Scottish & Southern Electricity Networks

TRANSMISSION

Creag Dhubh to Dalmally 275kV Connection

Environmental Impact Assessment

Volume 4 | Technical Appendix 10.4

Watercourse Crossing Assessment

April 2022

CONTENTS

List of Abbreviations

CAR	The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)
CEMP	Construction environment Management Plan
CIRIA	Construction Industry Research and Information Association
DWPA	Drinking Water Protection Area
ECoW	Environmental Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
GBR	General Binding Rule
GEMP	General Environmental Management Plan
GWDTE	Groundwater Dependent Terrestrial Ecosystem
NGR	National Grid Reference
OCEMP	Outline Construction Environmental Management Plan
OHL	Overhead Line
PPP	Pollution Prevention Plan
RBMP	River Basin Management Plan
SEPA	Scottish Environment Protection Agency
SSEN	Scottish and Southern Electricity Networks
SPEN	Scottish Power Energy Network
WC	Watercourse Crossing
WEWS Act	The Water Environment and Water Services (Scotland) Act 2003
WFD	Water Framework Directive

1 INTRODUCTION

1.1 The Proposals

1.1.1 This Technical Appendix (TA) presents information relevant to the Creag Dhubh to Dalmally 275kV Connection. It should be read in conjunction with the **Volume 2 – EIA Report** specifically **Chapter 2: Description of the Proposed Development, Chapter 6: Biodiversity,** and **Chapter 10: Hydrology, Hydrogeology, Geology and Soils**.

1.1.2 Scottish and Southern Electricity Networks (SSEN) Transmission, operating under licence as Scottish Hydro Electric Transmission plc, who own, operate and develop the high voltage electricity transmission system in the north of Scotland and remote islands (hereafter referred to as the 'Applicant'). Due to the growth in renewable electricity generation in the north and north-east of Scotland, upgrade of the transmission network is required in order to provide the necessary increase in transmission capacity.

1.1.3 The Applicant is proposing to apply for consent under section 37 of the Electricity Act 1989 to construct and operate a 13.3 kilometre (km) double circuit 275 kV overhead line (OHL), supported by lattice steel towers between a proposed substation at Creag Dhubh to the existing Scottish Power Energy Networks (SPEN) 275 kV OHL that runs from Dalmally to Inverarnan, near Succoth Glen, connecting via a Tie-In connection (the 'Proposed Development'). The location of the Proposed Development is shown in **Figure 1.1: Location Plan and Overview (EIAR Volume 3a).**

1.2 The Regulations

1.2.1 Principal legislation regarding the water environment is provided by the EU Water Framework Directive (WFD[1]) which aims to protect and enhance the quality of surface freshwater (including lakes, rivers, and streams), groundwater, Groundwater Dependent Terrestrial Ecosystems (GWDTEs), estuaries and coastal waters.

1.2.2 The key objectives of the WFD relevant to this assessment are:

- To prevent deterioration and enhance aquatic ecosystems; and
- To establish a framework for protection of surface freshwater and groundwater.

1.2.3 The WFD resulted in the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act[2]), which gives Scottish Ministers powers to introduce regulatory controls over water activities to protect, improve and promote sustainable use of Scotland's water environment.

- The Scottish Environment Protection Agency (SEPA) is the public body responsible for environment protection in Scotland under the Environment Act 1995 and the WEWS Act.

1.2.4 The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)[3] (CAR) provide a mechanism to deliver protection of the water environment. It details activities which are regulated by SEPA and the different levels of authorisation for activities likely to affect the water environment including:

[1] European Commission. The EU Water Framework Directive – integrated river basin management for Europe. https://ec.europa.eu/environment/water/water-framework/index_en.html [Last accessed: January 2022]

[2] Water Environment and Water Services (Scotland) Act 2003. https://www.legislation.gov.uk/asp/2003/3/contents [Last accessed: October 2021].

[3] The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide. Version 8.4 October 2019.

- Discharges to all wetlands, surface waters and groundwaters (replacing the Control of Pollution Act 1974);
- Impoundments (dams and weirs) of rivers, lochs, wetlands, and transitional waters; and
- Undertaking of engineering works in inland waters and wetlands.

1.2.5 The Proposed Development will require authorisation under CAR for access track watercourse crossings required to construct the Proposed Development. Section 4.2 of this TA details the levels of CAR authorisation and likely level of authorisation that will be required for the Proposed Development.

1.2.6 The SEPA Position Statement on Culverting Watercourses[4] (WAT-PS-06-02) and Supporting Guidance on Sediment Management[5] (WAT-SG-78) have also been taken into account within this assessment along with the supporting guidance provided in the River Crossings Good Practice Guide[6].

1.3 Purpose of this Baseline Report

1.3.1 This document provides:

- a conceptual assessment of watercourse crossings, including the strategy for their development, but does not comment on detailed engineering design. The Principal Contractor (the 'Contractor') would have overall responsibility for designing watercourse crossings, production of the final Watercourse Crossing Plan and for compliance with the CAR licence and SEPA's good practice guidelines;
- the likely level of CAR authorisation required; and
- the general principles of design the Contractor would follow to minimise changes to the hydrological regime and reduce any potential impacts on river morphology and aquatic ecology.

1.3.2 As part of the Environmental Impact Assessment (EIA) process, it was identified that access tracks required to construct the Proposed Development would cross more than 45 watercourses. The watercourse crossings are identified in **Figure 10.4.1 a-i (Appendix A)**.

[4] SEPA Position Statement to support the implementation of the Water Environment (Controlled Activities) (Scotland) Regulations 2001: WAT-PS-06-02: Culverting of Watercourses – Position Statement and Supporting Guidance. June 2015. Version 2.0. https://www.sepa.org.uk/media/150919/wat_ps_06_02.pdf [Last accessed October 2021].

[5] SEPA Supporting Guidance (WAT-SG-78). Sediment Management Authorisation (replacing WAT-PS_06-03). Version 1. December 2012. https://www.sepa.org.uk/media/151062/wat-sg-78.pdf [Last accessed October 2021].

[6] Engineering in the water environment: good practice guide: River crossings. Second edition, November 2010 https://www.sepa.org.uk/media/151036/wat-sg-25.pdf [Last accessed October 2021].

2 METHODOLOGY

2.1 Desk Study

2.1.1 The baseline hydrology of the site has been characterised as part of the EIA and sections relevant to the watercourse crossing assessment are summarised in this document.

2.1.2 The assessment utilised the following opensource datasets:

- Ordnance Survey (OS) 1:10,000 scale mapping;
- NatureScot Site Link[7];
- SEPA River Basin Management Plan[8]; and
- SEPA Flood Maps[9].

2.2 Field Survey

2.2.1 Field surveys of watercourses along the Proposed Indicative Alignment were conducted on 10th – 14th May 2021 in order to inform an assessment of the hydrological characteristics of the watercourses which could interact with the Proposed Development. Conditions at the time of the survey were mixed with periods of heavy rain and sunshine.

2.2.2 The survey was carried out by Briony McIntosh, a certified River Habitat Surveyor and Ramboll hydrologist with five years' experience undertaking hydrological field studies.

2.2.3 The survey was used to gain a high-level understanding of the key characteristics of watercourses which may interact with the Proposed Development and not to represent a detailed assessment of specific watercourse crossing locations which would be undertaken by the contractor as part of detailed design.

2.2.4 Geo-located survey points were collected, along with photographs, stream width, stream depth, and bed substrate information. These watercourse characteristics can be used to match the most appropriate crossing type during detailed design. An indication of the proposed crossing type at this stage is given in **Table 10.4.1** in this TA.

2.3 Limitations and Assumptions

2.3.1 Surveying was carried out at the early stages of the design and survey points were taken at the closest accessible location on the watercourses along the Proposed Indicative Alignment. Therefore, the surveyed points are not at the exact proposed access track crossing points. The watercourses characteristics do not, however, vary significantly upstream and downstream of the surveyed point. The survey is not intended as a detailed survey of each specific watercourse crossing location, it is an inspection of the site in general to inform an assessment of the hydrological regime in the area (e.g. are they ephemeral streams, fast flowing, deeply incised, wide shallow banked). The results of the survey are, therefore, considered suitably representative of the reach of the watercourse and applicable to the proposed access tracks.

[7] NatureScot Site Link https://sitelink.nature.scot/map [Accessed: 29/10/21]
[8] SEPA Water Environment Hub https://www.sepa.org.uk/data-visualisation/water-environment-hub/ [Accessed: 29/10/21]
[9] SEPA Flood Maps https://map.sepa.org.uk/floodmap/map.htm [Accessed: 29/10/21]

2.3.2 In addition, the survey did not include existing access tracks which the Proposed Development is proposing to use and their associated existing crossings which may not require upgrades as part of the proposed works. A number of these crossings are located along the Corryhoil forestry track which at the time of survey was inaccessible due to active forestry operations.

2.3.3 The Contractor would be responsible for undertaking further detailed watercourse crossing surveys prior to the design and construction of the final watercourse crossings.

2.3.4 Surveying of the crossing locations identified a number of smaller ephemeral streams, not considered as formal watercourses, which are indicative of surface water runoff accumulation or saturated peatland soils, influenced by land use activities such as grazing livestock. These features were not observed to support distinctly aquatic habitats or hydromorphological characteristics. As such, any potential impacts of the Proposed Development on these surface water flow paths are considered in **Chapter 9: Geology, Soils, Hydrology and Hydrogeology (Volume 2 EIAR).**

2.3.5 Watercourses or drainage features observed onsite and as shown in **Appendix B: Photodoc** were in some cases obscured by heavy vegetation. Although the watercourse or drainage feature is not always clearly visible in the photos, a detailed survey of the watercourse was conducted by the qualified surveyor to obtain the information relevant to this assessment.

2.3.6 The Contractor would have overall responsibility for designing water crossings, for the production of the final Watercourse Crossing Plan and for compliance with CAR and the SEPA good practice guidelines.

3 RESULTS

3.1 Desk Study

3.1.1 The river catchments that the Proposed Development passes through predominantly drain to Loch Awe and are catchments of the River Orchy, Teatle Water, and the Cladich River; in addition there are a number of smaller watercourses including Allt Fearna, Eas nan Ruadh, Allt Mhualuidh, Allt Fearna and Allt Fhuaran and other unnamed watercourses. With exception to this, is the southern-most section of the proposed OHL, which is located within the River Aray catchment and drains southwards to Loch Fyne.

3.1.2 The River Aray, River Cladich, and River Orchy are classified in the SEPA River Basin Management Plan (RBMP) as being in overall 'Moderate' condition, and the Teatle Water as being in overall 'Good' condition.

3.1.3 Loch Awe (to which the majority of the Proposed Development eventually drains) is classified as a Heavily Modified waterbody under the WFD classification scheme. The overall status of Loch Awe is assessed as being of 'Moderate Ecological Potential', the overall ecology is 'Poor' and the Physico-Chemical status of the Loch is 'Good'.

3.1.4 The Loch Fyne Upper Basin is a coastal waterbody which is classified as being of 'Good' overall status, 'Good' ecological status, and 'High' physico-chemical status by SEPA.

3.1.5 An unnamed tributary to the Cladich Water with direct connectivity to the Proposed Development and associated proposed access tracks, is within a Scottish Water Drinking Water Protection Area (DWPA). A Scottish Water intake is present on the stream at NGR 209680, 721112, and that Scottish Water should be notified of works within the DWPA. Records indicate that water is piped from the abstraction point to the north. Further details on the DWPA are within **Chapter 9: Geology, Soils, Hydrology and Hydrogeology (Volume 2 EIAR).**

3.2 Field Survey

3.2.1 Surveying was carried out at the early stages of the design by an experienced Ramboll hydrologist. Survey points were taken at the closest accessible location on the watercourses along the Proposed Indicative Alignment. This was considered suitable to capture watercourse characteristics within the vicinity of the proposed towers and therefore areas where new access tracks were likely to be proposed. As the watercourse characteristics do not vary significant upstream or downstream, the survey points are considered representative of the watercourse characteristics in that area and to the survey results are suitable to inform this conceptual assessment of watercourse crossings. As a result, the surveyed points are not at the exact proposed access track crossing points which would be surveyed further by the contractor as part of detailed design. Additionally, the survey did not include sections of existing track to be utilised. Refer to Section 2.3 for details on the limitations and assumptions on the field survey.

3.2.2 A total of 64 potential watercourse crossing points (**Figure 10.4.1, Appendix A**) have been identified for the proposed access tracks, of which 44 are existing crossings and have not been included further in this assessment.

3.2.3 As noted in the assumptions and limitations (Section 2.3), and in Section 3.2.1, surveys were completed along the Proposed Indicative Alignment where new infrastructure is proposed, and not existing tracks to be utilised. Therefore, of the 64 access track crossings required for the Proposed Development: 44 are existing crossings which were not the focus of the survey and / or were inaccessible at the time of survey due to active forestry operations; 15 locations are proposed new crossings which were surveyed in order to assess the characteristics of the watercourses which would be crossed (**Table 10.3.1**) and 4 locations are existing watercourse surveys along the survey route (**Table 10.3.2**). The locations are shown in**, Figure 10.4.2a-i (Appendix A)**.

3.2.4 Photographs of the watercourse survey locations are presented in **Appendix B, Photodoc**. The average channel width, depth, and bed substate material are presented in **Table 10.3.1**.

Table 10.3.1: Watercourse Survey Locations

Reference	Description	Width (m)	Depth (m)	Bed Substrate[10]
4	Unnamed Burn	0.4	0.6	peat
5	Unnamed Burn	1.0	0.3	cobble
7	Unnamed Burn	1.2	0.5	cobble
8	Unnamed Burn	0.5	0.3	peat
9	Unnamed Burn	1.0	1.0	gravel/pebble
10	Ephemeral flow path	0.3	0.4	gravel/pebble
11	Unnamed Burn	1.3	1.0	cobble
12	Ephemeral flow path	0.4	0.4	peat
13	Ephemeral flow path	0.2	0.1	peat
14	Ephemeral flow path	0.3	0.2	peat
15	Ephemeral flow path	0.3	0.3	peat
16	Unnamed Burn	0.3	0.5	gravel/pebble
17	Unnamed Burn	2.0	0.5	cobble

[10] River / stream substrate was taken as the predominant clast size and based on the Wentworth Scale 1922. C.E. Wentowrth. 1922. A scale of grade and class terms for clastic sediments. The Journal of Geology. Vol 30. No 5. 377-392.

Table 10.3.1: Watercourse Survey Locations				
18	Unnamed Burn	1.5	1.0	cobble
19	Ephemeral flow path	0.2	0.1	peat

Table 10.3.2: Watercourse Survey Locations – At Existing Crossings

Reference	Description	Stream Width (m)	Stream Depth (m)	Crossing Width (m)	Crossing Height (m)	Type of Culvert
1	Unnamed Burn	0.4	0.3	6.0	2.0	Circular Culvert
2	Unnamed Burn	0.4	0.2	6.0	1.0	Circular Culvert
3	River Array	2.5	0.7	7.0	3.0	Circular Culvert
6	Unnamed burn	1.0	0.4	2.0	1.2	Circular Culvert

4 CROSSINGS

4.1 Potential Types of Crossing Considered

4.1.1 The watercourse characteristics, both physical and ecological, would be matched to the most appropriate crossing type during detailed design. The potential crossing types are described below, with example photos shown in SEPAs River Crossings Good Practice Guide[6]:

- Single span structures - recommended where there is a need to minimise disturbance to the bank and bed of the watercourse. Where it is possible to set back abutments from the watercourse, it should be possible to maintain bank habitats under the crossing. Taking into account the maximum width of crossings to be undertaken on the proposed development, it is not anticipated that in-stream supports would be necessary at any crossings.
- Bottomless Box/ Arches - can be used where there are watercourses narrower than those appropriate for bridge construction but which have a requirement to provide mammal and/ or fish passage and ensure sufficient hydraulic capacity during peak flow periods. Arches minimise disruption to the streambed. Box culverts may incorporate mammal ledges and can be buried below stream bed level to enable bed material replacement.
- Circular Culverts - where potential impact is negligible due to the size, location or typology of the watercourse, circular culverts can be embedded into the channel to allow the natural bed to re-establish. Where necessary, provision can also be made for mammals adjacent to the culvert. Where a circular culvert is utilised, it is assumed that neither natural bed material nor water velocity nor depth are critical other than in respect of very localised hydraulics. In these cases, circular culverts are a more economical solution.
- Porous granular rock fill blanket and perforated pipes - where there is no clearly defined channel flow, flow can be maintained by a drainage blanket wrapped in geotextile placed below the road construction. Where such a crossing structure is utilised, flow is predominantly sub-surface interflow and a porous fill below the track provides flow continuity without concentrating the discharges into a narrow channel.

4.2 CAR Authorisations

4.2.1 The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended), A Practical Guide[11], Section 2.1 defines the level of authorisation for the carrying out of building or engineering works or works other than impounding works in:

- inland surface waters (other than groundwater) or wetlands; or
- in the vicinity of inland water or wetlands and having, or likely to have, a significant adverse impact on the water environment.

4.2.2 In order to allow for proportionate regulation based on the risk an activity poses to the water environment, there are three types of CAR authorisation as described in the following paragraphs.

4.2.3 The construction of bridges and other crossings needed for the Proposed Development will be applied for through SEPA under the appropriate level of CAR authorisation, by the Contractor.

[11] 4.2.1 The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended), A Practical Guide. Version 9.1, March 2022. https://www.sepa.org.uk/media/34761/car_a_practical_guide.pdf [Accessed April 2022]

Levels of Authorisation

General Binding Rules

4.2.4 General Binding Rules (GBRs) cover specific low risk activities. Activities complying with the rules do not require an application to be made to SEPA because compliance with a GBR is considered to be compliance with an authorisation. Since the Applicant or its Contractor is not required to apply to SEPA, there are no associated charges.

4.2.5 SEPA uses its statutory role in the land use planning system to highlight GBRs that may apply to a given proposal. The individual GBRs are described in more detail in the appropriate regime-specific sections of the CAR: Practical Guide section 2.2[3].

Registrations

4.2.6 These allow for the registration of small-scale activities that individually pose low environmental risk but, cumulatively, can result in greater environmental risk. The Applicant or its Contractor must apply to SEPA to register these activities. A registration will include details of the scale of the activity and its location, and there will be a number of conditions of registration that must be complied with. There is an application fee for registrations, though subsistence (annual) charges do not apply.

Licences

4.2.7 These allow for site-specific conditions to be set to protect the water environment from activities that pose a higher risk. Licences can cover linked activities on a number of sites over a wide area, as well as single or multiple activities on a single site. Application fees apply to all licences, and subsistence (annual) charges may apply. SEPA has simple licences and complex licences for activities for which different charges apply.

4.2.8 A key feature of CAR licences, unlike GBRs and registrations, is that they require the applicant to nominate a 'responsible person' (i.e. an individual/ partnership/ company) to be held accountable for securing compliance with the terms of the licence.

4.3 Assessed Likely Levels of CAR Authorisation

4.3.1 A total of 64 watercourse crossings are likely to be required for the construction of the Proposed Development, of which 44 are existing crossings. Four existing crossings in the vicinity of the Creag Dhubh substation were surveyed and comprise of circular culverts (**Table 10.3.2**). For the purposes of this TA, it has been assumed if upgrades are required to any of the 44 existing crossings, they would be replaced with new circular culverts, subject to detailed design. This is likely to require Registration or a Simple Licence.

4.3.2 Four of the proposed (new) crossings are located on watercourses with a width >1 m (crossing reference 7, 11, 17, 18 **Table 10.3.1**) which would require either a circular culvert or single-span bridge (**Table 10.4.1**). SEPA guidance typically requires that single span structures be designed where feasible, especially for wider watercourse crossings where a bridge design would typically be considered more appropriate. Subject to detailed design, these bridge crossings are considered to fall under CAR Registration.

4.3.3 At five of the proposed crossings (crossing reference 4, 5, 8, 9, 16 **Table 10.3.1**), it has been assumed for the purposes of this TA that a proposed watercourse crossing would constitute culverts (**Table 10.4.1**) with construction on the bed or banks of the watercourses only. Where feasible, bottomless arched culverts may be installed. However, it is noted that closed culverts are likely to be appropriate at most locations due the small size of watercourses, artificial morphology, or intermittent flow. This suggests that these smaller crossings would require Registration or a Simple Licence, subject to detailed design.

4.3.4 Six of the proposed crossings (crossing reference 10, 12, 13, 14, 15, 19 Table 10.3.1) are ephemeral streams with intermittent flow. These crossing points are likely to require circular culverts or cross drains (**Table 10.4.1**) which are likely to require Registration or a Simple Licence, subject to detailed design.

4.3.5 As the Proposed Development exceeds 4 ha, and contains >5 km track/ road, it is anticipated that a Construction Site License (CSL) would be required under the CAR. The appointed Contractor would prepare application materials in consultation with SEPA.

4.4 Anticipated Watercourse Crossings and Principles of Track Drainage

4.4.1 The detailed design of each watercourse crossing would seek to ensure hydraulic conveyance is maintained to prevent any restriction of flows, as well as allowing the free passage of mammals and aquatic ecology. Therefore, it is proposed that each watercourse crossing would have sufficient capacity to convey the peak flows associated with a 1 in 200 (0.5%) annual probability event (inclusive of a climate change allowance and an allowance for partial blockage). Anticipated watercourse crossing types for the proposed crossings are specified in **Table 10.4.1** below. For the purposes of this TA is has been assumed the existing crossings would remain in-situ or be replaced by new circular culverts subject to detailed design. The location of the crossings are shown in **Figure 10.4.2 (Appendix A).**

4.4.2 Detailed flow calculations would be undertaken by the Contractor in order to inform detailed design and to inform applications for CAR authorisation. Any new crossings identified by the Contractor, additional to those above, would give consideration to any local variations in channel dimensions and to bankside conditions. Where feasible within micrositing allowances, the narrowest locations would be selected, and the stability of the channel banks would be considered.

4.4.3 Construction shall be carried out in accordance with SEPA best practice[12] and SEPA Guidance for Pollution Prevention[13]. Splash boards and run-off diversion measures, including silt fencing adjacent and parallel to watercourses beneath bridges and at culvert crossings, would be used at all crossings during construction to prevent direct siltation of watercourses.

Table 10.4.1: Proposed Crossings - Anticipated Watercourse Crossing Type

Reference	Description	Width (m)	Likely Method of Crossing	Justification
4	Unnamed burn	0.4	Circular culvert	Watercourse <1 wide. Lowland burn with limited hydraulic potential.

[12] SEPA, 2010. Engineering in the Water Environment: Good Practice Guide, River Crossings.
[13] SEPA 2018. Works and Maintenance in or Near water: GPP5

Table 10.4.1: Proposed Crossings - Anticipated Watercourse Crossing Type				
5	Unnamed Burn	1.0	Circular culvert	Watercourse <1 wide. Lowland burn with limited hydraulic potential.
7	Unnamed Burn	1.2	Circular culvert / single-span bridge	Watercourse >1 wide. Lowland burn but more defined channel with higher hydraulic potential.
8	Unnamed Burn	0.5	Circular culvert	Watercourse <1 wide. Lowland burn with limited hydraulic potential.
9	Unnamed Burn	1.0	Circular culvert	Watercourse <1 wide. Lowland burn with limited hydraulic potential.
10	Ephemeral flow path	0.3	Circular culvert / cross drain	Watercourse <1 wide. Lowland burn with limited hydraulic potential.
11	Unnamed Burn	1.3	Circular culvert / single-span bridge	Watercourse >1 wide. Lowland burn but more defined channel with higher hydraulic potential.
12	Ephemeral flow path	0.4	Circular culvert / cross drain	No defined channel. Lowland surface water feature. Very limited hydraulic potential.
13	Ephemeral flow path	0.2	Circular culvert / cross drain	No defined channel. Lowland surface water feature. Very limited hydraulic potential.
14	Ephemeral flow path	0.3	Circular culvert / cross drain	No defined channel. Lowland surface water feature. Very limited hydraulic potential.
15	Ephemeral flow path	0.3	Circular culvert / cross drain	No defined channel. Lowland surface water feature. Very limited hydraulic potential.
16	Unnamed Burn	0.3	Circular culvert	Watercourse <1 wide. Lowland burn with limited hydraulic potential.
17	Unnamed Burn	2.0	Circular culvert / single-span bridge	Watercourse >1 wide. Lowland burn but more defined channel with higher hydraulic potential.
18	Unnamed Burn	1.5	Circular culvert / single-span bridge	Watercourse >1 wide. Lowland burn but more defined channel with higher hydraulic potential.
19	Ephemeral flow path	0.2	Circular culvert / cross drain	No defined channel. Lowland surface water feature. Very limited hydraulic potential.

4.4.4 The key measures to prevent impacts to watercourses and surface water resources in the area will be set out in a Construction Environmental Management Plan (CEMP), and detailed Pollution Prevention Plan (PPP), which will be prepared and implemented by the Principal Contractor following the determination of the Application for s37 consent. These would include an outline of the proposed approach to construction methods and environmental protection during all aspects of the construction phase, including standard pollution prevention guidelines to ensure no water pollutants would reach sensitive receptors. An Outline CEMP has been provided in **TA 2.1 (EIAR Volume 4)**.

4.4.5 General Environmental Management Plans (GEMP) (**TA 2.3, EIAR Volume 4**) would be implemented by the Contractor. GEMP – Working in Sensitive Habitats, states adequate track drainage would be installed through the use of culverts at regular intervals. Culverts used for cross drainage should comply with CIRIA guidance and be installed in compliance with CAR.

4.4.6 To ensure that all drainage measures employed during the construction phase of the Proposed Development are maintained appropriately and remain effective, the performance of the drainage measures would be monitored. The drainage management works would be supervised by the Environmental Clerk of Works (ECoW). A Planning Monitoring Officer (PMO) will also be responsible for checking consent conditions and licences are adhered to.

4.4.1 One new stone temporary access track is proposed to be constructed within the Cladich Water DWPA. This will include one watercourse crossing. An existing access track (to be upgraded) and crossing is also located within the DWPA. Working methods will be agreed in liaison with Scottish Water and at least three months' notice of works will be provided to Scottish Water. Works shall be carried out in line with the CEMP and PPPs incorporating stringent pollution control measures. Works within the DWPA will be supervised by the ECoW, visual inspection and sampling of the watercourse and intake point will be carried out and ongoing liaison with Scottish Water will be undertaken throughout works within the DWPA.

Appendix A – Figures

Figure 10.4.1: Watercourse Crossings

Figure 10.4.2: Watercourse Crossing Survey

Appendix B: Photodoc

This photo document supports the Watercourse Crossing Assessment. It should be noted that some of the watercourses or drainage features observed onsite were obscured by heavy vegetation. At such locations, although the watercourse or drainage feature is not always clearly visible in the photos below, inspection by the surveyor has been carried out to provide detail relevant to the assessment.

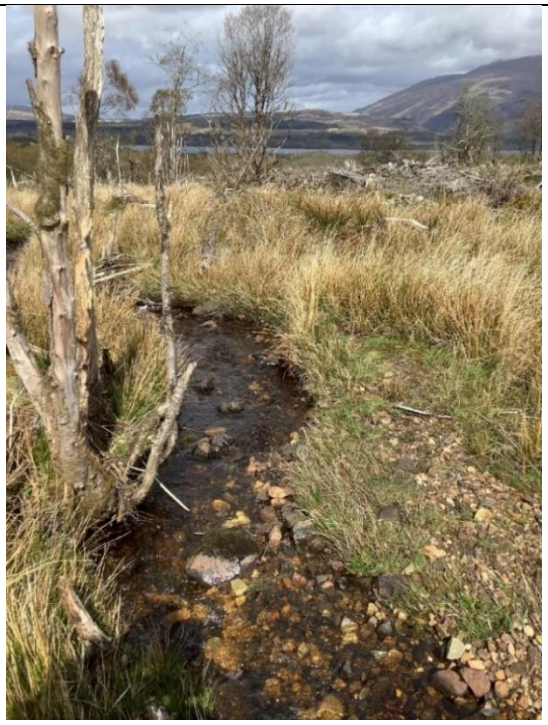
Watercourse survey references provided in the photo document below relate to location as shown in **Appendix A, Figure 10.4.2**.

Survey Location 1
Existing crossing: circular culvert.
 Photo 1: Downstream
 Photo 2: Upstream

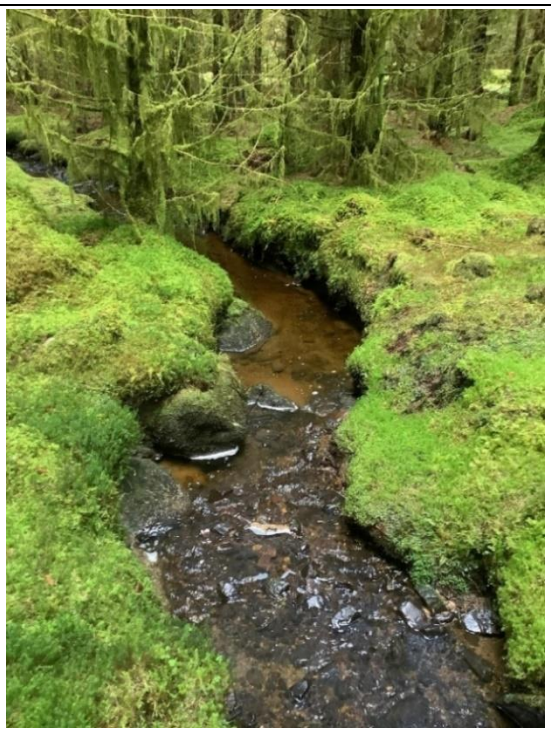
Survey Location 2
Existing crossing: circular culvert.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 3
Existing crossing: circular culvert.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 4
Anticipated crossing: circular culvert.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 5
Anticipated crossing: circular culvert
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 6
Existing crossing: circular culvert
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 7
Anticipated crossing: circular culvert.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 8
Anticipated crossing: circular culvert.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 9
Anticipated crossing: circular culvert.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 10
Ephemeral flow path. Anticipated crossing: circular culvert or cross drain.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 11
Anticipated crossing: circular culvert / single-span bridge.
 Photo 1: Downstream
 Photo 2: Upstream

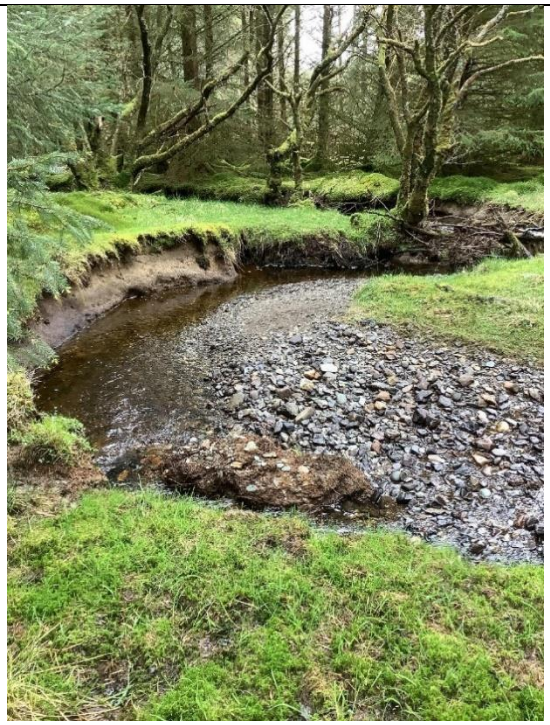
Survey Location 12
Ephemeral flow path. Anticipated crossing: circular culvert or cross drain.
 Photo 1: Downstream
 Photo 2: Upstream

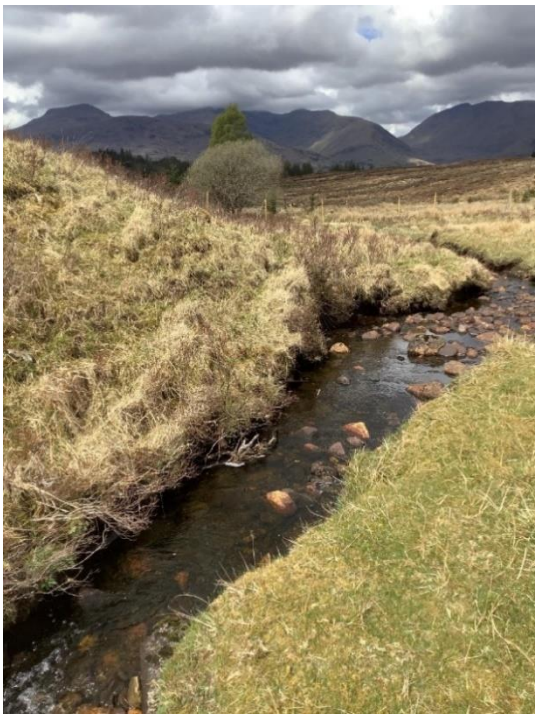
Survey Location 13
Ephemeral flow path. Anticipated crossing: circular culvert or cross drain.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 14
Ephemeral flow path. Anticipated crossing: circular culvert or cross drain.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 15
Ephemeral flow path. Anticipated crossing: circular culvert or cross drain.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 16
Anticipated crossing: circular culvert or cross drain.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 17
Anticipated crossing: single-span bridge.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 18
Anticipated crossing: circular culvert or single-span bridge.
 Photo 1: Downstream
 Photo 2: Upstream

Survey Location 19
Ephemeral flow path. Anticipated crossing: circular culvert or cross drain.
 Photo 1: Downstream
 Photo 2: Upstream