Creag Dhubh to Inveraray 275 kV Connection Environmental Impact Assessment

Volume 4 | Appendix 11.1

Watercourse Crossing Assessment

June 2022

CONTENTS

List of Abbreviations

BGS	British Geological Survey
CAR	Controlled Activity Regulations
CEMP	Construction Environmental Management Plan
ECoW	Ecological Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
GBR	General Binding Rules
GEMP	General Environmental Management Plans
GWDTE	Groundwater Dependent Terrestrial Ecosystems
OHL	Overhead Line
OS	Ordnance Survey
PMO	Planning Monitoring Officer
PPP	Pollution Prevention Plan
RBMP	River Basin Management Plan
SAC	Special Area of Conservation
SEPA	Scottish Environment Protection Agency
WEWS	Water Environment and Water Services (Scotland) Act 2003
WFD	Water Framework Directive

1 INTRODUCTION

1.1 The Proposals

1.1.1 This Appendix presents information relevant to the Creag Dhubh to Inveraray 275 kV Connection. It should be read in conjunction with **Volume 2** of the **EIA Report** for full details of the Proposed Development.

1.1.2 Scottish Hydro Electric Transmission plc (the Applicant) who, operating and known as Scottish and Southern Electricity Networks Transmission (SSEN Transmission), own, operate and develop the high voltage electricity transmission system in the north of Scotland and remote islands.

1.1.3 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.

1.1.4 The Applicant is proposing to apply for consent under Section 37 of the Electricity Act 1989 to construct and operate a 9 km double circuit 275 kV OHL, supported by steel lattice towers between a proposed substation at Creag Dhubh and the recently constructed Inveraray-Crossaig 275 kV capable OHL circuit, in Argyll, Scotland (the 'Proposed Development'). The Proposed Development is shown in **Figure 2.1: Proposed Development (EIAR Volume 3a).**

1.2 The Regulations

1.2.1 The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017, hereafter referred to as the 'EIA Regulations', contain two schedules. Schedule 1 lists projects where an Environmental Impact Assessment (EIA) is mandatory. Schedule 2 lists projects where EIA may be required "where proposed development is considered likely to give rise to significant effects on the environment by virtue of factors such as its nature, size or location".

1.2.2 The Proposed Development falls within Schedule 1 of the EIA Regulations, as it meets criteria of paragraph (3) of Schedule 1[1]. An EIA is therefore mandatory, and an Environmental Impact Assessment Report (EIA Report) will accompany the Section 37 application.

1.2.3 In addition, under the Principal legislation regarding the water environment is provided by the EU Water Framework Directive (WFD[2]) 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.

1.2.4 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.

1.2.5 The WFD resulted in the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act[3]), 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] https://www.legislation.gov.uk/ssi/2017/101/schedule/1/made

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

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

1.2.6 The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)[4] (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:

- 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.

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

1.2.8 The SEPA Position Statement on Culverting Watercourses[5] (WAT-PS-06-02) and Supporting Guidance on Sediment Management[6] (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[7].

1.3 Purpose of this Baseline Report

1.3.1 This document provides:

- A conceptual assessment of the watercourses which would potentially be crossed, including the strategy for the development of such crossings, but does not comment on the 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 licenses 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 potential impacts on river morphology and aquatic ecology.

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

[5] 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 [Accessed October 2021]

[6] 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 [Accessed October 2021]

[7] 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 [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 EIAR 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[8];
- SEPA River Basin Management Plan[9], and;
- SEPA Flood Maps[10].

2.2 Field Survey

2.2.1 Field surveys of watercourses along the Proposed Development t were conducted on 7 – 8 March 2022. Conditions at the time of survey were mixed with periods of sunshine and light showers.

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. Hannah Otton accompanied her, a Ramboll hydraulic modeller with three years' experience in the field.

2.2.3 The survey was used to gain a high-level understanding of the key watercourse characteristics at locations where the proposed access tracks are indicated to cross a watercourse. 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 likely proposed crossing type at this stage is given in **Table 4.1**.

2.2.4 The results of the survey in relation to the proposed access track crossing points are summarised in this document.

2.3 Limitations and Assumptions

2.3.1 Survey points were taken as close to the proposed crossing location as was considered safe. Access limitations meant two proposed crossings were inaccessible. In addition, some proposed crossings were not surveyed due to changes in the design post-survey. However, watercourse characteristics do not vary significantly upstream or downstream of surveyed points, therefore survey points taken along the same stretch of watercourse are considered representative.

2.3.2 **Figure 11.1.1 (Annex A)** denotes all proposed crossings and surveyed locations, using the same numbering where a survey location is considered representative of the watercourse characteristics at an upstream or downstream proposed crossing.

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

[8] NatureScot Site Link https://sitelink.nature.scot/map [Accessed October 2021]

[9] SEPA Water Environment Hub https://www.sepa.org.uk/data-visualisation/water-environment-hub/ [Accessed October 2021]

[10] SEPA Flood Maps https://map.sepa.org.uk/floodmap/map.htm [Accessed October 2021]

2.3.4 The surveying also identified a number of smaller ephemeral streams, not considered 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 11: Water Environment (EIAR Volume 2).**

2.3.5 Watercourses or drainage features observed on-site as shown in **Annex B: Photodoc,** were in some cases obscured by 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 Proposed Development passes through a number of smaller river catchments including:

- Allt Creag h-Airigh;
- Allt Barain;
- Allt a' Mhagarain;
- Allt Thomais;
- Allt an Spioraid;
- Erallich Water;
- Allt Criche; and
- Quaker's Burn

3.1.2 These watercourses all form part of the wider River Aray catchment draining in a general southerly direction to Loch Fyne.

3.1.3 The River Aray and Erallich Water are classified in the SEPA River Basin Management Plan (RBMP) as being in overall 'Moderate' condition.

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

3.2 Field Survey

3.2.1 Field surveys of watercourses along the proposed access track layout were completed by experienced Ramboll hydrologists.

3.2.2 A total of 60 potential watercourse crossing points (**Annex A: Figure 11.1.1**) have been identified for the proposed access tracks, of which 17 are existing crossings.

3.2.3 As noted in the limitations and assumptions, some survey points are located upstream or downstream of the proposed crossing location. As the watercourse characteristics do not very considerably over these short reaches, they are considered representative of watercourse conditions at the proposed crossing point. In these instances, the surveyed point and proposed crossing location have been given the same numbering in **Figure 11.1.1 (Annex A).**

3.2.4 Photographs of the surveyed points are present in Error! Reference source not found.**.** The average c hannel width, depth and bed substrate material are presented in **Table 3.1.**

Table 3.1: Watercourse Survey Locations - Proposed Crossings

Survey Location*	Name	Width (m)	Depth (m)	Bed Substrate[11]
14	Unnamed	0.60	0.30	Bedrock
15	Unnamed	0.15	0.25	Peat
16	Ephemeral	0.01	0.01	Peat
19	Unnamed	0.25	0.25	Cobble

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

Survey Location*	Name	Width (m)	Depth (m)	Bed Substrate[11]
20	Unnamed	0.15	0.2	Peat, boulder
21	Unnamed	0.15	0.4	Bedrock
22	Allt a' Mhagarain	3.00	0.40	Cobble, boulder
23	Unnamed	1.00	0.75	Cobble
26	Unnamed	0.40	0.50	Cobble
28 (Also representative of Crossings 26 and 27 – same watercourse)	Unnamed	0.40	0.70	Gravel, pebble
32 (Also representative of Crossing 31 – same watercourse)	Unnamed	0.30	0.25	Cobble
34 (Also representative of Crossing 33 – same watercourse)	Unnamed	0.20	0.30	Cobble
35	Unnamed	0.30	1.00	Cobble
36	Unnamed	0.30	0.25	Gravel, pebble
37	Unnamed	0.40	0.40	Bedrock
38 (Also representative of Crossing 39 – same watercourse)	Unnamed	0.30	0.25	Cobble
40	Unnamed	0.25	0.20	Cobble
41	Unnamed	0.15	0.25	Peat
42	Unnamed	0.15	0.10	Peat
43	Unnamed	0.30	0.20	Gravel, pebble
44	Unnamed	0.25	0.30	Gravel, pebble
45	Unnamed	0.30	0.10	Peat, silt

Survey Location*	Name	Width (m)	Depth (m)	Bed Substrate[11]
(Also representative of Crossing 46 – same watercourse)				
47 (Also representative of Crossing 48 – same watercourse)	Unnamed	0.40	0.40	Cobble
49	Unnamed	0.40	0.25	Cobble
50	Unnamed	0.40	0.15	Peat
51	Unnamed	0.30	0.30	Gravel, pebble
54	Unnamed	0.50	0.60	Gravel, pebble
*Numbering as shown in **Figure 11.1.1 (Annex A**)				

Table 3.2: Watercourse Survey - Existing Crossings

Survey* Location	Name	Width (m)	Depth (m)	Crossing Width (m)	Crossing Height (m)	Type of Crossing
1	Quakers Burn	1.0	0.5	6.0	1.0	Circular culvert
2	Allt Bail a' Ghobhainn	0.4	0.3	7.0	1.0	Circular culvert
3	Unnamed	1.5	0.6	3.0	1.5	Single span bridge
4	Unnamed	30.0	0.2	12.0	2.0	Circular culvert
55	Unnamed	0.3	0.2	6.0	1.5	Circular culvert
56	River Aray	2.0	1.2	6.0	1.5	Circular culvert
57	River Aray	0.8	0.2	6.0	1.5	Circular culvert
58	Unnamed	0.3	0.2	6.0	2.5	Circular culvert
59	Unnamed	0.3	0.3	6.0	1.5	Circular culvert
60	Unnamed	0.3	0.2	11.0	1.0	Circular culvert
* Numbering as shown in **Figure 11.1.1 (Annex A)**						

4 CROSSINGS

4.1 Types of Crossing

4.1.1 The characteristics of the watercourses, 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 SEPA's River Crossings Good Practice Guide[7]:

- Single Span Structures - Recommended where there is 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.
- 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 Authorisation

4.2.1 CAR, A Practical Guide, 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.

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[4].

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 Likely Levels of CAR Authorisation

4.3.1 A total of 60 watercourse crossings are likely to be required for the construction of the Proposed Development, of which 17 are existing crossings (**Figure 11.1.1, Annex A,** reference 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 55, 56, 57, 58, 59, and 60). Existing crossings that were surveyed (1, 2, 3, 4, 55, 56, 57, 58, 59, and 60**, Table 3.2**) comprise of circular culverts. For the purposes of this assessment, it has been assumed if upgrades are required to any of the 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 Based on the survey undertaken, two of the proposed (new) crossings are located on watercourses with a width >1 m (survey reference 22 and 22, **Table 3.1**) which would require either a circular culvert or single-span bridge (**Table 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 thirty of the surveyed crossing locations (**Figure 11.1.1, Annex A and Table 3.1** reference 14, 15, 19, 20, 21, 26, 27, 28, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 54), it has been assumed for the purposes of this assessment that a proposed watercourse crossing would constitute culverts (**Table 4.1**) with construction on the bed or banks of the watercourses. 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, or intermittent flow. This suggests that these smaller crossings would require Registration or a Simple Licence, subject to detailed design.

4.3.4 One of the proposed crossings (**Figure 11.1.1**, **Annex A** and **Table 3.1** reference 16) is an ephemeral stream with intermittent flow. This crossing point is likely to require a circular culvert or cross drain (**Table 4.1**) which is likely to require Registration or a Simple Licence, subject to detailed design.

4.3.5 For the ten crossings which were not surveyed or accessible (**Figure 11.1.1, Annex A**) it is assumed for the purposes of this assessment that the proposed watercourse crossing would likely constitute culverts and would require Registration or a Simple Licence, subject to detailed design. The Contractor would be responsible for surveying these watercourses and developing the detailed design.

4.3.6 As the Proposed Development exceeds 4 ha, and contains >5 km track/ road, it is anticipated that a construction site license would be required under the CAR. The Appointed Contractor would prepare application materials in consultation with SEPA.

4.4 Watercourse Crossings

4.4.1 The detailed design of each watercourse crossing would seek to ensure existing 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 4.1** below. For the purposes of this assessment is has been assumed the existing crossings would remain in-situ or be replaced by new circular culverts subject to detailed design. The locations of the crossings are shown in **Figure 11.1.1, Annex 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 4.1: Proposed Watercourse Crossing Type

Survey Location*	Name	Width (m)	Likely Method of Crossing	Justification
14	Unnamed	0.6	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
15	Unnamed	0.15	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
16	Ephemeral	0.01	Circular culvert / cross drain	No defined channel. Lowland surface water feature. Very limited hydraulic potential.
19	Unnamed	0.25	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
20	Unnamed	0.15	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
21	Unnamed	0.15	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
22	Allt a' Mhagarain	3.0	Circular culvert / single-span bridge	Watercourse >1 m wide. Lowland burn but more defined channel with higher hydraulic potential.
23	Unnamed	1.0	Circular culvert / single-span bridge	Watercourse >1 m wide. Lowland burn but more defined channel with higher 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

Survey Location*	Name	Width (m)	Likely Method of Crossing	Justification
26	Unnamed	0.40	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
28	Unnamed	0.4	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
32	Unnamed	0.3	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
34	Unnamed	0.2	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
35	Unnamed	0.3	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
36	Unnamed	0.3	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
37	Unnamed	0.4	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
38	Unnamed	0.3	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
40	Unnamed	0.25	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
41	Unnamed	0.15	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
42	Unnamed	0.15	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
43	Unnamed	0.3	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
44	Unnamed	0.25	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
45	Unnamed	0.3	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
47	Unnamed	0.4	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
49	Unnamed	0.4	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
50	Unnamed	0.4	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
51	Unnamed	0.3	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.
54	Unnamed	0.5	Circular Culvert	Watercourse <1 m wide. Lowland burn with limited hydraulic potential.

* Numbering as shown in **Figure 11.1.1 (Annex A)**

4.5 Track Drainage

4.5.1 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 a detailed Pollution Prevention Plan (PPP), which will be prepared and implemented by the Appointed 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 **Technical Appendix 2.1, EIAR Volume 4**.

4.5.2 SSEN Transmission's General Environmental Management Plans (GEMP) have been drafted (**Technical Appendix 2.3, EIAR Volume 4)** which would be implemented by the Appointed Contractor. The Working in Sensitive Habitats GEMP 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.

4.5.3 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 Ecological Clerk of Works (ECoW). A Planning Monitoring Officer (PMO) will also be responsible for checking consent conditions and licences are adhered to.

5 CONCLUSION

5.1.1 The Applicant is proposing to apply for consent under Section 37 of the Electricity Act 1989 to construct and operate an 8.9 km double circuit 275 kV OHL, supported by steel lattice towers between a proposed substation at Creag Dhubh and the recently constructed Inveraray-Crossaig 275 kV capable OHL circuit, in Argyll, Scotland (the 'Proposed Development').

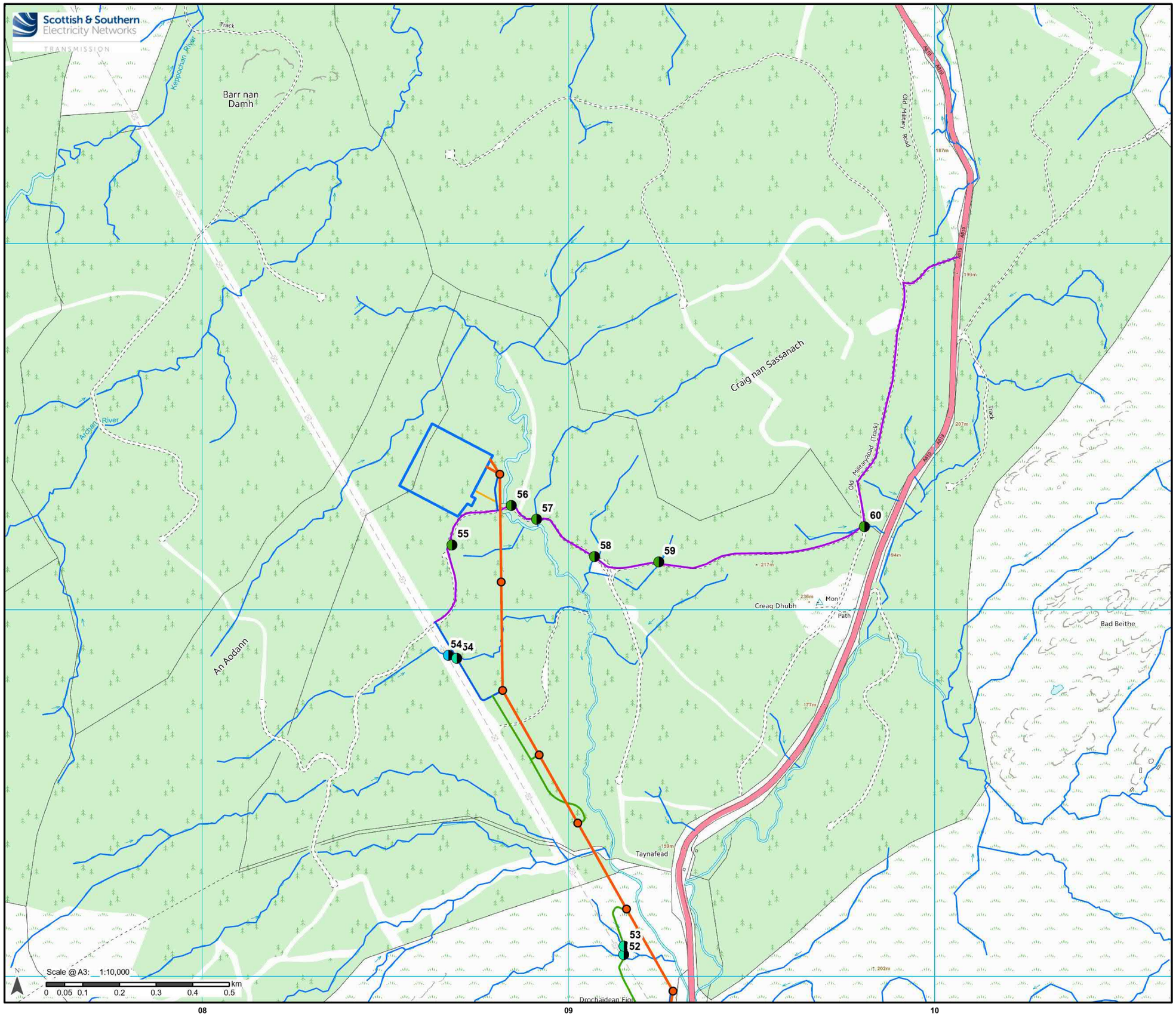
5.1.2 The main findings are stated below:

- A total of 60 watercourse crossings (including existing crossings) would be required to construct the Proposed Development.
- It is anticipated:
    - Upgrades may, or may not, be required for 17 existing watercourse crossings.
    - Two of the proposed (new) crossings would likely require a culvert or single span bridge as the watercourse width is > 1 m.
    - Culverts are anticipated to be required at all other crossing points where stream width is <1 m.
    - One of the proposed crossing locations is over an emphemeral stream with intermittent flow; the result of hillside surface water runoff. This location would likely require cross drains.
- Based on the above, varying levels of CAR authorisation are likely to be required.
- The Appointed Contractor would have overall responsibility for the detailed design of watercourse crossings in line with CIRIA and SEPA good practice guidelines; production of the final Watercourse Crossing Plan; applying for the appropriate CAR licence in consultation with SEPA; and for compliance with the CAR licence.
- The Appointed Contractor would be responsible for preparing and implementing the Construction Environmental Management Plan (CEMP) and Pollution Prevention Plan (PPP), and would implement measures set out in SSEN's General Environmental Management Plans (GEMP).
- The drainage management works would be supervised by the Ecological Clerk of Works (ECoW) and the performance of drainage measures would be monitored.
- A Planning Monitoring Officer (PMO) will also be responsible for checking consent conditions and licences are adhered to.

Scottish & Southern Electricity Networks

TRANSMISSION

Annex A - Figures



Legend

- Proposed Alignment Towers
- Proposed Alignment
- Inveraray - Crossaig Towers
- Inveraray - Crossaig OHL
- Proposed Creag Dhubh Substation (Separate Application)
- Watercourse

Temporary Diversions

- ITE / ITW 132 kV Diversion Poles
- 275 kV Diversion Towers
- ITE / ITW 132 kV Diversion
- 275 kV Diversion

Access Tracks

- Creag Dhubh Access Track
- Access Tracks - Track To Be Maintained
- Proposed Access Route (Perm)
- Proposed Access Route (Temp)
- Existing Access Tracks Upgrade

Type of Feature

- Surveyed Location (representative of proposed watercourse crossing)
- Existing watercourse crossing
- Proposed Crossing (not surveyed)
- Existing watercourse crossing (not surveyed)
- Crossing Inaccessible
- Spring

Project No:	LT000194
Project:	1620011091
Title:	Creag Dhubh to Inveraray 275 kV Overhead Line Figure 11.1.1: Watercourse Crossings
Drawn by:	NJ
Date:	20/09/2022
Drawing:	R162_11091_Fig11_1_1_EIARWCCAssessment_E

Scottish & Southern Electricity Networks
TRANSMISSION

08 09 10

18 17

Taynafead
Drochaidean Eion Ruadh-bhuidhe
Allt Guilmein
Creag Dhubh na h-Airigh
Allt na h-Airigh
Creag Chumhann
Allt an Fhuithe
Creag nam Fitheach
Carness
Waterfall
Sheepfold
Tom an Fheidh
Ford
River Aray
Glen Aray
Leac nam Ban
Mullach nam Maol 523m

53 52 51 50 50 51 49 47 47 48 45 45 46 44 44 43

Scale @ A3: 1:10,000
0 0.05 0.1 0.2 0.3 0.4 0.5 km

Legend

- Proposed Alignment Towers
- Proposed Alignment
- Inveraray - Crossaig Towers
- Inveraray - Crossaig OHL
- Proposed Creag Dhubh Substation (Separate Application)
- Watercourse

Temporary Diversions

- ITE / ITW 132 kV Diversion Poles
- 275 kV Diversion Towers
- ITE / ITW 132 kV Diversion
- 275 kV Diversion

Access Tracks

- Creag Dhubh Access Track
- Access Tracks - Track To Be Maintained
- Proposed Access Route (Perm)
- Proposed Access Route (Temp)
- Existing Access Tracks Upgrade

Type of Feature

- Surveyed Location (representative of proposed watercourse crossing)
- Existing watercourse crossing
- Proposed Crossing (not surveyed)
- Existing watercourse crossing (not surveyed)
- Crossing Inaccessible
- Spring

Project No:	LT000194
Project:	1620011091
Title:	Creag Dhubh to Inveraray 275 kV Overhead Line Figure 11.1.1: Watercourse Crossings
Drawn by:	NJ
Date:	20/09/2022
Drawing:	R162_11091_Fig11_1_1_EIARWCCAssessment_E

Scottish & Southern Electricity Networks
TRANSMISSION

07 08 09

17 16 15

Mullach nam Maol
523m
Lochan Dhub
Creag nam Fitheach
Allan Ruithe
Creag na h-Iolaire
Allt Creag nan Aighn
Allt Creag na h-Airigh
Creag Bhalgach
West Drimfern
Allt Barain
Druim Ban
Druim Breac
Eas na h-Airigh
Tom Fuar
Tom na Cuirte
South Tullich
North Tullich
Sheepfold
Ladyfield
Drimfern
Luidheagan Dubh
East Drimfern
Tom an t-Sabhail
Bail a' Chailtuinne
Toiseach nam Marbh
Cnoc Raineach
Allt aMhadaidh
River Aray
Glen Aray
Leac nam Ban
A819

Scale @ A3: 1:10,000
0 0.05 0.1 0.2 0.3 0.4 0.5 km

Legend

- Proposed Alignment Towers
- Proposed Alignment
- Inveraray - Crossaig Towers
- Inveraray - Crossaig OHL
- Proposed Creag Dhubh Substation (Separate Application)
- Watercourse

Temporary Diversions

- ITE / ITW 132 kV Diversion Poles
- 275 kV Diversion Towers
- ITE / ITW 132 kV Diversion
- 275 kV Diversion

Access Tracks

- Creag Dhubh Access Track
- Access Tracks - Track To Be Maintained
- Proposed Access Route (Perm)
- Proposed Access Route (Temp)
- Existing Access Tracks Upgrade

Type of Feature

- Surveyed Location (representative of proposed watercourse crossing)
- Existing watercourse crossing
- Proposed Crossing (not surveyed)
- Existing watercourse crossing (not surveyed)
- Crossing Inaccessible
- Spring

Project No: LT000194
Project: 1620011091

Title: Creag Dhubh to Inveraray 275 kV Overhead Line

Figure 11.1.1: Watercourse Crossings

Drawn by: NJ Date: 20/09/2022

Drawing: R162_11091_Fig11_1_1_EIARWCCAssessment_E

Scottish & Southern Electricity Networks
TRANSMISSION

07 08 09

15 14 13

Creag Bhalgach
West Drimfern
Alltan Creag nan Airigh
Alltan Barelin
Eas na h-Airigh
Druim Breac
Toiseach nam Marbh
Druim Ban
Drimfern
Luidheagan Dubh
East Drimfern
Cnoc Raineach
Tom an t-Sabhail
Barr a' Chailtuinne
Creagan Mhartuin
Sheepfold
Carn Ban
Barr Loisgte
87m
Alltan Thomais
Tom Ban
Stronmagachan
Glen Aray
Path
Old Military Road
Tom nam Buachaillean
Alltan an Spioraid
81m
Carn Odhar
Creag a' Chaibeil
Chapel (remains of)
Bile Gharbh
71m
FB
Waterfall
Linnie ghlustain
61m
Path
Creag Cour
Issues
Creag na Gaibhre
Fall
Kilmun
59m
Track
Alltan Taruig
Waterfall
Alltan Criche
Tom Dubh na Faing
Eas na Bo Raibhaich (Waterfall)
Eas Caillich
River Aray
Three Bridges
Collects
Track

Scale @ A3: 1:10,000
0 0.05 0.1 0.2 0.3 0.4 0.5 km

Legend

- Proposed Alignment Towers
- Proposed Alignment
- Inveraray - Crossaig Towers
- Inveraray - Crossaig OHL
- Proposed Creag Dhubh Substation (Separate Application)
- Watercourse

Temporary Diversions

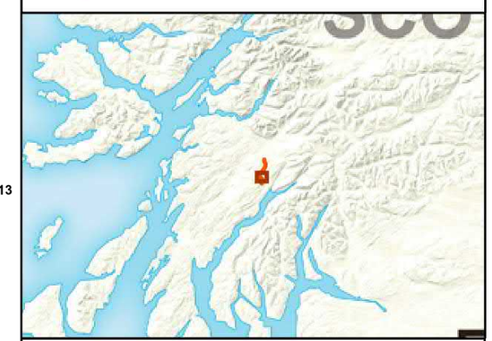
- ITE / ITW 132 kV Diversion Poles
- 275 kV Diversion Towers
- ITE / ITW 132 kV Diversion
- 275 kV Diversion

Access Tracks

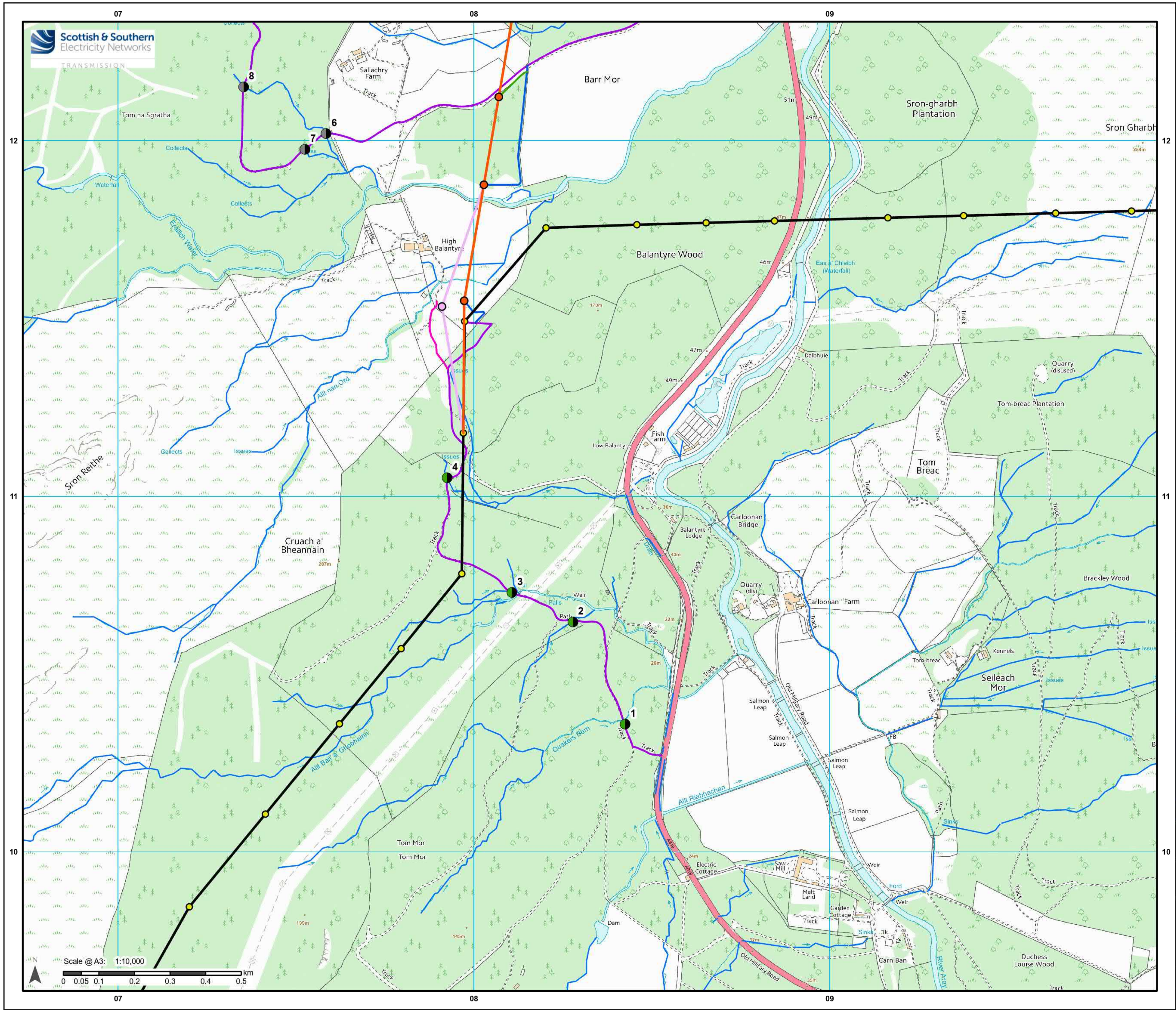
- Creag Dhubh Access Track
- Access Tracks - Track To Be Maintained
- Proposed Access Route (Perm)
- Proposed Access Route (Temp)
- Existing Access Tracks Upgrade

Type of Feature

- Surveyed Location (representative of proposed watercourse crossing)
- Existing watercourse crossing
- Proposed Crossing (not surveyed)
- Existing watercourse crossing (not surveyed)
- Crossing Inaccessible
- Spring



Project No:	LT000194
Project:	1620011091
Title:	Creag Dhubh to Inveraray 275 kV Overhead Line Figure 11.1.1: Watercourse Crossings
Drawn by:	NJ
Date:	20/09/2022
Drawing:	R162_11091_Fig11_1_1_EIARWCCAssessment_E



Legend

- Proposed Alignment Towers
- Proposed Alignment
- Inveraray - Crossaig Towers
- Inveraray - Crossaig OHL
- Proposed Creag Dhubh Substation (Separate Application)
- Watercourse

Temporary Diversions

- ITE / ITW 132 kV Diversion Poles
- 275 kV Diversion Towers
- ITE / ITW 132 kV Diversion
- 275 kV Diversion

Access Tracks

- Creag Dhubh Access Track
- Access Tracks - Track To Be Maintained
- Proposed Access Route (Perm)
- Proposed Access Route (Temp)
- Existing Access Tracks Upgrade

Type of Feature

- Surveyed Location (representative of proposed watercourse crossing)
- Existing watercourse crossing
- Proposed Crossing (not surveyed)
- Existing watercourse crossing (not surveyed)
- Crossing Inaccessible
- Spring

Project No: LT000194
Project: 1620011091

Title: Creag Dhubh to Inveraray 275 kV Overhead Line

Figure 11.1.1: Watercourse Crossings

Drawn by: NJ
Date: 20/09/2022

Drawing: R162_11091_Fig11_1_1_EIARWCCAssessment_E

Annex B – Photodoc

Survey Location 1
Existing Crossing Type: Circular Culvert
  Photo 1: upstream
  Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 2

Existing Crossing Type: Circular Culvert

Photo 1: upstream

Photo 2: downstream

Survey Location 3
Existing Crossing Type: Single Span Bridge
 Photo 1: upstream
 Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 4

Existing Crossing Type: Circular Culvert

Photo 1: upstream

Photo 2: downstream

Survey Location 14
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 15
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 16
Proposed crossing type: Circular Culvert/Cross Drain
 Photo 1: upstream
 Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 19
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 20
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 21
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 22
Proposed crossing type: Circular Culvert/ Single Span Bridge
 Photo 1: upstream
 Photo 2: downstream

Survey Location 23
Proposed crossing type: Circular Culvert/ Single Span Bridge
 Photo 1: upstream
 Photo 2: downstream

Survey Location 28
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 32
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 34
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 35
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 36
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 37
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 38

Proposed crossing type: Circular Culvert

Photo 1: upstream

Photo 2: downstream

Survey Location 40
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 41
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 42
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 43
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 44

Proposed crossing type: Circular Culvert

Photo 1: upstream

Photo 2: downstream

Survey Location 45
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 47
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 49
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 50
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 51
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Survey Location 54
Proposed crossing type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 55

Existing Crossing Type: Circular Culvert

Photo 1: upstream

Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 56

Existing Crossing Type: Circular Culvert

Photo 1: upstream

Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 57

Existing Crossing Type: Circular Culvert

Photo 1: upstream

Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 58
Existing Crossing Type: Circular Culvert
 Photo 1: upstream
 Photo 2: downstream

Scottish & Southern Electricity Networks
TRANSMISSION

Survey Location 59

Existing Crossing Type: Circular Culvert

Photo 1: upstream

Photo 2: downstream

Survey Location 60

Existing Crossing Type: Circular Culvert

Photo 1: upstream

Photo 2: downstream