – Bottomless Culvert	Proposed access track watercourse crossing of an un-named tributary to the River Coiltie. This is a small natural watercourse forming from runoff reaching the low point in the topography. The channel is poorly defined but some gravel and silt are present.	 *Photographs taken approximately 50 m upstream of the crossing location.*	

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW12-C Crossing 2 NH 45962 26352 Type 3 – Bottomless Culvert	Proposed access track watercourse crossing of un-named tributary to the River Coiltie. This is a small natural watercourse forming from runoff reaching the low point in the topography. The channel is poorly defined but some gravel and silt are present.		 Photograph taken aproximately 100 m upstream of crossing location.
SW12-B Crossing 1 NH 46185 26070 Type 3 – Bottomless Culvert	Proposed access track watercourse crossing of un-named tributary to Allt Glas Beag. This small watercourse is located in an area of peaty soil. Bedrock is visible in some parts of the channel. The reach viewed on site had varied cross section widths and some transportable gravel was visible within the channel.		

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW12 Crossing 1 NH 46132 25072 Type 3 – Bottomless Culvert	Proposed access track watercourse crossing of un-named tributary to Allt Glas Beag.	 *Photograph taken approximately 350 m downstream of crossing location.*	*No Associated Photographs*

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW11-B Crossing 1 NH 45635 23347 Type 3 – Bottomless Culvert	Proposed access track watercourse crossing of un-named tributary of Allt Coire an Ruighe. This is a small shallow watercourse created by hillslope runoff with a poorly defined channel dominated by peaty, boggy soils. No bedrock or coarse bed material were noted during the survey.	 *Photograph taken approximately 80 m downstream of the crossing location.*	

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW11-B Crossing 2 NH 45652 23217 Type 3 – Bottomless Culvert	Proposed access track watercourse crossing of un-named tributary of Allt Coire an Ruighe. This is a small shallow watercourse created by hillslope runoff. The channel is poorly defined, with a general lack of coarse bed material or bedrock.		
SW3 Crossing 1 NH45591 19142 Type 3 – Bottomless Culvert	Existing access track watercourse crossing of Allt Saigh. The crossing is a bridge with piers. The Allt Saigh is a steep bedrock channel and the crossing is located close to the confluence with Loch Ness. Upstream of the crossing, the watercourse comprises of a short cascade reach within a steep bedrock channel and a small pool has formed immediately upstream of the crossing. Downstream of the crossing, the bed is made up of protruding large bedrock outcrops.		

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW3-D Crossing 1 NH44313 19287 Type 1/Type 2 – Closed Pipe	Existing access track crossing of un-named watercourse which is a tributary of the Allt Saigh. The watercourse has a very steep gradient with bedrock visible upstream Some cobbles and gravels are visible in the channel upstream of the crossing.	 	

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW3-F Crossing 1 NH44047 19197 Type 3 – Bottomless Culvert	Existing access track watercourse crossing of unnamed watercourse which is a tributary of the Allt Saigh. The crossing is a bottomless concrete box culvert with wingwalls and a natural channel bed. Upstream, the channel is very steep, in an incised bedrock reach, with a supply of cobble and gravel material. At the upstream face of the current crossing, the gradient is lower and a pool has formed. Potentially transportable cobble and large gravels are present in the channel downstream of the crossing.		
SW3 Crossing 2 NH43731 19254 Type 4 – Bailey Bridge	Existing access track watercourse crossing of the Allt Saigh. The current structure is an open span metal bridge which has a suspended trash screen structure. Upstream of the bridge, the river is characterised by a bedrock and boulder channel with cobbles and gravels which may be transportable. The river flows through a confined valley, with trees along much of the riparian corridor in this reach.		

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW3-H Crossing 1 NH43385 19324 Type 3 – Bottomless Culvert	Existing access track watercourse crossing of unnamed watercourse.	*No Associated Photographs*	*No Associated Photographs*
SW5 Crossing 1 NH43495 20814 Type 4 – Bailey Bridge	Existing access track watercourse crossing of Allt Loch an t-Sionnaich. The bridge is a single span, metal structure with no abutments. The watercourse has a steep gradient and is dominated by bedrock and step pool typologies with no significant coarse bed material noted.		

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW7 Crossing 1 NH4341721321 Type 1/Type 2 – Closed Pipe	Existing access track watercourse crossing/impoundment of unnamed tributary to Allt Loch an t-Sionnaich. The crossing is located at an intake structure where the watercourse is dammed. Sediment transport processes are likely to be significantly impacted by the intake structure. Downstream of the crossing, water emerges through a circular concrete culvert into a relatively low gradient channel with significantly reduced flows.		
SW5-E Crossing 1 NH 44494 22702 Type 3 – Bottomless Culvert	This un-named tributary to Allt Loch an t-Sionnaich is the outfall from Loch Ruighe an t-Seilich and will flow into the Headpond. An access track is proposed over this watercourse to give access to the Embankments. The channel is small and dominated by cobbles and bedrock with a step pool typology.	*No Associated Photographs*	*No Associated Photographs*

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW5-E Crossing 2 NH 44505 22690 Type 3 – Bottomless Culvert	This un-named tributary to Allt Loch an t-Sionnaich is the outfall from Loch Ruighe an t-Seilich and will flow into the Headpond. An access track is proposed over this watercourse to give access to the Embankments. The channel is small and dominated by cobbles and bedrock with a step pool typology.	 *Photograph taken approximately 35 m downstream of the crossing location.*	
SW5-E Crossing 3 NH 44441 22475 Type 3 – Bottomless Culvert	This un-named tributary to Allt Loch an t-Sionnaich is the outfall from Loch Ruighe an t-Seilich and will flow into the Headpond. An access track is proposed over this watercourse to give access to the Embankments. The channel is small and dominated by cobbles and bedrock with a step pool typology.	 *Photograph taken approximately 120 m downstream of crossing location*	 *Photograph taken approximately 120 m downstream of crossing location*

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW5-D Crossing 1 NH 44247 22088 Type 3 – Bottomless Culvert	Proposed crossing of un-named tributary to Allt Loch an t-Sionnaich for access to the Embankments. Note this watercourse is proposed to be diverted into the Headpond following Embankment construction and only a small drainage culvert is expected to be required to allow runoff under the road. The channel is small and dominated by cobbles and bedrock with a step pool typology.		

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW5-B Crossing 1 NH 43749 21993 Type 3 – Bottomless Culvert	Proposed crossing of an un-named tributary to Allt Loch an t-Sionnaich for access to the Embankments. The channel was observed approximately 350 m downstream of the crossing location and was seen to gently meander around areas of hard bedrock. The channel was deep and incised into the soft ground with no visible gravels.	 *Photograph taken appoximately 350 m downstream of crossing location*	 *Photograph taken approximately 350 m downstream of crossing location*
SW13 Crossing 1 NH 44627 23729 Type 3 – Bottomless Culvert	Proposed crossing of Allt Glas Mòr for access to the Embankments. The channel is incised and flowing through peat dominated moorland. The planform is sinuous but appears to have been stable over time (i.e. not actively meandering). There is a general lack of coarse sediment. The location of the actual crossing was not visited. Aerial imagery depicts a well-defined channel at the crossing location, of similar size and form to the site photographed.	 *Photograph taken approximately 400 m upstream of crossing location.*	*No Associated Photographs*

ID, NGR and Crossing Type	Description	Upstream	Downstream
SW13 Crossing 2 NH 44574 23681 Type 3 – Bottomless Culvert	Proposed crossing of the small unnamed tributary to the Allt Glas Mòr for access to the Embankments. The site was not visited, but from aerial imagery, it appears similar in form to SW13 but smaller in size.	*No Associated Photographs*	*No Associated Photographs*
SW 31 Crossing 1 NH 48159 21879 Type 3 – Bottomless Culvert	Proposed crossing of the small unnamed tributary to Loch Ness for access to the Lower Control Works. The site was not visited, but from mapping, it appears to be a small, steep watercourse flowing through a wooded area.	*No Associated Photographs*	*No Associated Photographs*

Water Feature Buffer

Table 1-2 Other Breaches of the 50 m buffer

Breach of 50 m Buffer	Water feature	Works Description	Photograph
NH 48111 21786	Loch Ness	Lower Control Works	No Associated Photographs
NH 44374 22429	SW15	The Main Dam and Headpond will directly cut off by the Main Dam.	

Breach of 50 m Buffer	Water feature	Works Description	Photograph
NH44453 22292	Tributary to SW15	Will be lost to the Proposed Development	
NH44633 21965	SW5	The upper reaches of this watercourses between Loch nam Breac Dearga and where the Main Dam will be located will be lost to the Proposed Development.	

Breach of 50 m Buffer	Water feature	Works Description	Photograph
NH 45130 22288	Loch nam Breac Dearga (SW8)	Loch Nam Breac Dearga will be completely lost to the Proposed Development.	
20 m from Saddle Dam 2	Allt Coire an Ruighe (SW11)	Saddle Dam 2 will be built upgradient from SW11.	

Breach of 50 m Buffer	Water feature	Works Description	Photograph
SW16 lies approx. 35 m east of Saddle Dam 1	SW16	Saddle Dam 1	
SW5 is within 30m of Permanent Compound 12	SW5	Permanent Compound 12	No Associated Photographs

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