

TECHNICAL APPENDIX 10.2: WATERCOURSE CROSSING ASSESSMENT

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1. Technical Appendix 10.2: Watercourse Crossing Assessment

1.1 Introduction

Background

- 1.1.1 This Technical Appendix sets out the general principles which the Contractor will follow in order to minimise changes to the hydrological regime and reduce any potential impacts on river morphology and aquatic ecology, that could occur as a result of the installation of watercourse crossings on the proposed Achany Extension Wind Farm. Field surveys of crossing locations have also been used to determine the likely level of CAR authorisation required at each crossing location.
- 1.1.2 This document provides a conceptual assessment of proposed watercourse crossings including the strategy for their development, but does not comment on detailed engineering design. The Principal Contractor (the 'Contractor') will have overall responsibility for designing water crossings, for the production of a final Watercourse Crossing Plan and for compliance with Controlled Activity Regulations (CAR) regulations and the Scottish Environment Protection Agency's (SEPA) good practice guidance.
- 1.1.3 As part of the Environmental Impact Assessment (EIA) process, it was identified that a number of watercourse crossings shall be required to serve the Proposed Development. Design iterations for layout of the Proposed Development have taken in to account the sensitivity of surface water resources, and turbine / infrastructure layout has been configured such that the number of crossings required has been minimised, while taking in to account further environmental and physical constraints identified.
- 1.1.4 Watercourses on the area of the Proposed Development drain to the River Cassley, which forms part of the River Oykel Special Area of Conservation (SAC) and this assessment takes in to account the sensitivity of the receiving controlled waters to the potential impacts of watercourse crossings.
- 1.1.5 Surveying of crossing locations carried out for this assessment also identified a number of smaller ephemeral streams (not considered as formal watercourses) which are indicative of areas of surface water runoff accumulation or saturated peatland soils. 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 and Hydrogeology).

Legislation

- 1.1.6 Principal legislation regarding the water environment is provided by the EU Water Framework Directive (WFD) 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.
- 1.1.7 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.

- 1.1.8 The WFD resulted in the Water Environment and Water Services (Scotland) Act 2003 (WEWS Act¹), which gives Scottish Ministers powers to introduce regulatory controls over water activities in order to protect, improve and promote sustainable use of Scotland's water environment.
- 1.1.9 SEPA is the public body responsible for environmental protection in Scotland under both the Environment Act 1995 and the WEWS Act. Many SEPA policies relating to water are now delivered by the regulatory methods produced to implement the CAR Regulations. The CAR Regulations make it an offence to undertake the following activities with regard to watercourse crossings without an authorisation under the CAR Regulations:
- 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.
- 1.1.10 Any proposed access track water crossings would, therefore, require authorisation under the CAR Regulations. This assessment takes into account SEPA guidance on the implementation of CAR.
- 1.1.11 The SEPA Position Statement on Culverting of Watercourses² (WAT-PS-06-02) and Supporting Guidance on Sediment Management³ (WAT-SG-78) have also been taken into account within this assessment along with the supporting guidance provided in the River Crossings Good Practice Guide⁴.

1.2 Identification of Watercourse Crossings

- 1.2.1 Field surveys of potential watercourse crossings were carried out along the route of the proposed access tracks. The surveys were completed by a Ramboll UK hydrologist on the 02 – 05 November 2020. A total of 32 survey points were collected and are presented in Annex 1. Table 10.1 below provides reference to the location of the surveyed points as identified in Annex 1 and describes the key characteristics of proposed crossing locations.
- 1.2.2 Twenty-five of the surveyed points were found to be smaller ephemeral streams formed by surface water runoff accumulation or saturated peatland soils. These features were not observed to support distinctly aquatic habitats or hydromorphological characteristics and are not therefore considered 'natural watercourses'. These survey points are not shaded in blue in Table 10.1. They would however, require track drainage measures to be in place as detailed in Table 10.2 and the 'Track Drainage' section of this technical appendix.
- 1.2.3 Seven of the surveyed points were considered 'natural watercourses'. These points represent the watercourse crossing locations of the Proposed Development as presented

¹ Water Environment and Water Services (Scotland) Act 2003. <https://www.legislation.gov.uk/asp/2003/3/contents> [Last accessed: November 2020].

² 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 April 2021].

³ 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 April 2021].

⁴ 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 April 2021].

in Annex 2. The watercourse crossings (as distinct from accumulation of surface water runoff on saturated peatland soils) are shaded in blue in Table 10.1 and summarised in Table 10.3 in the 'Summary' of this technical appendix.

- 1.2.4 Photographs of the identified locations are presented in Annex 3. The average channel width and depth, as well as the bed substrate material are presented below. A number of the surveyed locations were identified to not be watercourses and, although included within Table 10.1, have not therefore been carried forward to the assessment of potential watercourse crossing type.

Table 10.1: Summary of Survey of Potential Watercourse Crossing Locations

Survey Location	Description	Width (m)	Depth (m)	Bed Substrate
1	Representative of unnamed ephemeral streams or areas of saturated ground formed by surface water runoff accumulation. (Not a watercourse)	0.30	0.05	peat
2	Unnamed 'natural watercourse'	0.30	0.05	peat
3	Representative of unnamed ephemeral streams or areas of saturated ground formed by surface water runoff accumulation. (Not a watercourse)	0.80	0.05	peat
4	Allt Bad an t-Sagairt	3.00	0.40	boulder
5	Representative of unnamed ephemeral streams or areas of saturated ground formed by surface water runoff accumulation. (Not a watercourse)	1.00	1.00	sand, cobble
6		1.00	0.05	peat
7		0.20	0.30	peat
8		1.00	1.50	peat
9		1.50	1.00	peat
10		1.50	1.00	peat
11		0.30	0.30	peat
12		0.50	0.05	peat
13		0.20	0.05	peat
14		0.50	0.15	peat, cobble
15		0.30	0.50	peat
16		0.30	0.15	peat, bedrock
17		0.40	0.15	cobble
18		1.00	0.05	peat

Survey Location	Description	Width (m)	Depth (m)	Bed Substrate
19		0.50	0.05	peat
20		0.50	0.05	peat, bedrock
21		0.20	0.05	peat
22		0.30	0.70	bedrock
23		0.00	0.00	peat
24		1.00	0.05	peat
25		0.45	0.50	peat, gravel- pebble
26		0.6	0.05	peat
27	Unnamed 'natural watercourse'	0.30	0.50	peat
28	Unnamed 'natural watercourse'	1.50	0.80	peat
29	Unnamed 'natural watercourse'	0.80	0.50	peat
30	Unnamed 'natural watercourse', potentially cut / straightened	0.50	1.00	peat
31	Representative of unnamed ephemeral streams or areas of saturated ground formed by surface water runoff accumulation. (Not a watercourse)	0.30	0.40	peat
32	Allt an Ràsail	5.00	1.00	peat

1.3 Types of Crossing

1.3.1 The most appropriate watercourse crossing type required at each location has been identified depending on physical and ecological characteristics. The potential crossing types are described below:

- 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 will 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 stream bed. 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.
- 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 which provides flow continuity without concentrating the discharges into a narrow channel.

1.4 CAR Authorisations

1.4.1 As set out previously in section 1.1.9, the CAR advise on which activities are regulated by SEPA. In particular, Section 6 of the Water Environment Regulation Practical Guide sets out that CAR requires 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.

1.4.2 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.

Levels of Authorisation

General Binding Rules

1.4.3 General Binding Rules (GBRs) cover specific low risk activities. Such activities complying with the rules would not require a CAR application to be made to SEPA because compliance with a GBR is considered to be compliance with an authorisation. Since the Applicant or the Principal Contractor would not be required to apply to SEPA where GBRs are applicable, there are no associated charges.

1.4.4 SEPA has a 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. They are numbered according to Schedule 3 of the CAR Regulations.

Registrations

1.4.5 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

- 1.4.6 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.
- 1.4.7 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.

Requirements for Bridges and Other Crossings

- 1.4.8 The detailed design of bridges and other crossings will include the application to SEPA for the necessary consents under CAR.

Likely Levels of CAR Authorisation

- 1.4.9 Two crossings will span relatively large watercourses as shown in Annex 2. These are WC4 (survey location SL28) across the Allt Bad an t-Sagairt, and WC7 (survey location SL32 is approximately 110m north-west of the proposed crossing point) across the Allt an Ràsail. SEPA guidance typically requires that single span structures be designed where feasible, especially for larger watercourse crossing widths where a bridge design would typically be considered more appropriate. For the purpose of this Technical Appendix it is anticipated a bridge structure here, if selected, would affect less than 20m of total bank. Subject to detailed design, this bridge crossing is considered likely to fall under CAR Registration.
- 1.4.10 At the remaining potential watercourse crossing locations, it has been assumed for the purposes of this Technical Appendix that the proposed watercourse crossings could constitute culverts 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.
- 1.4.11 Adopting a conservative approach, it is anticipated that the watercourses at these locations would require a Simple Licence. These crossings may only require Registration, dependant on detailed design, where closed culverts are proposed on single track roads and where the watercourses are less than or equal to 2m wide. However, this will be confirmed with SEPA at detailed design stage.

1.5 Watercourse Crossings

- 1.5.1 The detailed design of each watercourse crossing would ensure hydraulic conveyance is maintained to prevent any restriction of flows and allow for the free passage of mammals and aquatic ecology. Each watercourse crossing would also have sufficient capacity to comply with the climate change-adjusted 1:200-year flood including an allowance for partial blockage. Anticipated crossing types for the formal watercourse crossings and also where tracks encounter ephemeral streams or areas of saturated ground are listed in Table 10.2 below.
- 1.5.2 Detailed flow calculations would be undertaken during the refinement phase to inform detailed design and to inform applications for CAR authorisation. It is considered highly

unlikely that any further formal watercourse crossings would be identified during the refinement phase. However, were any new watercourse crossings identified by the Contractor, additional to those above, consideration would be given 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 also be considered.

- 1.5.3 Splash boards and run-off diversion measures, including silt fencing adjacent and parallel to watercourses beneath bridges and at culvert crossings, will be used at all crossings during construction to prevent direct siltation of watercourses.

Table 10.2: Anticipated Watercourse Crossing Type or Drainage Management Approach

Survey Location	Description	Likely crossing method*	Justification
1	Not a watercourse	Cross drains beneath the track would manage areas of saturated ground.	Limited potential hydraulic or ecological impact
2	Unnamed 'natural watercourse'	Circular culvert	Limited potential hydraulic or ecological impact
3	Not a watercourse	Cross drains beneath the track would manage areas of saturated ground.	Limited potential hydraulic or ecological impact
4	Allt Bad an t-Sagairt	Single-span (bridge)	Minimise disturbance to bed and banks, ensure 1:200 flow capacity
5 to 26	Not a watercourse	Cross drains beneath the track would manage areas of saturated ground.	Limited potential hydraulic or ecological impact
27	Unnamed 'natural watercourse'	Circular culvert	Limited potential hydraulic or ecological impact
28	Unnamed 'natural watercourse'	Circular culvert	Limited potential hydraulic or ecological impact
29	Unnamed 'natural watercourse'	Circular culvert	Limited potential hydraulic or ecological impact
30	Unnamed 'natural watercourse', potentially cut / straightened	Circular culvert	Limited potential hydraulic or ecological impact
31	Not a watercourse	Cross drains beneath the track would manage areas	Limited potential hydraulic or ecological impact

Survey Location	Description	Likely crossing method*	Justification
		of saturated ground.	
32	Allt an Ràsail	Single-span (bridge)	Minimise disturbance to bed and banks, ensure 1:200 flow capacity
*Indicative only at this stage, subject to detailed design phase			

1.6 Track drainage

- 1.6.1 To ensure that all drainage measures employed during the construction phase of the Proposed Development are maintained appropriately and remain effective, the Environmental Clerk of Works (ECoW) shall supervise drainage management works and monitor performance of installed drainage measures. All monitoring and supervision of the drainage management works will be recorded and held by the ECoW.
- 1.6.2 Greenfield 'clean' upslope run-off and track run-off (rainwater) should be kept separate where possible and be discharged separately to suitably-vegetated areas at least 50m from watercourses to allow the settlement of solids. Where settlement over vegetation is not ecologically sound (e.g. involving intact blanket bog, requiring only rain-fed nutrients), or where this is not practical due to the type or scarcity of vegetation cover and/or available area, silt traps or settlement lagoons will be utilised and monitored to ensure stored surface water is kept to a minimum.
- 1.6.3 Cross drains would be installed at regular intervals along trackside drainage and would be installed as pipe culverts under the track surface. The frequency of cross drains would increase in areas where higher flows are anticipated such as in areas of high surface flow (e.g. flushes or low-lying areas); where bank seepages are noted; and where historical or active drains are intercepted. Requirements for a temporary silt trap at each end of a cross drain will be assessed prior to the works being undertaken.
- 1.6.4 Pipe culverts used for cross drainage will be long enough so that road fill does not extend beyond the end of a culvert. Pipes will be laid at grades at least 2% (1:50) but no greater than 10% (1:10) and angled 30 to 45 degrees cross-track to improve inlet efficiency. Check dams will be installed immediately above a cross drain inlet and silt traps are required at the inlet points to prevent blockage of the pipe due to silt build up.

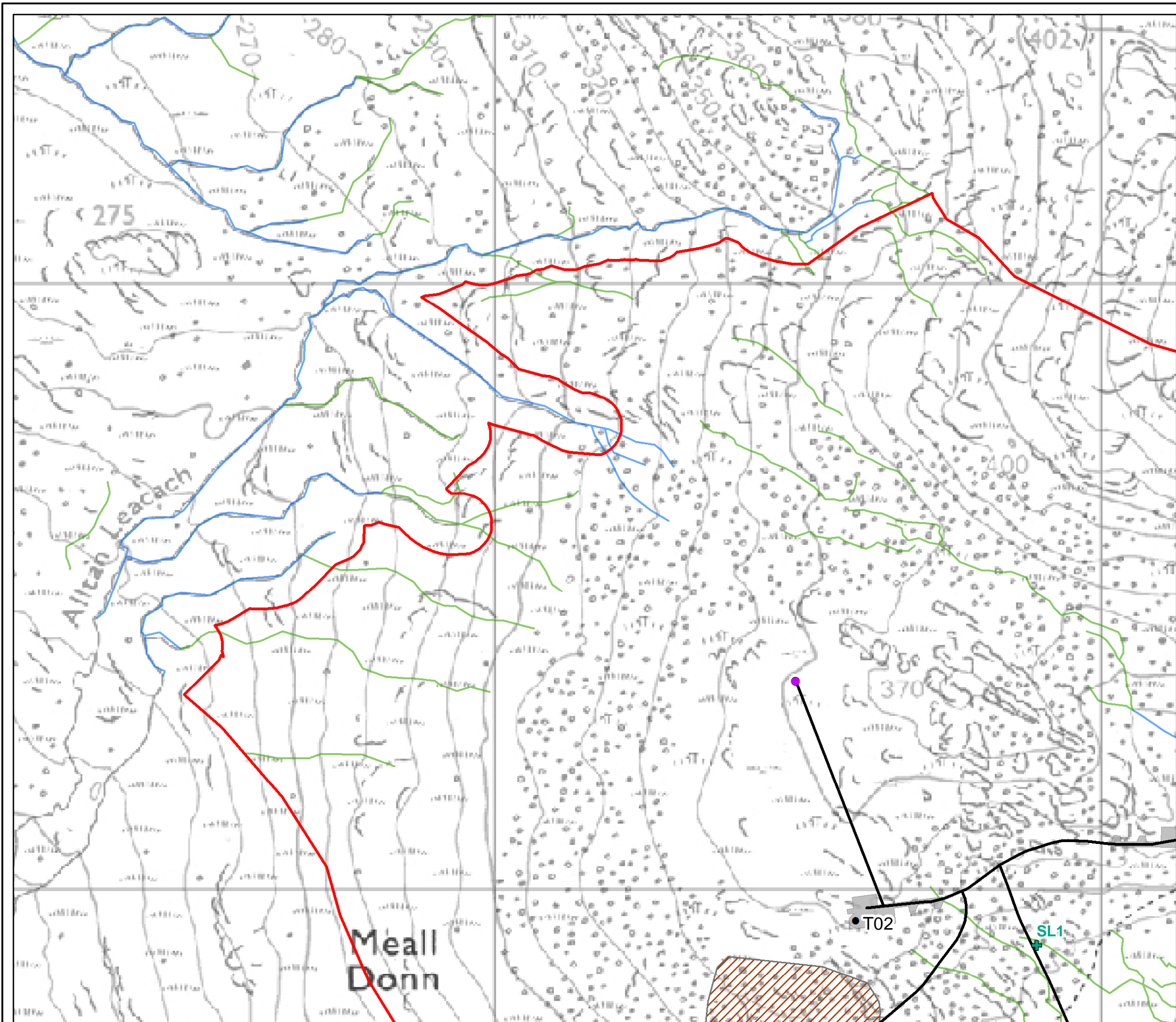
1.7 Summary

- 1.7.1 A site survey of all surface water features, including watercourses, ephemeral streams and drains identified in the previous ES, was carried out in November 2020. A total of 32 crossing points with hydrological features for the Proposed Development were identified.
- 1.7.2 Twenty-five of these surveyed points were found to be smaller ephemeral streams formed by surface water runoff accumulation or saturated peatland soils and not considered 'natural watercourses'. Seven of the surveyed points were confirmed as 'natural watercourses' and represent the watercourse crossing points of the Proposed Development.
- 1.7.3 Track drainage will be required in the areas identified as ephemeral streams or surface water accumulations. It is anticipated this will be in the form of circular culverts or cross drains designed to have sufficient capacity to comply with the climate change-adjusted peak flows.

- 1.7.4 Seven watercourse crossings will be required which likely to be in the form of circular culverts or single-span bridges. These will be designed to have sufficient capacity to comply with the climate change-adjusted 1:200-year flood including an allowance for partial blockage. The seven watercourse crossings are summarised in Table 10.3 and presented in Annex 2.

Table 10.3: Summary of 'Natural Watercourse' Crossings

Watercourse Crossing	Survey Location	Width (m)	Depth (m)	Description	Likely crossing method*	Justification
WC1	2	0.30	0.05	Unnamed 'natural watercourse'	Circular culvert	Limited potential hydraulic or ecological impact
WC2	4	3.00	0.40	Allt Bad an t-Sagairt	Single-span (bridge)	Minimise disturbance to bed and banks, ensure 1:200 flow capacity
WC3	27	0.30	0.50	Unnamed 'natural watercourse'	Circular culvert	Limited potential hydraulic or ecological impact
WC4	28	1.50	0.80	Unnamed 'natural watercourse'	Circular culvert	Limited potential hydraulic or ecological impact
WC5	29	0.80	0.50	Unnamed 'natural watercourse'	Circular culvert	Limited potential hydraulic or ecological impact
WC6	30	0.50	1.00	Unnamed 'natural watercourse', potentially cut / straightened	Circular culvert	Limited potential hydraulic or ecological impact
WC7	32	5.00	1.00	Allt an Ràsail	Single-span (bridge)	Minimise disturbance to bed and banks, ensure 1:200 flow capacity
*Indicative only at this stage, subject to detailed design phase						



Key

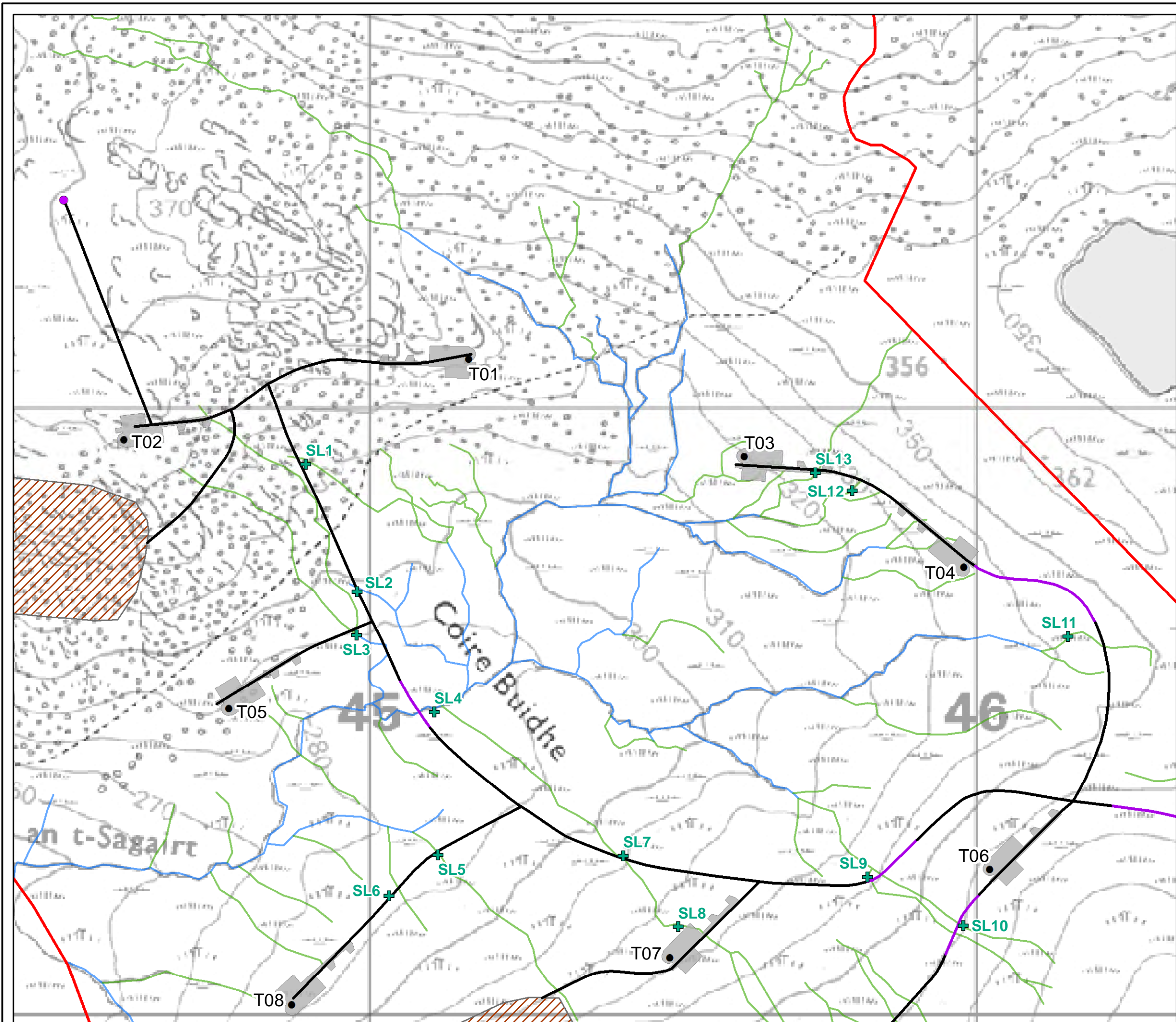
- Site Boundary
- Turbine
- LiDAR Compound Location
- Founded/Cut Track
- Hardstanding
- Borrow Pit Search Area
- Survey Locations
- Ephemeral Stream
- Natural Watercourse

Scale 1:6,000 @ A3
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TA10.2 Annex 1a
Watercourse Crossing Survey Plan

Achany Extension Wind Farm
EIA Report



Key

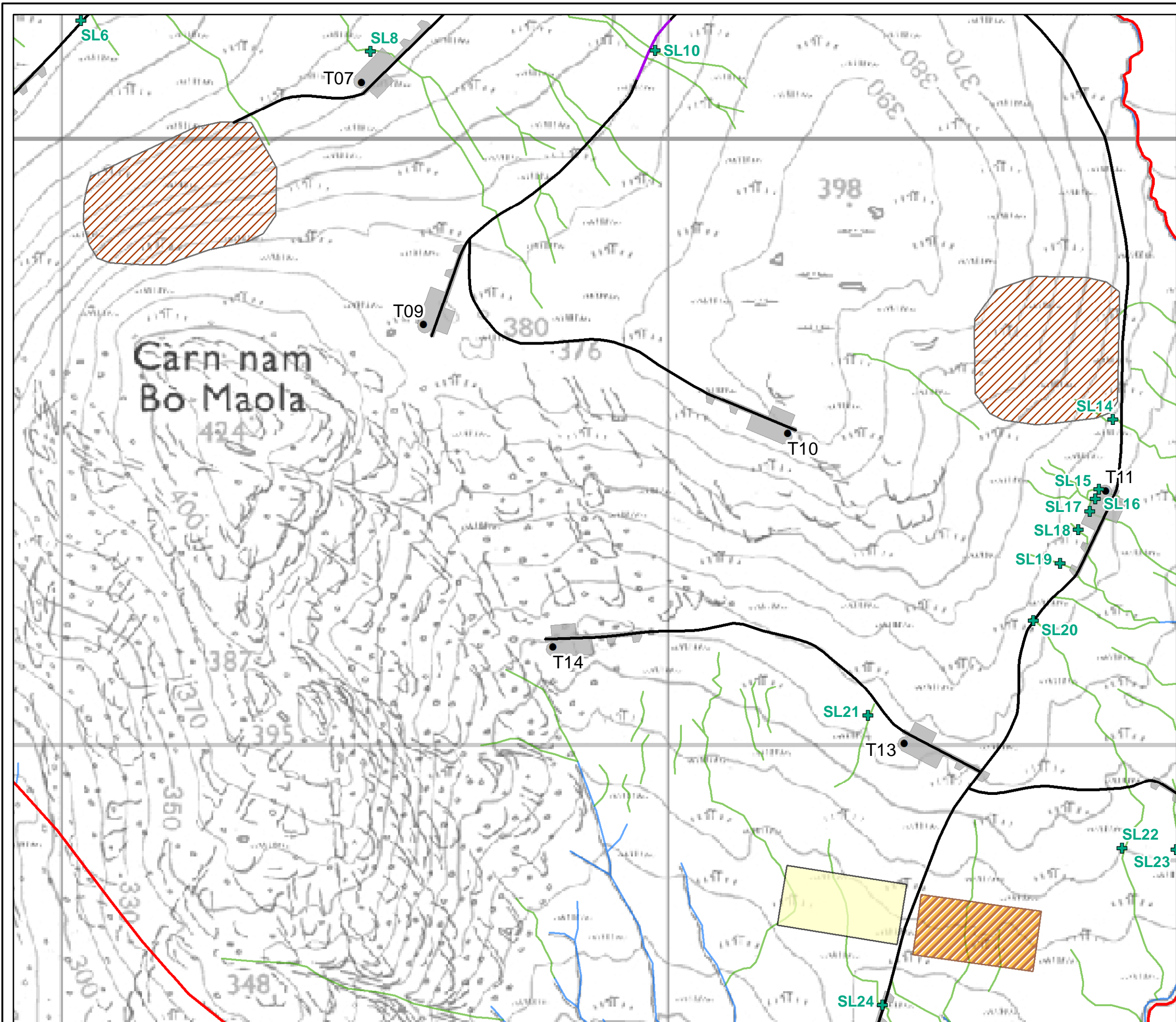
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- Turbine
- LiDAR Compound Location
- Floated Track
- Founded/Cut Track
- Hardstanding
- Borrow Pit Search Area
- Survey Locations
- Ephemeral Stream
- Natural Watercourse

Scale 1:6,000 @ A3
0 0.1 0.2 Km



TA10.2 Annex 1b
Watercourse Crossing Survey Plan

Achany Extension Wind Farm
EIA Report



Key

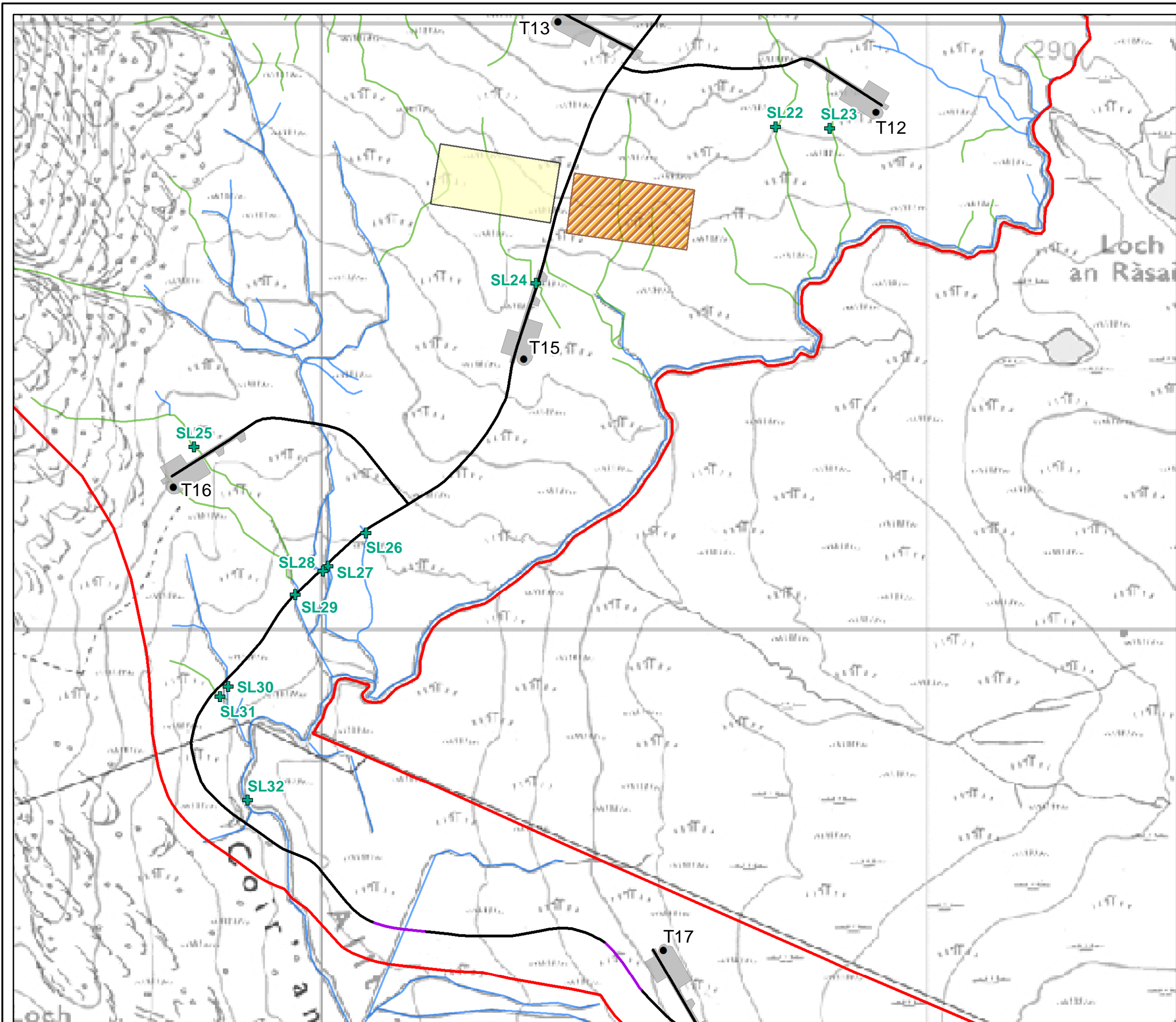
- Site Boundary
- Turbine
- Floated Track
- Founded/Cut Track
- Substation, Welfare Facility and Store
- Temp. Construction Compound, Security, Storage and Batching Plant
- Hardstanding
- Borrow Pit Search Area
- Survey Locations
- Ephemeral Stream
- Natural Watercourse

Scale 1:6,000 @ A3
0 0.1 0.2 Km



TA10.2 Annex 1c
Watercourse Crossing Survey Plan

Achany Extension Wind Farm
EIA Report



Key

- Site Boundary
- Turbine
- Floated Track
- Founded/Cut Track
- Substation, Welfare Facility and Store
- Temp. Construction Compound, Security, Storage and Batching Plant
- Hardstanding
- Survey Locations
- Ephemeral Stream
- Natural Watercourse









Scale 1:6,000 @ A3
0 0.1 0.2 Km



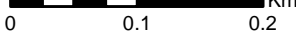
TA10.2 Annex 1d
Watercourse Crossing Survey Plan

Achany Extension Wind Farm
EIA Report

Key

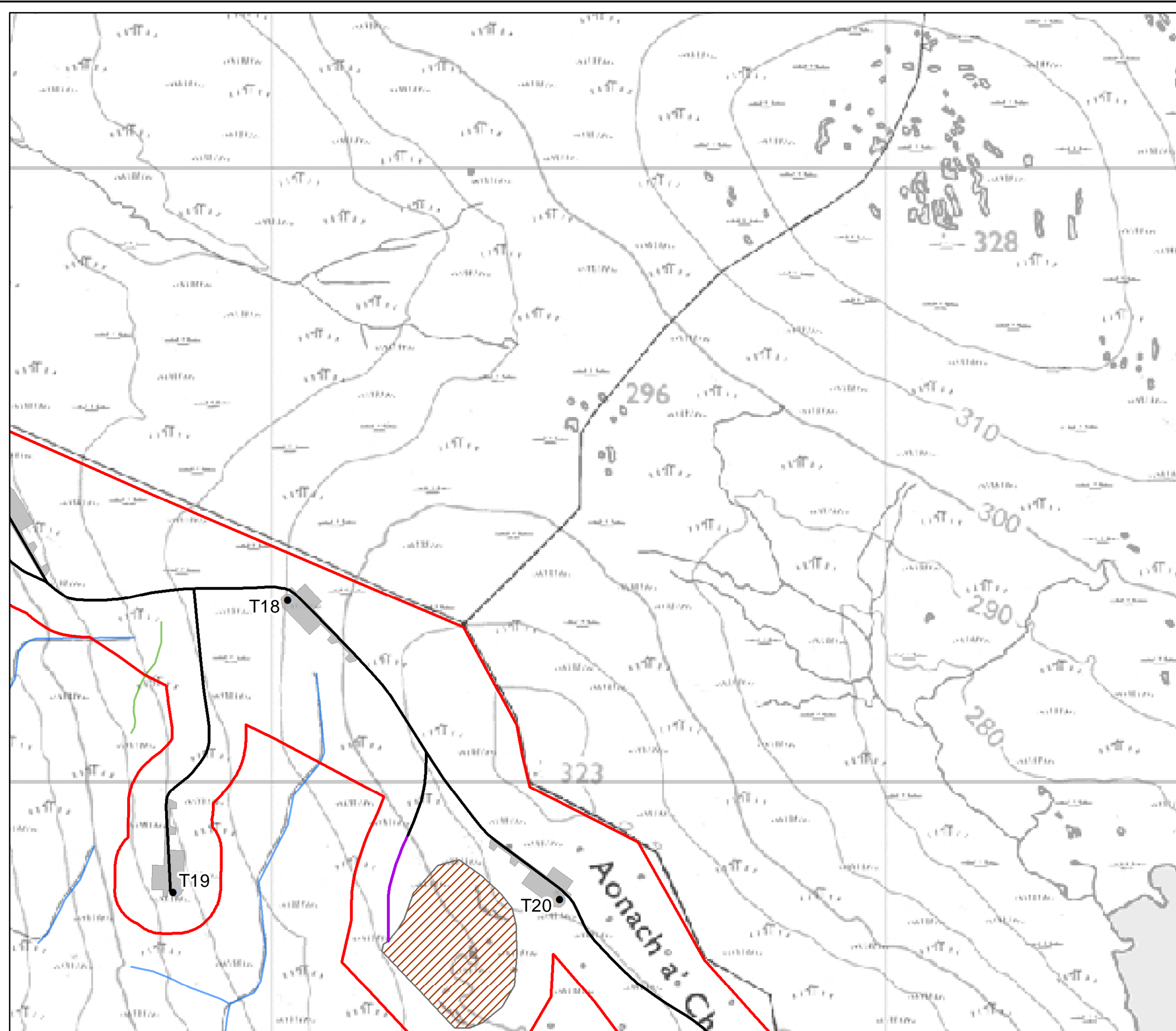
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-  Turbine
-  Floated Track
-  Founded/Cut Track
-  Hardstanding
-  Borrow Pit Search Area
-  Ephemeral Stream
-  Natural Watercourse

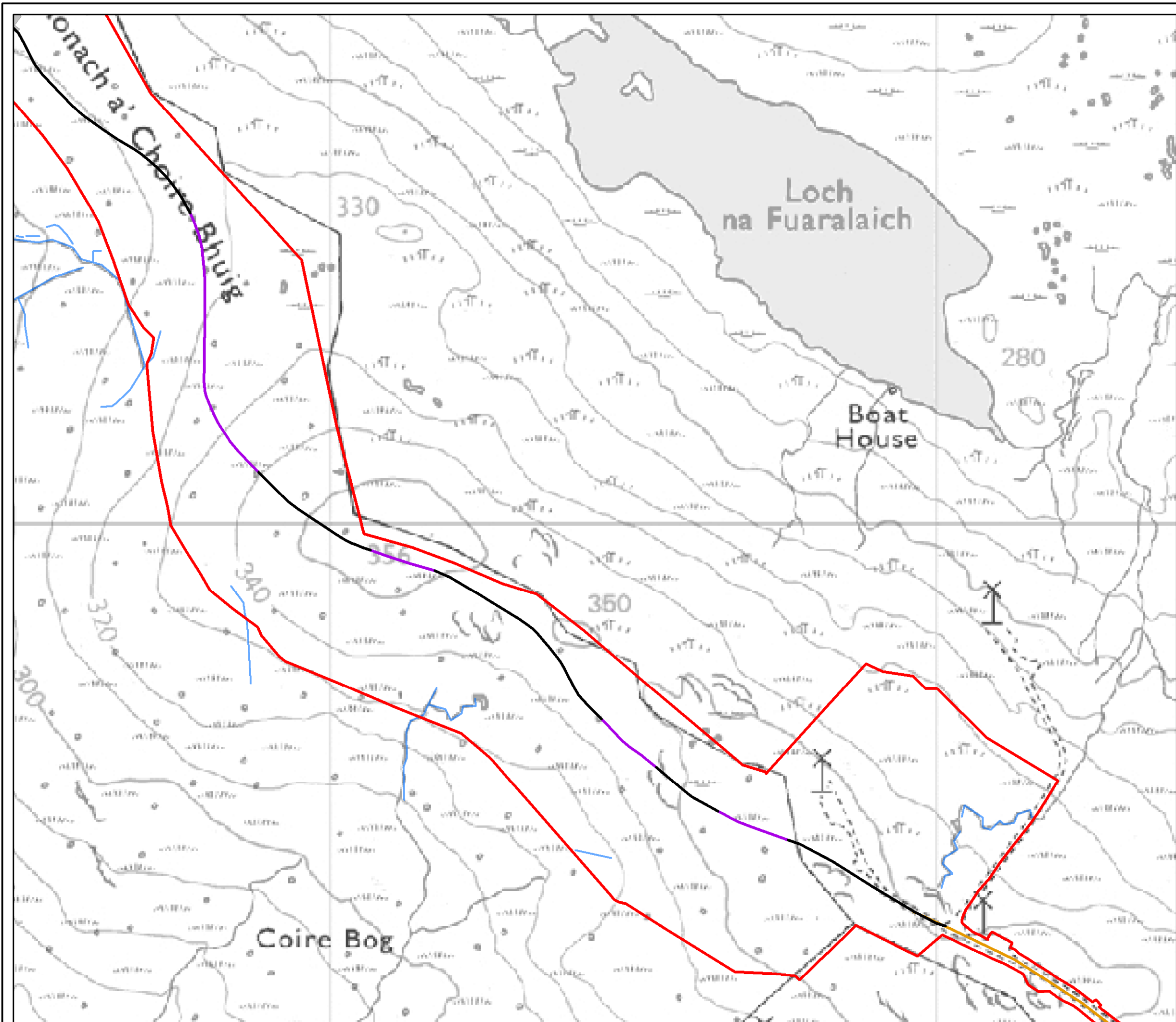
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TA10.2 Annex 1e
Watercourse Crossing Survey Plan

Achany Extension Wind Farm
EIA Report





Key

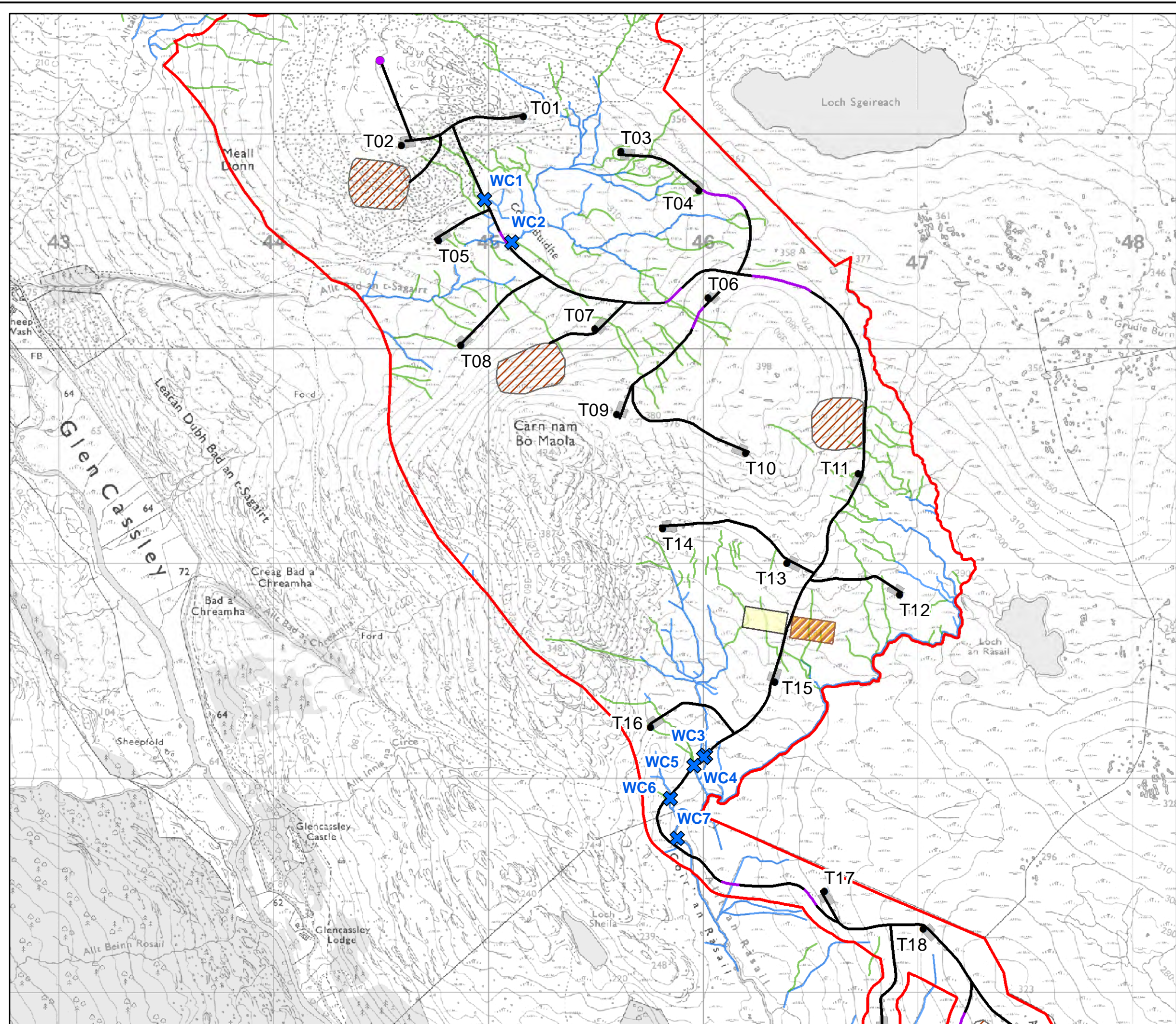
- Site Boundary
- Floated Track
- Founded/Cut Track
- Existing Track to be Upgraded
- Hardstanding
- Natural Watercourse

Scale 1:6,000 @ A3
0 0.1 0.2 Km



TA10.2 Annex 1f
Watercourse Crossing Survey Plan

Achany Extension Wind Farm
EIA Report



Key

- Site Boundary
- Turbine
- LiDAR Compound Location
- Floated Track
- Founded/Cut Track
- Substation, Welfare Facility and Store
- Temp. Construction Compound, Security, Storage and Batching Plant
- Hardstanding
- Borrow Pit Search Area
- Watercourse Crossings
- Ephemeral Stream
- Natural Watercourse

Scale 1:17,000 @ A3
0 0.1 0.2 Km



TA10.2 Annex 2
Watercourse Crossing Plan

Achany Extension Wind Farm
EIA Report

TECHNICAL APPENDIX 10.2 - Annex 3 Watercourse Crossing Photo Record

This Watercourse Crossing photo record document accompanies the Watercourse Crossing Assessment, Technical Appendix 10.2. It should be noted that several of the watercourses or drainage features observed on the site were obscured by heavy vegetation or located within a peat hag. 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 assessment in Technical Appendix 10.2, Table 10.1.

Watercourse crossing references provided in the photo document below relate to locations as shown in Annex 1 of Technical Appendix 10.2: "Watercourse Crossing Location Plan".

Location: WC 1

Access track to T01/T02, ephemeral flow path.
Anticipated crossing: circular culvert or cross drains.



Photo 1: Downstream



Photo 2: Upstream

Location: WC 2

Access track to T01/T02, unnamed 'natural watercourse'.

Anticipated crossing: Circular culvert.



Photo 1: Downstream



Photo 2: Upstream

Location: WC 3

Access track to T05, ephemeral flow path.

Anticipated crossing: circular culvert or cross drains.



Photo 1: Downstream



Photo 2: Upstream

Location: WC 4

Access track to T01/T02, Allt Bad an t-Sagairt

Anticipated crossing: Single-span (bridge)



Photo 1: Downstream



Photo 2: Upstream

Location: WC 5

Access track to T08, ephemeral flow path
Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 6

Access track to T08, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 7

Access track to north western turbine locations, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 8

Access track to T07, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 9

Access track to north western turbine locations, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 10

Access track between T06 and T09, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 11

Access track between T06 and T04, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 12

Access track between T04 and T03, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 13

Access track between T04 and T03, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 14

Access track north of T11, ephemeral flow path
Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 15

Access track to the east of T11, ephemeral flow path
Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 16

Access track to the south east of T11, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 17

Access track to the south of T11, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 18

Access track to the south of T11, ephemeral flow path
Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 19

Access track to the south of T11, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 20

Access track to the south of T11, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 21

Access track between T13 and T14, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 22

Access track to T12, ephemeral flow path
Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 23

Access track to T12, ephemeral flow path
Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 24

Access track north of T15, ephemeral flow path
Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 25

Access track to T16, ephemeral flow path, area of surface water accumulation
Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 26

Access track to T12, ephemeral flow path
Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 27

Access track between T15 and T17, unnamed watercourse

Anticipated crossing: Circular culvert



Photo 1: Downstream



Photo 2: Upstream

Location: WC 28

Access track between T15 and T17, unnamed watercourse

Anticipated crossing: Circular culvert



Photo 1: Downstream



Photo 2: Upstream

Location: WC 29

Access track between T15 and T17, unnamed watercourse

Anticipated crossing: Circular culvert



Photo 1: Downstream



Photo 2: Upstream

Location: WC 30

Access track between T15 and T17, unnamed watercourse (potentially cut / straightened)

Anticipated crossing: Circular culvert



Photo 1: Downstream



Photo 2: Upstream

Location: WC 31

Access track between T15 and T17, ephemeral flow path

Anticipated crossing: Circular culvert or cross drains



Photo 1: Downstream



Photo 2: Upstream

Location: WC 32

Access track to T01/T02, Allt an Ràsail
Anticipated crossing: Single-span (bridge)

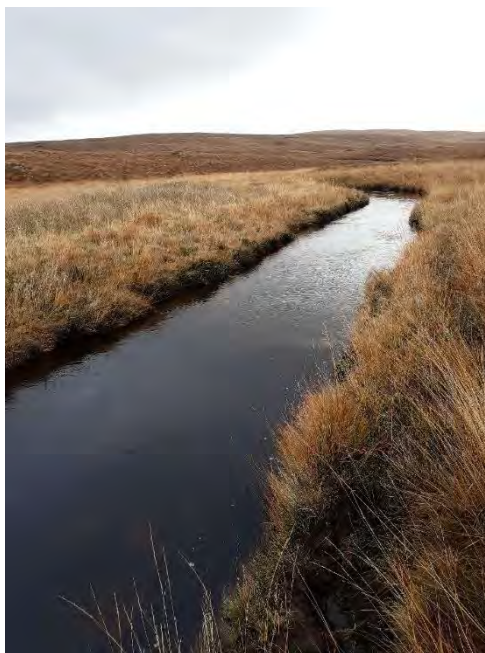


Photo 1: Downstream



Photo 2: Upstream