

## **Technical Appendix 10.4: Watercourse Crossing Assessment**

## TECHNICAL APPENDIX 10.4: WATERCOURSE CROSSING ASSESSMENT

### 10.1 Introduction

10.1.1 This Technical Appendix presents a conceptual analysis of the watercourses that would potentially be crossed by the Proposed Development. It should be read in conjunction with **EIAR Volume 2** in particular **Chapter 2: Description of Proposed Development (EIAR Volume 2)** for details of the Proposed Development, and **Chapter 10: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2)**.

#### Legislation

10.1.2 The principal legislation regarding the water environment is provided by the EU Water Framework Directive (WFD<sup>1</sup>) 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.

10.1.3 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.

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

10.1.5 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.

10.1.6 The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended)<sup>3</sup> (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.

10.1.7 The Proposed Development will require authorisation under CAR for access track watercourse crossings required to construct the Proposed Development. Section 10.6 of this Technical Appendix details the levels of CAR authorisation and likely level of authorisation that will be required for the Proposed Development.

10.1.8 The SEPA Position Statement on Culverting Watercourses<sup>4</sup> (WAT-PS-06-02) and Supporting Guidance on Sediment Management<sup>5</sup> (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<sup>6</sup>.

### 10.2 Purpose of this Technical Appendix

10.2.1 This document provides:

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<sup>1</sup> European Commission. The EU Water Framework Directive – integrated river basin management for Europe. [https://ec.europa.eu/environment/water/water-framework/index\\_en.html](https://ec.europa.eu/environment/water/water-framework/index_en.html)

<sup>2</sup> Water Environment and Water Services (Scotland) Act 2003. <https://www.legislation.gov.uk/asp/2003/3/contents>

<sup>3</sup> The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended): A Practical Guide. Version 8.4 October 2019.

<sup>4</sup> 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.

<sup>5</sup> 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>

<sup>6</sup> 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>

- 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 Appointed 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 Appointed Contractor would follow to minimise changes to the hydrological regime and reduce potential impacts on river morphology and aquatic ecology.

### 10.3 Methodology

#### Desk Study

10.3.1 The baseline hydrology of the Site has been characterised as part of the EIAR and details can be found in Section 10.5 of **Chapter 10: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2)**.

#### Field Survey

10.3.2 Filed survey of watercourses was completed by Stagfire Ecological Surveys on behalf of Ramboll. Surveying took place between the 22<sup>nd</sup> and 28<sup>th</sup> July 2022. All data was captured electronically.

10.3.3 The survey was used to gain a high-level understanding of the key watercourse characteristics at locations where the proposed secondary access tracks and roads 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.

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

#### Limitations and Assumptions

10.3.5 Survey points were taken as close to the proposed crossing location as was considered safe and were limited to "Access – Existing Road" and "Access – Existing Track" (see **Figure 10.4.1 (Annex A)**). It is not anticipated that works will be required to the main trunk road, and no survey of the access over open ground was completed as it is assumed that bog mats would be laid and there would be no watercourse crossings required.

10.3.6 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.

10.3.7 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 10: Hydrology, Hydrogeology, Geology and Soils (EIAR Volume 2)**.

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

10.3.9 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 surveyor to obtain the information relevant to this assessment.

10.3.10 The Appointed 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.

## 10.4 Identification of Watercourse Crossings

10.4.1 A total of 34 potential watercourse crossing points (**Figure 10.4.1 (Annex A)**) have been identified for the proposed access tracks, of which 23 are existing crossings.

10.4.2 Photographs of the surveyed points are present in **Annex B: Photodoc**. The average channel width, depth and bed substrate material at locations where new crossings are proposed are presented in **Table 10.4.1**. Details of existing crossings that will be utilised by the Proposed Development are set out in **Table 10.4.2**.

**Table 10.4.1: Watercourse Survey Locations – Proposed Crossings**

Survey Location*	Watercourse Name	Width (m)	Depth (m)	Bed Substrate
3	Unnamed	1.0	0.1	Gravel
5	Allt Baca Ghail	3.0	0.2	Cobble
10	Unnamed (ephemeral)	1.0	0.1	Grass
11	Unnamed	0.8	0.1	Cobble
13	Unnamed	0.5	0.2	Peat
23	Unnamed (field drain, ephemeral)	0.75	0.05	Gravel
24	Unnamed	1.0	0.25	Gravel
25	Unnamed	3.0	0.2	Gravel
31	Unnamed	0.75	0.2	Boulder
32	Unnamed	0.8	0.1	Silt
34	Unnamed	1.0	0.25	Peat

\*Numbering as shown in Figure 10.4.1 (Annex A)

**Table 10.4.2: Watercourse Survey Locations – Existing Crossings**

Survey Location*	Watercourse Name	Width (m)	Depth (m)	Crossing Width (m)	Crossing Height (m)	Type of Crossing
1	Unnamed	0.5	0.05	1.8	0.1	Plastic pipe culvert
2	Unnamed	1.0	0.1	6.0	1.5	Open bottom culvert
4	Unnamed	1.8	0.1	3.6	0.5	Circular culvert
6	Unnamed	0.5	0.15	3.5	1.5	Open bottom culvert

**Table 10.4.2: Watercourse Survey Locations – Existing Crossings**

7	Unnamed	1.0	0.1	3.25	2.0	Circular culvert
8	Unnamed	2.0	0.25	2.8	1.75	Open bottom culvert
9	Abhainn Sgaladail	15.0	0.3	6.0	4.5	Single span bridge
12	Allt Loch Ille Chipain	2.5	0.15	1.0	1.75	Single span bridge
14	Abhainn Ruadh	3.0	0.3	1.0	1.75	Single span bridge
15	Abhainn Ruadh	2.5	0.3	2.8	2.75	Single span bridge
16	Unnamed	1.5	0.2	3.5	1.0	Circular culvert
17	Unnamed	1.0	0.1	5.5	1.0	Circular culvert
18	Unnamed	1.0	0.1	3.0	1.0	Circular culvert
19	Allt Loch nam Breac	2.5	0.15	2.5	1.25	Single span bridge
20	Abhainn Mhor	6.0	0.25	4.0	3.1	Box culvert
21	Unnamed (field drain)	1.0	0.25	4.0	0.3	Circular culvert
22	Unnamed	1.0	0.1	3.0	1.0	Open bottom culvert
26	Unnamed	1.0	0.15	4.0	0.5	Circular culvert
27	Unnamed	1.25	0.2	3.5	0.5	Circular culvert
28	Allt Sgaisgar	2.0	0.2	2.5	1.0	Circular culvert
29	Unnamed	0.5	0.1	4.0	0.7	Circular culvert
30	Unnamed	1.5	0.1	2.5	0.75	Circular culvert
33	Unnamed	1.75	0.25	3.0	0.8	Circular culvert
*Numbering as shown in Figure 10.4.1 (Annex A)						

## 10.5 Crossings

### Types of Crossing

10.5.1 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<sup>6</sup>:

- **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.

## 10.6 CAR Authorisations

10.6.1 CAR, A Practical Guide<sup>3</sup>, 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.

10.6.2 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.

10.6.3 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 Appointed Contractor.

### Levels of Authorisation

#### *General Binding Rules*

10.6.4 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 Appointed Contractor is not required to apply to SEPA, there are no associated charges.

10.6.5 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.

#### *Registrations*

10.6.6 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 Appointed 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

- 10.6.7 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.
- 10.6.8 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.

### 10.7 Likely Levels of CAR Authorisation

- 10.7.1 A total of 34 watercourse crossings are likely to be required for the construction of the Proposed Development.
- 10.7.2 Eleven (**Figure 10.4.1 (Annex A)** reference 3, 5, 10, 11, 13, 23, 24, 25, 31, 32, and 34) are proposed (new) crossings. It has been assumed for the purposes of this assessment that the majority of these proposed watercourse crossings (reference 3, 11, 31, 32 and 34) would constitute circular culverts 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.
- 10.7.3 One of the proposed crossings is located on a watercourse with a width >2 m (reference 5) which would likely require a single-span bridge. 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.
- 10.7.4 The remaining watercourse crossings (references 10, 13, 23, 24, 25) are burns with low hydraulic potential or considered ephemeral streams with intermittent flow. These crossing points are likely to require a circular culvert or cross drain which is likely to require Registration or a Simple Licence, subject to detailed design.
- 10.7.5 Twenty-three are existing crossings (**Figure 10.4.1 (Annex A)** reference 1, 2, 4, 6, 7, 8, 9, 12, 14, 15, 16, 17, 18, 19, 20, 21, 22, 26, 27, 28, 29, 30 and 33). 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 a like-for-like structure subject to detailed design. This is likely to require Registration or a Simple Licence.
- 10.7.6 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.

### 10.8 Watercourse Crossings

- 10.8.1 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 10.4.3** below. For the purposes of this assessment it has been assumed the existing crossings would remain in-situ or be replaced by crossings of a similar type subject to detailed design. The locations of the crossings are shown in **Figure 10.4.1 (Annex A)**.
- 10.8.2 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 micro-siting allowances, the narrowest locations would be selected, and the stability of the channel banks would be considered.

- 10.8.3 Construction shall be carried out in accordance with SEPA best practice<sup>7</sup> and SEPA Guidance for Pollution Prevention<sup>8</sup>. 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 10.4.3: Proposed Watercourse Crossing Type**

Survey Location	Name	Width (m)	Likely Method of Crossing	Justification
3	Unnamed	1.0	Circular culvert	Watercourse <2 m wide. Lowland burn with limited hydraulic potential.
5	Allt Baca Ghail	3.0	Single-span bridge	Watercourse >2 m wide with high hydraulic potential.
10	Unnamed (ephemeral)	1.0	Circular culvert / cross-drain	Poorly defined burn with limited hydraulic potential.
11	Unnamed	0.8	Circular culvert	Watercourse <2 m wide. Lowland burn with limited hydraulic potential.
13	Unnamed	0.5	Circular culvert / cross drain	Watercourse <2 m wide. Lowland burn with limited hydraulic potential.
23	Unnamed (field drain, ephemeral)	0.75	Circular culvert / cross drain	Watercourse <2 m wide, potentially ephemeral in nature, limited hydraulic potential.
24	Unnamed	1.0	Circular culvert / cross drain	Watercourse <2 m wide. Lowland burn with limited hydraulic potential.
25	Unnamed	3.0	Circular culvert / cross drain	Poorly defined burn, although >2 m wide it is shallow and is surface water accumulation with limited hydraulic potential.
31	Unnamed	0.75	Circular culvert	Watercourse <2 m wide. Lowland burn with limited hydraulic potential.
32	Unnamed	0.8	Circular culvert	Watercourse <2 m wide. Lowland burn with limited hydraulic potential.
34	Unnamed (field drain)	1.0	Circular culvert	Watercourse <2 m wide. Lowland, poorly defined burn with limited hydraulic potential.

*\*Numbering as shown in Figure 10.4.1 (Annex A)*

## 10.9 Track Drainage

- 10.9.1 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 s37 application. These would include an outline of the proposed approach to construction methods and environmental protection

<sup>7</sup> SEPA, 2010. Engineering in the Water Environment: Good Practice Guide, River Crossings

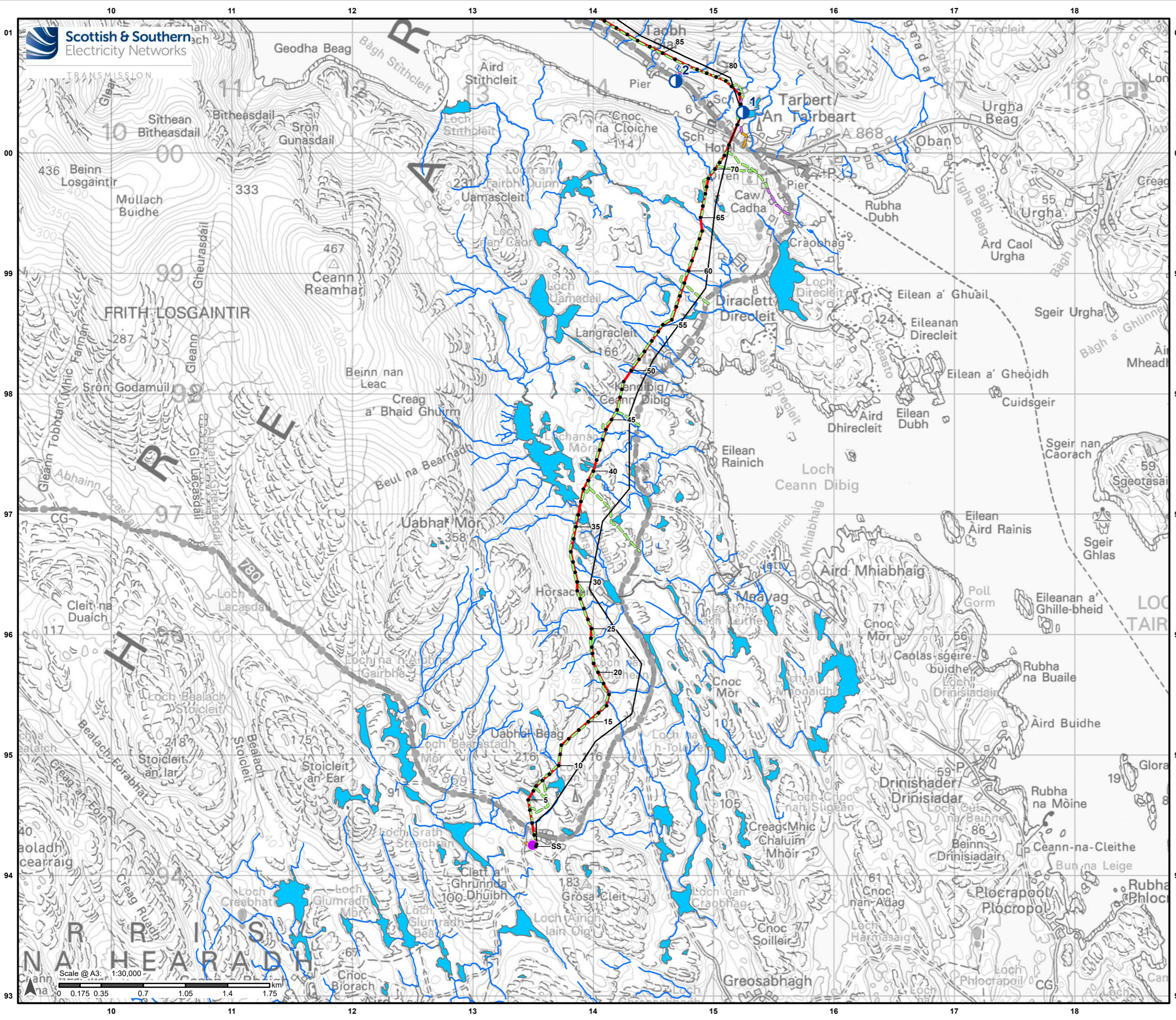
<sup>8</sup> SEPA 2018. Works and Maintenance in or Near water: GPP5



during all aspects of the construction phase, including standard pollution prevention guidelines to ensure no water pollutants would reach sensitive receptors.

- 10.9.2 SSEN Transmission's General Environmental Management Plans (GEMP) have been drafted (**Technical Appendix 2.2: SSEN Transmission General Environmental Management Plans (GEMP) (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.
- 10.9.3 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 Environmental Clerk of Works (ECoW).

## ANNEX A – FIGURES

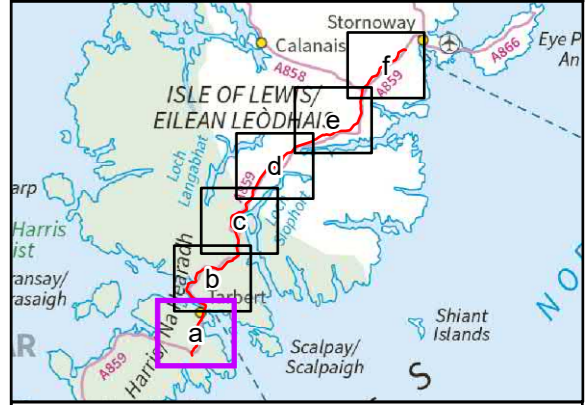


**Legend**

- Proposed Alignment
- Indicative Pole Location
- Harris 132kV Grid Supply Point
- - - Access - Existing Road
- - - Access - Existing Track
- - - Access - Open Ground
- Existing 132kV OHL to be Dismantled
- Watercourse
- Waterbody

**Survey Feature Type**

- Existing Watercourse Crossing



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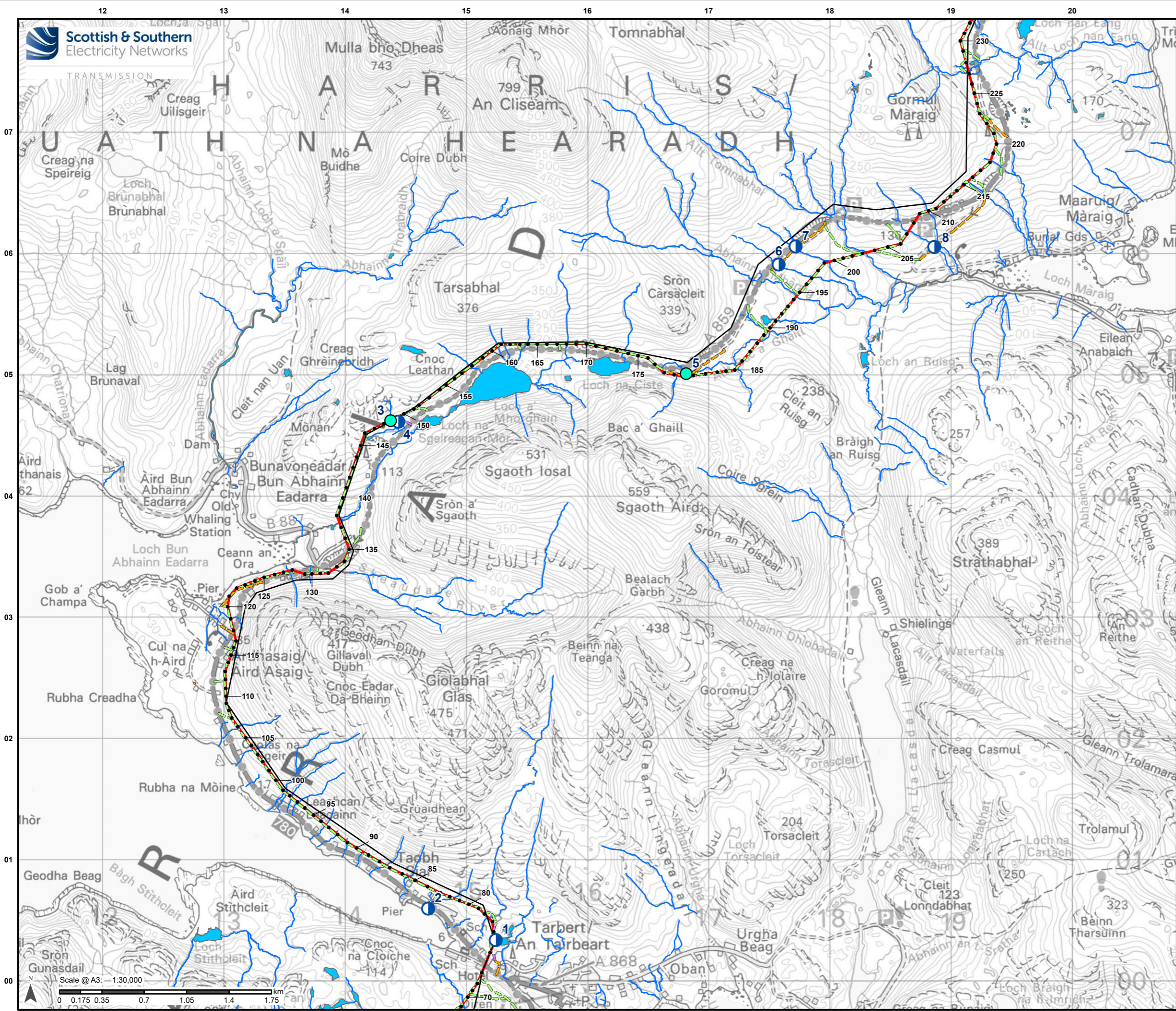
Project No: LT0245  
Project: Harris to Stornoway 132 kV OHL Replacement

Title: Figure 10.4.1a: Watercourse Crossings

Drawn by: AB Date: 07/09/2022

Drawing: R162\_11469\_001\_Fig10-4-1\_WatercourseCrossings\_C

Scale @ A3: 1:30,000  
0 0.175 0.35 0.7 1.05 1.4 1.75 km

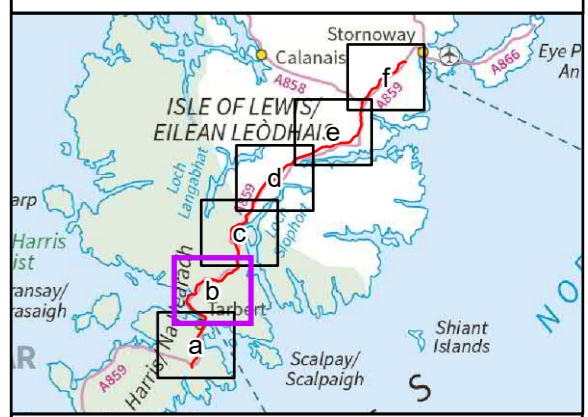


**Legend**

- Proposed Alignment
- Indicative Pole Location
- - - Access - Existing Road
- - - Access - Existing Track
- - - Access - Open Ground
- Existing 132kV OHL to be Dismantled
- Watercourse
- Waterbody

**Survey Feature Type**

- Watercourse
- Existing Watercourse Crossing



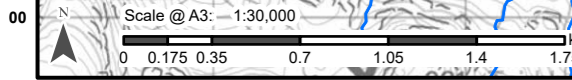
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Project No: LT0245  
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Title: Figure 10.4.1b: Watercourse Crossings

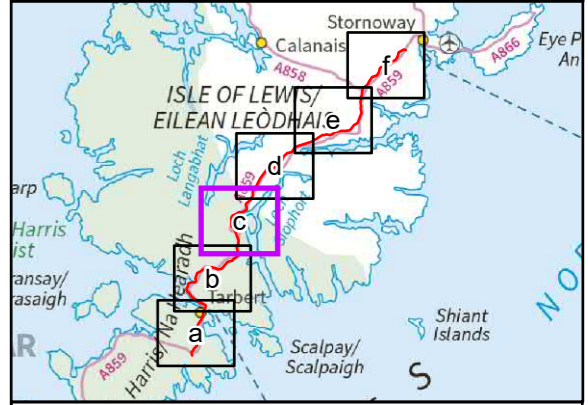
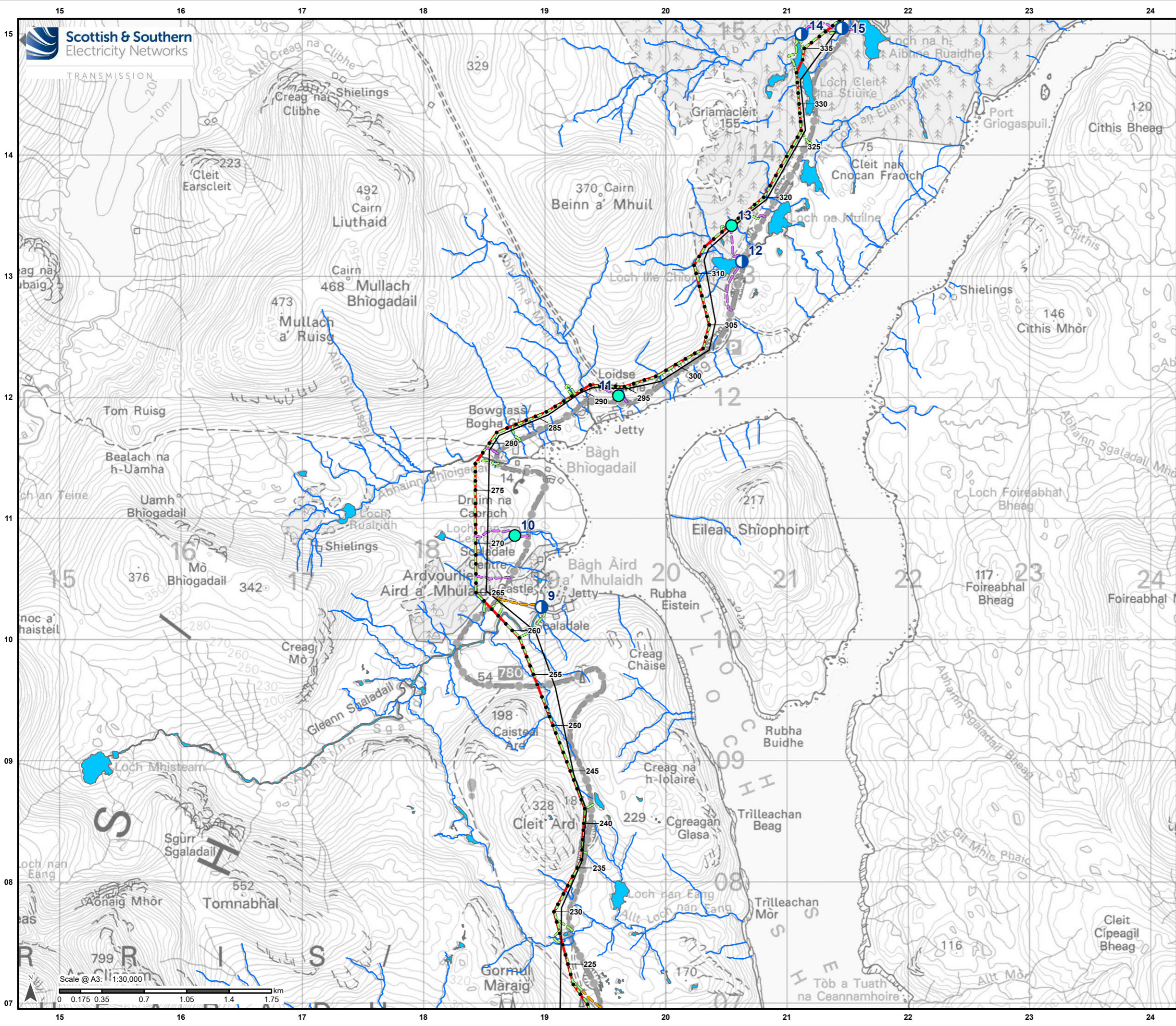
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Drawing: R162\_11469\_001\_Fig10-4-1\_WatercourseCrossings\_C



**Legend**

- Proposed Alignment
  - Indicative Pole Location
  - - - Access - Existing Road
  - - - Access - Existing Track
  - - - Access - Open Ground
  - Existing 132kV OHL to be Dismantled
  - Watercourse
  - Waterbody
- Survey Feature Type**
- Watercourse
  - Existing Watercourse Crossing



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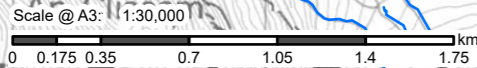
Project: Harris to Stornoway 132 kV OHL Replacement

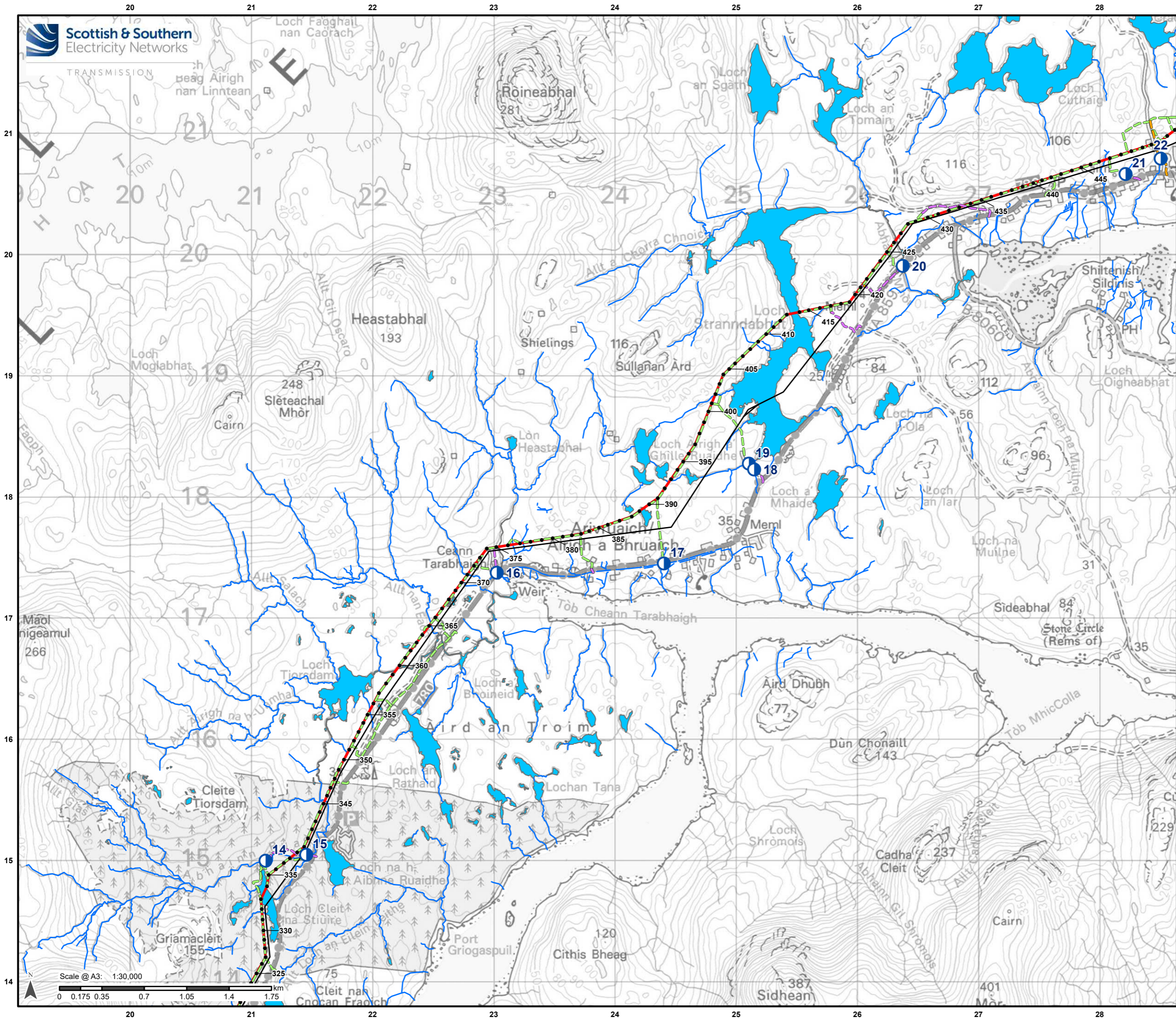
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Figure 10.4.1c:  
Watercourse Crossings

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Date: 07/09/2022

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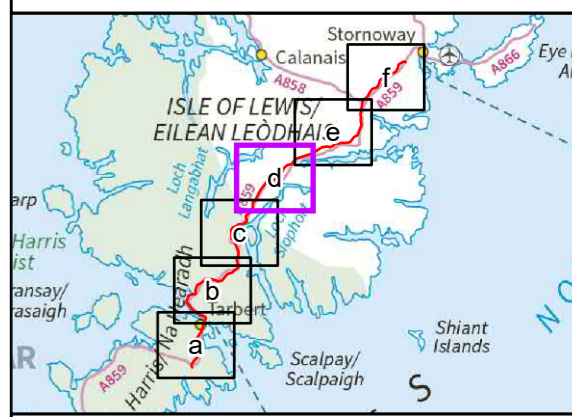


**Legend**

- Proposed Alignment
- Indicative Pole Location
- - - Access - Existing Road
- - - Access - Existing Track
- - - Access - Open Ground
- Existing 132kV OHL to be Dismantled
- Watercourse
- Waterbody

**Survey Feature Type**

- Existing Watercourse Crossing



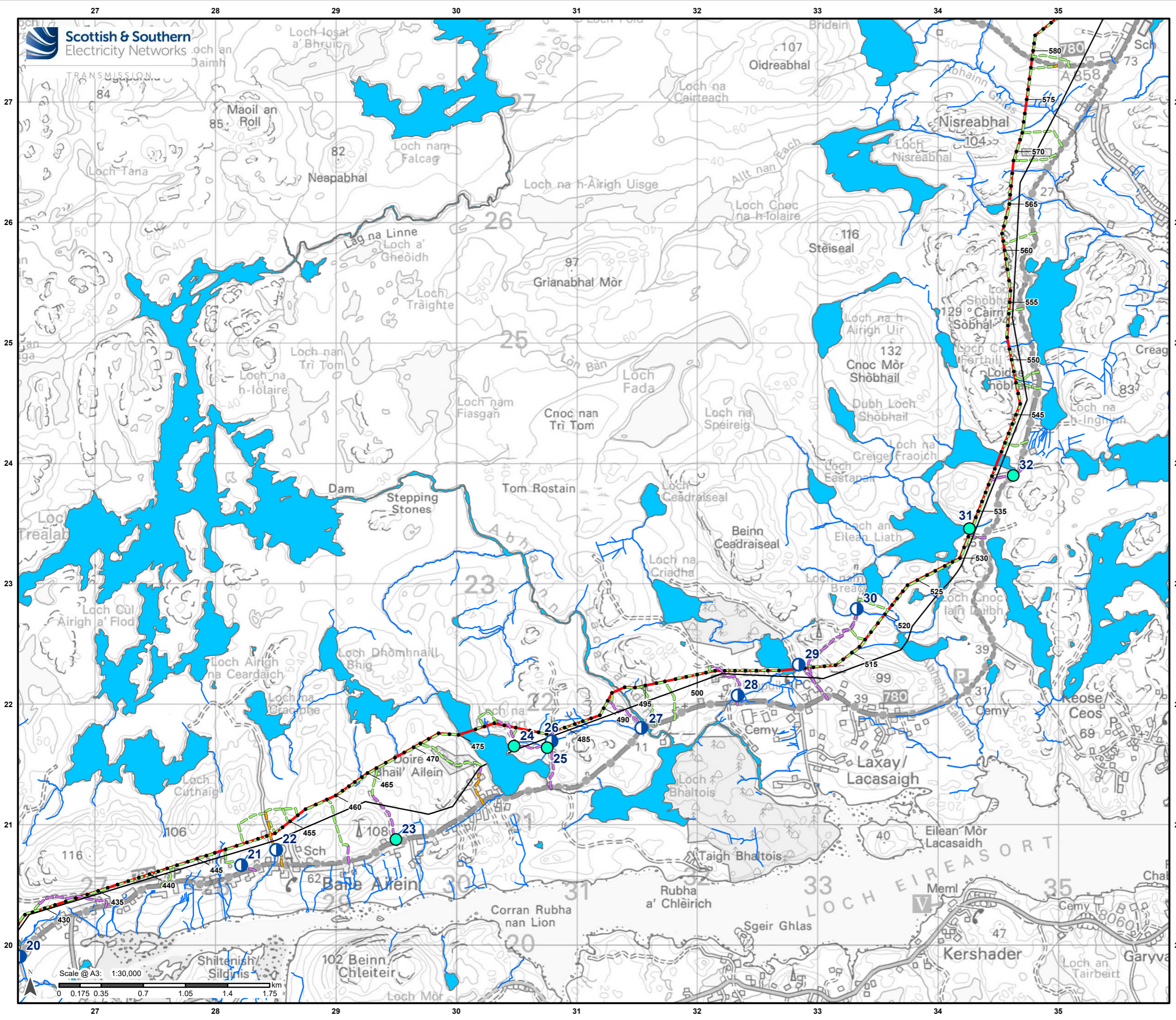
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Title:  
Figure 10.4.1d:  
Watercourse Crossings

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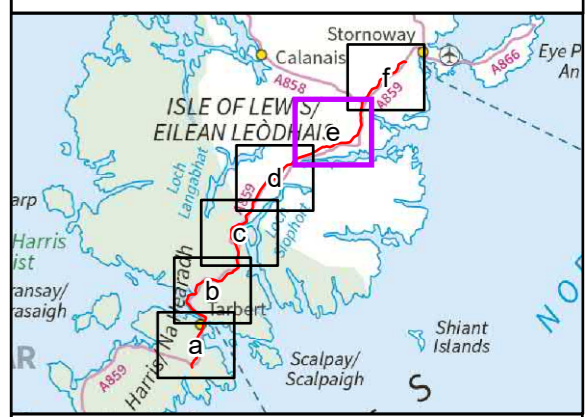


**Legend**

- Proposed Alignment
- Indicative Pole Location
- - - Access - Existing Road
- - - Access - Existing Track
- - - Access - Open Ground
- Existing 132kV OHL to be Dismantled
- Watercourse
- Waterbody

**Survey Feature Type**

- Watercourse
- Existing Watercourse Crossing



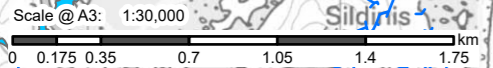
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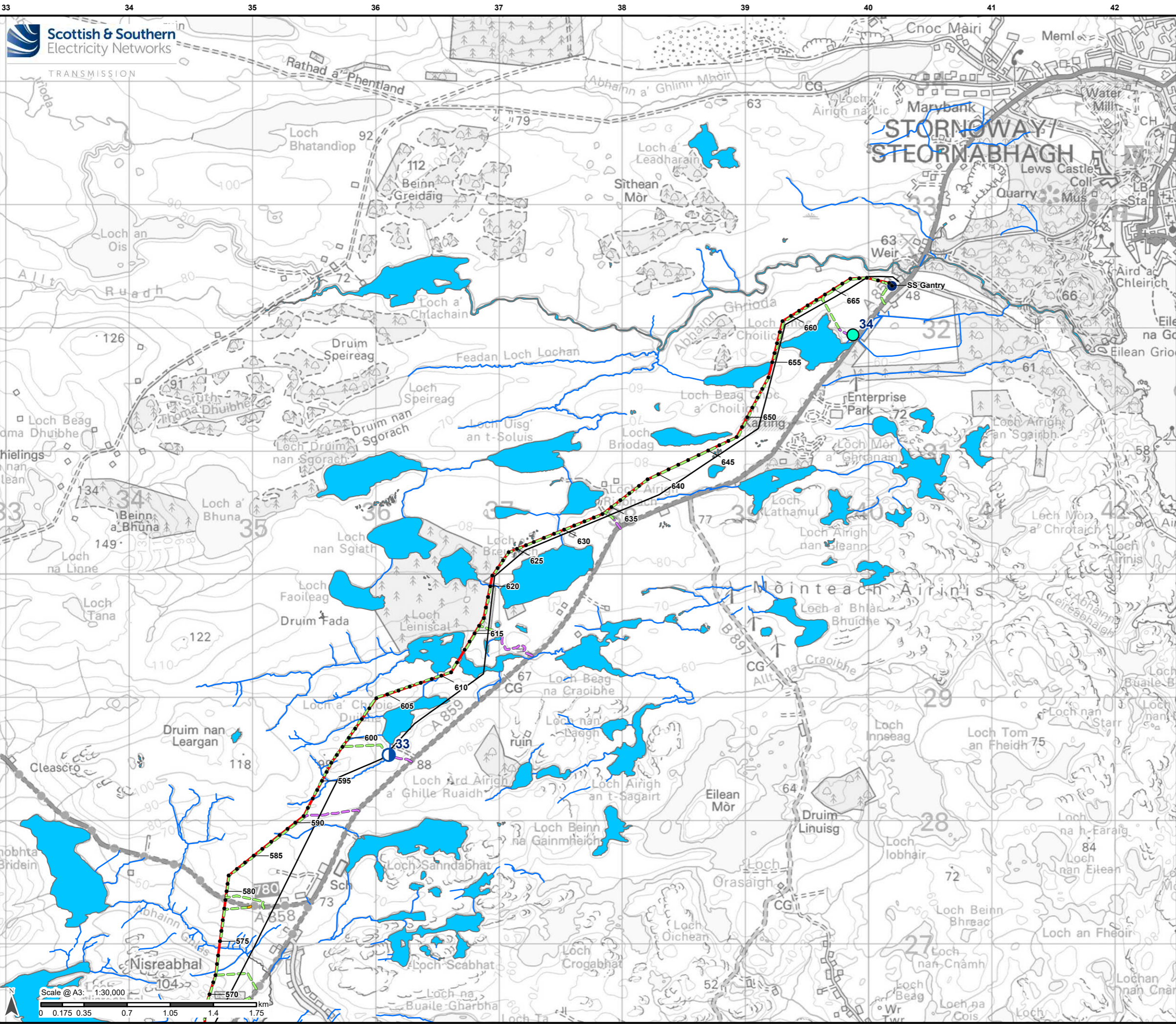
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Figure 10.4.1e:  
Watercourse Crossings

Drawn by: AB Date: 07/09/2022

Drawing: R162\_11469\_001\_Fig10-4-1\_WatercourseCrossings\_C



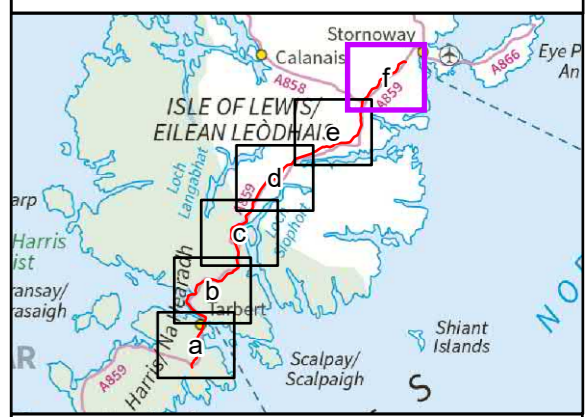


**Legend**

- Proposed Alignment
- Indicative Pole Location
- Stornoway Substation
- - - Access - Existing Road
- - - Access - Existing Track
- - - Access - Open Ground
- Existing 132kV OHL to be Dismantled
- Watercourse
- Waterbody

**Survey Feature Type**

- Watercourse
- Existing Watercourse Crossing



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Project No: LT0245  
Project: Harris to Stornoway 132 kV OHL Replacement

Title: Figure 10.4.1f: Watercourse Crossings

Drawn by: AB Date: 07/09/2022

Drawing: R162\_11469\_001\_Fig10-4-1\_WatercourseCrossings\_C