

Corrievarkie Pumped Storage Hydro

Scoping Report

ILI (Trossachs PSH) Ltd

25 May 2021

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Glossary

Abbreviation	Term	Abbreviation	Term
AOD	Above Ordinance Datum	HER	Historic Environment Record
ASL	Above Sea Level	HES	Historic Landscape Assessment mapping
AWI	Ancient Woodland Inventory	HESP	Historic Environment Policy for Scotland
BGS	British Geological Society	HGV	Heavy Goods Vehicle
BMP	Biosecurity Management Plan	HLA	Historic Landscape Assessment
BS	British Standard	HMP	Habitat Management Plan
CAR	Controlled Activities Regulations	IEA	Institute of Environmental Assessment
CCP	Climate Change Plan	INNS	Invasive Non-Native Species
CEMP	Construction Environment Management Plan	LCA	Landscape Character Area
CIHT	Chartered Institution of Highways and Transportation	LCT	Landscape Character Type
CIEEM	Chartered Institute of Ecology and Environmental Management	LDP	Local Development Plan
CLG	Community Liaison Group	LEMP	Landscape and Ecological Management Plan
CRTN	Calculation of Road Traffic Noise	LGV	Large Goods Vehicle
CTMP	Construction Traffic Management Plan	LVIA	Landscape and Visual Impact Assessment
DETR	Department for Environment, Transport and the Regions	MMA	Materials Management Appraisal
DMRB	Design Manual for Roads and Bridges	MW	Megawatt
DTM	Digital Terrain Model	MWh	Megawatt Hour
EC	European Commission	NCAP	National Collection of Aerial Photographs
ECU	Energy Consents Unit	NPF	National Planning Framework
EclA	Ecological Impact Assessment	NRTF	National Road Traffic Forecasts (Great Britain)
EIA	Environmental Impact Assessment	NSR	Noise Sensitive Receptor
EIAR	Environmental Impact Assessment Report	NVC	National Vegetation Classification
FRA	Flood Risk Assessment	ONS	Office for Nations Statistics
FWPM	Freshwater Pearl Mussel	PAN	Planning Advice Notes
GDL	Garden and Designed Landscape	PPE	Personal Protective Equipment
GHG	Greenhouse Gas	PSH	Pumped Storage Hydro
GLVIA	Guidelines for Landscape and Visual Impact Assessment	PSYM	Predictive SYstem for Multimetrics
GWLTE	Groundwater Dependent Terrestrial Ecosystems	PWS	Private Water Supplies

Abbreviation	Term	Abbreviation	Term
PKC	Perth and Kinross Council	TBM	Tunnel Boring Machine
RBD	River Basin District	THC	The Highland Council
RIVPACS	River Invertebrate Prediction and Classification System	TMP	Traffic Management Plan
RNMA WLA	Rannoch-Nevis-Mamores-Alder Land Area	Wild TWL	Top Water Level
RBMP	River Basin Management Plan	UK	United Kingdom
SAC	Special Area of Conservation	UKTAG	UK Technical Advisory Group
SBL	Scottish Biodiversity List	WFD	Water Framework Directive
SEPA	Scottish Environmental Protection Agency	WML	Waste Management Licence
SPA	Special Protected Area	WMP	Waste Management Plan
SPP	Scottish Planning Policy	WoSAS	West of Scotland Archaeology Service
SPZ	Source Protection Zone	WeBS	Wetland Bird Survey
SuDS	Sustainable Drainage Systems	ZTV	Zone of Theoretical Visibility

1. Introduction

1.1. Overview

This Scoping Report has been prepared by AECOM on behalf of ILI (Trossachs PSH) Ltd (hereafter referred to as the 'Applicant'). The purpose of the report is to request a Scoping Opinion, pursuant to Regulation 12 of the Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 with respect to the scope and approach to the Environmental Impact Assessment (EIA) of the proposed Corrievearkie Pumped Storage Hydro (PSH) scheme (hereafter referred to as the 'Development').

1.1.1. The Applicant

The Applicant has been developing renewable energy projects for over 15 years, ranging from single, medium sized wind turbines that benefited from the UK's Feed-in Tariff, to commercial scale wind farm developments. The Applicant has since diversified into PSH as it seeks to play its part in meeting Scotland's future energy needs. The Applicant has one PSH project in development and awaiting determination; the proposed 450 megawatt (MW) Red John PSH scheme located near Dores, south of Inverness.

1.2. Background

The Applicant proposes to construct a PSH scheme at a small freshwater loch, Loch Monaidh, which is situated between Loch Ericht, Loch Garry¹ and Loch Rannoch, approximately 9 km south west of Dalnaspidal and 11 km north of Bridge of Ericht, as shown on Figure 1.1 Site Location Plan, Appendix A..

The Development Site was identified from a Scotland-wide site search exercise and is considered suitable due to a number of factors such as topography, underlying geology, and proximity to the electricity grid. The Development will both abstract and discharge water from and to Loch Ericht, which is part of the Tummel hydro-electric scheme and is dammed at both ends.

Throughout this Scoping Report, the term 'the Development Site' is used to refer to the area encompassed by the Development Site red line boundary as shown on Figure 1.1 Site Location. Figure 1.2A Indicative Design Layout shows indicative infrastructure including the headpond, headrace, powerhouse, tailrace, spillway, access and other associated permanent and temporary infrastructure.

1.3. Development Components

Table 1.1 Development Components, below describes the component parts of a PSH scheme and provides the terminology applicable to the Development, and which is used throughout this report. Further detail on each of these components can be found within Chapter 2 Project Description, Table 2.1 Development Parameters (limits of deviation).

Table 1.1: Development Components

Component	Description
Headpond	The upper reservoir, including embankment or dam.
Embankment	Embankments or dams around the headpond reservoir/water body.
Reservoir	Water body retained within the headpond embankments.
Tailpond	The lower reservoir. In this case this is the existing water body of Loch Ericht.
Tailpond – Passage of Vessels	Loch Ericht will be used to transport the abnormal indivisible loads (AILs), for example the tunnel boring machine, by vessel from the North West loch structure to site.
Inlet / Outlet	The location where the tunnels enter the headpond and tailpond.
Headrace	The underground high-pressure tunnel connecting the headpond to the power cavern.

¹ There is more than one Loch Garry in Scotland. Throughout this report any reference to Loch Garry is in reference to the loch located near Dalnaspidal.

Component	Description
Tailrace	The underground low-pressure tunnel connecting the power cavern to the outlet in the tailpond.
Power Cavern	This is a below-ground component that will contain the combined pump / turbines, generators, switchgear and transformers.
Sub / switching station	This station will be an above-ground component that will consist of a secure electrical compound in which electrical equipment will be housed.
Spillway	This spillway will consist of a buried pipeline and will be used as a system to drain any excess water from the headpond as well as being used for the scouring and draining down of the headpond in an emergency situation.
Surge Shaft(s)	Structures that are provided along the waterways to contain pressure fluctuations within the hydraulic system. The low-pressure tunnel shaft will be underground, with the high-pressure tunnel shaft with a section cut into the hillside.
Loch Structure(s)	Located at each end of the tailpond loch route, the structures will include lifting equipment, slipways and boat yards. The structures will be used for loading and unloading vessels with plant, equipment and material. The range in water levels of the loch is currently unknown, therefore at this stage we anticipate these structures to be a maximum of 15m above the Top Water Level (TWL) of the loch with any auxiliary lifting equipment above that. The structures will be used to launch and recover vessels as well as moor vessels alongside.
Access tracks	There will be both temporary and permanent access tracks required to be constructed as part of the development. The alignment of existing access tracks will be utilised as far as possible. Any existing access track will be upgraded to accommodate the size and number of vehicles required to travel to from and around the development.
Compounds	Temporary and permanent compounds will be required across the development. Some will be used for construction related activities such as laydown areas, work yards and for general site maintenance. Others will be used for office space, parking areas, welfare areas, and accommodation. These may include electric charging points for electric shuttle cars/buses.
Temporary Accommodation	Some temporary accommodation will be provided within the above compounds, with an additional offsite camp required. It is estimated that the potential footprint of the offsite camp will be around 8,000 m ² . This temporary camp will likely be located close to the Development Site and/or along one of the construction access routes. This offsite location has yet to be identified with the relevant studies currently being undertaken.

The total area within the scoping red line is approximately 4,029 hectares (ha). Not all of this area within the boundary will be developed.

Corrievorkie PSH will have a storage capacity of approximately 14.5 gigawatt hours (GWh) with approximately 600 MW installed electrical generation capacity (subject to further investigation and feasibility works).

1.4. Environmental Impact Assessment Legislative Context

As the Development will comprise an electricity generating plant with a gross electrical output in excess of 50 MW, consent to construct and operate will be required from the Scottish Ministers under Section 36 of the Electricity Act 1989 (the Act). The Section 36 application will be prepared in accordance with the requirements of the Electricity Act 1989 and submitted to the Energy Consents and Unit (ECU) of the Scottish Government. The Scottish Ministers will also be requested to give a direction for planning permission to be deemed granted under Section 57(2) of the Town and Country Planning (Scotland) Act 1997, as amended.

The Electricity Works (EIA) (Scotland) Regulations 2017 apply to applications under Section 36 of the Act. The proposed Development constitutes a Schedule 2 development under Regulation 2(1) of the Electricity Works (EIA) (Scotland) Regulations 2017; EIA is not mandatory for Schedule 2 developments. As there is potential for the Development to have significant effects on the environment, the Applicant considers it appropriate to undertake an EIA.

1.5. Withdrawal of the United Kingdom from the European Union

As of 23:00 on 31 January 2020, the UK is no longer a Member State of European Union (EU). However, in accordance with the transitional arrangements provided for in Part 4 of the Withdrawal Agreement as implemented into domestic law by the European Union (Withdrawal Agreement) Act 2020 (“the 2020 Withdrawal Agreement Act”) [REF 12], the UK entered an implementation period which ended on 31 December 2020. During the implementation period the UK continued to be treated as if it were still an EU Member State for many purposes with most EU law (including as amended or supplemented) continuing to apply to the UK. The Withdrawal Act retained the body of existing EU-derived law (which includes EIA Regulations and other relevant environmental legislation) within UK domestic law. These regulations provide for the EIA Regulations to be amended to ensure they function correctly following the implementation period. In particular, the amendments update references in the EIA Regulations to EU law, Member States and related terms to reflect the UK leaving the EU. The regulations do not make substantive changes to the way the EIA regime operates following Brexit.

1.6. The Scoping Report

This Scoping Report sets out the proposed scope for assessments to be included within the EIAR to be submitted as part of the Section 36 application for the Development.

As required under Regulation 12 (2) of the Electricity Works (EIA) (Scotland) Regulations 2017, this Scoping Report contains:

Requirement	Found within Scoping Report
<i>A description of the location of the development, including a plan sufficient to identify the land</i>	Chapter 2 Project Description, Figure 1.1: Site Location and Figure 1.2A: Indicative Design Layout
<i>A brief description of the nature and purpose of the development and of its likely significant effects on the environment</i>	Chapters 5 to 15 of this Scoping Report
<i>Such other information or representations as the developer may wish to provide or make</i>	Chapters 3 and 4 of this Scoping Report

The remainder of this Scoping Report is structured as follows:

- Chapter 2 Project Description;
- Chapter 3 Scope of the Environmental Impact Assessment;
- Chapter 4 Planning Policy;
- Chapter 5 Landscape and Visual Amenity;
- Chapter 6 Terrestrial Ecology;
- Chapter 7 Aquatic Ecology
- Chapter 8 Ornithology;
- Chapter 9 Geology, Soils and Carbon;
- Chapter 10 Water Environment;
- Chapter 11 Flood Risk and Water Resources
- Chapter 12 Archaeology and Cultural Heritage;
- Chapter 13 Access, Traffic and Transport;
- Chapter 14 Noise and Vibration; and
- Chapter 15 Socio-economics, Recreation and Tourism.

This Scoping Report is supported by the following Figures found within Appendix A:

Table 1.1: Supporting Figures

Chapter	Fig No.	Title
Introduction	1.1	Site Location
	1.2 A	Indicative Design Layout
	1.2 B	Indicative Design Layout (above ground infrastructure only)
Project Description	2.1	Constraints Plan
	2.2	Design Evolution
Landscape and Visual Amenity	5.1	Zone of Theoretical Visibility (Development Headpond)
	5.2	Zone of Theoretical Visibility (Development Tailpond)
	5.3	Zone of Theoretical Visibility (Headpond and Tailpond)
	5.4	Landscape Designations
	5.5	Landscape Character Types
	5.6	Representative Viewpoints
Terrestrial Ecology	6.1	Statutory Designations
	6.2	Non Statutory Designations
	6.3	Terrestrial Ecology Field Survey Areas
Aquatic Ecology	7.1	Aquatic Survey Locations
Ornithology	8.1	Statutory Designations
	8.2	Ornithology Field Survey Areas
	8.3	Vantage Point Survey
Water Environment	10.1	Water Environment Features and Attributes
Flood Risk and Water Resources	11.1	Existing Tummel-Garry Hydro Scheme Infrastructure
	11.2	Direct and indirect catchment areas of Loch Ericht
Archaeology & Cultural Heritage	12.1	Designated Heritage Assets, and Non-Designated Assets Recorded on Canmore within 3 km
	12.2	Designated Heritage Assets, and Non-Designated Assets Recorded on Canmore within 1 km
Access, Traffic & Transport	13.1	Transport Study Area: General Construction Traffic Access Route
	13.2	Transport Study Area: Abnormal and Indivisible Loads Delivery Route from Port of Corpach
Noise and Vibration	14.1	Noise and Vibration Sensitive Receptors

This Scoping Report is also supported by the following additional Appendices, which can be found at the end of this document:

- Appendix B: Terrestrial Ecology Field Survey Methods
- Appendix C: Ornithology Field Survey Methods

1.7. Consultation

The Applicant is committed to ongoing engagement with statutory and non-statutory consultees and interested parties throughout the consenting process. The Applicant has already undertaken informal consultation with the ECU, Perth and Kinross Council (PKC), NatureScot and Historic Environment Scotland as well as initial high level consultation with local communities through an interactive online presentation. A project website has also been created to provide information and updates.

A Pre-Application Consultation report will be submitted with the Section 36 application which will detail the informal and formal consultation held, and how this has informed project development.

2. Project Description

2.1. Site Description

The Development would have a capacity of approximately 600 Megawatts (MW) although this is subject to further investigation and feasibility works.

The Development is located at central national grid reference NN 56198 71961. It is situated to the east of Loch Ericht within Perth and Kinross and adjacent to the Highland Council administrative area. The Development would require creation of a headpond, its associated embankments, inlet and outlet structures on Loch Ericht, a loch structure with pier and slipway, access tracks, substation and control building as well as underground headrace / tailrace and power cavern structures. The headpond location can be seen on Figure 1.2A Indicative Design Layout with grid references of key development components provided in Section 2.6 below.

2.2. Environmental Designations

The Development Site is located outwith and to the south west of the Cairngorms National Park, and adjacent to European designated nature conservation sites Drumochter Hills Special Area of Conservation (SAC) Special Protection Area (SPA) and Site of Special Scientific Interest (SSSI). The Development Site is also situated within the eastern part of the Rannoch – Nevis – Mamores – Alder Wild Land Area (RNMA WLA) as shown on Figure 2.1 Constraints Plan and Figure 5.4 Landscape Designations. It is the third most extensive WLA, separated from the largest WLA (Cairngorms) by the Drumochter Pass with the A9 road corridor and Inverness to Perth railway line. The RNMA WLA contains several mountain ranges and is popular for a wide range of recreational users, attracting many visitors wishing to experience wild land qualities in different ways². Whilst most of the lochs within the WLA have formed naturally, the area also includes a number of dammed waterbodies and associated hydro-electric schemes including Loch Ericht.

Further details on designated sites and their sensitivity to the Development are addressed within Chapters 5-15 of this Scoping Report.

2.3. Site Access

At present, the site can be accessed from the A9 trunk road (T) via the Calvine junction (B847) or the Tummel Bridge junction (B8019). If the southernmost junction is taken, the B8019 merges with the B846 at Tummel Bridge, then at Balmore there is an intersection between the B846 and the northern access route (B847). From this point there is only one access route (B846) heading West along the Northern edge of Loch Rannoch to the Bridge of Ericht. At this point a private track is accessed via the Talladh Beithe Estate, travelling North up the East side of Loch Ericht to the Development Site. Access routes can be seen on Figure 13.1 Transport Study Area: General Construction Traffic Access Route.

2.4. Identification of Alternatives

Under Schedule 4, parts 2 and 3 of the Electricity Works (EIA) (Scotland) Regulations 2017, the Applicant is required to provide “a description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.” As well as “a description of the relevant aspects of the current state of the environment (the “baseline scenario”) and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge.”

The Development was identified as part of a Scotland-wide review of PSH potential conducted by the Applicant. The topography and geology of Loch Ericht provide suitable conditions for pumped storage hydro in this location.

² Rannoch – Nevis – Mamores – Alder Wild Land Area, SNH 2017 <https://www.nature.scot/sites/default/files/2017-11/Consultation-response-Description-of-Wild-Land-Rannoch-Nevis-Mamores-Alder-July-2016-14.pdf>

There are few, if any, energy storage technologies which can provide the grid scale services of pumped storage hydro. Alternative storage technologies are either too small (batteries) or largely unproven (compressed air) and, in the case of ancillary services such as fast response, are more carbon intense (open cycle gas).

PSH schemes provide benefits by balancing the electricity supply and demand. Recharge occurs at periods of low demand and stores excess energy generated by baseload and intermittent power stations so that this energy can be re-released at peak times. This is especially beneficial in Scotland where an increasing percentage of electricity is coming from wind power, the delivery of which is intermittent and therefore PSH schemes support renewable energy generators by providing greater stability to the grid. Pumped storage can also provide ancillary services to the grid.

2.5. Design Evolution

The Development has evolved through a design process resulting in the layout presented in this report. This design evolution will continue to be informed by and refined throughout the EIA process. The headpond area has evolved through consideration of engineering feasibility and environmental constraints. Where possible, mitigation has been embedded into the design to reduce any potential significant effects from the Development on identified receptors. Consultation responses, stakeholder feedback, and collation of baseline surveys results will continue to influence the final design for the Development.

The following sections below describe the design process for the Development to date.

2.5.1. Design I: Feasibility

During a Scotland-wide review of PSH potential conducted by the Applicant, a PSH scheme utilising Loch Ericht was identified. An indicative arrangement of the Development was then developed which was based on two provisional headpond locations as shown on Figure 2.2: Design Evolution. During the feasibility stage, the buildability and landscape and visual aspects and ecological designations were considered for both of the headpond options.

An initial meeting was held with AECOM, the Applicant, NatureScot (formerly SNH) and Perth and Kinross Council (PKC) where the feasibility of both headpond options was discussed in relation to both Wild Land and statutory ecological designations, in addition to discussing route to site options. The primary outcome of this meeting determined that there was not the ability to determine “no satisfactory alternative” option to locating the headpond out with the statutorily designated Drumochter Hills SPA/SAC/SSSI, and therefore Design Iteration 1 option was discounted. The access route through Dalnaspidal was then also discounted due to land ownership constraints, consenting concerns associated with constructing a new road through the Talla Bheith Forest as well as developing a new level crossing within the Cairngorm National Park next to Dalnaspidal Lodge.

2.5.2. Design II: Scoping

With the preferred headpond option being refined to Design Iteration 2, the next phase in design focussed on creating a design that fulfilled the ability to meet the requirements of the Applicant, creating a design that would allow a suitable amount of storage relevant to the amount of earthworks required to create the headpond, whilst simultaneously taking environmental constraints into consideration. To inform this improved headpond design, a number of initial studies were undertaken.

As part of the design iteration, a high level environmental desk study was undertaken which included a desk based review of environmental constraints to refine the proposed headpond location outwith the Drumochter Hills SPA/SAC/SSSI in combination with an initial desk based review of publicly available data and an initial site walkover which identified the potential for winter birds and Golden Eagles on the shores of Loch Ericht. The initial site walkover also highlighted the importance of recreational activities relating to Ben Alder Estate amongst other likely receptors which could be affected by the Development.

A further desk-based study was undertaken which covered an initial appraisal of the potential access routes to the site. This covered both general construction traffic, including construction staff, and also the delivery of larger components designated as Abnormal and Indivisible Loads (AILs). This considered routes to site by all relevant modes of transport as well as identifying potential Ports of Entry (PoE) for larger components entering the country. This study provided an indicative assessment of the feasibility of using potential access routes to site primarily on the public road network and identified high level

risks and constraints. The purpose of this study was to identify an initial preferred access solution for general construction traffic and AILs.

In summary, the design was amended as follows:

- Design Iteration 1 location was discounted, with Design Iteration 2 location utilising Loch Monaidh, outside of the Drumochter Hills SAC and SPA, taken forward as the preferred option;
- Proposed construction site access tracks that utilise the existing forest tracks and adopted road network as much as possible;
- Proposed AIL access that utilise the forest tracks and road network as much as possible and utilising the fire breaks in the woodlands at Ben Alder Estate to minimise loss after delivery to site by loch vessels;
- Above ground infrastructure was refined to reduce impact on landscape; and
- A temporary soil disposal area for any excess spoil generated during construction that utilises land of low ecological value. Any excess spoil remaining after construction of the embankments will be incorporated into the design through the detailed design process.

The layout is shown on Figure 1.2A Indicative Design Layout and Figure 1.2B Indicative Design Layout Above Ground Infrastructure. Figure 1.2A displays all infrastructure, with Figure 1.2B showing only the above ground infrastructure for clarity on which components would be visible.

2.6. The Development

Table 2.1 below sets out the key characteristics of the development proposed at Scoping stage – note this is subject to further refinement.

Table 2.1: Development Parameters (limits of deviation)

Component	Detail (Approximate Parameters)
Headpond – Location	Location: NN 56378 68898
Headpond Reservoir	Working volume of water up to 18,500,000 m ³
Headpond Embankment	There are four proposed embankments. The maximum embankment height is 93 m high above existing ground level (735m AOD (736.5m including 1.5m fencing)). Embankment Height 1 (West) 44m Embankment Height 2 (South) 33m Embankment Height 3 (East) 93m Embankment Height 4 (South) 8m
Headpond Inlet Outlet	Intake tower height: Approximately 40 m below water and 15 m above top water level.
Headrace surface surge shaft	Location: NN 56913 69408 Dimensions: Approximately 20 m diameter shaft with 10 m high cutting and 5 m high embankment
Tailpond (Loch Ericht)	Location: NN 55100 73535
Tailpond Inlet Outlet Location	- Location: NN 54687 71991
Tailpond Inlet Outlet	Dimensions: Approximately 30 x 100 x 35 m with approximately 15 m above the top water level of the loch (W x L x H)
Headrace	Length: approx. 790 m
Tailrace	Length: approx. 2,600m
Power Cavern	Dimensions: 100 x 40 x 40 m
Access Tracks (new temporary)	Total length: 6 km
Access Tracks (new permanent)	Total length: 7.5 km 1.5 km of which is through current commercial forestry
Access Tracks (upgrade)	Total approximate length: 19.5 km
Construction Compounds	Total no. compounds: 12 (8 temporary and 4 permanent)

Component	Detail (Approximate Parameters)
	Total area: approx. 66,500 m ²
Temporary Accommodation	Some temporary accommodation will be provided within the above compounds, with an additional offsite camp required, location tbc, size circa 8,000 m ² .
Switching Station	Area: 8,000 – 10,000 m ²
Loch Structure(s) – Location (Loch Ericht)	Northern Pier Location: NN 61544 83509 Southern Pier Location: NN 55186 72689
Loch Structure(s)	Distance from loch bank: approximately 100 m Width: 75m Height: up to 15 m above top water level of the loch (dependent on existing water levels of the loch, which are currently unknown)

2.6.1. Pre-Construction (Site Establishment)

2.6.1.1. Permanent and temporary access tracks

Table 2.3 Access Tracks sets out the proposed access tracks location, length, state of construction (temporary/ permanent) and type (new/ upgrade). Tracks can also be viewed on Figure 1.2A Indicative Design Layout.

Table 2.3: Access Tracks

Track Location / Use	New/ Upgrade	Permanent / Temporary	Approximate Location (NGR)	Approximate Length (km)
Ben Alder Estate – AIL deliveries	Upgrade	Permanent	NN 63665 85813	2.5
Ben Alder Estate – AIL deliveries	New	Permanent	NN 61916 84728	1.5
Ben Alder Estate	New	Permanent	NN 56197 68708	5
Talladh Beithe and Ben Alder	Upgrade	Permanent	NN 52187 58199	17
Talladh Beithe	New	Permanent	NN 52850 58138	1
Construction Site	New	Temporary	NN 55254 69419	5.5
Dalwhinnie (Ardverkie Estate)	New	Temporary	NN 63527 84681	0.5

2.6.1.2. Construction Compounds

Table 2.4 Proposed Construction Compounds set out the proposed construction compounds and their approximate location and area.

Table 2.4: Proposed Construction Compounds

Compound No.	Usage	Permanent / Temporary	Approx. Location (NGR)	Approx. Max.Size (m ²)
1	Main Site - Shoreline compound	Temporary	NN 55112 72563	30,000
2	Main Site - Smaller shoreline compound	Permanent	NN 54965 72400	10,000
3	Main Site - Inlet/outlet compound	Permanent	NN 54748 72054	7,500
4	Main Site - Access track compound	Temporary	NN 54749 68926	2,500
5	Main Site -Headpond compound (South)	Permanent	NN 56231 68657	1,500
6	Main Site - Headpond compound (East)	Temporary	NN 57189 68808	500

Compound No.	Usage	Permanent / Temporary	Approx. Location (NGR)	Approx. Max. Size (m ²)
7	Talladh Beithe - Borrow pit/ Storage compound	Temporary	NN 51820 60040	2,500
8	Talladh Beithe - Borrow pit/ Storage compound	Temporary	NN 51451 62441	2,500
9	Talladh Beithe - Borrow pit/ Storage compound	Temporary	NN 53355 64671	2,500
10	Dalwhinnie (Ardverikie Estate) – Storage compound	Temporary	NN 63527 84681	1,000
11	AIL Route – Access track storage compound	Temporary	NN 63643 85831	1,000
12	AIL Route – Loch Structure	Permanent	NN 61562 83524	5,000
<u>TOTAL AREA (m²)</u>				<u>66,500</u>

2.6.2. Construction

2.6.2.1. Programme

Construction is expected to take up to 6 years which excludes the pre-construction works. The construction activity is anticipated to peak at around years 3 and 4 during the construction of the tunnels, waterways and headpond. The underground tunnelling work is expected to be a 24-hour operation and headpond construction is anticipated to be undertaken during working hours (typically between 0800 to 1800). The indicative program in Table 2.5 Indicative Construction Programme below shows what activities are sequenced together and which activities are linked to achieving the target commissioning date. This programme will be updated and further detail provided as the EIA process progresses.

Table 2.5 Indicative Construction Programme

	Year 1				Year 2				Year 3				Year 4				Year 5				Year 6			
	Q1	Q2	Q3	Q4																				
Construction Design																								
Site investigation																								
M&E works procurement																								
Construction design																								
Mobilisation																								
Mobilisation																								
Access Roads																								
Construction Camps																								
Headpond																								
Draining Lochs																								
Dam construction including lining																								
Spillway & Inlet/outlet works																								
Tailpond																								
Diversion works																								
Inlet/outlet works																								
Tunnelling																								
Powerhouse access tunnel																								
Construction tunnel																								
Access tunnels																								
Headrace tunnel																								
Tailrace tunnel																								
Powerhouse																								
Tunnelling around powerhouse																								
Pressure shaft																								
Surge tank (headrace and tailrace)																								
Turbine installation																								
Balance of plant																								
Other works																								
Delivery of ALL's																								
Control Building																								
Substation & Grid Connection																								
Pre-commissioning																								
Commissioning																								
Completion of project																								

2.6.2.2. Construction Vehicles, Plant and Equipment

Several different types of plant and equipment will be required for the terrestrial construction of the Development. These include, but are not limited to:

- Bulldozers;
- Mobile cranes (some of which may be AILs);
- Mobile crushing and screening plant;
- Dump trucks — for the transportation of materials within the Development Site;
- Electric shuttle cars/buses;
- Excavators;
- Graders;
- Low loaders - for delivery of plant and equipment (including AILs);
- Mechanical breaking plant;
- Pumps;
- Drilling, piling and blasting rigs;
- Rollers;
- 8-wheel tippers;
- Tractors and trailers;
- Temporary concrete batching plant;
- Temporary bunded fuelling station;
- Temporary floating track - i.e. bogmats or trackway system;
- Tunnel services - i.e. lighting, electricity, ventilation etc.;
- Silt busters, silt curtains and dewatering tubes;
- Water bowsers and water cannons;
- Wheel wash facilities; and
- Tunnel Boring Machine (TBM) — or equivalent (AIL).

Specialised types of the plant listed above may be required for the construction of specific components of the Development and the most suitable equipment for the task will be identified.

The main vehicle movements would occur during the middle of the construction period, whilst the major earthworks above and below ground are underway. It is anticipated that the large plant and equipment will remain inside the construction areas for each component of the Development and the operators and staff will be shuttled around site via light vehicles such as vans, minibuses and pickup trucks. Also included in the areas will be temporary fuelling stations with fuel bowsers and pumps.

The tunnel boring machine (TBM) and other AILs will be delivered in to the preferred PoE, which is currently the Port of Corpach, before being transported via the access route from the A889 to the Loch Structure on the West bank of Loch Ericht. The AILs will then be transferred to a vessel and transported down Loch Ericht to site. General construction deliveries would not be transported on Loch Ericht and instead will be delivered via the A9 (T), B8019 and B846 before joining proposed access routes south of the site. Traffic access routes can be found on Figure 13.1 Transport Study Area: General Construction Traffic Access Route and Figure 13.2 Transport Study Area: Abnormal and Indivisible Loads Delivery Route from Port of Corpach.

The loch structure area, as shown in Figure 1.2A Indicative Design Layout, will consist of a pier, slipways and a boat yard that is expected to have both temporary and permanent components. The facility will accommodate the delivery of large components associated with the tunnelling and mechanical and electrical components. Several different types of plant and equipment will be required for the construction and operation of the proposed loch structure. These include, but are not limited to:

- Barges;
- Long reach excavators;
- Tugs;
- Jack up barges;
- Workboats;

- Temporary cranes;
- Mobile cranes; and
- Piling rigs.

2.6.2.3. Materials Management

Due to the nature of the Development, it is recognised that the generation and handling of material will require suitable management to minimise any likely significant adverse effects to the environment, surrounding landscape and project cost in addition to minimising transport movements on the local road network from offsite disposal. It is anticipated that a Waste Management Licence (WML) will be required for carrying out this operation in addition to a Waste Management Plan (WMP).

The Development requires a significant amount of material to construct the impoundment structures at the headpond. The design, shape and size of the impoundment will be confirmed through the EIA process. However, at this stage, it is anticipated the embankment structure could be up to 93 m high and require around 7,200,000 m³ of material to construct. Indicative excavated material volumes can be found below within Table 2.6 Indicative Excavated Material Volumes.

Due to the volume of material anticipated to be required for the construction of various components, a Materials Management Appraisal (MMA) will be undertaken as part of the EIA process and updated prior to construction, to ensure that the material that is generated from construction is classified and reused as far as practically possible. The MMA will ensure that the best practical option is secured by:

- Determining the final volumes and likely nature of the rock that will be excavated from the different excavation operations;
- Determine final volumes of other materials such as vegetation and suitable management routes such as local biomass supply and reinstatement;
- Classification of the excavated rock to determine the use in the Development as well as outside on other construction projects;
- Identifying temporary or long-term storage requirements on or off-site; and
- Assessment of the environmental impacts of each option highlighting the need for any additional primary consents or licences.

The Access, Traffic and Transport EIAR chapter will include traffic analysis of the impact of transporting materials via the existing road network; and include a Construction Traffic Management Plan (CTMP) for transport impacts and management.

The approximate material volume calculations are provided below in Table 2.6 Indicative Excavated Material Volumes. This is indicative at this stage until preliminary site investigation works have been undertaken in order to inform the design of the Development and the cut and fill balance calculations. A list of potential ground surveys that may be necessary are included within Chapter 9 Geology, Soils and Carbon, Section 9.7 Ground Surveys. Therefore, it is proposed to provide an MMA as part of the EIAR which will provide additional information on the type and volume of materials generated from the Development. This will also determine the requirement for any permanent storage of material which could be considerably landscaped, as opposed to significantly impacting the local transport network with movements off-site.

Table 2.6: Indicative Excavated Material Volumes

	Waterways	Power Cavern	Construction Tunnel	Access Tunnel	Headpond Embankment
Volume (m³)	200,000	260,000	240,000	170,000	7,200,000

Note: The volume given in the 'Headpond' column is an assumption of level of material required to construct the embankment

The headpond embankment will be constructed with a mixture of suitable material that is generated from the underground activities on site and material that will be sourced within the proposed impounded area of the headpond. Excess material that is surplus to requirements and which cannot be used in the embankment is anticipated to be able to be stored permanently on site. It may be possible to use this surplus material for landscaping purposes and reinstatement across the Development Site. The design philosophy is to reduce the amount of excess material by:

- Incorporating space in the design of components such as the headpond to accommodate as much of the excess material as possible; and
- Reduce the amount of imported material.

The intention is to use as much of the rock / surplus material generated on site to construct the Development components (embankment, roads, and concrete structures) whilst reducing the excess material to a minimum.

2.6.2.4. Power Requirements

Electrical power will be required on the Development Site for various aspects of construction. A temporary grid connection will be required from the local distribution network. The temporary grid connection would reduce fuel consumption and noise associated with on-site generators. Prior to the availability of the temporary grid connection, it is anticipated during the enabling works that the majority of the power will be supplied by portable generators. It is assumed that most of the smaller works will use mobile petrol generators and equipment. Table 2.7 below shows the sources of power for large construction operations.

Table 2.7: Estimated Electrical Power Requirements of portable Generators

Usage	Fuel Type	Range (kVA)	Estimated number of units
Construction compounds	Diesel, Bio-diesel	40 -100	6 -10
Pumping	Diesel, Bio-Diesel	250 - 500	4 -8
Tunnelling	Diesel, Bio-Diesel	100 – 1250	6 -10

2.6.2.5. Construction Workforce

The number of construction staff on site will vary according to the construction phase and activities being undertaken and will be confirmed by the primary contractor upon instruction. However, it is expected that up to 500 people will be employed onsite during the construction phase at its peak, after which it will then generally decrease as construction is progressed through to the commissioning phase. However, this will be subject to the requirements of the primary contractor and therefore may vary.

Due to the distance from any major town or city, it is anticipated that an offsite temporary worker accommodation site will be required for the duration of the major construction works, with some accommodation provided onsite for critical path activities at peak construction. It is estimated that the potential footprint of the offsite accommodation site will be around 8,000 m². This temporary accommodation site will likely be located close to the Development Site and/or along one of the construction access routes, and consist of the following:

- Housing and cabins for workforce accommodation;
- Welfare facilities, i.e. kitchens, shower blocks, rest and recreation spaces;
- Utilities and services, i.e. power, telecoms and water;
- Car parking; and
- Facilities to enable bus Park & Ride/Park & Share to the Development Site e.g. space will be provided for a bus to enter, turn and exit the site.

This offsite location has yet to be identified with the relevant studies currently being undertaken. The applicant will continue to liaise with the relevant stakeholders to determine this location.

2.6.2.6. Substation and Grid Connection

The grid connection for the Development would be via a new switching station located within the Development Site. An indicative switching station would consist of control building(s), switchgear, busbars, perimeter fence and overhead or underground cables. This is likely to comprise a hard-standing area of approximately 8,000 – 10,000 m².

The location of the grid connection has not yet been confirmed, but two potential locations have been identified - these are set out in Table 2.8 Potential Grid Connection Locations, below.

Table 2.8: Potential Grid Connection Locations

Route Option	Grid Connection	Direction	Approximate Distance (km)
1	Rannoch Substation	South	14
2	Laggan Substation	North	39

The grid connection will be subject to a separate consenting arrangement and undertaken by the statutory undertaker. Notwithstanding this, information will be provided within the EIAR on the most likely grid connection route and method, including a high level assessment of any likely significant cumulative effects on the information known at the time of submission.

2.6.3. Commissioning

The Development will be commissioned in stages commencing with a period of “dry commissioning”. During this period the components (dam leakage control, valves, motors, pumps and electrical control systems) will be tested for functionality with no water in the headpond. Once satisfied that everything is in order, the reservoir will be filled by allowing rainwater to pond in the headpond and by pumping water from Loch Ericht. Once there is sufficient water, there will be a period of wet commissioning that will repeat the dry commissioning tests with water in the system to allow the full functionality of the pump turbines to be tested. This, together with commissioning of the grid connection will allow the facility to operate in a reduced capacity until full functionality testing can occur when the water in the system is at capacity volume.

2.6.4. Operation

2.6.4.1. Operational Lifetime

The expected lifetime of a PSH scheme is reported in academic literature to be around 80 years. This is considered to be a conservative estimation as Ffestiniog Power Station in Wales and Cruachan Power Station were commissioned in 1963 and 1965 respectively and are still in good operational condition having had some relatively minor phased refurbishment works. It is expected that the civil works (tunnels and dams) will last for up to 100 years. However, throughout this period it is expected that the electrical plant will require refurbishment or reconditioning every 25 years.

2.6.4.2. Maintenance Requirements

Once commissioned, PSH plants typically require very little maintenance. Table 2.9 Anticipated Maintenance Requirements **Error! Reference source not found.** below sets out the expected maintenance requirements for the Development.

Table 2.9: Anticipated Maintenance Requirements

Component	Objectives	Inspections Carried out by:	Frequency
Headpond (Embankment)	Examine the critical safety features including, embankment, overflow, and scour arrangements, the condition of the major elements and the operating records.	A qualified third-party Panel Engineer, Supervising Engineer and or the Operator	Routine surveillance (Operator) – Minimum once or twice weekly. Inspection (Supervising Engineer) – Annually Inspection (Panel Engineer) – 10 years
Tunnels	Tunnel integrity and performance	Operator	10 years
Pump / Turbines and Generators	Reliable operation of equipment in the service environment – achieved through planned, periodic inspection and checking of components and systems, together with replacement or rectification of parts wherever required. Maximum availability of equipment and a minimum of unplanned shut-downs by	Operator	As recommended by the manufacturer, likely to be daily, weekly, monthly and quarterly checks as per the maintenance schedules, with major refurbishment works not expected more frequently than five-year intervals

Component	Objectives	Inspections Carried out by:	Frequency
	using planned/periodic shutdowns to inspect all equipment.		
Loch structure	Examine the pier structure to ensure the integrity and operation is maintained.	Operator	Annual inspection of structure. 10 years detailed inspection.

2.6.4.3. Operational Workforce

It is expected that there will be up to 10 permanent on-site jobs created as a result of the operation of the facility. There is also likely to be additional jobs created in a remote-control centre. More jobs would be created if a visitor centre or similar, for example Cruachan (<https://www.visitcruachan.co.uk/>) which encourages eco-tourism through its onsite visitor centre and tours, is considered viable.

2.6.4.4. Lighting Requirements

It is expected that there will be a requirement for internal lighting within the access tunnels, and the power cavern. Further to this, external lighting is expected to be at the tunnel entrances and along the perimeter fence of the access compound, focused around the entry gate. All lighting will be sensitively designed to be directional, on appropriate set timers, and low level where possible to reduce the effects of light pollution and associated effects on wildlife. During operation of the loch structure it is anticipated that there will be navigational lights required to be used in the dark along with navigational buoys. No security lighting would be required at the loch as infra-red security lights will be used.

2.6.4.5. Operational Water Discharge and Abstraction

Once the Development is fully commissioned, the working water volume will pass between the headpond and Loch Ericht in order to provide the storage and generate electricity at peak times.

It is anticipated that the average drawdown level of the headpond will be between 700 and 735 m AOD. The estimated drawdown in Loch Ericht, when at Top Water Level (TWL), is estimated to be around 1 m. A management/ water use agreement will need to be agreed with other water users in the Ericht catchment to ensure there is sufficient water resource for all parties. It should be noted that a PSH scheme will tend to operate on cycles that are dictated by the energy markets. It is considered likely that there will be multiple days during any given year when the Development will complete a full pump/generate cycle in a single day. .

2.6.5. Decommissioning

The decommissioning of large-scale pumped storage hydro projects is extremely rare due to the long operational lifespan of the facility. However, at the end of its operational life, the Development can be decommissioned which would involve the following activities:

- Water would be drained from the headpond and released at an agreed rate and timescale through the appropriate licensing regime into Loch Ericht;
- The pump, turbines, and associated mechanical and electrical plant would be removed;
- The tunnel and power cavern entrances will be blocked off with local soil;
- The tailpond inlet and outlet structures will be removed;
- All surface structures will be removed after appropriate ecological assessment however the embankment and access tracks may remain;
- Should the embankment remain in situ, the scour valves will remain open to prevent incident; and
- Security fences can be removed although access through the headpond structures will be secured.
- Partial removal of the loch structures that were utilised for mooring barges to transport materials across Loch Ericht.

Under the Reservoirs Act, the headpond does not need to be drained, as long as ongoing maintenance is undertaken. However for this EIAR, the assumption is that the reservoir will be drained. It is anticipated that a Decommissioning Method Statement will be conditioned as part of the Section 36 consent.

3. Scope of the Environmental Impact Assessment

3.1. Overview

This chapter outlines the proposed scope and approach to the EIA.

3.2. EIA Regulations 2017

Under Part 1 section 3 of the Electricity Works (EIA) (Scotland) Regulations 2017, the following factors and the interaction between these factors are to be considered within any EIA submitted for Scoping after 16 May 2017:

Population and human health;

Biodiversity, and in particular species and habitats protected under Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora(a) and Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds(b);

Land, soil, water, air and climate; and

Material assets, cultural heritage and the landscape.

In addition, EIAR's are to include the expected effects deriving from the vulnerability of the Development to major accidents and disasters.

The chapter titles included within this Scoping Report and proposed for the EIAR do not directly correspond with the list of factors in the Electricity Works (EIA) (Scotland) Regulations 2017. However, all of the factors are addressed so far as relevant to the Development within the Scoping Report. Table 3.1 Summary of Factors and Environmental Topics therefore sets out where each of the factors are addressed within this Scoping Report and under which environmental topic they are included.

Table 3.1: Summary of Factors and Environmental Topics

Chap ter	Environmental Topic	Factor
5	Landscape and Visual Assessment	Landscape
6	Terrestrial Ecology	Biodiversity
7	Aquatic Ecology	Biodiversity
8	Ornithology	Biodiversity
9	Geology, Soils and Carbon	Land and soil
10	Water Environment	Water and human health
11	Flood Risk and Water Resources	Water, major accidents and disasters, and human health
12	Archaeology and Cultural Heritage	Cultural heritage
13	Access, Traffic and Transport	Material assets
14	Noise and Vibration	Human health
15	Socio-economics, Recreation and Tourism	Material assets & human health

3.3. Scope of the EIA

Unless stated to the contrary, the scope of the EIA for each of the environmental topics set out within this Scoping Report will include an assessment of the construction and operation phases of the Development.

Decommissioning has been scoped out of assessment as the decommissioning of large-scale pumped storage hydro projects is extremely rare due to the long operational lifespan of the facility. Potential decommissioning effects are therefore considered to be similar to, and associated with the components described in the operational project phase however a decommissioning survey and plan would be produced when required.

Table 3.2 Summary, Proposed EIA Scope summarises the proposed scope of the EIAR. Further details for specific environmental topics can be found in Chapters 5 to 15 of this Scoping Report.

Table 3.2: Summary, Proposed EIA Scope

Environmental Topic	Proposed Scope of Assessment	Element Proposed to be Scoped Out
Landscape and Visual Assessment	Assessment of the effects on landscape character and visual amenity for construction and operation of the Development.	Decommissioning phase
Terrestrial Ecology	Survey and assessment of: <ul style="list-style-type: none"> • Sites designated for nature conservation; • Priority habitats; • Protected mammals; and • Invasive non-native species. 	Decommissioning phase
Aquatic Ecology	Survey and assessment of aquatic habitats and species.	Decommissioning phase
Ornithology	Survey and assessment of: <ul style="list-style-type: none"> • General breeding birds; • Schedule 1 breeding birds; • Flight activity by Schedule 1 birds and other birds of conservation concern, including during the non-breeding season; and • Qualifying species of the Drumochter Hills SPA. 	Decommissioning phase
Geology, Soils and Carbon	Assessment of geology and soils including ground investigations and peat assessments.	Assessment of operational and decommissioning effects. Impacts from seismic activity and assessment on the competency of rock.
Water Environment	Assessment of water quality and water resource, hydromorphology assessment and a Water Framework Directive (WFD) assessment.	Decommissioning phase
Flood Risk and Water Resources	Production of Flood Risk Assessment and surface water hydrological assessment	Decommissioning phase
Archaeology and Cultural Heritage	Assessment of effects on cultural heritage assets and their setting within and up to 1 km of the Development Site boundary.	Assessment of operational and decommissioning effects.
Access, Traffic and Transport	Details of the point(s) of access to the Development Site, routes to Site for construction traffic, an indication of the anticipated number of vehicle movements and mitigation to accommodate traffic associated with the Development.	Assessment of operational and decommissioning effects. Hazardous loads.
Noise and Vibration	Assessment of construction and operation noise and vibration.	Baseline vibration survey, low frequency noise during operation, and decommissioning effects.
Socio-economics, Recreation and Tourism	Assessment of the effects on the local community, local economy, recreation and tourism in the area.	Effects on business, including lodges, during operation. Population demographics. Decommissioning phase.

3.3.1. Factors to be Scoped Out

Some factors are not relevant to the Development as there is limited scope for likely significant effects. For instance, climate is to be scoped out of the EIA as changes in climate will be factored into the Development design (climate vulnerability such as finished floor levels) and the abstraction licence (rates of abstraction in years of low flow levels in Loch Ericht).

Given the low population density in and around the Development Site, it is not proposed to undertake a full socio-economic assessment with respect to employment, businesses or population. Potential effects on population and human health are considered to be adequately addressed within the water quality, flood risk, noise and recreational assessments.

No significant air quality effects are anticipated as emissions to air are restricted to construction power and construction dust, which can both be mitigated through good practice measures (e.g. dust management plan through a Construction Environmental Management Plan). In addition, there is the possibility to connect to local mains electricity, which would minimise the need for on-site electrical generators during construction. A forestry assessment is not proposed to be undertaken due to the limited amount of tree removal required for the Development. Access is proposed throughout an existing forestry track where some small areas of widening would be necessary, however these will not be significant. There are also a number of forestry operations planned by landowners within forestry around the site which are managed by their own forestry plans. Any tree removal would be undertaken in consultation with the landowners and their forestry plans updated as required.

As detailed within Section 3.3 Scope of the EIA above, the decommissioning phase has been scoped out of the assessment.

3.4. Approach to EIA

The EIA will identify and assess the likely environmental effects of the Development. A key aim of EIA is to integrate environmental considerations into the design process. Through the identification of likely significant adverse environmental effects, mitigation measures to avoid, reduce or offset adverse environmental effects or maximise environmental benefits can be incorporated into the project design. The main steps to be followed in the EIA are as follows:

- Baseline surveys will be undertaken in order to identify and describe the environmental character of the area potentially affected by the Development. This information is provided to the scheme designers at the earliest opportunity;
- Relevant natural and manmade processes that may change the character of the site are identified;
- Consideration is then given to the possible interactions between the Development and both existing and future site conditions. These interactions or effects are assessed using stated criteria based on accepted guidance and good practice;
- Using the initial designs of the Development, the possible environmental effects, both direct and indirect, are predicted;
- Recommendations can then be made to avoid, minimise or mitigate adverse effects and enhance positive effects. Alterations to the design can then be reassessed and the significance of potential environmental effects assessed; and
- The results of the EIA are set out in an EIAR that will accompany the Section 36 application to the ECU.

3.4.1. Approach to the Assessment

3.4.1.1. Overview

The determination of the significance of the impacts arising from the Development is a key stage in the EIA process. In order to assess the overall significance of an impact it is necessary to establish the magnitude of the effect occurring i.e. the change to the existing baseline conditions as a result of the development and the sensitivity or importance of the receiving environment or receptor. Assessment of significance for environmental topics will combine professional judgement with consideration of a number of factors including the:

- The type of effect, i.e. whether it is adverse, beneficial, neutral or uncertain;
- The probability of the effect occurring based on the scale of certain, likely or unlikely;
- The sensitivity of the resource or receptor under consideration;
- The magnitude of the potential effect in relation to the degree of change which occurs as result; and
- Whether the effect is temporary, permanent, and/or reversible.

3.4.1.2. Sensitivity or Importance of Receptors

The sensitivity of the baseline conditions is assessed according to the relative importance of existing environmental features on or near to the site, or by the sensitivity of receptors which would potentially be affected by the Development. Criteria for the determination of sensitivity or of importance or value of receptors are established based on approved guidance, legislation, statutory designation and/or professional judgment.

The criteria in Table 3.3 Sensitivity provides a general definition for determining the sensitivity of receptors.

Table 3.3: Sensitivity

Sensitivity	Definition
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.
High	The receptor has low ability to absorb change without fundamentally altering its present character, is of high environmental value, or of national importance.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value or is of regional importance.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.
Negligible	The receptor is resistant to change and is of little environmental value.

3.4.1.3. Magnitude of Effect

The magnitude of potential effects on environmental baseline conditions is identified through consideration of the Development taking into account the scale or degree of change from the existing baseline as a result of the effect. Consideration is given to the duration and reversibility of the effect as well as consideration of relevant legislative or policy standards or guidelines.

Table 3.4 Magnitude of Effect provides a general definition for determining the magnitude of a particular effect.

Table 3.4: Magnitude of Effect

Magnitude	Definition
High	Total loss or major alternation to key elements/features of the baseline conditions such that post development character/composition of baseline condition will be fundamentally changed.
Medium	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition of the baseline condition will be materially changed.
Low	Minor shift away from baseline conditions. Changes arising from the alteration will be detectable but not material; the underlying character/composition of the baseline condition will be similar to the pre-development situation.
Negligible	Very little change from baseline conditions. Change is barely distinguishable, approximating to a "no change" situation.

3.4.1.4. Significance of Effect

The general approach adopted in the assessment of significance is outlined in Table 3.5 Significance of Effects below. A combination of the magnitude of the impact under consideration and the sensitivity of the receiving environment determines the significance of effect. For some specialist topics, additional categories have been added where a greater level of definition is required. It should be noted that this general approach is a framework and should not be treated as a matrix.

Table 3.5: Significance of Effects

Magnitude	Sensitivity				
	Very High	High	Medium	Low	Negligible
High	Major	Major	Moderate	Moderate	Minor
Medium	Major	Moderate	Moderate	Minor	Negligible
Low	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

The significance of the effects arising from the Development will be reported using a seven-point scale, as follows:

- Major Adverse, Moderate Adverse, Minor Adverse;
- Negligible; and
- Major Beneficial, Moderate Beneficial, Minor Beneficial.

Effects predicted to be Minor are considered to be manageable and such effects are 'Not Significant'. Effects assessed as Moderate or Major are considered to be 'Significant'. When the significance of impacts is assessed this takes into account mitigation, i.e. the assessment applies to the residual impacts of the Development, which can be defined as any impact that would remain following the implementation of proposed mitigation measures.

These may differ between the specialist topics, but where this occurs, the variation will be explained clearly and fully.

3.4.1.5. Cumulative Effects

The effects of the Development will be assessed in combination with other projects that are either under construction or currently going through planning. Those approved or under construction will be considered as part of our baseline, those still going through the planning process will be considered as part of our cumulative assessment. Projects to be included within our cumulative assessment will be identified through a search of the PKC and THC planning portals as well as that of the ECU.

Cumulative effects will be considered for each of the environmental topics, unless stated otherwise within Chapters 5- to 15 of this Scoping Report. The cumulative assessment will take into account any existing environmental problems and any areas of particular environmental importance such as designated sites and landscapes. The cumulative assessment will also consider effects between the different environmental topics (intra-project effects) for the Development as well as the effects from other projects (inter-project effects).

Cumulative effects will also consider the operational effects related to the water catchments with other hydro schemes such as the Garry, Rannoch and Allt Shallainn schemes. Whilst their operation is considered baseline, the cumulative operation in terms of drawdown and discharge on the hydrology and water balance of the receiving catchments will be considered although could be controlled through the conditions of the Controlled Activities Regulations (CAR) licence and abstraction licence.

Cumulative sites of the appropriate scale and those which are reasonably foreseeable will be agreed with PKC in advance and will be included in the impact assessment being carried out where shared receptors may be affected.

3.4.1.6. Mitigation

Some mitigation measures to avoid, reduce or offset the consequences of the Development will be embedded within the Development design whilst others may require adherence to particular requirements on construction methodology or mode of operation. The final assessment of significance will consider the mitigation measures and requirements that have been incorporated into the Development – this will be the assessment of residual likely significant environmental effects.

It is likely that the following management plans will be submitted as part of the EIA or as a post-consent condition:

- Construction Environment Management Plan (CEMP), which will be supported by;

- Dust Management Plan;
- Recreation and Access Plan;
- Noise Management Plan;
- Water Management Plan;
- Emergency Response Management Plan;
- Construction Traffic Management Plan (CTMP);
- Materials Management Plan;
- Landscape and Ecological Management Plan (LEMP).

3.5. Secondary Consents

It is recognised that other consents and licenses will be required for the construction and operation phase of the Development. At present it has been identified that the following may be required:

- Abstraction Licence;
- CAR Licence;
- European Protected Species licences;
- Reservoir registration under the Reservoir (Scotland) Act 2011; and
- Waste Management Licence.

This list is not exhaustive and will be updated as required. Information on when and who will gain the relevant consents and licences will be included within a Schedule of Mitigation in the EIAR. As much information as possible will be provided within the EIAR towards the application for these secondary consents.

4. Planning Policy

4.1. Introduction

The Planning Statement accompanying the EIAR and Section 36 application will summarise the national, regional, and local planning policy guidance and development plan policies that are relevant to the Development. The Planning Statement will also assess the Development against the relevant policies and plans summarised in the chapter. Policies related to individual disciplines will be examined within the relevant technical chapters of the EIAR.

Land-use policies and strategies applicable to the Development will be identified via a review of documents and consultation with the ECU and other statutory consultees. The policies and plans which will be consulted as part of the assessment are outlined below. These documents reflect the current direction of the UK and Scottish Government's objectives for accommodating a project such as a pumped storage hydro scheme. The Planning Statement will demonstrate the considerable need for this project as identified through UK and Scottish legislation, policy, and plans.

4.2. National Planning Policy

4.2.1. Energy Policy

4.2.1.1. Climate Change Plan

Energy is a devolved matter for the Scottish Government, who declared a state of climate emergency in April 2019, making Scotland one of the first nations in the world to make this declaration. In doing so, climate change is placed at the centre of all policy decisions. As a result, amendments were made to the Climate Change (Scotland) Act 2009 in the form of the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019. To reflect these new legislative changes, the Scottish Government produced the *Update to the Climate Change Plan 2018 – 2032: Securing a Green Recovery on a Path to Net Zero* (CCP; 2020a).

The CCP is a plan for meeting the Scottish Government's greenhouse gas emission reduction targets to 2032. It was updated in December 2020 to incorporate the new targets resulting from the climate emergency declaration to reduce emissions by 75% by 2030 (compared with 1990) and to net zero by 2045. The CCP explores a variety of ways to achieve this target, including highlighting the important role that pumped storage can play in decarbonising the electricity system, maintaining security of supply and helping to create a more resilient system due to its ability to release stored energy when there is high demand. The CCP goes on to say:

"We will continue to fight hard for measures to unlock investment in Pumped Storage Hydro (PSH)... We have asked the UK Government to bring forward mechanisms, potentially similar to those available for interconnectors, which will enable the substantial investment needed to develop PSH; we will work with the developers to ensure that this can deliver sustainable and secure jobs and supply chain benefits to Scotland's rural areas."

Collaborating on actions to support investment in new PSH is one of the proposals linked to Outcome 2 in the CCP, which relates to a secure and flexible electricity supply which is able to manage fluctuations and interruptions.

4.2.1.1. Scottish Energy Strategy

The Scottish Government published the *Scottish Energy Strategy: The Future of Energy in Scotland* (SES) in 2017 to provide long term guidance to detailed energy policy decisions. The forecast and targets within the SES were in line with the Climate Change (Scotland) Act (2009), however this was amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 which brought in the new targets to reduce emissions by 75% by 2030 (compared with 1990) and to net zero by 2045, reflected by the updated CCP. There are now plans to update the SES in 2021 to reflect these changes.

Nevertheless, the SES remains a committed strategy to taking a whole system energy approach which encourages different sectors to collaborate. As with the CCP, the importance of PSH to provide flexibility to the energy system is recognised, with the need for investment in increased PSH capacity throughout the 2020s identified. A comparison from 2014 is provided, with the energy storage at that time for coal,

gas and other petroleum-based products amounting to hundreds of TeraWatt Hours (TWh) of storage, similar to the total demand for electricity, with PSH accounting for only 30 GigaWatt hours (GWh). As 1 TWh equals 1,000 GWh, PSH represents only a tiny fraction of the fossil fuel storage capabilities. A significant increase in capacity in PSH is therefore clearly needed to move away from fossil-fuel reliant energy storage and achieve the 2045 net zero target.

4.2.1.2. Outline of Legislation, Policies and Plans

The following list of UK and Scottish Government legislation, policies and plans regarding energy will be included and summarised in the Planning Policy chapter of the EIAR:

- Department for Business, Energy & Industrial Strategy (BEIS; 2020) The Energy White Paper: Powering our Net Zero Future;
- Committee on Climate Change (2019) Net Zero: The UK's Contribution to Stopping Global Warming;
- BEIS and Ofgem (2017) Upgrading our Energy System: Smart Systems and Flexibility Plan;
- Department of Energy & Climate Change (2011) Planning our Electric Future: A White Paper for Secure, Affordable, and Low-carbon Energy;
- The Scottish Government (2020b) Protecting Scotland, Renewing Scotland: The Government's Programme for Scotland 2020-2021;
- Climate Change (Scotland) act 2009 as amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019
- Scottish Government (2020a) *Update to the Climate Change Plan 2018 – 2032: Securing a Green Recovery on a Path to Net Zero*;
- Scottish Government (2017; or as updated) *Scottish Energy Strategy: The Future of Energy in Scotland*; and,
- Scottish Government (2019) *A vision for Scotland's electricity and gas networks*.

The following document is also considered relevant:

National Grid Electricity System Operator (2020; or as updated) *Future Energy Scenarios* (updated each year, this provides forecasts relating to the need for renewable energy and storage technologies in order to meet UK decarbonisation targets. PSH is identified as a key component of energy system flexibility which will become increasingly more important as society reduces reliance on fossil fuels. Significant growth in PSH is therefore anticipated, with a need for storage capacity increasing from the approximate 4GW currently available to between 23 and 41 GW by 2050).

4.2.2. National Planning Policy

Applications for energy developments in Scotland that have capacity to generate in excess of 50 MW of electricity are made to and determined by Scottish Ministers in accordance with the provisions of Section 36 of the Electricity Act (1989), as outlined in Section 1.4 Environmental Impact Assessment Legislative Context. Deemed planning permission will also be sought under Section 57(2) of the Town and Country Planning (Scotland) Act 1997, as amended.

The key legal, policy and advice documents of relevance to the Development which are material considerations to the decision-making process are outlined below.

4.2.2.1. The Planning (Scotland) Act 2019 and the Town and Country Planning (Scotland) Act 1997

Developed as a central part in reforms to the planning system, the Planning (Scotland) Act 2019 amends many of the provisions of the Town and Country Planning (Scotland) Act 1997. Elements of the 2019 Act have been introduced gradually since it gained Royal Assent in July 2019 through a reform programme, among the first of which were amendments to the contents and procedures for preparing the National Planning Framework, which has led to the commencement of National Planning Framework 4 (NPF4; see Section 4.2.2.4 National Planning Framework 4 (NPF4)).

The reform programme was due to be completed in early 2021, however it was delayed due to Covid-19 and as a result, amendments are expected to continue throughout 2021. The Town and Country Planning (Scotland) Act 1997, as amended, remains the principle legislation in Scotland governing the use and development of land.

4.2.2.2. National Planning Framework 3 (NPF 3)

NPF3 (Scottish Government, 2014a) is the strategy for the direction of development and infrastructure investment in Scotland, as identified by the Scottish Government for the purpose of economic and sustainable growth. It has a statutory basis and as such is a material consideration. NPF3 sets out a strategy for Scotland's development over 20 to 30 years, helping to inform the wider programmes of government, public agencies and local authorities. It is the spatial expression of the Scottish Government's Economic Strategy and informs plans for infrastructure investment. As a statutory document, NPF3 has a central role to play in ensuring that spatial development is promoted in such a way as to best meet Scotland's ambitious climate change and renewable energy aspirations.

The Scottish Government sets out their vision for future development in Scotland through two connected publications, NPF3 and Scottish Planning Policy (SPP; discussed in Section 4.2.2.3 Scottish Planning Policy (SPP)). This vision centres on:

1. A successful sustainable place;
2. A low carbon place;
3. A natural resilient place; and,
4. A connected place.

Within NPF3, national developments are identified which formally establish the need for a specific development or development type. One of the 14 developments identified is PSH at new or existing sites throughout Scotland that would exceed 50 MW (p. 73), the statement of need is shown in Figure 4.1: Excerpt from NPF3 of the Statement of Need and Description for PSH. The Development is therefore classified as a national development, with NPF3 further supporting this as a need.

**5. STATEMENT OF NEED AND DESCRIPTION –
Pumped Hydroelectric Storage**

1 – Location: Throughout Scotland.

2 – Description of Classes of Development: Development for pumped hydroelectric storage which would be or exceed 50 megawatts consisting of:

- a. new and/or expanded and/or refurbished water holding reservoir and dam.
- b. new and/or refurbished electricity generating plant structures or buildings.
- c. new and/or expanded and/or refurbished pump plant structures or buildings.
- d. new and/or expanded and/or refurbished water inlet and outlet pipework.
- e. new and/or refurbished substations and/or transformers directly required for the pumped hydroelectric schemes which fall within the description.
- f. new and/or replacement transmission cables directly linked to the pumped hydroelectric schemes which fall within the description.

3 – Designation: A development within one or more of the Classes of Development described in paragraph (2) (a) to (f) is designated a national development.

4 – Need: These classes of development are needed to support the strategic role of pumped hydroelectric storage within our electricity network by increasing the capacity through new or expanded sites. This promotes security of electricity supplies and will help to balance electricity demand with intermittency of some types of generation.

Figure 4.1 Excerpt from NPF3 of the Statement of Need and Description for PSH (p.73)

4.2.2.3. Scottish Planning Policy (SPP)

SPP (Scottish Government, 2014b) sets out national planning policies which reflect Scottish Ministers' priorities for the operation of the planning system and for the development and use of land. SPP firmly establishes the Scottish Government's purpose to achieve sustainable economic growth and its commitment to sustainable development. Indeed, SPP commits to a "*presumption in favour of development that contributes to sustainable development*" (p. 9, para. 27).

The SPP shares the vision of NPF3 as per Section 4.2.2.2 National Planning Framework 3 (NPF3) and, with regards to the vision of 'a low carbon place', states: "*By seizing opportunities to encourage*

mitigation and adaptation measures, planning can support the transformational change required to meet emission reduction targets and influence climate change. Planning can also influence people's choices to reduce the environmental impacts of consumption and production, particularly through energy efficiency and the reduction of waste." (p. 7, para 19).

In regards to energy storage projects, Paragraph 156 of SPP refers to these being amongst the national priorities for energy infrastructure improvement. Paragraphs 167 and 168 reiterate the above and voice the government's support for energy storage schemes in general due to their ability to support the development of renewable energy and maintain the stability of the electricity network.

4.2.2.4. National Planning Framework 4 (NPF4)

The Scottish Government have been engaging on NPF4 since January 2020 and are working towards laying a draft in Parliament in Autumn 2021, with expected adoption by Scottish Ministers around spring / summer 2022. On its adoption it will replace both NPF3 and SPP.

The Position Statement on NPF4 (Scottish Government, 2020c) states that the new framework is expected to set out a vision for development in Scotland until 2050 and be centred on four key outcomes:

1. Net-zero emissions;
2. A wellbeing economy;
3. Resilient communities; and,
4. Better, greener places.

It is likely that at least the draft NPF4 will have been published on submission of the section 36 application for the Development, although it is unlikely to have been adopted by this time. In which case, whilst NPF3 and SPP will remain current policy, the draft NPF4 will be an increasingly important consideration. Nevertheless, with the expected emphasis on net zero emissions, NPF4 is likely to continue to support the CCP, which highlights the need for and expansion of PSH.

4.2.2.5. Planning Advice Notes

Planning Advice Notes (PANs) set out detailed advice from the Scottish Government (2021a) in relation to a number of planning issues. Those relevant to the Development are likely to include:

- PAN 51: Planning, Environmental Protection and Regulation;
- PAN 60 Planning for Natural Heritage;
- PAN 65 Planning and Open Space;
- PAN 68 Design Statements;
- PAN 75 Planning for Transport;
- PAN 79 Water and Drainage;
- PAN 3/2010 Community Engagement;
- PAN 1/2011 Planning and Noise;
- PAN 2/2011 Planning and Archaeology;
- PAN 1/2013 Environmental Impact Assessment (Including Annex A: Further Reading);
- Flood Risk;
- Hydro Schemes;
- Energy Storage; and,
- Planning and Waste Management.

4.2.2.6. Circulars

Circulars contain policy from the Scottish Government (2021b) on the implementation of legislation or procedures. The circular particularly relevant to the Development is Planning Circular 1/2017: Environmental Impact Assessment regulations.

4.3. Local Development Planning Policy

4.3.1. Perth and Kinross Local Development Plan

The Development falls primarily within the boundary of Perth and Kinross and so is subject to the Perth and Kinross Local Development Plan 2 (Perth and Kinross Council, 2019). This guides all future development and the use of all land across the council area, as well as setting out a vision for the area. This vision aligns with that of the Strategic Development Plan (TAYplan), which is jointly prepared by Angus, City of Dundee, Fife and Perth & Kinross Councils (see Section 4.3.2 TAYplan Strategic Development Plan (2016-36)). This relates to the area being “*sustainable, more attractive, competitive and vibrant without creating an unacceptable burden on our planet*” (p. 10).

Policies relevant to the Development include:

- Policy 1: Placemaking;
- Policy 2: Design Statements;
- Policy 15: Public Access;
- Policy 26: Scheduled Monuments and Archaeology;
- Policy 31: Other Historic Environment Assets;
- Policy 33: Renewable and Low-Carbon Energy;
- Policy 35: Electricity Transmission Infrastructure;
- Policy 37: Management of Inert and Construction Waste;
- Policy 38: Environment and Conservation;
- Policy 39: Landscape;
- Policy 40: Forestry, Woodland and Trees;
- Policy 41: Biodiversity;
- Policy 42: Green Infrastructure;
- Policy 47: River Tay Catchment Area;
- Policy 52: New Development and Flooding;
- Policy 53: Water Environment and Drainage;
- Policy 55: Nuisance from Artificial Light and Light Pollution;
- Policy 56: Noise Pollution;
- Policy 57: Air Quality; and,
- Policy 60: Transport Standards and Accessibility Requirements.

4.3.2. TAYplan Strategic Development Plan (2016-36)

The TAYPlan (2017) is jointly prepared by Angus, City of Dundee, Fife and Perth & Kinross Councils and sets out land use policies to guide long-term development. Issues which affect the wider region, such as climate change, infrastructure planning and sustainable economic growth are considered.

Policies relevant to the Development include:

- Policy 2: Shaping Better Quality Places;
- Policy 7: Energy, Waste and Resources;
- Policy 8: Green Networks; and,
- Policy 9: Managing Tayplan’s Assets.

4.3.3. The Highland Council Local Development Plan

Although the Development falls largely within Perth and Kinross, the northern section of the red line boundary falls within the Highland Council and therefore the Highland-wide Local Development Plan (HwLDP; 2012) will be relevant to its determination. The HwLDP sets out the overarching vision statement, spatial strategy and general planning policies for the whole of the Highland Council area, except the area covered by the Cairngorms National Park Local Plan.

Policies relevant to the Development include:

- Policy 28 Sustainable Design;
- Policy 29 Design Quality and Place-Making;

- Policy 43 Tourism (Also Highland area Tourism Partnership Plan);
- Policy 51 Trees and Development;
- Policy 52 Principle of Development in Woodland;
- Policy 55 Peat and Soils;
- Policy 57 Natural, Built and Cultural Heritage;
- Policy 58 Protected Species;
- Policy 59 Other Important Species;
- Policy 60 Other Important Habitats;
- Policy 61 Landscape;
- Policy 62 Geodiversity;
- Policy 63 Water Environment;
- Policy 64 Flood Risk;
- Policy 66 Surface Water Drainage;
- Policy 72 Pollution;
- Policy 77 Public Access; and,
- Policy 78 Long Distance Routes.

4.3.4. West Highland and Islands Local Development Plan

The West Highland and Islands Local Development Plan (WestPlan; Highland Council, 2019) is the relevant area local development plan within the Highland Council for the Development. It guides future development and sets out a vision for the area. There are no land allocations within the red line boundary, however the 'Ben Alder, Laggan and Glen Banchor (Part)' Special Landscape Area is close by. This is seen as having a regionally significant landscape and visual quality, although it is the HwLDP which contains the relevant policy in regards to this.

4.3.5. Cairngorms Local Development Plan

The red line boundary for the majority, does not enter the Cairngorms National Park, with only a very small section within the RLB at Dalwhinnie. No development is proposed within this small area, however it is likely that some sections of the Cairngorms Local Development Plan will be relevant due to the proximity of the Development to its boundary. The Cairngorms National Park Authority announced its intention of adopting the Cairngorms Local Development Plan 2020 in November 2024 and so it is assumed for the purposes of this Scoping Report that this adoption will be imminent. The plan guides development within the National Park with the long-term vision to ensure "*an outstanding National Park, enjoyed and valued by everyone, where nature and people thrive together.*"

The relevant policies are limited as the Development falls outside the plan boundary, however will include those which reference the potential for wider effects from a development:

- Policy 4: Natural Heritage;
- Policy 5: Landscape;
- Policy 7: Renewable Energy (which includes hydropower);
- Policy 9: Cultural Heritage; and,
- Policy 10: Resources.

4.4. References

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5. Landscape and Visual Amenity

5.1. Introduction

The Landscape and Visual Impact Assessment (LVIA) will assess the effects of the Development on the landscape resource of the site and its environs, and the visual amenity of the site and surrounding area. This chapter considers the scope of the potential effects on the fabric and character of the existing landscape and the influence that the Development could have on views and the visual amenity of people in and around the vicinity. The approach and methodology to the LVIA is continuously reviewed and updated to comply with current best practice.

Landscape and visual effects are interrelated with other environmental effects but will be assessed separately. Landscape effects associated with a Development relate to the changes to the fabric, character and quality of the landscape and how it is experienced. Visual effects relate closely to changes to the landscape, but also concern changes in people's views as a result of the introduction of the Development.

This chapter is supported by the following Figures:

- Figure 5.1 Zone of Theoretical Visibility (Headpond);
- Figure 5.2 Zone of Theoretical Visibility (Tailpond);
- Figure 5.3 Zone of Theoretical Visibility (Headpond and Tailpond);
- Figure 5.4 Landscape Designations;
- Figure 5.5 Landscape Character Types; and
- Figure 5.6 Representative Viewpoints.

5.1.1. Guidance

The landscape and visual assessment will be carried out in accordance with the following good practice guidance documents:

- The Landscape Institute and Institute of Environmental Management and Assessment (2013). Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition;
- Landscape Institute, (2019) Visual Representation of Development Proposals, Technical Guidance Note 06/19;
- Countryside Agency in conjunction with Scottish Natural Heritage, (2002) Landscape Character Assessment Guidance;
- NatureScot³ (2020) Assessing impacts on Wild Land Areas, Technical Guidance;
- NatureScot (2019) Draft Guidance for Assessing the Effects on Special Landscape Qualities of Scotland's National Scenic Areas and National Parks;
- Scottish Natural Heritage, (2015) Hydroelectric Schemes and the Natural Heritage; and
- NatureScot (2019) Landscape Charter Assessment digital map of Landscape Character Types.

5.2. Baseline Conditions

An initial study will be carried out to gain an understanding of the landscape and visual resource and the extent of likely significant effects. The baseline study within the LVIA chapter will consist of two parts.

- Landscape character; and
- Visual amenity.

5.2.1. Zone of Theoretical Visibility

Initial Zone of Theoretical Visibility (ZTV) mapping has been undertaken to establish the theoretical extent of visibility of the primary Development components within the wider landscape. This is based on the headpond and tailpond inlet/outlet scoping design in Chapter 2 Project Description. The ZTV has been used to inform the extent of the study area and the identification of landscape and visual receptors.

³ NatureScot which was formerly known as SNH

The ZTV maps indicate areas from where it may be possible to view the proposed headpond including the embankment structures and the tailpond. It should be considered as a tool to assist in assessing the theoretical visibility of the Development and not a measure of the visual effect. The use of these maps needs to be qualified by the following considerations:

- The ZTV is based on a bare ground model – Ordnance Survey (OS) Terrain 5 DTM data which does not take account of the screening effects of vegetation, buildings or other structures;
- The headpond ZTV has been calculated based on a maximum dam height of 736.5m AOD and a maximum surface height of the waterbody of 735m AOD (Note: The maximum embankment height is 93 m high above existing ground level (735m AOD (736.5m including 1.5m fencing)).);
- The tailpond ZTV has been calculated based on maximum height of 373m AOD for the tailpond inlet/outlet structure;
- Some areas of theoretical visibility may comprise forestry, moorland or agricultural land, which don't tend to be visited and the likelihood of views being experienced is consequently low; and
- The ZTV maps do not take account of the likely orientation of a viewer, such as the direction of travel and there is no allowance for reduction of visibility with distance, weather or light.
- Not all elements of the Development have been accounted for in the initial ZTV, such as access tracks, loch structure, buildings within compounds or tunnel portal structures. However, all of the project components will inform the scope of the LVIA.

Further ZTV analysis will also be undertaken as part of the LVIA in parallel with the iterative design process to refine the landscape fit of the various development components.

ZTVs are shown on Figures 5.1 ZTV Development Headpond, 5.2 ZTV Development Tailpond and 5.3 ZTV Development Headpond and Tailpond.

5.2.2. Study Area

An initial study area of 20km from the headpond has been established based on initial desk-based study including ZTV analysis. This is the extent to which potentially significant effects on the landscape and visual receptors are likely to be experienced. However, it is anticipated that potentially significant direct and indirect effects will be limited to a more focussed area within the 20km study area which will be refined based on further analysis.

5.2.3. Landscape Designations and Wild Land Areas

Information about areas which contribute to the value of the landscape can be recognised by statute and/or in local plans. Information on these areas and their status forms a landscape designation. A preliminary review of environmental designations has identified that the Development site falls within a Wild Land Area and there is theoretical visibility of one or more of the Development components from the summits within the western edge of the Cairngorms National Park and National Scenic Areas to the south. The study area also includes a Special Landscape Area and Local Landscape Area identified in THC and PKC Supplementary Planning Guidance respectively.

Landscape designations and Wild Land Areas are shown on Figure 5.4 Landscape Designations and listed below.

Table 5.1: Landscape Designations and Wild Land Areas

Landscape Designation	Approximate Distance to Headpond	Distance to Tailpond Inlet /Outlet
Cairngorms National Park	3.4 km	3.4 km
Loch Rannoch and Glen Lyon NSA	5.8 km	9.8 km
Ben Nevis and Glen Coe NSA	17.2 km	18.4 km
WLA 14: Rannoch – Nevis – Mamores – Alder	Lies within WLA	Lies within WLA
WLA 15: Cairngorms (<i>intend to scope out of LVIA</i>)	9.2 km	9.8 km
WLA 10: Breadalbane-Schiehallion (<i>intend to scope out of LVIA</i>)	14.0 km	18.1 km
Ben Alder, Laggan and Glen Banchor SLA	2.5 km	0.2 km

Landscape Designation	Approximate Distance to Headpond	Distance to Tailpond Inlet /Outlet
Rannoch Forest LLA	6.0 km	6.4 km

5.2.3.1. Cairngorms National Park

The Cairngorms National park (CNP) is located approximately 3.4 km to the north east of the headpond and tailpond. A very small section of the CNP boundary lies within the site boundary in Dalwhinnie where a temporary construction compound will be located during the construction period.

The ZTV coverage within the CNP is limited to elevated areas in the western periphery of the CNP including the Munro summits of Gael-charn, Beinn Udlamain and Sgairneach Mhòr west of the A9. Whilst the LVIA will consider the potential effects on the special landscape qualities of the CNP, a specific Special Landscape Qualities Impact Assessment is not considered to be necessary given the limited theoretical visibility within the CNP.

5.2.3.2. National Scenic Areas

There are two National Scenic Areas (NSAs) within the south and south west of the study area:

- Loch Rannoch and Glen Lyon NSA; and
- Ben Nevis and Glen Coe NSA.

These areas of landscape represent Scotland's finest scenery and ensures its protection from inappropriate development. The southern access track to the Development following the existing estate track at Bridge of Ericht lies within the north western edge of the Loch Rannoch and Glen Lyon NSA. The headpond ZTV also indicates limited scattered coverage across pockets of higher ground within this NSA, approximately 12 km at its nearest point in the north east of the NSA. It also includes the summit and north facing slopes of Schiehallion, Meall Garbh and Càrn Gorm. Similarly the north eastern section of the Ben Nevis and Glen Coe NSA experiences theoretical visibility of the headpond at approximately 18 km at its closest point.

The LVIA will consider the potential effects on the special landscape qualities of both NSAs that are relevant to the theoretical visibility experienced within the study area. Initial desk based analysis and targeted field work along with early consultation with NatureScot will establish whether a specific Special Landscape Qualities Impact Assessment is required.

5.2.3.3. Local Landscape Designations

There are two local landscape designations within the study area as follows:

- Ben Alder, Laggan and Glen Banchor Special Landscape Area (SLA), designated by The Highland Council (Assessment of Highland Special Landscape Areas, 2011); and
- Rannoch Forest Local Landscape Area (LLA), designated by Perth and Kinross Council (Landscape Supplementary Guidance 2020).

The Ben Alder, Laggan and Glen Banchor SLA lies within the site boundary and to the immediate west and north of the tailpond and the Rannoch Forest LLA abuts a section of the southern access track. The ZTVs for the headpond and tailpond indicate varying visibility across both these areas particularly across the Ben Alder range, along Loch Ericht and pockets of higher ground to the south west at Rannoch Forest.

The LVIA will consider the potential effects on both these local landscape designations including their special qualities which will also inform the mitigation strategies through design development.

5.2.3.4. Wild Land Area

The site and much of the study area falls within Wild Land Area (WLA) 14: Rannoch – Nevis – Mamores – Alder. As part of the LVIA a Wild Land Area impact assessment will be undertaken following the technical guidance published by NatureScot in 2020 and informed by fieldwork and detailed consideration of the specific nature of the Development. This will follow the five main steps in judging the significance of the effects.

The WLA assessment and corresponding analysis and understanding of the strength of attributes and responses will have a strong bearing on the approach to mitigation. Understanding their physical

attributes, perceptual responses and resulting wild land qualities will be fundamental in informing the design development in order to avoid and minimise potential effects.

There are also two neighbouring WLAs within the study area:

- WLA 10: Breadalbane-Schiehallion WLA; and
- WLA 15: Cairngorms.

Currently the ZTV analysis indicates that there is no theoretical visibility within WLA 15: Cairngorms and limited and patchy theoretical visibility within WLA 10: Breadalbane-Schiehallion which is located approximately 14 km to the south of the headpond at its closest point. Due to the distance of WLA 10: Breadalbane-Schiehallion and lack of theoretical visibility within WLA 15: Cairngorms, it is considered that a Wild Land Assessment of these two areas will not be required, providing the ZTV coverage remains unchanged as the design of the Development is refined.

5.2.4. Landscape Fabric

The site lies within a remote upland landscape with the headpond occupying an area of open peatland centred around Loch Monaidh and surrounded by rising landform. The tailpond lies on the eastern shore of Loch Ericht adjacent to the small cluster of properties at Corrievarkie Lodge and the pocket of plantation forestry. Access tracks from the south at Loch Ericht follow the existing estate track with additional tracks proposed across the rising moorland to the headpond. An additional access track extends from the A889 north of Dalwhinnie following an existing forestry track through forestry to the north shore of Loch Ericht where the loch structure is proposed.

The landscape is dominated by the presence of Loch Ericht and the dramatic Ben Alder mountain range to the west. Land rises steeply either side of the loch with pockets of forestry and native woodland planting along sections of the lower loch side and following incised watercourses. Large scale vegetation patterns at altitude prevail with heather grassland, blanket bog and alpine plant communities present.

5.2.5. Landscape Character

The landscape baseline will review published landscape character assessments. This will be supported by a survey of the existing land use, landscape elements and features to establish the present landscape character, quality and condition within the study area and in relation to the site itself.

NatureScot published an updated set of national Landscape Character Types (LCTs) in 2019 which superseded the earlier SNH landscape character descriptions and mapping. A review of the LCT digital mapping shows that the site and wider study area are covered by many LCTs. However, due to the nature of the Development not all LCTs within the study area warrant detailed assessment.

The landscape assessment will consider the LCTs the Development is located within and the surrounding LCTs where there is theoretical visibility of the Development components and has the potential to result in significant landscape effects.

The Development is located within the following LCTs:

- LCT 376 – Summits and Plateaux-Tayside (headpond and access tracks)
- LCT 373 – Upper Upland Glens with Lochs (tailpond inlet/outlet and associated buildings, access tracks)
- LCT 374 – Mid Upland Glens with Lochs (access track)
- LCT 88 – Loch and Glen (loch structure and access track)
- LCT 126 – Upland Glen – Cairngorms (access track)

LCTs are shown on Figure 5.5 Landscape Character Types.

5.2.6. Visual Amenity

The visual assessment will determine the degree of anticipated change to visual amenity experienced by people (visual receptor), that would occur as a result of the Development, considering views from dwellings, roads, walking and cycle routes and hill summits. The visual assessment considers static and sequential effects through analysis of individual viewpoints, considered representative of the range of views within the study area.

Representative viewpoints have been provisionally selected to represent views from a range of different types of visual receptor. At each of the agreed viewpoint locations the following factors which influence the assessment of visual effects will be considered:

- Receptor type (dwelling / road / footpath / open space etc.) and relative numbers of people likely to be affected;
- Relative elevation to the Development;
- Existing views (composition, quality, visual characteristics - nature and extent of skyline, aspects of visual scale and proportion and key foci);
- Distance of viewpoint to nearest point of the Development;
- Percentage and elements of Development potentially visible;
- Angle of view (narrow/wide/view up/ view down/ level);
- Type and nature of view (foreground/midground/background/direct/oblique/screened/partial screening);
- Duration of view i.e. continuous such as a house, or transient such as a pedestrian/vehicular traveller; and
- Analysis of potential visual effects. The analysis relates to each of the identified receptors and concludes with an evaluation of the significance of effects related to each receptor/groups of receptors.

Recreational users of the landscape are the main visual receptor within the study area. This includes people travelling on the core path network, cycling on the National Cycle Network as well as local roads and tracks and particularly within the study area walking towards landmarks such as hill summits. There are many Munros within the study area, where views and the impression of the landscape is an important contribution to the overall experience for those who climb them. The LVIA baseline analysis of recreational receptors will consider popular recreational routes, core paths and mountain summits. A series of representative viewpoints have been selected from well recreated summits within the Ben Alder Range, Cairngorms National Park and Schiehallion. Other recreational viewpoints include core paths and cycle paths.

There are a small number of residential receptors within the study area that would experience visibility of the construction or operational phases of the project. These include estate properties and individual cottages and farmsteads to the south of the study area around Bridge of Erich and Loch Rannoch.

Transport users include motorists using the local road network within the study area. Key routes include the A9 near Dalwhinnie and the B846 near Bridge of Erich. There are also a number of local roads and tracks within the landscape within the Ben Alder Estate. Representative viewpoints have been selected from locations where potential views of temporary and permanent components of the Development could be experienced by road users.

5.2.6.1. Representative Viewpoints

The following table provides a list of the 15 representative viewpoints and the receptor groups to be covered in the LVIA. These viewpoints have been selected based on a desktop study, analysis of the ZTVs and targeted site work. They have been selected to provide a representative range of viewing distances and viewing experience of the different scheme components (both during construction and permanent structures in operation). The majority of viewpoints are from mountain summits which reflects the highly recreated nature of the study area but will also enable an assessment of the sequential views experienced by walkers accessing them and using the wider landscape.

A list of the proposed viewpoints for the assessment is contained in Table 5.2 Representative Viewpoints below and on Figure 5.6 Representative Viewpoints.

Table 5.2: Representative Viewpoints

VP	Viewpoint Name	Receptor Type/Reason for Selection	Location	
			Eastings	Northing
1	Geal-charn	Recreational summit – represents elevated views experienced by walkers from this Munro summit located on the edge of the Cairngorms National Park. Main permanent project components	259830	778111

VP	Viewpoint Name	Receptor Type/Reason for Selection	Location	
			Easting	Northing
		likely to be visible in the view include the loch structure and associated access tracks and tailpond structures.		
2	Sgairneach Mhòr	Recreational summit – represents elevated views experienced by walkers from this Munro summit located on the edge of the Cairngorms National Park. Main permanent project components likely to be visible in the view include the headpond and access tracks.	259848	773117
3	Ben Alder	Recreational summit – represents elevated views experienced by walkers from this Munro summit. Main permanent project components likely to be visible in the view include the headpond and access tracks.	249570	771836
4	Culra Bothie	Recreational users – represents views experienced by walkers accessing the Ben Alder Munro range from the Culra Bothie. Main permanent project component likely to be visible in the view is the headpond.	252104	776091
5	Geal Charn	Recreational summit - represents elevated views experienced by walkers from this Munro summit. Main permanent project components likely to be visible in the view include the headpond, tailpond and access tracks.	250531	781128
6	Sgor Gaibhre	Recreational summit – represents elevated views experienced by walkers from this Munro summit. Main permanent project component likely to be visible in the view is the headpond.	244478	767544
7	Schiehallion	Recreational summit – represents elevated views experienced by walkers from this Munro summit in the NSA. Main permanent project component likely to be visible in the view is the headpond.	271454	754727
8	Sròn Smeur (off Beinn Pharlagain walk near Rannoch Station)	Recreational users – represents elevated views experienced by walkers from this hill summit. Main permanent project components likely to be visible in the view are the headpond and tailpond.	245203	760176
9	North west of Core Path on local hill Meal Doire	Recreational users – represents views experienced by walkers accessing a local hill (Meal Doire) adjacent to a Core Path to the south west of Loch Garry. Main permanent project components likely to be visible in the view are the headpond and access tracks.	261286	768511
10	Path on north side of Loch Ericht	Recreational users – represents views experienced from an informal walking track along the west side of Loch Ericht. Main permanent project components likely to be visible are the headpond, tailpond structures and access tracks.	254295	773269
11	Corrievarkie Lodge	Residential – represents views from Corrievarkie Lodge and adjacent estate property. Main permanent project components likely to be visible are the headpond, tailpond structures and access tracks.	254940	772213
12	Ben Alder Lodge House	Residential and recreational users – represents views from the Lodge House and recreational users accessing the Ben Alder estate. Main permanent project components likely to be visible are the loch structure and associated access tracks.	262615	784086
13	NCN 7, Lochs and Glens Way on General Wade's Military Road	Recreational and road users – represents views from users of the NCN 7 towards the access track off the A889 associated with the loch structure.	263932	785803
14	Bridge of Ericht	Residential and road users – represents views from residential properties and road users at Bridge of Ericht of the access track off the B846.	252130	758250
15	Stob an Aonaich Mhòir	Recreational users – represents elevated views experienced by walkers from the Corbett summit. Main permanent project components likely to be visible in the view are the headpond, tailpond structures and access tracks.	253893	769456

5.2.6.2. Visualisations

Visualisations will be prepared in accordance with the Landscape Institute Technical Guidance Note 06/19 Visual Representation of Development Proposals (2019). The Development is considered to fall within Category A as visualisations will accompany the LVIA as part of a formal EIAR.

Baseline photography will be undertaken from all of the proposed viewpoints along with Type 3-Photomontage and Photowire (photographs with wireline overlays) visualisations. Visualisations will be accompanied with a technical visualisation methodology. Not all viewpoints will require full photomontages due to the nature of the view from some viewpoints, where wireline overlays will be a more appropriate method of illustrating the change to the view.

Visualisations will include the following:

- Baseline photographs;
- Photomontage at year 1 of operation (or wireline from applicable viewpoints);
- Photomontage at year 15 (demonstrating the effects of mitigation planting); and
- Cumulative wirelines (from applicable viewpoints).

Where relevant, from elevated viewpoints, photomontages will depict the full headpond water level and the lower draw down limit. The refined selection of viewpoints that require full photomontages and/ or cumulative photomontages will be agreed in advance with relevant stakeholders including NatureScot and Perth and Kinross Council (PKC).

5.3. Methodology

Consultation will be carried out with the ECU, NatureScot, PKC, THC and the Cairngorms National Park to discuss landscape and visual considerations relating to the Development as part of the assessment process. A detailed methodology will be included within the LVIA, but can be summarised into five key stages:

- Establishment of baseline conditions relating to landscape character and the visual context, including judgements on value and susceptibility which contribute to the sensitivity to change of the existing landscape and visual resource. Identification of main areas where effects would occur through further ZTV analysis and the identification of potential landscape and visual receptors;
- Evaluation of potential significant effects anticipated to result from the introduction of the Development into the baseline context. Layout and site design advice to create the most sympathetic layout in response to the WLA key attributes and qualities and key landscape and visual constraints to help mitigate potentially significant effects;
- Assessment of landscape and visual effects based on the sensitivity to change and magnitude of effect. The assessment would take into account the potential for mitigation measures to reduce these effects;
- Description of the anticipated effects and their significance based on a five-point scale in which the nature of effects can be either adverse or beneficial;
 - During construction;
 - Year 1 of operation; and
 - Year 15 of operation once any mitigation planting has established.
- Assessment of cumulative landscape and visual effects based on applications for schemes of a similar type, nature and scale agreed in advance with the ECU and PKC. The cumulative assessment will be based on the addition of the Development in combination with the cumulative schemes (consented and application schemes) within a 20 km study area where there is likely to be intervisibility and potentially significant cumulative effects.

5.4. Likely Significant Effects

Potential significant effects on landscape and visual amenity which will be considered include the following:

5.4.1. Construction

Landscape Character

- Temporary physical effects on the landscape fabric as a result of the movement and scale of plant and activities associated with constructing the various project components including; headpond,

embankments and inlet outlet structure, tailpond and associated built infrastructure, tunnelling, loch structure, construction compounds, temporary accommodation and access tracks;

- Temporary effects on the wild land qualities of WLA 14: Rannoch – Nevis – Mamores – Alder as a result of the above construction operations;
- Temporary effects on landscape designations (NSAs, SLA and LLA) including their setting as a result of the above construction operations; and
- Temporary effects on the LCTs within the study area as a result of the above construction operations.

Visual Amenity

- Temporary disruption to views from, recreational and residential receptors and road users due to construction plant and activities associated with the construction of the various project components including; headpond, embankments and inlet outlet structure, tailpond and associated built infrastructure, tunnelling, loch structure, construction compounds, temporary accommodation and access tracks.

5.4.2. Operation

Landscape Character

- Long term effects on the physical landscape fabric including loss of existing landscape elements including landform changes due to the introduction of the operational project components including: headpond including embankments and inlet outlet structure, infrastructure associated with the tailpond at Loch Ericht, tunnel portals, surge shafts, permanent access tracks and compounds and lighting;
- Long term effects on the wild land qualities of WLA 14: Rannoch – Nevis – Mamores – Alder as a result of the above operational project components;
- Long term effects on landscape designations (NSAs, SLA and LLA) including their setting as a result of the above operational project components; and
- Long term effects on the LCTs within the study area including perceptual changes to the character as a result of the above operational project components.

Visual Amenity

- Long term changes to views from recreational and residential receptors and road users due to the introduction of the operational project components including; headpond including embankments and inlet outlet structure, infrastructure associated with the tailpond at Loch Ericht, tunnel portals, surge shafts, permanent access tracks and compounds and lighting; and
- Consideration will also be given to the effects and appearance associated with draw down in the headpond which has the potential to effect views from some of the recreational receptors.

5.4.3. Decommissioning

Decommissioning of large-scale pumped storage hydro projects is extremely rare due to the long operational lifespan of the facility. Potential decommissioning effects are therefore considered to be similar to, and associated with the components described in the operational project phase and as such will not be considered as an assessment phase of the Development.

5.5. Likely Mitigation Measures

Primary mitigation measures will be the steps taken during the design phase of the Development to help influence the design in order to minimise potential effects, based on key sensitivities, constraints and opportunities as part of an iterative process of design and assessment. These measures are embedded in the scheme design. Secondary mitigation measures are those that are not built into the final development proposals and seek to further reduce potential effects that could not be entirely designed out.

Potential mitigation measures will be developed further to ensure that the Development is integrated into the surrounding landscape.

We will do this through a thorough understanding of the special landscape qualities, scenic and recreational value inherent in the landscape and opportunities for enhancement and restoration. Specific embedded mitigation measures will include the following:

- Siting and design of above ground components through a holistic approach to design development;

- Sensitive alignment of access tracks to minimise their appearance within the landscape and views, using landform and vegetation to assist in partially screening and integrating them;
- Reducing the impression of size, scale and change in the landscape by earthwork profiling to blend the headpond embankment and other structures into the existing landscape;
- Use of high quality materials of new structures including the use of green roofs and consideration of appropriate vernacular;
- Reinstatement of temporary tracks and compounds and reducing the working width of permanent access tracks and compounds;
- Embedding biodiversity, habit creation and climate resilience through site wide landscape and ecology mitigation and management plans;
- Early landscape planting prior to construction operations taking place to provide the opportunity for earlier establishment of native woodland planting.

Those potentially significant effects that cannot be designed out would require further, secondary mitigation measures, these may include:

- Potential off-site planting to screen temporary construction works and long-term operational elements from nearby residential receptors; and
- Any other secondary measures that are considered necessary to reduce any residual significant landscape and visual effects.

5.6. Summary and Conclusions

The focus of the LVIA will be to minimise potentially significant effects on the landscape and visual resource through the iterative process of design and assessment. The LVIA will be undertaken in accordance with GLVIA 3 and all best practice guidance. Developing mitigation strategies which positively respond to the special landscape qualities of this highly designated and recreated landscape will be central to the design development process. This will be undertaken in parallel with more detailed consultation with NatureScot and PKC to ensure that key areas of concern are appropriately and proportionality addressed and mitigation opportunities realised in the LVIA and design development process.

5.7. References

The Landscape Institute and Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment (GLVIA), Third Edition;

Landscape Institute, (2019) Visual Representation of Development Proposals, Technical Guidance Note 06/19;

Scottish Natural Heritage, (2015) Hydroelectric schemes and the natural heritage;

Nature Scot (2020) Assessing impacts on Wild Land Areas, Technical Guidance;

NatureScot (2019) Draft Guidance for Assessing the Effects on Special Landscape Qualities of Scotland's National Scenic Areas and National Parks; and

NatureScot (2019) Landscape Charter Assessment digital map of Landscape Character Types. (Available at: <https://www.nature.scot/professional-advice/landscape/landscape-character-assessment/scottish-landscape-character-types-map-and-descriptions>)

6. Terrestrial Ecology

6.1. Introduction

This Chapter addresses terrestrial ecology. It does not include aquatic ecology or ornithology, which are the subject of Chapters 7 Aquatic Ecology and 8 Ornithology of this EIA Scoping Report, respectively. Throughout this Chapter the term 'ecological feature' is used to refer to sites designated for nature conservation, habitats, and plant and animal species.

Throughout this Chapter, species are given their scientific names when first referred to and their common names only thereafter. All distances are cited as the shortest boundary to boundary distance 'as the crow flies' unless otherwise specified.

The approach to Scoping for terrestrial ecology accords with the *Guidelines for Ecological Impact Assessment in the UK and Ireland*, published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

This chapter is supported by the following:

- Figure 6.1 Statutory Designations
- Figure 6.2 Non Statutory Designations
- Figure 6.3 Terrestrial Ecology Field Survey Areas
- Appendix B Terrestrial Ecology Field Survey Methods

6.2. Baseline Conditions

The baseline conditions with respect of terrestrial ecology have been determined through a brief and high-level desk study, and from an understanding of the Development Site gained through completion of an initial site walkover and ornithology field surveys since October 2020.

The desk study sought to identify nature conservation designations and records of protected and notable habitats and species potentially relevant to the Development. A stratified approach was taken when defining the desk study area, based on the likely zone of influence of the Development on different ecological features. Accordingly, the desk study searched for:

- Any international nature conservation designations within 10 km of the Development Site;
- Other statutory nature conservations designations within 2 km of the Development Site;
- Records of protected and notable habitats and species within 2 km of the Development Site; and,
- Local non-statutory nature conservation designations within 1 km of the Development Site.

A range of data sources were used for the desk study, as set out in Table 6.1: Desk Study Data Sources.

Table 6.1: Desk Study Data Sources

Data Source	Date Accessed	Data Obtained
Perth and Kinross Council website (https://www.pkc.gov.uk/)	04/02/2021	<ul style="list-style-type: none"> • Local Development Plan policies relevant to nature conservation. • Local non-statutory nature conservation designations within 1 km of the Site. • Local Biodiversity Action Plan information.
Highland Council website (https://www.highland.gov.uk/)	04/02/2021	<ul style="list-style-type: none"> • Local Development Plan policies relevant to nature conservation. • Local non-statutory nature conservation designations within 1 km of the Site. • Local Biodiversity Action Plan information.
NBN Atlas Scotland (commercially-available records only)	04/02/2021	<ul style="list-style-type: none"> • Recent biological records, defined as being from the year 2000 onwards (inclusive).
Ordnance Survey (OS) 1:25,000 maps and aerial photography	04/02/2021	<ul style="list-style-type: none"> • Habitats and connectivity relevant to interpretation of planning policy and potential protected / notable species constraints.

Data Source	Date Accessed	Data Obtained
NatureScot Natural Spaces webpage (https://gateway.snh.gov.uk/natural-spaces/)	04/02/2021	<ul style="list-style-type: none"> • Ancient Woodland Inventory (AWI) for Scotland. • Results of Native Woodland Survey of Scotland (NWSS).
NatureScot SiteLink webpage (https://sitelink.nature.scot/home)	04/02/2021	<ul style="list-style-type: none"> • International statutory designations within 10 km. • Other statutory designations within 2 km.

6.2.1. Local Planning Policy

The Development is spread over two local council areas – Perth and Kinross on the southern part east of Loch Ericht, and Highland Council to the west and north.

Local planning policies for Perth and Kinross Council are included in the Perth and Kinross Local Development Plan (LDP), adopted in 2019. Table 6.2: Relevant Policies of Perth and Kinross LDP provides a summary of the policies relevant to nature conservation.

Table 6.2: Relevant Policies of Perth and Kinross LDP

Planning Policy	Relevant Purpose
Policy 38A – International Nature Conservation Sites	Development which could have significant effects on internationally designated sites will only be permitted if assessment shows it will not have adverse effects on the integrity of the site or if there is no suitable alternative, there are imperative reasons of overriding public interest and mitigation measures are provided.
Policy 38B – National Designations	Development which could have significant effects on nationally designated sites will only be permitted if it will not adversely affect the integrity of the area or any such adverse effects are clearly outweighed by nationally important social, economic or environmental benefits.
Policy 38C – Local Designations	Development which would affect an area designated by the Council as being of local conservation or geological interest will not usually be permitted unless the objectives of the designation and the overall integrity of the designated area would not be compromised, or any adverse effects of the designation are clearly outweighed by social and economic benefits.
Policy 40A – Forest and Woodland Strategy	Protection of pre-existing trees and encouragement of the planting of new native woodland where appropriate.
Policy 40B – Trees, Woodland and Development	Proposed developments with trees on site should be surveyed to assess the value of existing trees and if they must be removed, mitigation measures provided.
Policy 41 – Biodiversity Policy	Protection and enhancement of all wildlife whether protected / designated or not and the Tayside Local Biodiversity Action Plan will be considered as well as legislation when developments are proposed.
Policy 42 – Green Infrastructure	All new developments are required to contribute to green infrastructure including protection, enhancement and management of existing green infrastructure and creation of new green infrastructure / wildlife corridors.
Policy 47 – River Tay Catchment Area	Protection and enhancement of the nature conservation interests within the River Tay Catchment Area.
Policy 52 – New Development and Flooding Policy	Supports the delivery of the actions and objectives to avoid an overall increase, reduce overall, and manage flood risk as set out within the relevant SEPA Flood Risk Management Strategies and the Local Flood Risk Management Plans.

Relevant local planning policies for Highland Council are detailed in the Highland-wide Local Development Plan (HwLDP) (adopted 2012). The plan is currently under review, with a new plan expected once changes outlined in the Planning Bill (2017) are better understood.

Table 6.3: Relevant Policies of Highland-wide LDP

Planning Policy	Relevant Purpose
Policy 28 – Sustainable Design	Supports developments promoting and enhancing social, economic and environmental wellbeing and such developments will be assessed on the extent to which they impact on habitats and species.
Policy 51 – Trees and Development	Supports development promoting protection of existing trees and woodlands. Where appropriate a woodland management plan will be required to secure management of an existing resource. Additional tree / hedge planting required to compensate removal and enhance setting.
Policy 52 – Principle of Development in Woodland	Development of a wooded site must demonstrate the need and show that the site has capacity to accommodate it. Strong presumption in favour of protecting woodland resources. Development only supported where there is clear and significant public benefit, and where woodland is removed compensatory planting usually required. Strong presumption against development where it affects inventoried woodland, designated woodland or other important features.
Policy 55 – Peat and Soils	Developments must demonstrate how they have avoided unnecessary disturbance, degradation or erosion of peat and soils. Unacceptable disturbance of peat will not normally be permitted unless there are benefits that clearly outweigh the adverse effects. A peatland management plan may be required.
Policy 58 – Protected Species	Protected species surveys are required. A mitigation plan will be required to avoid or minimise impacts. Development likely to have an adverse effect on protected species will only be permitted where: there is no satisfactory alternative; the development is required for preserving public health or public safety and/or other imperative reasons of over-riding public interest; and/or, the development will not be detrimental to favourable conservation status.
Policy 59 – Other Important Species	The Council will have regard to other important species, including those listed by the Habitats Directive, UK and Local Biodiversity Action Plans, and the Scottish Biodiversity List.
Policy 60 – Other Important Habitats and Article 10 Features	The Council will seek to safeguard major landscape features important for linear and continuous structure or as wildlife corridors, and will have regard to other important habitats including those listed by the Habitats Directive, priority habitat of UK and Local Biodiversity Action Plans and the Scottish Biodiversity List; and, habitats of priority / protected birds.
Policy 74 – Green Networks	Development in areas identified for the creation of green networks should avoid fragmentation of the network and improve its connectivity, where appropriate.

The red line boundary only enters the Cairngorms National Park within a very small area at Dalwhinnie, where no development is proposed, however it is likely that the Cairngorms Local Development Plan is relevant to the Development due to its proximity to the Development. Further detail on the Cairngorm LDP can be found within Chapter 4 Planning Policy, Section 4.3.5 Cairngorms Local Development Plan.

The Cairngorms Nature Action Plan (CNAP) (2019 – 2024) outlines a series of Action Plans relevant to the Development. Priority topics within the Landscape Scale Conservation section include Woodland expansion and enhancement, Moorland and Peatland, Nature friendly farming and Freshwater and Wetland restoration. Priority species listed in the CNAP include wildcat *Felis silvestris*, mountain hare *Lepus timidus* and woolly willow *Salix lanata*.

The Tayside Local Biodiversity Action Plan (LBAP) (2016 – 2026) aims to conserve and enhance the region's biodiversity, considering both local and national priorities, and to co-ordinate existing actions, as well as initiating and co-ordinating new ones. It includes ecosystem action plans for Water and Wetlands, Uplands and Woodlands. It also contains a long list of priority species for conservation including otter *Lutra lutra*, red squirrel *Sciurus vulgaris*, water vole *Arvicola amphibius* and pearl-bordered fritillary *Boloria euphrosyne*.

For the precise wording of the above policies please refer back to the source document. These planning policies have been considered when assessing potential ecological constraints and opportunities identified by the desk study and when assessing requirements for further survey, design options and ecological mitigation.

6.2.2. Statutory Designations

Six Special Areas of Conservation (SAC), one Wetland of International Importance (Ramsar site) and four Sites of Special Scientific Interest (SSSI) exist within the search distances specified above. These

are described below in Table 6.4. Their locations in relation to the Development Site are presented on Figure 6.1 Statutory Designations.

Table 6.4. Statutory Designated Sites for Nature Conservation

Designation	Reason(s) for Designation	Distance and Direction from the Development Site
Drumochter Hills SAC and SSSI	<p>Qualifying features of the SAC are:</p> <ul style="list-style-type: none"> Alpine and boreal heaths; Hydrophilous tall herb fringe communities of plains of the montane to alpine levels; Northern Atlantic wet heaths with <i>Erica tetralix</i>; European dry heaths; Sub-Arctic <i>Salix</i> spp. scrub; Siliceous alpine and boreal grasslands; Siliceous rocky slopes with chasmopytic vegetation; Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>); Species-rich <i>Nardus</i> grassland, on siliceous substrates in mountain areas; and, Blanket bog*. <p>The notified biological features of the SSSI are:</p> <ul style="list-style-type: none"> Montane habitat assemblage; Vascular plant assemblage; and, Breeding bird assemblage. <p>The single notified geological feature is:</p> <ul style="list-style-type: none"> Fluvial geomorphology of Scotland. 	<p>A small proportion of the SAC and SSSI are located within the Development Site. (The Development Site covers approximately 8% of the total area of the SAC and SSSI). However, the only above-ground infrastructure associated with the Development within the boundary of these sites is a short section of access track. An access track already exists at this location and would be subject only to upgrading. All other infrastructure which appears to be within the boundary of the SAC / SSSI is below ground, and would not be expected to have any effects on these designations.</p> <p>The SAC and SSSI are approximately coincident, with the SSSI extending slightly closer to the A9 in the east.</p>
Coire Bhachdaidh SSSI	<p>The notified features of this SSSI are:</p> <ul style="list-style-type: none"> Upland habitat assemblage; Vascular plant assemblage; and, Breeding bird assemblage. 	<p>Located on the east side of Loch Ericht, with roughly a third of the SSSI within the Development Site.</p>
Ben Alder and Aonach Beag SAC and SSSI	<p>Qualifying features of the SAC are:</p> <ul style="list-style-type: none"> Alpine and boreal heaths; Blanket bog* Sub-Arctic <i>Salix</i> spp. scrub; Siliceous alpine and boreal grasslands; Alpine and subalpine calcareous grasslands; Alpine pioneer formations of the <i>Caricion bicoloris-atrofuscae</i>*; Siliceous scree of the montane to snow levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>); European dry heaths; Hydrophilous tall herb fringe communities of plains of the montane to alpine levels; Northern Atlantic wet heaths with <i>Erica tetralix</i>; Siliceous rocky slopes with chasmopytic vegetation; and, Calcareous rocky slopes with chasmophytic vegetation. <p>The notified biological features of the SSSI are:</p> <ul style="list-style-type: none"> Upland habitat assemblage; Vascular plant assemblage; Bryophyte assemblage; Lichen assemblage; and, 	<p>Immediately adjacent to the Development Site on the west bank of Loch Ericht. The outlines of the SAC and SSSI are coincident.</p>

Designation	Reason(s) for Designation	Distance and Direction from the Development Site
	<ul style="list-style-type: none"> Breeding bird assemblage. <p>The single notified geological feature is:</p> <ul style="list-style-type: none"> Structural and metamorphic geology: Dalradian. 	
River Tay SAC	<p>Qualifying features of the SAC are:</p> <ul style="list-style-type: none"> Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea; River lamprey <i>Lampetra fluviatilis</i>; Brook lamprey <i>Lampetra planeri</i>; Sea lamprey <i>Petromyzon marinus</i>; and, Atlantic salmon <i>Salmo salar</i>. 	Encompasses Loch Rannoch and located immediately adjacent to the southern extent of the proposed access route, separated by the width of the B846.
River Spey SAC	<p>Qualifying features of the SAC are:</p> <ul style="list-style-type: none"> Freshwater pearl mussel <i>Margaritifera margaritifera</i>; Sea lamprey; Atlantic salmon; and Otter. 	The River Truim, which is encompassed by the SAC designation, is located approximately 100 m from the Development Site at Dalwhinnie and is separated by the A889. The SAC likely receives run-off from the Dalwhinnie Area.
Black Wood of Rannoch SAC and SSSI	<p>The qualifying feature of the SAC is:</p> <ul style="list-style-type: none"> Caledonian forest*. <p>The notified biological features of this SSSI are:</p> <ul style="list-style-type: none"> Native pinewood; Upland birch woodland; Breeding bird assemblage; Dragonfly assemblage; Invertebrate assemblage; Lichen assemblage; and, Fungi assemblage. 	<p>The boundaries of the SAC and SSSI are not coincident. The SSSI is located on the southern (opposite) side of Loch Rannoch, 0.7 km from the southern extent of the Development Site.</p> <p>The SAC is also located on the southern side of Loch Rannoch, but is 3 km from the southern extent of the Development site.</p>
Rannoch Moor SAC and Ramsar site	<p>Qualifying features of the SAC are:</p> <ul style="list-style-type: none"> Natural dystrophic lakes and ponds; Blanket bog*; Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels Depressions on peat substrates of the <i>Rhynchosporion</i>; Dry heath; Freshwater pearl mussel; Otter; Transition mires and quaking bogs; and, Northern Atlantic wet heath with <i>Erica tetralix</i>. <p>The Sitelink website identifies blanket bog as being a reason for the designation of the Ramsar site. According to the Ramsar Information Sheet, other notable habitats present include:</p> <ul style="list-style-type: none"> Oligotrophic soligenous mire; Marginal swamps and fens; and, Dry heath. <p>Freshwater pearl mussel and otter are also notable fauna present within the designated site.</p>	Located 9.5 km west of the Development Site and separated by extensive conifer plantation, moorland and Loch Eigheach. The Ramsar site covers only 15% of the total SAC area and is confined to its eastern extent. Within the search area, Rannoch Moor SAC spans both banks of Garbh Ghaoir, whereas the Ramsar site is restricted to the south bank.

* Indicates that this Annex I habitat is a priority type.

6.2.3. Non-Statutory Designations

No non-statutory designated sites are located within 1 km of the Development Site (with the exception of ancient and native woodland, for which see section 6.2.4.1 Ancient and Native Woodland).

6.2.4. Habitats

6.2.4.1. Ancient and Native Woodland

Within 1 km of the Development Site, ancient woodland of semi-natural origin is frequent on the lower slopes on the east side of Loch Ericht. An additional smaller area is present within conifer plantation on the sides of the River Ericht between Loch Ericht and Loch Rannoch. In the wider area are patches on the south side of Loch Rannoch, and on the north side of Loch Ericht near Dalwhinnie. Two smaller areas of ancient woodland identified from Rob Roy maps are associated with larger areas of previously described woodland on the east and west sides of Loch Ericht.

Woodland listed as native by the NWSS is frequent along both sides of Loch Ericht, overlapping much of the ancient woodland. Much of the woodland adjacent to the southern access route, including along the River Ericht and in Bridge of Ericht is also listed as native.

Additional patches are present around Dalwhinnie and on the south bank of Loch Rannoch.

The locations of ancient and native woodland are shown on Figure 6.2 Non-Statutory Designations.

6.2.4.2. Habitats

Detailed habitat and botanical survey will be carried out for the EIA, and habitats in the Development Site and surrounding areas are not currently known in detail. However, initial site visits and inspection of aerial photography indicate that blanket bog with deep peat is abundant in the headpond vicinity, dominated by heather *Calluna vulgaris* and hare's-tail cottongrass *Eriophorum vaginatum* (note that the headpond is outside of the boundary of the Drumochter Hills SAC, for which blanket bog is a qualifying feature). It has been noted that at least some of this blanket bog is a higher altitude form containing cloudberry *Rubus chamaemorus*, and *Sphagnum fuscum* (a less common species of bog moss) has also been incidentally observed. The blanket bog is often gullied with peat exposure and occasionally rock exposure where small streams run through the bog, and there is at least one particularly wet area (by the existing lochan) which is potentially treacherous with very extensive sphagnum.

The existing lochan in the headpond area appears to be oligotrophic, as would be expected for a high altitude waterbody amongst blanket bog. There are peripheral areas around the lochan with rush *Juncus* sp. and bottle sedge *Carex rostrata*, and other graminoids which may include notable species.

Locally at the edge of and partially within the blanket bog stony basic flushes have been noted, containing brown mosses such as *Scorpidium scorpioides*. Basic flushes are likely to be the most floristically species-rich vegetation within or near the Development Site, and (particularly at this altitude) may include notable vascular and/or bryophyte species. The extent and abundance of such flushes will not be known until detailed habitat surveys have taken place. More commonly, there is also more species-poor flush vegetation dominated by rushes, which is a common vegetation type amongst wetter upland habitats.

Drier grassy areas, such as on hilltops amongst the blanket bog, include montane acid grassland with frequent *Carex bigelowii* and the moss *Racomitrium lanuginosum*, which are common at higher altitudes. There may also be more notable grassland and heath types outside the blanket bog areas.

Blanket bog, wet heath and (particularly nearer Loch Rannoch) acid grassland appear to be common along at least the existing track from Bridge of Ericht. At Bridge of Ericht, there is mature semi-natural broadleaved woodland dominated by birch *Betula* sp. Such woodland may also exist beside Loch Ericht, and may be of note depending on age and species-richness. Elsewhere near access routes at lower altitude there are locally extensive commercial Sitka spruce *Picea sitchensis* plantation, some immature, which is of lower ecological value.

6.2.5. Records of Protected and Notable Species

The NBN Atlas Scotland returned numerous commercially-available records of protected and notable species and these are described below in Table 6.4: NBN Atlas Scotland Commercially-Available Records.

Table 6.4: NBN Atlas Scotland Commercially-Available Records

Type	Species	Scientific Name	Conservation Designation(s)	Source	Notes
Mammal	Brown long-eared bat	<i>Plecotus auritus</i>	EPS; SBL	Bat Conservation Trust	Multiple records from the Killlichonan area between 2012 and 2019.
Mammal	Daubenton's bat	<i>Myotis daubentonii</i>	EPS; SBL	NatureScot	A single record from near Dalwhinnie in 2001.
Mammal	Otter	<i>Lutra lutra</i>	EPS; SBL	HBRG; NatureScot	Records from Allt an Tuirc (2011 and 2003) and the north bank of Loch Rannoch (2012).
Mammal	Red squirrel	<i>Sciurus vulgaris</i>	WCA Sch5; SBL	Scottish Wildlife Trust	Numerous records from between 2006 and 2019, mainly to the north end of Loch Ericht and the north-west bank of Loch Rannoch.
Mammal	Water vole	<i>Arvicola amphibius</i>	WCA Sch5; SBL	NatureScot	One record from 2001 from a tributary of Allht Ghlas, within the part of the Development Site encompassing the access track from Bridge of Ericht.
Mammal	Mountain hare	<i>Lepus timidus</i>	SBL*	HBRG; NatureScot	Numerous records between 2001 and 2008, mostly from the A9.
Reptile	Common lizard	<i>Zootoca vivipara</i>	SBL	HBRG	Single record near Dalwhinnie (2018).
Amphibian	Common toad	<i>Bufo bufo</i>	SBL	HBRG	Single record near Dalwhinnie (2012).
Invertebrate	Small heath	<i>Coenonympha pamphilus</i>	SBL	HBRG	Single record from Allt Coire Bhataich (2004).
Invertebrate	Large heath	<i>Coenonympha tullia</i>	SBL	HBRG	Three records from Allt Coire Bhataich (2004).
Invertebrate	A wasp	<i>Evagetes crassicornis</i>	SBL	HBRG	A single record from Caochan Wood near Dalwhinnie (2010).
Invertebrate	Azure hawk	<i>Aeshna caerulea</i>	Vulnerable in Great Britain	British Dragonfly Society	A single record from between Loch Ericht and Loch Rannoch (2013).
Plant	Snow Rock-moss	<i>Andreaea nivalis</i>	SBL	British Bryological Society	Two records, both from Ben Alder (2004).
Lichen	51 species of lichen		6 Nationally Rare species; 33 Nationally Scarce species; 21 SBL species	British Lichen Society	Mostly from Ben Alder and Aonach Beag, Coire Bhachdaidh and Black Wood of Rannoch SSSIs, and Glen Truim.
Invasive Mammal	Mink	<i>Neovison vison</i>	Invasive non-native species	NatureScot	A single record (2011) from conifer plantation between Loch Ericht and the A889.
Invasive Mammal	Sika deer	<i>Cervus nippon</i>	Invasive non-native species	HBRG	Records from 2000 were returned from Drumochter.

*Mountain hare is to be added to Schedule 5 of the Wildlife and Countryside Act in March, making it an offence to intentionally or recklessly kill or injure the species.

EPS – European Protected Species (i.e. species protected by the Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the 'Habitats Regulations'); WCA Sch5 – Schedule 5 of the Wildlife and

Type	Species	Scientific Name	Conservation Designation(s)	Source	Notes
Countryside Act 1981 (as amended); SBL – a species of principal importance for conservation in Scotland listed on the Scottish Biodiversity List; HBRG – Highland Biological Recording Group.					

6.3. Methodology

6.3.1. Field Survey

Given the above baseline information, it is proposed that field surveys are carried out to inform the potential impacts of the Development on the following ecological features:

- Priority and/or other notable habitats;
- Rare or otherwise notable plant species;
- Invasive non-native plant species; and
- Protected mammals, including:
 - Otter *Lutra lutra*;
 - Pine marten *Martes martes*;
 - Wildcat *Felis silvestris*;
 - Water vole *Arvicola amphibius*;
 - Badger *Meles meles*; and,
 - Bats.

Details of the proposed methods and survey areas to establish baseline conditions for impact assessment of the above ecological features are provided in Appendix B Terrestrial Ecology Field Survey Methods. The associated field survey areas are illustrated on Figure 6.3 A - H, Terrestrial Ecology Field Survey Areas.

It is not proposed to carry out survey for herbivores or to conduct a herbivore impact assessment beyond that achievable during National Vegetation Classification (NVC) survey. If required, a survey and assessment of herbivores, or other more detailed habitat condition assessment, could be undertaken in the future to inform development of management measures to mitigate or compensate for permanent adverse effects on notable habitats. It is expected that this work would be conducted under post-planning arrangements.

6.3.2. Ecological Impact Assessment

The results of the completed field surveys, in combination with the outcomes of further desk study and any consultation with relevant stakeholders, will be used to inform the Ecological Impact Assessment (EclA) component of the EIA. This will be conducted in accordance with the industry-standard guidelines produced by CIEEM (CIEEM, 2018).

CIEEM impacts will be translated in the assessment into more widely-used terms, following the approach and definitions set out in Section 3.4.1 of this Scoping Report. Taking account of professional judgement and the full range of impact assessment parameters, the 'sensitivity' of an ecological feature will be translated as 'Very High', 'High', 'Medium', 'Low' and 'Negligible', while impact magnitude will be translated as 'High', 'Medium', 'Low' and 'Negligible'. Full descriptions of the definitions of sensitivity and impact magnitude can be found in Tables 3.3: Sensitivity and 3.4: Magnitude of Effect, respectively, in Chapter 3 Scope of the Environmental Impact Assessment.

Significance of effect will then be derived using a matrix-based approach, in common with other EIA chapters and as shown in Table 3.5: Significance of Effects, which can either be adverse or beneficial.

Where significant effects on an ecological feature are predicted by the EclA, appropriate mitigation measures will be proposed. Likely mitigation measures are outlined in the mitigation section below. Ecological enhancement measures that are proportionate to the impact of the Development, and, if appropriate, mitigation for predicted effects of lower significance, will also be considered in pursuance of the objective of Scottish Planning Policy to achieve biodiversity benefits from the Development.

6.4. Likely Significant Effects

6.4.1. Construction

The likely significant effects on ecological features (excluding aquatic and avian features, for which see Chapter 7 Aquatic Ecology and Chapter 8 Ornithology) during the construction phase of the Development are as follows:

- Permanent habitat loss (e.g. the loss of notable habitats due to construction of the headpond, access tracks or other infrastructure);
- Temporary habitat loss (e.g. the temporary loss of habitat to accommodate temporary construction compounds or other works areas);
- Habitat degradation as a result of pollution incidents (e.g. fuel or oil spills);
- Permanent or temporary changes to hydrological conditions which may affect vegetation and habitats (e.g. where tracks or infrastructure cause changes to water abundance or quality in groundwater dependent terrestrial ecosystems (GWDTE), such as flushes, or in blanket bog and associated deep peat);
- Loss of habitat supporting protected and/or notable species, or loss of places of shelter of such species (e.g. loss of habitat supporting water voles, or rare plants, or loss of otter holts);
- Creation of barriers to animal movements (e.g. the construction of watercourse crossings potentially impeding the movement of otter or water vole);
- Temporary disturbance and/or displacement of species during construction (e.g. disturbance of protected species such as otter whilst occupying places of shelter);
- Potential for direct mortality of protected/notable species during construction (e.g. as a result of increased vehicular traffic, or as a result of pollution incident); and,
- Potential for spread of invasive non-native species.

There are six SACs and one Ramsar site within 10 km of the Development (see Table 6.3: Statutory Designated Sites for Nature Conservation). This includes Drumochter Hills SAC, which is within the Development Site, and the River Tay SAC and River Spey SAC, which are both likely to be hydrologically connected to the Development Site. The potential for likely significant effects (LSE) on these (and any other) European sites will therefore be assessed as part of a Habitats Regulations Appraisal (HRA) exercise. It is anticipated, in the absence of mitigation, that LSE on European sites will be possible, therefore it is likely that a full and detailed 'appropriate assessment' will be necessary, taking into account developed mitigation. This will be reported as a Statement to Inform Habitats Regulations Appraisal suitable for use by the relevant planning authorities.

6.4.2. Operation

Impacts on ecological features (excluding aquatic and avian features, for which see Chapter 7 Aquatic Ecology and Chapter 8 Ornithology) during the operational phase of the Development are likely to be of limited magnitude and it is considered unlikely that there will be significant effects on them. The following effects may arise, but, as stated, are unlikely to be significant:

- Disturbance of nocturnal species (e.g. bats) as a result of permanent low-level security lighting;
- Disturbance of protected or notable species during routine maintenance activities (by personnel, vehicles or machinery); and,
- Certain elements of infrastructure may present opportunities for protected or notable species (e.g. access tracks may provide increased basking opportunities for reptiles).

Note that the headpond will not support fish and so is unlikely to present a significant beneficial foraging opportunity for otter, if any are present at this altitude. Moreover, water levels will fluctuate markedly, so it is also unlikely that the headpond would provide any significant benefit to otters for establishment of places of shelter.

6.4.3. Decommissioning

It is unlikely that there will be any new impacts or effects on ecological features during the decommissioning phase of the Development beyond those which can be expected during the construction and/or operational phases. The decommissioning phase has therefore been excluded from the assessment.

6.5. Likely Mitigation Measures

Compliance with planning policy requires that the Development considers and engages the following mitigation hierarchy where there is potential for impacts on relevant ecological features:

1. Avoid ecological features where possible;
2. Minimise impact by design, method of working or other measures (mitigation), for example by enhancing existing features; and
3. Compensate for significant residual effects (e.g. by providing suitable habitats elsewhere).

This hierarchy requires the highest level to be applied where possible. Only where this cannot reasonably be adopted should lower levels be considered.

At this early stage in the design of the Development, it is not possible to make detailed recommendations for mitigation. The requirement for specific mitigation will be determined based on the results of field survey work and the subsequent Ecological Impact Assessment (EclA).

However, it is likely that the following generic mitigation measures will be required and implemented to reduce the impacts of the Development:

- Appointment of an Ecological Clerk of Works (ECoW) for the duration of the construction period;
- Avoidance, where possible, of priority or otherwise notable habitat through project design and micro-siting;
- Restoration of habitat temporarily lost during the construction period;
- Translocation of plant species of conservation concern (if present and feasible) where these cannot otherwise be avoided;
- Maintenance of hydrological regimes, where possible, particularly in areas of blanket bog and GWDTE (such as flushes);
- Implementation of standard pollution prevention measures to protect habitats, surface waters and species;
- Avoidance of key areas and/or features used by notable and protected species through project design and micro-siting;
- Timing of construction activities to minimise impacts upon species;
- Implementation of pre-construction checks for protected species;
- Implementation of works exclusion zones around specially-protected species to ensure that they are not disturbed or otherwise directly harmed during construction, and acquiring associated licensing where necessary to ensure legal compliance; and,
- Avoidance of impacts on any identified invasive non-native species.

Mitigation (or more specifically compensation) for the loss of habitat caused in particular by the creation of the headpond may require management measures to be implemented to improve the condition of similar upland habitats in the surrounding area. For example, the latest assessed condition of several of the qualifying upland habitats in the Drumochter Hills SAC is stated on the Sitelink website to be 'unfavourable'. The negative pressures causing this condition are stated to include grazing pressure, trampling and burning. As noted in 6.3.1 above, targeted detailed studies beyond those anticipated for the EIA may be required to inform such management, but are proposed to be conducted under post-planning arrangements.

Note that the measures described above, in addition to those designed as part of the EIA process, will be incorporated into a Landscape and Ecological Management Plan (LEMP). In addition, a Construction Environment Management Plan (CEMP) will be prepared detailing environmental protection (such as pollution prevention measures) to be implemented during the construction phase of the Development.

6.6. Summary and Conclusions

It is possible, in the absence of mitigation, that there may be a number of permanent and temporary adverse effects on ecological features as a result of the Development, including on designated nature conservation sites, notable habitats and protected/notable species.

These will be investigated through the completion of a variety of targeted ecological surveys, the methods for which are described in Appendix B Terrestrial Ecology Field Survey Methods.

Appropriate mitigation will be developed and implemented to minimise the impacts of the Development. Where significant effects cannot be avoided, proportionate mitigation and compensatory measures will be provided. Where possible, ecological enhancement will also be suggested and incorporated into the Development.

6.7. References

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1 – updated September 2019. Chartered Institute of Ecology and Environmental Management, Winchester.

7. Aquatic Ecology

7.1. Introduction

The Ecological Impact Assessment (EclA) will consider the potential issues arising from the construction, operation and decommissioning of the Development in relation to existing aquatic ecology: and habitats and species, within the hydrological catchment affected by the Development Site. The assessment will provide baseline information which will be used to inform the EIA and will form the basis of the aquatic ecology chapter of the EIAR. This will be conducted in accordance with SEPA guidance (SEPA, 2013) and the guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018). Where significant effects on an ecological feature are predicted by the EIA, appropriate mitigation measures will be proposed. Mitigation measures and ecological enhancement measures that are proportionate to the impact of the Development will also be considered in order to achieve biodiversity benefits from the Development.

This chapter is supported by the following: Figure 7.1 Aquatic Survey Locations.

7.1.1. Guidance

The assessment will be undertaken within the context of the following relevant legislative instruments, planning policies and guidance documents and legislative instruments, including:

- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (the 'Habitats Directive');
- Council Directive 2000/60/EC establishing a framework for Community action in the field of water policy (the 'Water Framework Directive');
- EU Regulation 1143/2014 on invasive alien species;
- Convention on Wetlands of International Importance ('Ramsar convention');
- Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the 'Habitats Regulations');
- Wildlife and Countryside Act 1981 (as amended) (the 'WCA');
- Nature Conservation (Scotland) Act 2004 (as amended);
- Wildlife and Natural Environment (Scotland) Act 2011 (as amended);
- Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003;
- Scottish Planning Policy (SPP) 2014;
- Scotland's fourth National Planning Framework (NPF4);
- Perth & Kinross Council Local Development Plan;
- Highland-wide Local Development Plan;
- Tayside Local Biodiversity Action Plan (LBAP);
- Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018);
- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended) (CAR).

7.2. Baseline Conditions

The baseline conditions for the red line boundary of the Development with respect to aquatic ecology have been initially summarised through a brief and high-level desk study. The desk study sought to characterise those Water Framework Directive waterbodies relevant to the Development. The desk study sought also to identify nature conservation designations and records of protected and notable aquatic habitats and aquatic species, including Invasive Non-Native Species (INNS). A range of data sources were used for the desk study, as set out in Table 7.1: Desk Study Data Sources.

Table 7.1: Desk Study Data Sources

Data Source	Date Accessed	Data Obtained
SEPA webpage	27/02/2021	<ul style="list-style-type: none"> • Water Framework Directive (WFD) classification data

Data Source	Date Accessed	Data Obtained
(https://www.sepa.org.uk/data-visualisation/water-classification-hub/)		
Highland Council website (https://www.highland.gov.uk/)	04/02/2021	<ul style="list-style-type: none"> Local Development Plan policies relevant to nature conservation. Local non-statutory nature conservation designations within 1 km of the Site. Local Biodiversity Action Plan information.
NBN Atlas Scotland (commercially available records only) (https://scotland.nbnatlas.org/)	04/02/2021	<ul style="list-style-type: none"> Recent biological records, defined as being from the year 2000 onwards (inclusive).
NatureScot SiteLink webpage (https://sitelink.nature.scot/home)	04/02/2021	<ul style="list-style-type: none"> International statutory designations within 10 km. Other statutory designations within 2 km.

7.2.1. Water Framework Directive Classification Data

Six WFD waterbodies have the potential to be ecologically (and hydrologically – please refer to Chapter 10 Water Environment and Chapter 11 Flood Risk and Water Resources) affected by the Development:

- **River Ericht (Source to Loch Ericht near Dalwhinnie)** has a length of 1.1 km and is classified as 'High' under the WFD (ID: 6625). The watercourse discharges into Loch Ericht at approximately NGR NN 62671 84120. River Ericht and its tributaries are crossed by two access tracks, one or both of which will be upgraded as part of the route for heavy machinery and materials to be transported from the A-roads near Dalwhinnie to the construction location by barge along Loch Ericht.
- **River Ericht (Loch Ericht to Loch Rannoch)** is designated a heavily modified river (ID: 6624) classified as having 'Bad Ecological Potential' under the WFD. The main stem is approximately 6.4 km. Whilst the main stem is not affected by the Development, several of the tributaries discharging into River Ericht from the east are crossed by an existing track which will be upgraded to become the southern access route to the Development.
- **Alder Burn (ID: 6628)** is approximately 5.4 km in length and is classified as 'High' under the WFD. The waterbody discharges into Loch Ericht at approximately NGR NN49697 67892. Whilst Alder Burn will not be physically influenced by the Development, the potential decrease in the water level of Loch Ericht has potential ecological implications, particularly fish passability, for the watercourse.
- **Cam Chriochan (ID: 6627)** is classified as 'High' under the WFD. The main stem of the river is approximately 8.7 km in length and discharges into Loch Ericht at approximately NGR NN 48529 64105. As with Alder Burn, Cam Chriochan will not be physically influenced by the Development but the potential decrease in the water level of Loch Ericht has potential ecological implications, particularly fish passability, for the watercourse.
- **Allt Ghlas source to sluice (ID: 6919)** is a river classified as 'High' under the WFD. The river discharges into River Ericht downstream of Loch Ericht, at approximately NGR NN 51003 62630. The main stem of Allt Ghlas is approximately 8.7 kilometres in length. Whilst the main stem is not affected by the Development, several of the tributaries discharging into Allt Ghlas from the east are crossed by an existing track which will be upgraded to become the southern access route.
- **Allt na Glaise (ID: 6596)** is classified as 'Poor' under the WFD due to the presence of fish barriers. The main stem of the river is approximately 19.3 km long, and currently receives the discharge from Loch Monaidh. The discharge into Allt na Glaise from Loch Monaidh will cease with construction of the headpond and headpond embankment.
- **Loch Ericht (ID: 100203)** is 22.4 square kilometres in area. The water body has been designated as a heavily modified water body on account of physical alterations that cannot be addressed without a significant impact on water storage for hydroelectricity generation. Loch Ericht has an overall WFD classification of 'Good Ecological Potential'.

The WFD classification data for the biological elements in the most recent WFD classification year (2018) currently available on the SEPA website for the five riverine WFD waterbodies is presented in Table 7.2: WFD biological elements classification data for 2018.

Table 7.2: WFD biological elements classification data for 2018

WFD element	River Ericht (source to Loch Ericht)	River Ericht (Loch Ericht to Loch Rannoch)	Alder Burn	Cam Chriochan	Allt Ghlas source to sluice	Allt na Glaise
WFD-ID	6625	6624	6628	6627	6919	6596
Heavily Modified?	No	Yes	No	No	No	No
Overall Status	High	Bad Ecological Potential	High	High	High	Poor
Overall Ecology	High	Bad*	High	High	High	Poor
Biological elements	High	Poor	High	High	High	Poor
Macroinvertebrates (RICT/WHPT)	High	High	High	High	High	Good
Macroinvertebrates (ASPT)	High	High	High	High	High	High
Macroinvertebrates (NTAXA)	High	High	High	High	High	Good
Fish	High	Poor	High	High	High	Poor
Fish ecology	-	Poor	-	-	-	-
Fish barrier	High	High	High	High	High	Poor

* River Ericht (Loch Ericht to Loch Rannoch) has 'Bad' status for overall ecology due to 'Bad' status for all hydrology elements

Loch Ericht, designated as a heavily modified waterbody (HMWB), is classified as 'Good Ecological Potential'. The pre-HMWB classification is 'Bad' status. This is due to the 'Poor' status for morphology and 'Bad' status for hydrology, which results in the 'Bad' status for overall ecology defining the pre-HMWB classification. Loch Ericht attains 'High' status for all other classification elements.

7.2.2. Statutory Designations

Table 6.4: Statutory Designated Sites for Nature Conservation in Chapter 6 Terrestrial Ecology describes the statutory and non-statutory nature conservation sites within the study area and the reasons for designation. All sites are shown on Figures 6.1 Statutory Designations and 6.2 Non-Statutory Designations. Those deemed relevant to this aquatic ecology scoping assessment are:

- **River Spey SAC** is designated for Freshwater pearl mussel *Margaritifera margaritifera*, Sea lamprey *Petromyzon marinus*, Atlantic salmon *Salmo salar*, and Otter *Lutra lutra*. The designation includes the River Truim and its tributaries, which runs through Dalwhinnie approximately 100 m from the northern margin of the red line boundary. The river watershed likely extends within the red line boundary.
- **River Tay SAC** is designated for River lamprey *Lampetra fluviatilis*, Brook lamprey *Lampetra planeri*, Sea lamprey, and, Atlantic salmon. Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels also form part of the SAC designation. The designation includes Loch Rannoch, located at the southern extent of the southern access route.

7.2.3. Records of Protected, Notable and Invasive Non-Native Aquatic Species

The NBN Atlas Scotland search returned no commercially-available records of aquatic INNS within 2 km of the Development Site. No recent (post-2000) records of fish species were identified, however Atlantic salmon *Salmo salar*, brown / sea trout *Salmo trutta* and European eel *Anguilla anguilla* were recorded in the River Truim and Loch Ericht between 1995 and 1998. Arctic char *Salvelinus alpinus* was most recently recorded in 1985 in an unknown water body within the search area, from the grid reference considered likely to be either Loch Ericht or a hill lochan to the north-west. All records were uploaded to NBN Atlas Scotland by the Biological Records Centre.

Several recent records for aquatic species of interest were returned in the data search; *Rhabdiopteryx acuminata* (a stonefly) and *Limnephilus ignavus* (a caddisfly) are Nationally Rare and Nationally Scarce respectively. *L. ignavus* was recorded in the River Truim at Dalwhinnie in 2008, whereas *R. acuminata* was recorded at Bridge of Ericht in 2007. Both of these records were provided by SEPA. Large white

hook moss *Leucobryum glaucum* is listed in Annex 5 of the Habitats Directive, whilst Snow Feather-moss *Sciuro-hypnum glaciale*, listed in the Scottish Biodiversity List. *L. glaucum* was recorded at Loch Garry in 2003 and *S. glaciale* was recorded at Ben Alder and Aonach Beag SSSI in 2004. Both records were provided by the British Bryological Society.

7.3. Methodology

The study area will include the Development Site as shown on Figure 1.1 Site Location.

7.3.1. Aquatic Ecology Desk Study

It is recognised that a variety of data (i.e. species records; existing reports and information detailing results of previous ecological field surveys) is available from third parties, for example SEPA, Highland Biological Recording Group (HBRG), Scottish Fisheries Coordination Centre (SFCC). It is therefore proposed that the ecological desk study undertaken so far will be further supplemented with data requested from relevant third parties, in partnership with the Terrestrial Ecology desk study (see Chapter 6 Terrestrial Ecology), to further develop the initial baseline already established, whilst also better informing the scope of the field surveys.

The desk study will include a catchment-wide data search of all hydrologically connected water bodies, taking into account barriers that may restrict species distribution, to establish what species are likely to be present within the Development boundary.

7.3.2. Site Walkover Survey

The scope of field survey may change based on the results of the desk study and/or following consultation with relevant stakeholders. Following the ecological desk-based assessment and stakeholder consultation, a site walkover survey will be undertaken across the Development Site to further validate the scope of the ecological field surveys. The objective of the site walkover survey is to assess each location in terms of the required ecological surveys to be undertaken on a site by site basis.

7.3.3. Aquatic Ecological Field Surveys

The scope of field survey may change following consultation with relevant stakeholders and based on the results of the desk study and the site walkover surveys. However, it is anticipated that the following field surveys will be undertaken to establish the baseline conditions for aquatic ecology features potentially affected by the Development:

- Aquatic invertebrates – samples will be collected from all water bodies and watercourses located within the red line boundary affected by the Development during spring (March-May/June) and autumn (September-November):
 - Loch Monaidh will be sampled using the Predictive SYstem for Multimetrics (PSYM) standard methodology⁴ (Pond Action, 2002), as recommended by SEPA (2000). One invertebrate sample will be collected using a standard Freshwater Biological Association (FBA) pattern pond net (mesh size: 1mm), with 3 minutes of sampling time divided equally between the marginal mesohabitats of the loch followed by a 1-minute active search for additional species.
 - One sample will also be collected from each of the other watercourses/water bodies identified at the site to be potentially impacted. Flowing watercourses will be sampled using a standard FBA pattern pond net in line with the standard River Invertebrate Prediction and Classification System (RIVPACS) (Wright, Sutcliffe and Furse, 2000) and UK Technical Advisory Group (UKTAG) methodology (WFD-UKTAG, 2014a). In-stream habitats will be 'kick sampled' where practicable, or 'sweep sampled', for 3 minutes followed by a 1-minute hand search of larger substrates.
 - Aquatic invertebrate sampling will identify any protected, notable or Invasive Non-Native Species (INNS) and give an indication of the conservation value and current quality status of the surveyed watercourses.
- Aquatic macrophytes – all water bodies and watercourses located within the red line boundary affected by the Development will be surveyed during summer (June to August):

⁴ N.B. PSYM analysis is not yet available for Scotland. PSYM methodology provides a standardised survey procedure to collect the data required to assess pond conservation value using standard criteria

- Survey of flowing watercourses will follow the guidance set out in the UKTAG River Assessment Method (Macrophytes and Phytobenthos) for use with LEAFPACS2 (WFD-UKTAG, 2014b). The survey will be carried out by walking within the channel of each watercourse along a 100 m transect, where safely accessible;
- Grapnel sampling will be employed for inaccessible or deeper water, i.e. Loch Ericht.
- Loch Monaidh will be surveyed using the PSYM standard methodology (Pond Action, 2002). Macrophytes are surveyed by walking or wading the entire perimeter of the dry and shallow water areas of the waterbody. Deeper water areas are sampled either using a pond net or by grapnel thrown from shallow water to make a complete list of wetland plants present within the outer edge of the loch.
- Protected, notable and INNS will be identified to provide an indication of the conservation value and current quality status of watercourses on the site.
- Freshwater pearl mussel (FWPM) habitat assessment – before macroinvertebrate surveys take place at each site, a bathyscope will be used to identify suitable habitat for FWPM so that any potentially present (considered unlikely pending the results of the desk study) are not disturbed or damaged through the kick sampling methodology. The survey will follow the Monitoring the Freshwater Pearl Mussel (Young et al., 2003) guidance. This guidance includes the protocol developed to provide standardised methods for baseline surveys of unstudied populations. If any FWPM are found during the habitat assessment, surveys of that location will cease and further surveys would have to proceed under a protected species licence which would be obtained from NatureScot.
- Freshwater pearl mussel (FWPM) eDNA sampling – FWPM eDNA sampling is proposed at the downstream end of the three WFD waterbodies discharging into Loch Ericht and the watercourses directly impacted by the Development. FWPM eDNA sampling will inform whether FWPM are present and, if necessary, inform the scope of further surveys and potential mitigation strategy that may be required prior to construction. eDNA sampling involves collecting 20 sub-samples from the river perimeter, combining the samples in a container and preserving them for laboratory analysis.
- Fish passage assessment – an assessment of potential issues for fish passage at the downstream end of the three WFD waterbodies discharging into Loch Ericht and the watercourses directly impacted by the Development by either LiDAR (Light Detection and Ranging) or bathymetry survey is recommended. This will take into consideration the potential change in water level of Loch Ericht during operation of the Development. The assessment will (a) inform potential impacts to WFD status, and (b) identify potential mitigation actions.
- Fish spawning habitat assessment – fish spawning habitat potential will be assessed over a 100 m stretch of each of the watercourses to be potentially impacted at the site, and in the margins of Loch Ericht and other standing water bodies. Key aquatic features such as channel dimensions, depth, mesohabitat coverage, habitat features, substrate composition, accessibility for migratory species and potential spawning areas for salmonid and lamprey species will be analysed following SEPA's Guidance for Applicants on Supporting Information Requirements for Hydropower Applications (SEPA, 2005).
- Fish eDNA sampling – fish eDNA sampling is proposed to assess whether fish are present in Loch Monaidh and to inform whether a fish rescue is required prior to construction. Fish eDNA sampling is also proposed for Loch Ericht to determine if this may constitute a suitable release site should a fish rescue be required. Fish eDNA sampling will identify what species of fish are present, both native and INNS. This will allow suitable release sites to be identified, if necessary, and inform the impact assessment and mitigation strategy. eDNA sampling involves collecting 20 samples from around the water body edge, combining the samples in a container and preserving them for laboratory analysis.
- Invasive non-native species (INNS) – an assessment of INNS within both lochs and the surveyed watercourses will be undertaken during macrophyte, aquatic invertebrate, fish spawning habitat and eDNA surveys. Terrestrial plant species growing on the banks, margins and within the channel of surveyed waterbodies will also be recorded. The INNS assessment will identify any species classified as INNS in Scotland.

7.4. Likely Significant Effects

7.4.1. Construction & Decommissioning

The likely significant effects during construction of the Development on aquatic ecological features are considered to comprise the following:

1. Noise pollution and vibration on the aquatic environment resulting from piling during construction of the cofferdam(s), permanent and temporary dock structures, barge movement during transportation of machinery and materials, and tunnel boring operations. Potential effects on fish from intense anthropogenic sounds include death, tissue damage, behavioural changes and increased stress. Noise pollution may also impact on aquatic invertebrate communities.
2. Loss of habitat and / or rare species due to construction of the Inlet / Outlet structure on the Loch Ericht shoreline, temporary and permanent dock structures, construction of watercourse crossings for temporary and permanent access roads and site compounds, dewatering and permanent loss of Loch Monaidh for headpond construction, and permanent loss of the discharge stream from Loch Monaidh due to construction of the headpond embankment.
3. Increased sediment input into running watercourses due to plant movement, transportation of excavated tunnel material and spoil management of material from tunnelling works. Such activities also increase the of polluting substances entering into surface waters and affecting the aquatic ecological communities. Increased fine sediments can smother riverine substrates, potentially resulting in modification of aquatic macrophyte and invertebrate communities, and potentially resulting in damage to fish spawning habitats. Furthermore, inputted sediments may contain polluting substances or change the nutrient loads of the receiving watercourse, resulting in further modification of the aquatic communities through loss of sensitive species. temporary site drainage features, such as SUDs, settlement ponds, and temporary ditches, may also convey fine sediments and polluting substances to watercourses.
4. Plant movement, transportation of excavated tunnel material and transportation of construction materials onto and throughout the Site also increase the potential risk of introducing and spreading INNS. Once established, INNS can quickly outcompete and / or predate upon native species, disrupting natural communities and ecological processes.

Points 1, 3 and 4 can also be expected from the decommissioning, deconstruction and removal of structures from the Development Site.

7.4.2. Operation

The potential effects during operation of the Development on aquatic ecological features are considered to comprise the following:

- Disruptions to the longitudinal connectivity of watercourses as a result of watercourse crossings for permanent access roads, including culverting of watercourses, potential increased fine sediments and polluting substances input into waterbodies resulting from traffic using access roads, e.g. disruption to fish passage and the dispersal of other aquatic flora and fauna;
- Potential effects resulting from headpond filling operations, including fish entrainment / impingement and disruption to fish passage to water bodies upstream of Loch Ericht, stranding of marginal habitat of Loch Ericht including temporary loss of spawning habitat, and transportation of INNS through the Inlet / Outlet structure to the headpond and nearby water bodies;
- Effects as a result of discharge operations, such as scour of Loch Ericht bed material and fish habitat, potential input of INNS and polluting substances or fine sediments from the headpond;
- Stranding and submergence of marginal habitat, and aquatic communities occupying these habitats, of the headpond during filling and discharge operations;
- Effects as a result of permanent site drainage, including SUDs, settlement ponds, temporary ditches and other drainage features (as discussed in section 7.4.1 Construction & Decommissioning.);
- Effects due to the spread of INNS through the Site as a result of operation of the scheme and traffic using access roads (as discussed in section 7.4.1 Construction & Decommissioning.).

7.5. Likely Mitigation Measures

The Development will be adopting environmental design measures as part of its design, which will be demonstrated through adherence to a Landscape and Ecological Management Plan (LEMP). This will ensure that good practice is adopted at the Development Site throughout the construction and operation phases. A Construction Environmental Management Plan (CEMP) will be developed and will set out the methods and procedures that will be implemented to minimise the environmental impact, including potential effects on aquatic habitats and due to INNS. This is likely to include, but are not limited to, the following:

7.5.1. Construction

- Restricting the timing of piling, tunnel boring, and other noise and vibration-generating activities within the cofferdam and in the immediate vicinity of the loch shoreline to avoid fish migration seasons and minimise impacts;
- Implementing a 'soft start' to piling works to minimise the effects of noise from piling on fish and deter fish from the immediate area where physical injury may occur. Consideration of bubble screens or similar screening to deter fish from the area of piling during construction;
- For materials and machinery delivered or removed by barge, sourcing a local barge to reduce the potential to introduce INNS from other waterbodies;
- Implementation of appropriate biosecurity measures throughout the development, following 'Check, Clean, Dry' principles and potentially including; washing plant and vehicles before transferring between this and different construction sites, disinfection of plant, personal protective equipment (PPE) and materials after works in aquatic habitats, ensuring where possible that materials are retained in the habitats where they originated, especially where INNS are known to be present, drying facilities should be provided for equipment and PPE, avoiding transfer of water between aquatic habitats on site;
- Culverting of watercourse using bottomless culverts, where required to maintain a natural bed and facilitate fish passage, and installed following SEPA best practice guidance;
- Installation of dust screens along access tracks and silt fencing along watercourses to prevent contamination of the surroundings with dust and fine sediments;
- Where considered necessary to prevent silt-laden runoff into aquatic habitats, silt fencing to be installed alongside spoil stockpiles;
- Maintaining a 20 m standoff buffer between works, especially those involving spoil management, and aquatic habitats to reduce the risk of runoff contaminating waterbodies. Ideally the buffer will be maintained as a vegetated strip to act as a sediment trap in the event that runoff does occur;
- Provision and use of vehicle washing facilities to minimise dust and siltation;
- Implementation of Sustainable Drainage (SuDs) features and attenuation features to control runoff and avoid contamination into waterbodies.

7.5.2. Operation

- Installation of an appropriately designed inlet/outfall screen (based on the fish and other aquatic species present) to prevent fish entrainment and INNS transfer into the Development operations;
- Establishing a maximum inlet velocity from Loch Ericht to minimise fish and INNS entrainment into the Development operations (e.g. taking into consideration the size of the inlet screen);
- Development to minimise the risk of cross-catchment transfer of water by operating as a completely 'closed-loop' system, whereby water will be drawn from Loch Ericht to the headpond and returned to Loch Ericht via the spillway pipe or outflow tunnel;
- Operating the filling of the headpond to minimise the drawn-down of Loch Ericht, thus minimising the risk of loss of fish passage to water bodies discharging into the loch, and consideration of installation of fish ladders, or similar fish passes, to negate the potential loss of fish passage;
- Effective measures to prevent the over-topping of the headpond, which would result in disruption of surrounding habitats and potentially in the spread of INNS or other species or contamination.

The effectiveness of implemented mitigation measures and ecological enhancements should be assessed and monitored to ensure the effectiveness of the measures.

7.5.3. Decommissioning

Decommissioning of the Development at the end of its operational life may also lead to the requirement for further upgrade or renewal of vehicle crossings of watercourses, spread of INNS that may have colonised the area during operation, including in the headpond, and significant impacts of sediment runoff and pollution from decommissioned infrastructure. Decommissioning would provide opportunities for the reinstatement of watercourses and water bodies lost or impacted as a result of the Development, in line with future local conservation aspirations. A pre-decommissioning survey will be required with the relevant requirements included within the decommissioning plan. As such, it is proposed to scope the decommissioning phase out of the EIAR assessment.

7.6. Summary and Conclusions

The aquatic ecology (habitats and species) within the red line boundary of the Development will be considered as part of the EIAR. Aquatic ecology and associated habitats will be further investigated to understand the current baseline condition and to inform any potential mitigation measures or ecological enhancement measures.

A variety of data is available from third parties. Collation and assessment of this data will be included in a desk study, which will also inform subsequent surveys that also comprise the assessment of the aquatic ecology baseline condition of the Development.

A number of potential impacts to aquatic ecology and associated habitats have been identified during both the construction and operation phases of the Development. In summary, water quality issues, sedimentation, noise and vibration impacts, risk of INNS transfer, and habitat loss comprise potential impacts during construction. Fish passage loss and entrainment, INNS transfer, habitat loss and water quality issues and sedimentation watercourses comprise potential impacts during operation.

Careful consideration of the design, construction and operation of the Development will account for mitigation measures to address these potential issues and would likely include, for example, undertaking operations a safe distance from watercourses, adoption of good practices as detailed in SEPA and UK guidelines and regulations, undertaking construction operations during select periods of the year to minimise the impact on the aquatic ecology. Mitigation and monitoring measures will be designed and implemented as a result of the conclusions of the impact assessment

7.7. References

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Wright J.F, Sutcliffe D.W, Furse M.T, editors (2000). *Assessing the biological quality of freshwaters: RIVPACS and other techniques*. Freshwater Biological Association; Ambleside, UK.

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8. Ornithology

8.1. Introduction

This Chapter addresses ornithology. It considers birds only and not wider terrestrial ecology, which is the subject of Chapter 6 Terrestrial Ecology of this EIA Scoping Report. Throughout this Chapter the term 'ornithological feature' is used to refer to sites designated for the conservation of birds, and to bird species and the habitats which support them.

Throughout this Chapter, species are given their scientific names when first referred to and their common names only thereafter. All distances are cited as the shortest boundary to boundary distance 'as the crow flies' unless otherwise specified.

The approach to Scoping for ornithology accords with the *Guidelines for Ecological Impact Assessment in the UK and Ireland*, published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

This chapter is supported by the following:

- Figure 8.1 Statutory Designations
- Figure 8.2 Ornithology Field Survey Areas
- Figure 8.3 Vantage Point Survey
- Appendix C Ornithology Field Survey Methods

8.2. Baseline Conditions

The baseline conditions with respect of ornithology have been determined through a brief and high-level desk study, and through completion of a limited programme of field survey carried out at the Development Site in the period October to December 2020.

8.2.1. Desk Study

The desk study sought to identify nature conservation designations and records of protected and notable species potentially relevant to the Development. A stratified approach was taken when defining the desk study area, based on the likely zone of influence of the Development on different ornithological features. Accordingly, the desk study searched for:

- Any international nature conservation designations within 10 km of the Development Site;
- Other statutory nature conservations designations within 2 km of the Development Site;
- Records of protected and notable species within 2 km of the Development Site; and,
- Local non-statutory nature conservation designations within 1 km of the Development Site.

A range of data sources were used for the desk study, as set out in Table 8.1: Desk Study Data Sources. All relevant and commercially available records made since the year 2000 were extracted from NBN Atlas Scotland.

Table 8.1: Desk Study Data Sources

Data Source	Date Accessed	Data Obtained
Perth and Kinross Council website (https://www.pkc.gov.uk/)	04/02/2021	<ul style="list-style-type: none"> • Local Development Plan policies relevant to nature conservation. • Local non-statutory nature conservation designations within 1 km of the Site. • Local Biodiversity Action Plan information.
Highland Council website (https://www.highland.gov.uk/)	04/02/2021	<ul style="list-style-type: none"> • Local Development Plan policies relevant to nature conservation. • Local non-statutory nature conservation designations within 1 km of the Site. • Local Biodiversity Action Plan information.

Data Source	Date Accessed	Data Obtained
NBN Atlas Scotland (commercially-available records only)	04/02/2021	<ul style="list-style-type: none"> Recent biological records, defined as being from the year 2000 onwards (inclusive).
Ordnance Survey (OS) 1:25,000 maps and aerial photography	04/02/2021	<ul style="list-style-type: none"> Habitats and connectivity relevant to interpretation of planning policy and potential protected / notable species constraints.

8.2.2. Local Planning Policy

A description of local planning policy which is also relevant to assessment of impacts on ornithological features is provided in Section 6.2.1 of Chapter 6 Terrestrial Ecology.

The Tayside LBAP (2016 – 2026) aims to conserve and enhance the region’s biodiversity, considering both local and national priorities, and to co-ordinate existing actions, as well as initiating and co-ordinating new ones. It includes ecosystem action plans for Water and Wetlands, Uplands and Woodlands. It also contains a long list of priority species for conservation including black grouse *Tetrao tetrix*, Scottish crossbill *Loxia scotica* and spotted flycatcher *Muscicapa striata*.

The Cairngorms Nature Action Plan (2019 – 2024) also outlines a series of Action Plans relevant to the Development. Priority topics within the Landscape Scale Conservation section include Woodland expansion and enhancement, Moorland and Peatland, Nature friendly farming and Freshwater and Wetland restoration. Priority species listed in the CNAP include raptors (in particular golden eagle *Aquila chrysaetos*, hen harrier *Circus cyaneus* and peregrine *Falco peregrinus*), curlew *Numenius arquata* and redshank *Tringa totanus*.

8.2.3. Statutory Designations

Three Special Protection Areas (SPAs) and four SSSIs designated in part for their breeding bird assemblage exist within the search distances specified in Section 8.2.1. These are described below in Table 8.2: Statutory Designated Sites for Ornithology. Their locations in relation to the Development Site are presented on Figure 8.1 Statutory Designations.

Table 8.2: Statutory Designated Sites for Ornithology

Designation	Reason(s) for Designation	Distance and Direction from the Development Site
Drumochter Hills SPA and SSSI	<p>Qualifying features of the SPA are:</p> <ul style="list-style-type: none"> Merlin <i>Falco columbarius</i> (breeding); and, Dotterel <i>Charadrius morinellus</i> (breeding). <p>In addition to the qualifying features, Drumochter Hills SPA is important for its unusual assemblage of breeding birds with both Arctic species such as dotterel, ptarmigan <i>Lagopus mutus</i> and snow bunting <i>Plectrophenax nivalis</i>, and upland species such as golden eagle, merlin, peregrine, golden plover <i>Pluvialis apricaria</i>, greenshank <i>Tringa nebularia</i> and dunlin <i>Calidris alpina</i> present at the same site.</p> <p>The SSSI is also notified for its breeding bird assemblage (which includes those mentioned for the SPA and also wigeon <i>Anas penelope</i> and ring ouzel <i>Turdus torquatus</i>), as well as its habitats, vascular plant assemblage and geology.</p>	<p>A small proportion of the SPA and SSSI are located within the Development Site. (The Development Site covers approximately 8% of the SPA / SSSI). However, the only above-ground infrastructure associated with the Development within the boundary of these sites is a short section of access track. An access track already exists at this location and would be subject only to upgrading. All other infrastructure which appears to be within the boundary of the SPA / SSSI is below ground, and would not be expected to have any effects on these designations.</p> <p>The SPA and SSSI are approximately coincident, with the SSSI extending slightly closer to the A9 in the east.</p>
Coire Bhachdaidh SSSI	<p>The SSSI is notified for its breeding bird assemblage (which includes merlin, golden eagle, red grouse <i>Lagopus lagopus</i>, wite <i>Linaria flavirostris</i>, wheatear <i>Oenanthe</i></p>	<p>Located on the east side of Loch Erich, with roughly a third of the SSSI within the Development Site.</p>

Designation	Reason(s) for Designation	Distance and Direction from the Development Site
	<i>oenanthe</i> , ring ouzel, stonechat <i>Saxicola rubicola</i> and golden plover), as well as its habitats and vascular plant assemblage.	
Ben Alder and Aonach Beag SSSI	The SSSI is notified for its breeding bird assemblage (which includes ptarmigan, golden plover, dotterel, dunlin and black-throated diver <i>Gavia arctica</i>), as well as its habitats, vascular plants, bryophytes and lichen assemblages, in addition to geological features.	Immediately adjacent to the Development Site on the west side of Loch Ericht.
Black Wood of Rannoch SSSI	Notified for its breeding bird assemblage (which includes black-throated diver), in addition to various woodland habitats, dragonflies, invertebrates, lichens and fungi.	Located on the southern (opposite) side of Loch Rannoch, 0.7 km from the southern extent of the Development Site.
Ben Alder SPA	The sole qualifying feature of this SPA is breeding dotterel.	Located 0.8 km north-west of the Development Site and separated by Loch Ericht and extensive moorland associated with Ben Alder and adjacent mountains.
Rannoch Lochs SPA	The sole qualifying feature of this SPA is breeding black-throated diver.	A multi-part site with the three nearest components located south and west of the Development Site at 2.1 km, 4 km and 10.4 km and separated by conifer plantation, moorland and Loch Rannoch.

8.2.4. Non-statutory Designations

No non-statutory designated sites with ornithological interest are located within 1 km of the Development Site.

8.2.5. Records of Protected and Notable Species

The NBN Atlas Scotland returned numerous commercially-available records of protected and notable ornithological species and these are described in Table 8.3: NBN Atlas Scotland Commercially Available Ornithological Records, below.

A notable species absent from these is dotterel, a qualifying species of both the Drumochter Hills SPA and Ben Alder SPA.

Table 8.3: NBN Atlas Scotland Commercially-Available Ornithological Records

Species	Scientific Name	Conservation Designation(s)	Source
Black grouse	<i>Tetrao tetrix</i>	BoCC Red List; SBL	RSPB
Black-throated diver	<i>Gavia arctica</i>	WCA Sch1, BoCC Amber List; SBL	RSPB
Bullfinch	<i>Pyrrhula pyrrhula</i>	BoCC Amber List, SBL	BTO
Common gull	<i>Larus canus</i>	BoCC Amber List	BTO
Common sandpiper	<i>Actitis hypoleucos</i>	BoCC Amber List	BTO
Crossbill	<i>Loxia curvirostra</i>	WCA Sch1	RSPB; BTO
Cuckoo	<i>Cuculus canorus</i>	BoCC Red List, SBL	RSPB; BTO
Curlew	<i>Numenius arquata</i>	BoCC Red List; SBL	RSPB
Dunnoch	<i>Prunella modularis</i>	BoCC Amber List	BTO
Golden eagle	<i>Aquila chrysaetos</i>	WCA Sch1; SBL	SOC; BTO
Grasshopper warbler	<i>Locustella naevia</i>	BoCC Red List; SBL	RSPB

Species	Scientific Name	Conservation Designation(s)	Source
Grey wagtail	<i>Motacilla cinerea</i>	BoCC Red List	BTO
Lapwing	<i>Vanellus vanellus</i>	BoCC Red List; SBL	RSPB; BTO
Lesser redpoll	<i>Acanthis cabaret</i>	BoCC Red List; SBL	RSPB; BTO
Meadow pipit	<i>Anthus pratensis</i>	BoCC Amber List	BTO
Merlin	<i>Falco columbarius</i>	WCA Sch1, BoCC Red List; SBL	SOC
Mistle thrush	<i>Turdus viscivorus</i>	BoCC Red List	BTO
Oystercatcher	<i>Haematopus ostralegus</i>	BoCC Amber List	BTO
Red grouse	<i>Lagopus lagopus</i>	BoCC Amber List; SBL	SOC; BTO
Redshank	<i>Tringa totanus</i>	BoCC Amber List; SBL	RSPB
Redstart	<i>Phoenicurus phoenicurus</i>	BoCC Amber List	RSPB
Reed bunting	<i>Emberiza schoeniclus</i>	BoCC Amber List; SBL	RSPB
Ring ouzel	<i>Turdus torquatus</i>	BoCC Red List; SBL	RSPB; SOC
Ringed plover	<i>Charadrius hiaticula</i>	BoCC Red List	SOC; BTO
Siskin	<i>Spinus spinus</i>	SBL	BTO
Skylark	<i>Alauda arvensis</i>	BoCC Red List; SBL	BTO
Snipe	<i>Gallinago gallinago</i>	BoCC Amber List	RSPB; BTO
Snow Bunting	<i>Plectrophenax nivalis</i>	WCA Sch1; BoCC Amber List; SBL	SOC
Song Thrush	<i>Turdus philomelos</i>	BoCC Red List; SBL	BTO
Spotted Flycatcher	<i>Muscicapa striata</i>	BoCC Red List; SBL	RSPB
Swift	<i>Apus apus</i>	BoCC Amber List; SBL	RSPB
Teal	<i>Anas crecca</i>	BoCC Amber List	BTO
Tree Pipit	<i>Anthus trivialis</i>	BoCC Red List; SBL	RSPB
Whinchat	<i>Saxicola rubetra</i>	BoCC Red List	RSPB
Willow Warbler	<i>Phylloscopus trochilus</i>	BoCC Amber List	BTO
Wood Warbler	<i>Phylloscopus sibilatrix</i>	BoCC Red List; SBL	RSPB
Woodcock	<i>Scolopax rusticola</i>	BoCC Red List; SBL	BTO

BoCC – Birds of Conservation Concern; WCA Sch1 – Schedule 1 of the Wildlife and Countryside Act 1981 (as amended); SBL – a species of principal importance for conservation in Scotland listed on the Scottish Biodiversity List RSPB – Royal Society for the Protection of Birds; SOC – Scottish Ornithologists' Club; BTO – British Trust for Ornithology.

8.3. Methodology

Given the above baseline information, it is proposed that field surveys are carried out to inform the potential impacts of the Development on the following ornithological features:

- Breeding golden eagle;
- Other breeding raptors listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended);
- Breeding red-throated diver *Gavia stellata* and black-throated diver;
- Lekking black grouse;
- Moorland / upland breeding birds, including dotterel and other waders, and snow bunting.

In addition, vantage point (VP) surveys will be carried out to observe flight activity by target species, in particular Schedule 1 raptors, over the headpond area. As far as is safely possible (considering that the headpond is remote and located at approximately 700 m elevation), VP surveys will be conducted monthly for a period of one year, thereby covering the breeding and non-breeding seasons.

Details of the proposed methods to establish baseline conditions for impact assessment of the above ornithological features are provided in Appendix C Ornithology Field Survey Methods. The associated

field survey areas are illustrated on Figure 8.2 Ornithology Field Survey Areas, while the location of the VP overlooking the headpond and surrounding area is shown on Figure 8.3 Vantage Point Survey.

8.3.1. Modelling

To supplement the targeted ornithological field survey, Golden Eagle Territory (GET) Modelling will be carried out to predict the potential impacts on territorial golden eagles from habitat loss, in particular from the construction of the headpond.

Where necessary, the approach to GET Modelling will be discussed and agreed with NatureScot.

8.3.2. Impact Assessment

The results of the completed field surveys, in combination with the outcomes of desk study and any consultation with relevant stakeholders, will be used to inform the Ecological Impact Assessment (EclA) component of the EIA. This will be conducted in accordance with the industry-standard guidelines produced by CIEEM (CIEEM, 2018).

CIEEM impacts will be translated in the assessment into more widely-used terms, following the approach and definitions set out in Section 3.4.1 of this Scoping Report. Taking account of professional judgement and the full range of impact assessment parameters, the 'sensitivity' of an ornithological feature will be translated as 'Very High', 'High', 'Medium', 'Low' and 'Negligible', while impact magnitude will be translated as 'High', 'Medium', 'Low' and 'Negligible'. Full descriptions of the definitions of sensitivity and impact magnitude can be found in Tables 3.3: Sensitivity and 3.4: Magnitude of Effect, respectively, in Chapter 3 Scope of the Environmental Impact Assessment.

Significance of effect will then be derived using a matrix-based approach, in common with other EIA chapters and as shown in Table 3.5: Significance of Effects, which can either be adverse or beneficial.

Where significant effects on an ornithological feature are predicted by the EclA, appropriate mitigation measures will be proposed. Likely mitigation measures are outlined in the mitigation section outlined below. Enhancement measures that are proportionate to the impact of the Development, and, if appropriate, mitigation for predicted effects of lower significance, will also be considered in pursuance of the objective of Scottish Planning Policy to achieve biodiversity benefits from the Development.

8.4. Likely Significant Effects

8.4.1. Construction

The potential significant effects on ornithological features during construction of the Development on ornithological features can be categorised as follows:

- Permanent or temporary loss of habitat which supports bird species as a result of the construction of infrastructure (e.g. access tracks, the headpond etc.);
- Disturbance to and/or displacement of species whilst at the nest, displaying or foraging (e.g. as a result of noise disturbance during construction);
- Disturbance to and/or displacement of foraging birds; and,
- Accidental destruction of active bird nests.

There are three SPAs within 10 km of the Development (see Table 8.2: Statutory Designated Sites for Ornithology) Given the proximity of these sites to the Development, and in particular the potential for qualifying bird species to use habitat within the Development Site as 'functionally-linked habitat' to the Drumochter Hills SPA, the potential for effects on these (and any other) European sites will be considered as part of a Habitats Regulations Appraisal (HRA) exercise. It is anticipated, in the absence of mitigation, that likely significant effects on European sites will be possible, therefore it is likely that a full and detailed 'appropriate assessment' will be necessary, taking into account developed mitigation. This will be reported as a Statement to Inform Habitats Regulations Appraisal suitable for use by the relevant planning authorities.

8.4.2. Operation

Impacts on ornithological features during the operational phase of the Development are likely to be of limited magnitude and may not be significant. The following effects may arise, but their significance will be determined through the EclA process:

- Disturbance of birds listed on Schedule 1 and/or 1A of the Wildlife and Countryside Act 1981 (as amended), caused by low frequency routine maintenance activities; and,
- Permanent displacement of birds from the headpond area due to loss of habitat.

Note that the headpond will not support fish and so will not present a foraging opportunity for fish-eating species such as divers or osprey *Pandion haliaetus*. Moreover, water levels will fluctuate markedly, so the headpond will also not be suitable for breeding by divers or other birds which nest around the edge of upland waterbodies.

8.4.3. Decommissioning

It is unlikely that there will be any new impacts or effects on ecological features during the decommissioning phase of the Development beyond those which can be expected during the construction and/or operational phases. The decommissioning phase has therefore been excluded from the assessment.

8.5. Likely Mitigation Measures

Compliance with planning policy requires that the Development considers and engages the following mitigation hierarchy where there is potential for impacts on relevant ornithological features:

1. Avoid ornithological features where possible;
2. Minimise impact by design, method of working or other measures (mitigation), for example by enhancing existing features; and
3. Compensate for significant residual effects (e.g. by providing suitable habitats elsewhere).

This hierarchy requires the highest level to be applied where possible. Only where this cannot reasonably be adopted should lower levels be considered.

At this early stage in the design of the Development, it is not possible to make detailed recommendations for mitigation. The requirement for specific mitigation will be determined based on the results of field survey work and the subsequent EclA.

However, it is likely that the following generic mitigation measures will be required and implemented to reduce the impacts of the Development:

- Appointment of an ECoW for the duration of the construction period;
- Removal of habitat which may be suitable for nesting birds outside of the breeding season (taken to be March to August, inclusive);
- Implementation of pre-construction checks for nesting breeding birds;
- Implementation of works exclusion zones around specially-protected species to ensure that they are not disturbed or otherwise directly harmed during construction; and,
- Timing of works to avoid sensitive periods of the day (e.g. avoiding the period around dawn when black grouse lekking activity is at a peak).

Note that the measures described above, in addition to those which are designed as part of the EIA process, will be incorporated into a Landscape and Ecological Management Plan (LEMP). In addition, a Construction Environment Management Plan (CEMP) will be prepared detailing pollution prevention measures to be implemented during the construction phase of the Development.

8.6. Summary and Conclusions

It is possible, in the absence of mitigation, that there may be a number of permanent and temporary adverse effects on ornithological features as a result of the Development.

These will be investigated through the completion of a variety targeted field surveys, the methods for which are described in Appendix C Ornithology Field Survey Methods. The results of field surveys will be supplemented by GET Modelling to predict habitat loss and impacts on golden eagles, in particular from construction of the headpond.

Appropriate mitigation will be developed and implemented to minimise the impacts of the Development. Where significant effects cannot be avoided, proportionate mitigation and compensatory measures will

be provided. Where possible, enhancement measures will also be suggested and incorporated into the Development.

8.7. References

CIEEM (2018). Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine. Version 1.1 – updated September 2019. Chartered Institute of Ecology and Environmental Management, Winchester.

<https://caimgorms.co.uk/working-together/authority/national-park-strategies/cnap/>

9. Geology, Soils and Carbon

9.1. Introduction

The EIA will consider the potential issues arising from the construction of the Development in relation to existing and future potential geological and ground condition impacts.

The assessment will provide baseline information; discuss potential mitigation and management and assess the significance of residual impacts assuming the proposed mitigation is implemented.

9.2. Baseline Conditions

The geology of the area is shown on Geological Maps Sheet No. 54E – Loch Rannoch (British Geological Society; BGS, 2014) and Sheet No. 63E – Dalwhinnie (BGS, 2002). The bedrock geology of the Development Site is dominated by metamorphic psammite, quartzite and semipelite rocks with localised igneous intrusions. A notable intrusion is that of granodiorite in the region of the proposed inlet / outlet location. The rocks in this group are of Neoproterozoic age and are principally from the Gaich Psammite Formation at the proposed headpond site.

The Ericht-Laiden fault trends from south west to north east down the centre of Loch Ericht which is marked by the valley which contains Loch Ericht. On the West side of Loch Ericht are the Reidh Choire fault (trending SE to NE) and the Inverpattack-Margie fault (trending SSW to NNE). Another noted fault trends SE to NW from Gualann Sheileach, passing North of the proposed headpond down to the loch edge. Across the Development Site the strata is shown to dip in several directions ranging from 10° to 81°.

The superficial deposits in the Development area are from the Quaternary period. The elevated areas east of Loch Ericht are covered primarily by peat. At the headpond location there is a large area of degraded peat from the access track to beyond Loch Monaidh. The extent and level of degradation of the peat deposits are currently unknown and will be further determined through the EIA.

Till is common from north of the headpond location down to the edge of Loch Ericht with some areas of localised peat. At the loch edge where construction compounds are proposed, there is an area of peat as well as alluvium, mostly consisting of sand, silt, clay and gravel. The peat at the loch edge has likely been washed downstream during stormy conditions. This was seen during a site walkover.

A review of the BGS online GeolIndex viewed has identified several records of seismic activity, one as recently as 2009.

9.3. Methodology

The study area will include the Development Site as shown on Figure 1.1 Site Location, plus a 250 m buffer.

It is recognised that a variety of data is available from third parties i.e. NatureScot, SEPA and PKC. It is therefore proposed that the following tasks will be undertaken to ensure the baseline data informs the impact assessment:

- Review of solid and drift geology maps; and
- Review of Macaulay soil maps.

The data review will include a search for nationally protected geological SSSI or Regionally Important Geological Sites (RIGS) or protected geo-morphological features within the vicinity of the Development Site. There are no records of coal mine workings in the vicinity of the Development Site.

The focus of the groundwater methodology will be on the aquifers (both bedrock and superficial deposits) that lie within the study area. The assessment will consider the construction and operational effects which may interact with the aquifers (both as a resource for potential use in the future and their role in supporting groundwater fed habitats) and any existing abstractions which are found locally.

In addition to the impacts on any sensitive receptors, this chapter will also review the impacts of the geology on the design and construction of the development. The Development will look to utilise as much of the material excavated for below ground infrastructure in the construction of above ground infrastructure, such as the embankments for the headpond. In order to do this, this chapter will include an assessment of reuse of excavated material on site through a Materials Management Assessment (MMA).

Given the recent seismic activity in the immediate area of the development, the design of all infrastructure, particularly the headpond embankments, will be designed with this in mind. For the headpond embankments, these will be designed and constructed in line with the Reservoirs (Scotland) Act 2011.

There are no recognised standards or methodologies for assessing the ground conditions effects of PSH projects. However, a method for the ground conditions assessment has been broadly derived from the Design Manual for Roads and Bridges (DMRB), LA 109 Geology and Soils (formally Volume 11, Section 3, and Part 11 (Geology & Soils) and Part 6 (Land Use)).

9.4. Site Walkover Survey

Following a review of the desk-based assessment, a site walkover survey will be undertaken across the study area. The depth and variability of drift deposits including the possibility of peat and soft or waterlogged ground and shallow rock will be determined based on any existing historical on site quarries, cuttings, exposures and stream beds and surface (peat) features.

9.5. Peat Assessment

Given the likely presence of peat across the Development Site an assessment on the impacts of peat will be undertaken. Depending on the extent of the peat the following assessments may be undertaken:

- Preliminary Peat Slide Risk Assessment;
- Preliminary Peat Management Plan, including peat balance; and
- Carbon Assessment.

The approach taken in the EIA will be guided by relevant legislation (including waste management legislation) and the following good practice guidance documents:

- Peatland Survey – Guidance on Developments on Peatland, Scottish Government, SNH and SEPA (2017);
- Developments on Peatland: Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste, Scottish Renewables and SEPA, Version 1 (2012); and
- Peat stability will be assessed in accordance with Peat Landscape Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments (2017).

A number of ground surveys will be undertaken during the EIA which will determine the extent of peat across the Development Site.

9.6. Carbon Assessment

In order to determine the carbon produced and captured by the Development, a Carbon Assessment will be undertaken. This will consist of identifying and quantifying the following:

- The embedded carbon in the operational equipment;
- The embedded carbon in the construction materials (e.g. concrete, steel);
- The CO₂e gasses produced by transportation of materials and personnel during construction;
- The CO₂e released by disturbing and excavating peatlands during construction; and,
- The CO₂e captured by improving peatlands.

This assessment will provide insight into the carbon balance of the system and the overall carbon intensity per GWh of generation.

9.7. Ground Surveys

In order to determine the characteristics of the geology within the Development Site Ground Investigation (GI) surveys will be phased during and after the EIA. Table 9.1 Potential Ground Surveys shows the different GI surveys that may be undertaken.

Table 9.1: Potential Ground Surveys

Phase	Example Ground Investigation Method	Requirement for Survey
1 (during EIA)	Peat Probing (phase 1 and 2)	Avoidance of deep peat, peat slide risk assessment and peat management plan
2a (post EIA)	Client Led – Cable percussive boreholes and material sampling	Detailed design (30%)
2b (post EIA)	Contractor Led – Rotary drilled boreholes and material sampling	Completion of detailed design and micro sitting of underground structures and location of fault lines

9.8. Assessment Methods and Guidance

The assessment method that will be followed is described in Chapter 3 Scope of the Environmental Impact Assessment and, where necessary, further refined below.

The assessment of the significance of individual impacts on the receiving environment will be based on criteria for the sensitivity or importance of the resources as described in Table 9.2 Sensitivity Definition.

Table 9.2: Sensitivity Definition

Sensitivity	Description
Very High	Geology/ Soils The area occupied by the development is protected by International EU legislation (World Heritage Sites, Geopark).
High	Geology/ Soils Feature of national importance, for example a SSSI.
Medium	Geology/ Soils Site of local geological importance (Local Geological Site – previously Regionally Important Geological Site).
Low	Geology/ Soils Sites with local geology/ soils interest.

9.9. Likely Significant Effects

9.9.1. Construction

The construction of the Development will result in the excavation of peat and release of carbon into the atmosphere. In addition construction activities may result in the pollution of surface water within the peat.

The initial construction of access tunnels may require some dewatering around the entrance portals and during the initial stages of the tunnel borings. However, once the TBM has started boring it can cope with hydrostatic pressurises by virtue of its earth pressure balancing systems behind the cutting face. No dewatering is therefore required for tunnel construction. In certain instances, grouting or freezing of the ground may be required in front on the TBM where heavily fractured rock material is encountered.

The drill and blast methods for constructing the powerhouse cavern, surge shafts and possibly the headrace tunnel will generally require competent rock i.e. without significant amounts of fracturing. If water is encountered or rock is not deemed competent enough to support itself, then a lining may be required such as rock anchors, rebar and / or shotcrete. Temporary dewatering around fracture to reduce pressures and enable the Sprayed Concrete Lining (SCL) to cure may be required. An assessment on the competency of rock is not part of the scope of the EIAR as it will be mitigated by inherent safety and engineering design solutions.

Impacts from seismic activity are scoped out as they will be mitigated by inherent safety and engineering design solutions secured under the Reservoirs (Scotland) Act 2011, and are therefore scoped out of the EIAR.

9.9.2. Operation

Following completion of the construction phase, areas impacted by the development, such as peatlands, will either be reinstated or will be unchanged. As such, significant effects on geology and soils during the operational phase are unlikely; and this is therefore scoped out for this phase.

9.9.3. Decommissioning

The decommissioning phase has been scoped out as no additional excavation is required and as the main structures would remain in situ.

9.10. Likely Mitigation Measures

The Development will have embedding environmental design measures as part of its design. This will ensure that good practice is adopted at the Development Site throughout the construction and operation phases.

The purpose of embedding environmental design measures as part of the design will be to minimise the impacts on peat, including the release of carbon, and to balance, as well as possible the material being excavated on site with what is being reused.

The CEMP will address geology and soils issues, including measures to protect geology and peat from the any potentially pollution activities.

The MMA will demonstrate how the project will utilise the reuse of excavated material on site, as part of the construction of the development.

9.11. Summary and Conclusions

The geology around the Development Site will be further investigated in order to inform the geo-environmental and geotechnical assessments. This is to minimise the impact of the development on the surrounding geology, carbon resource and to reduce the potential amount excess material that is generated from the construction activities.

The operational and decommissioning phase of the Development is unlikely to result in any significant effects geological features and is therefore proposed to be scoped out of the EIAR.

9.12. References

British Geological Society, 2014, Sheet number 54E, [online]
<http://www.largeimages.bgs.ac.uk/iip/mapsportal.html?id=1009217>

British Geological Society, 2002, Sheet number 63E, [online]
<http://www.largeimages.bgs.ac.uk/iip/mapsportal.html?id=1002419>

Guidance on Developments on Peatland, Scottish Government, SNH and SEPA, 2017, [online],
<https://www.gov.scot/publications/peatland-survey-guidance/>

Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste, Scottish Renewables and SEPA, Version 1, 2012, [online],
<https://www.gov.scot/publications/assessment-of-peat-volumes-reuse-of-excavated-peat-and-minimisation-of-waste-guidance/>

Best Practice Guide for Proposed Electricity Generation Developments, 2017, [online],
<https://www.gov.scot/publications/peat-landslide-hazard-risk-assessments-best-practice-guide-proposed-electricity/>

10. Water Environment

10.1. Introduction

This scoping chapter is based on a desk study and considers the potential for impacts of the Development on surface and groundwater bodies, including their water quality, hydromorphology and the quality of any licenced or private water supplies (PWS). It describes the water environment baseline and receptors before setting out the potential for significant environmental effects and the scope for mitigation. It goes on to describe the surveys and assessment that will be undertaken as part of the Environmental Impact Assessment (EIA). Please refer to Chapter 6 Terrestrial Ecology for the assessment of any ground water dependent terrestrial ecosystems, Chapter 7 Aquatic Ecology in relation to the assessment of flora and fauna associated with the aquatic environment, Chapter 9 Geology, Soils and Carbon in relation to the assessment of geology, bedrock, peat and carbon, Chapter 11 Flood Risk and Water Resources for consideration of flood risk and surface water resources, and Chapter 15 Socio-economics, Recreation and Tourism in relation to impacts on recreational uses within the site.

This chapter is supported by the following: Figure 10.1 Water Environment Features and Attributes.

10.1.1. Local Planning Policy

The Development is spread over two local council areas – Perth and Kinross (PKC) on the southern east part of Loch Erich, and the Highland Council (THC) to the west and north.

Local planning policies for PKC are included in the Perth and Kinross Local Development Plan (LDP), adopted in 2019. Table 10.1: Relevant Policies of Perth and Kinross LDP provides a summary of the policies relevant to the water environment.

Table 10.1: Relevant Policies of Perth and Kinross LDP

Planning Policy	Relevant Purpose
Policy 38A – International Nature Conservation Sites	Development which could have significant effects on internationally designated sites will only be permitted if assessment shows it will not have adverse effects on the integrity of the site or if there is no suitable alternative, there are imperative reasons of overriding public interest and mitigation measures are provided.
Policy 38B – National Designations	Development which could have significant effects on nationally designated sites will only be permitted if it will not adversely affect the integrity of the area or any such adverse effects are clearly outweighed by nationally important social, economic or environmental benefits.
Policy 41 – Biodiversity Policy	Protection and enhancement of all wildlife whether protected / designated or not and the Tayside Local Biodiversity Action Plan will be considered as well as legislation when developments are proposed.
Policy 42 – Green Infrastructure	All new developments are required to contribute to green infrastructure including protection, enhancement and management of existing green infrastructure and creation of new green infrastructure / wildlife corridors, and ensuring that development does not lead to the fragmentation of existing green and blue networks. This policy notes that the water environment is an important contributor to the network of blue and green corridors for the alleviation of flood risk, wildlife, recreation and the amenity needs of the community.
Policy 47 – River Tay Catchment Area	Protection and enhancement of the nature conservation interests within the River Tay Catchment Area.
Policy 53A – Water Environment	Development at any location and of any scale should protect and where practical improve the water environment (ground and surface water) in accordance with the Water Framework Directive (WFD) (as implemented in Scotland through national legislation that remains enforced at the time of writing). The Scottish River Basin Management Plan has protection and improvement objectives which aim to ensure that there is no deterioration of water body status and where possible secure long-term enhancements to water body status. All new developments should provide appropriate management of surface water runoff using sustainable drainage techniques (where possible) and the appropriate disposal of foul waste water. Finally, The Council will not support development over an existing culvert or the culverting of watercourses as part of a new development unless there is no practical alternative. Where deemed necessary it will be essential to provide

Planning Policy Relevant Purpose

adequate access for maintenance. Existing culverts should be opened and redundant water engineering structures removed whenever possible to benefit wildlife and improve amenity and a suitable riparian buffer zone between development and the watercourse should be provided.

Relevant local planning policies for THC are detailed in the Highland-wide Local Development Plan (HwLDP) (adopted 2012) and are described in Table 10.2: Relevant Policies of Highland-wide LDP. The plan is currently under review, with a new plan expected once changes outlined in the Planning Bill (2017) are better understood.

Table 10.2: Relevant Policies of Highland-wide LDP

Planning policy	Relevant purpose
Policy 28 – Sustainable Design	Supports developments promoting and enhancing social, economic and environmental wellbeing and such developments will be assessed on the extent to which they impact on habitats and species.
Policy 63 – Water Environment	New development must not compromise the objectives of the WFD (as implemented in Scotland under national legislation that remains enforced at the time of writing), aimed at the protection and improvement of Scotland's water environment.
Policy 64 – Flood Risk	Policy 64 deals with flood risk and new development. However, it also states that any developments, particularly those on the flood plain, should not compromise the objectives of the WFD (as implemented in Scotland under national legislation that remains enforced at the time of writing). Where flood management measures are required, natural methods such as restoration of floodplains, wetlands and water bodies should be incorporated, or adequate justification should be provided as to why they are impracticable. Such interventions may provide opportunities for physical improvements to water bodies.
Policy 65 – Waste Water Treatment	Policy 65 sets out the Council's expectations with regards to the management of foul water from new developments. Where connection to the public sewer is not possible robust justification is required and an assessment to demonstrate that no significant environmental effects would occur from the alternative management method.
Policy 66 – Surface Water Drainage	All proposed development must be drained by Sustainable Drainage Systems (SuDS) designed in accordance with The SuDS Manual (CIRIA C697) and, where appropriate, the Sewers for Scotland Manual 2nd Edition. P
Policy 74 – Green Networks	Development in areas identified for the creation of green networks should avoid fragmentation of the network and improve its connectivity, where appropriate. Proposals for the long term monitoring of SuDS is also required as part of planning applications.

10.2. Baseline Conditions

10.2.1. Study Area

The Development Site is located to the east of Loch Ericht, approximately 12 km north of Bridge of Ericht, and 17 km south of Dalwhinnie in the Scottish Highlands (the majority of the Site is within the Perth and Kinross Council administrative area, with a northern section within The Highland Council area).

For the purpose of this scoping assessment, a 1 km study area around the red line boundary including areas of new development or temporary works has been used within which waterbodies that may be affected by the Development have been identified (see Figure 10.1 Water Environment Features and Attributes). For these waterbodies, the baseline also considers downstream attributes since water quality impacts can sometime propagate along watercourses. However, due to the size and length of Loch Ericht, this waterbody is considered the ultimate downstream receptor (i.e. it is not considered that significant water quality effects will propagate further downstream).

The study area is characterised by wild mountainous terrain with elevations up to approximately 934 mAOD. The land use is predominantly open moorland, with small areas of coniferous plantations mainly along lochsides and the northern access track from Dalwhinnie.

The Dalwhinnie No 2 Met Office station records for the period 1981-2010 an annual average rainfall of over 1300 mm, meaning the site is particularly wet in the UK context, which will influence pollution control during construction.

10.2.2. Surface Waterbodies

From a review of online Ordnance Survey maps and aerial imagery, the main waterbodies located within the study area and which are thought to have some form of hydrological connectivity to the Development are listed in Table 10.3 Surface Waterbodies below, shown from north to south (see also Figure 10.1 Water Environment Features and Attributes). Those which are classified under the WFD are given in bold, with descriptions following the table (although note that WFD designation applies to all tributaries with the catchments of WFD designated waterbodies).

Table 10.3: Surface Waterbodies

Loch Ericht Catchment	River Garry Catchment
River Ericht	Allt Coire Dhomhain
Loch Ericht	Allt na Glaise
Allt Udlamain	Allt Feith Gharuiareagan
Allt Choire Bhachdaidh	
Allt an Sgaillean	
Loch Monaidh	
Allt Ghlas	
Allt Choire Glais	
Allt an Luib Bhain	
Allt a' Choire Odhair Bhig	
Allt Loch Mheugaidh	
Allt Coire Earra Dheargan	
Allt nan Tonnagan	
Multiple small watercourses (unnamed) on west and east sides of Loch Ericht)	

River Ericht

The River Ericht upstream of Loch Ericht has a length of 1.1 km and is classified as 'high' under the WFD (ID: 6625). The river rises on the western slopes above the loch, to the south west of Dalwhinnie and flows through an area of commercial forestry before discharging directly to the loch.

Downstream of Loch Ericht, the watercourse (ID: 6624) has a length of 6.4 km before flowing into Loch Rannoch. This reach is designated as a heavily modified waterbody as flows are depleted due to the presence of the dam structure and abstraction from the loch to the Rannoch power station. The waterbody has an overall status of 'bad', with a 'poor' status for biological elements, a status of 'bad' for hydrology, and 'fail' for ecological indicators.

Loch Ericht

Loch Ericht (ID: 100203) is the largest body of water in the vicinity of the Development at 22.4 km², running from north to south on the east side of the study area. The loch is deep at 156.1 m (Murray, Sir J. and Pullar, L., 1910), formed as a result of glacial erosion, with a long linear form, set in a steep, northeast-southwest trending valley.

A relatively narrow catchment area exists around Loch Ericht, with numerous watercourses and small lochs draining this upland area towards Loch Ericht. Loch Monaidh and its outflow fall within the River Garry catchment to the east.

The loch is designated as a heavily modified waterbody, with a status of 'good ecological potential' as it is part of the Tummel-Garry hydropower network. Under the classification, the loch has 'poor' status for morphology, 'bad' status for hydrology, and 'bad' status for overall ecology.

Allt Coire Dhomhain

The Allt Coire Dhomhain is located to the north of the proposed development area, within the River Garry catchment (ID: 6610). The main stem is 10.6 km in length and the waterbody is not heavily modified and has an overall status of 'poor', with a status of 'poor' for biological elements related to fish passage and water quality issues.

Allt na Glaise

The Allt na Glaise is located to the east of the proposed development area within the River Garry catchment, and is designated under the WFD (ID: 6596). The watercourse is classified as unmodified and has a length of 19.3 km is classified as 'poor', with issues of barriers to fish migration, abstraction for hydropower and water quality issues preventing it from reaching 'good' status. The watercourse feeds Loch Garry (ID: 100349) and subsequently the River Garry downstream (ID: 6912). Loch Garry is at a significant distance, however they are hydrologically connected to the proposed development and so further consideration of the risk of indirect effects is required.

Allt Ghlas

The Allt Glas (ID: 6919) has a length of 8.7 km and a status of 'high' under the WFD. The watercourse flows from north to south, rising to the south of the Proposed Development and crossing the main access road from the south. A diversion to Loch Ericht is located at approx. NGR NN 251390 762897 and downstream of the sluice, the waterbody is heavily modified, with a status of 'moderate ecological potential' (ID: 6918) and a length of 0.8km. The watercourse has 'moderate' status for overall hydrology and 'moderate' status for overall ecology.

10.2.3. Geology

The geology of the study area is an important consideration for determining the potential for adverse impacts on groundwater quality, including any local abstractions. Chapter 9 Geology, Soils and Carbon provides full details of the Development Site's geology, which is only summarised below.

The bedrock geology of the Development Site is dominated by metamorphic psammite, quartzite and semipelite rocks with localised igneous intrusions (British Geological Society; BGS, 2014).

The superficial deposits in the Development area are from the Quaternary period. The elevated areas east of Loch Ericht are covered primarily by peat. At the headpond location there is a large area of degraded peat from the access track to beyond Loch Monaidh.

Till is most common from approximately 0.5 km north of the headpond location down to the loch margin with some areas of localised peat. At the loch's margin where the construction compound is proposed, there is an area of peat as well as alluvium, mostly consisting of sand, silt, clay and gravel.

10.2.4. Hydrogeology

The bedrock hydrogeological information is relatively limited but seems to show the Pre-Cambrian rocks which will be largely impermeable, generally without groundwater except at shallow depths (BGS, 1988). MacDonald (2005) lists the bedrock aquifer productivity of Moine rocks as being in the very low category (in some cases low category when pelites are present). For these categories, low is defined as 0.1 to 1 l/s and very low as <0.1 l/s. These quantities would only be suitable for supplying private resources, and even then, resources may tend to be variable. The presence of fracture zones in a locality may enhance the yields from any wells but locating these zones can be difficult. Although hydraulic property information is very difficult to obtain in these areas, it is likely that the permeabilities of the bedrock will be very low.

The superficial deposits which are present in the area are likely to contain groundwater at shallow depths. It has also been observed that extensive blanket bog (peat) exists around Loch Monaidh within the proposed Development Site. The presence of peat deposits could indicate the bedrock in the area being generally impermeable.

The Development Site lies mainly within the Rannoch groundwater body (ID: 150691) designated under the River Basin Management Plan (RBMP) for Scotland (Ref. SEPA Water Classification Hub). The access route in via Dalwhinnie lies with the Strathnarin, Speyside and Cairngorm (SSC) groundwater body (ID: 150709). The extent of the Rannoch groundwater body covers an area of approximately 1,273 km² and is currently classed as 'good'. The SSC groundwater body covers an area of approximately 3,726 km² and is also classed as 'good'.

10.2.5. Water Supplies

Groundwater Drinking Water Protected Areas are areas that have been defined by SEPA in line with the requirements of The Water Environment (Drinking Water Protected Areas) (Scotland) Order 2013 to fulfil the requirements of the WFD. These are areas where land use is causing pollution of the raw water and action is being undertaken to reduce this risk to reduce the need for extra treatment of raw

water. Land around Dalwhinnie and up the River Truim and tributaries into the Dalnaspidal Forest, but north of the Development, is included in a surface water Drinking Water Protected Area (see Figure 10.1 Water Environment Features and Attributes).

According to SEPA's Scottish Environment Map (Ref. SEPA. Scottish Environment Map) only the settlements of Dalwhinnie in the north of the study area and Bridge of Erich in the South are both included within a Water Regulation Zones (i.e. an area where Scottish Water provides a domestic drinking water supply).

At the time of the assessment no information on licenced water abstractions was available. The location and data on licenced abstractions has been requested from SEPA.

There are a very small number of isolated properties found within the study area which may be served by an unlicenced private water supply (PWS). They are also likely to have non-public sewer domestic sewerage systems, that are common in rural areas, which although not a receptor, will influence background water quality. A full record of all PWS will be requested from the environmental health departments of the two local authorities (namely PKC and THC).

10.2.6. Ecological Potential of Water Bodies

It is important that any water dependent nature conservation sites and protected species are identified for each water body receptor so that they may be taken into account by the impact assessment (i.e. a waterbody that has a higher conservation status will be considered a more important and potentially more sensitive receptor).

Table 6.4 Statutory Designated Sites for Nature Conservation in Chapter 6 Terrestrial Ecology describes the statutory and non-statutory nature conservation sites within the study area. All sites are shown on Figures 6.1 Statutory Designations and 6.2 Non Statutory Designations, with those deemed relevant to this water environment scoping assessment also shown on Figure 10.1 Water Environment Features and Attributes. These include the Drumochter Hills SAC/SPA/SSSI as this site includes the headwaters of the Allt na Glaise, Allt Udlamain, and tributaries of Allt Coire Bhachdaidh (e.g. up Coire Bhurich), and River Tay Special Area of Conservation (SAC) which includes Loch Rannoch and is designated for oligotrophic/mesotrophic standing water and various fish species.

Coire Bhachdaidh Site of Special Scientific Interest (SSSI) is designated for upland habitat, vascular plant assemblages and breeding birds. These are not relevant to the watercourses flowing through this designated site, and thus their importance will not be determined by the SSSI designation.

Note that the ecological assessment of all impacts on these nature conservation sites is discussed in Chapter 6 Terrestrial Ecology and Chapter 7 Aquatic Ecology. They are only considered here in the context of determining the importance and sensitivity of water bodies to pollution risks and physical changes to morphology that may occur as a consequence of the Development.

Chapter 6 Terrestrial Ecology and Chapter 7 Aquatic Ecology set out the scope of protected species surveys, including those relevant to waterbodies within the study area. The results of these surveys will inform the important setting of waterbodies for the full impact assessment.

10.3. Methodology

10.3.1. Water Environment Impact Assessment

The study area is described in Section 10.2.1 Study Area, and includes the Development Site and nearby waterbodies which could potentially be impacted by it (such as Loch Erich, Loch Monaidh, Allt Choire Bhachdaidh, Allt an Sgaillean, Allt na Glaise, Allt Coire Dhomhain and Allt Ghlas and other watercourses along the access route or close to future proposed temporary construction compounds).

Further desk studies will be undertaken of readily available data from online sources providing information on local climate, topography, soils, hydrogeology and land use. An online literature search will also be undertaken to identify relevant studies relating to the hydrology and water quality, and liaison with those undertaking an assessment of aquatic ecology so that relevant information can be included when determining the importance and sensitivity of each waterbody. In addition, a data request will be made to SEPA and NatureScot for any relevant hydrological, water quality, and water resource data that they hold, and to The Highland Council and the Perth and Kinross Council for information on any

known local PWS. Further data requests and consultations will be made to other third parties where necessary (e.g. Scottish Water).

Following a review of available information and data, a gap analysis will be undertaken to determine the need for further surveys. These could include a programme of water quality and level monitoring (surface and groundwater), and hydromorphological surveys. The scope of surveys will be developed in consultation with stakeholders. However, at this stage it is assumed that adequate data would be available from the desk study and a site walkover survey of the main development sites and along access routes.

A hydromorphological survey would be carried out focusing on those watercourses and waterbodies that may be directly impacted by the Development (e.g. Allt Choire Bhachdaidh, Allt an Sgaillean, Allt na Glaise and Allt Ghlas). The requirement for further surveys, field work and assessment would be determined following completion of the baseline desk study, walkover survey, and scoping consultation. The scope of any more detailed surveys and assessment would be agreed in advance with statutory consultees, as required, however at present, it is envisaged that these will be sufficient.

The identification of impacts will be undertaken using the source-pathway-receptor model. This model identifies the potential sources or 'causes' of impact as well as the receptors (e.g. surface water resources) that could potentially be affected. The presence of a potential impact, source and a potential receptor does not always infer an impact; there needs to be an impact pathway or 'mechanism' via which the source can have an impact on the receptor. The assessment will be primarily qualitative and informed by existing data and information.

The importance of a waterbody will be determined based on the criteria presented in Table 10.4 Receptor Importance. The magnitude of effect will be determined based on the criteria in Chapter 3 Scope of the Environmental Impact Assessment, Table 3.4 Magnitude of Effect, taking into account the likelihood of the effect occurring. The likelihood of an effect occurring is based on a scale of certain, likely or unlikely. Finally, the significance of effects will be determined using the matrix presented in Table 3.5 Significance of Effects. Only those effects moderate or greater are considered significant.

Table 10.4 Receptor Importance

Importance	Category			
	General criteria	Groundwater	Surface Water	Hydromorphology
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character, is of very high environmental value, or of international importance.	Source Protection Zone (SPZ) 1 within a Principal Aquifer. Feature of international importance, for example a SAC. Alternatively, groundwater is critical to designated sites of nature conservation. Water abstraction ⁵ : >1000 m ³ /day.	Q95 ⁶ ≥ 1.0 metres cubed per second (m ³ /s); Receptors to flood risk: essential infrastructure or highly vulnerable development; Watercourse having a WFD classification shown in a RBMP. Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water)/Species protected by EC legislation	Unmodified, near to or pristine conditions, with well-developed and diverse geomorphic forms and processes characteristic of river and lake type.
High	The receptor has low ability to absorb change without fundamentally altering its	Principal Aquifer (not within SPZ 1). Sensitive habitats of national importance. Groundwater is a locally valuable resource	Q95 ⁶ < 1.0 m ³ /s; Watercourse having a WFD classification shown in a RBMP. Species protected under EC or UK legislation	Conforms closely to natural, unaltered state and will often exhibit well-developed and diverse geomorphic forms and processes characteristic of river and lake type.

⁵ Water abstraction – in addition a higher value may be placed on a source where it is the only practical water supply option available

⁶ Q95 is the flow equalled or exceeded 95% of the time

Importance	Category			
	General criteria	Groundwater	Surface Water	Hydromorphology
	present character, is of high environmental value, or of national importance.	because of its moderate quality and / or yield, or is known to be locally exploited for water supply. GWDTE with high dependency on groundwater. Water abstraction: 1000-500 m ³ /day.		Deviates from natural conditions due to direct and/or indirect channel, floodplain, bank modifications and/or catchment development pressures.
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, has some environmental value or is of regional importance.	Secondary Aquifer. Groundwater of limited value because its quality does not allow potable or other quality sensitive uses. Exploitation of local groundwater is not extensive and / or local areas of nature conservation known to be sensitive to groundwater impacts. GWDTEs with moderate dependency on groundwater. Water abstraction: 50-499 m ³ /day.	Watercourses not having a WFD classification shown in a RBMP	Shows signs of previous alteration and / or minor flow / water level regulation but still retains some natural features, or may be recovering towards conditions indicative of the higher category.
Low	The receptor is tolerant of change without detriment to its character, is low environmental value, or local importance.	Unproductive Strata - rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow. Changes to groundwater not expected to impact on local ecology. Limited economic or social uses. GWDTE with minimal dependency on groundwater i.e. fed by rain and natural surface drainage. Water abstraction: <50 m ³ /day.	Watercourses not having a WFD classification shown in a RBMP.	Substantially modified by past land use, previous engineering works or flow / water level regulation. Watercourses likely to possess an artificial cross-section (e.g. trapezoidal) and will probably be deficient in bedforms and bankside vegetation. Watercourses may also be realigned or channelised with hard bank protection, or culverted and enclosed. May be significantly impounded or abstracted for water resources use. Could be impacted by navigation, with associated high degree of flow regulation and bank protection, and probable strategic need for maintenance dredging. Artificial and minor drains and ditches will fall into this category.
Negligible	The receptor is resistant to change and is of little	Not applicable.	Not applicable.	Not applicable.

Importance	Category			
	General criteria	Groundwater	Surface Water	Hydromorphology
environmental value				

Note 1: Professional judgement is applied when assigning an importance category to all water features. The WFD status of a watercourse is not an overriding factor and in many instances it may be appropriate to upgrade a watercourse which is currently at poor or moderate status to a category of higher importance to reflect its overall value in terms of other attributes and WFD targets for the watercourse. Likewise, a watercourse may be below Good Ecological Status, this does not mean that a poorer quality discharge can be emitted.

Note 2: Based on the water body 'Reach Conservation Status' presently being adopted for HS2 (and developed originally by Atkins) (and based on Geomorphological approaches to river management. Project record W5A/i661/1 (Environment Agency, 1998b) and River Geomorphology: a practical guide (Environment Agency, 1998a).

10.3.2. Water Framework Directive Assessment

The Development must not cause further deterioration of any relevant WFD parameter (i.e. the reduction in class of any parameter or prevent the improvement) to meet future WFD objectives. This also means that any discharges to the non-WFD waterbodies must not impact on the WFD waterbodies further downstream.

The WFD assessment will be undertaken in two stages. An initial screening and scoping assessment would be undertaken to identify components of the Development and impacts that could potentially lead to non-compliance with WFD objectives for relevant waterbodies. This would be based on gathering and evaluating existing data and determining qualitatively the potential for non-compliance with WFD objectives for the various designated waterbodies within the study area. The assessment will consider biological, physico-chemical (water quality) and hydromorphological (physical) elements, for surface water and groundwater bodies at the site of interest, and for connecting waterbodies. It will also consider the objectives of any protected areas and mitigation measures proposed by SEPA to improve water body status.

Depending on the outcome of the screening and scoping study, and after consultation with SEPA, a 'detailed' assessment may be required and then undertaken. This will focus on the critical issues of concern to SEPA and the scope would be agreed with them in advance

10.4. Likely Significant Effects

10.4.1. Construction

During the construction phase there is the potential for adverse effects on the water environment (including any PWS and other uses of water) from contamination and high levels of fine sediment in runoff (including the potential wash out of fine sediment from temporary spoil heaps, embankment, and access tracks), chemical spillages, and physical changes to waterbodies as a consequence of:

- Creation of the headpond at Loch Monaidh, which will need to be dewatered;
- The construction and operation of temporary and permanent compounds, particularly those that are close to waterbodies including Loch Ericht (risks include construction site runoff, storage and use of fuel and chemicals), waste water from welfare facilities, concrete wash out and other waste facilities);
- The excavation and dewatering of borrow pits;
- Dewatering and water abstraction operations (e.g. around tunnel portals and air shafts);
- Excavation and crushing of rock which can lead to runoff containing excessive quantities of fine sediment and potentially elevated levels of certain chemical substances;
- Works directly within waterbodies including the operation of boats and other vessels on Loch Ericht;
- Permanent or temporary diversion of watercourses;
- Construction of temporary access tracks which cross watercourses and may require upgrades to existing structures (e.g. culverts) or installation of new structures;
- Earthworks, embankment construction and the creation of spoil heaps;

- Other general construction activities (e.g. stripping of vegetation, movement of plant and possible batching of concrete etc.); and
- Subsurface construction such as surge shaft, tailrace tunnel, headrace tunnel, tunnel portals.

Without appropriate mitigation, significant residual effects could adversely affect the natural attributes and uses of waterbodies and potentially their WFD status. There is also the potential for any local PWS (which are yet to be confirmed) to be adversely impacted. Waterbodies which could be affected during construction include Loch Ericht, Loch Monaidh, Allt Choire Bhachdaidh, Allt an Sgaillean, Allt na Glaise, Allt Coire Dhomhain and Allt Ghlas among others.

In terms of groundwater resources (quantity), no significant effects are expected from the construction phase. Any dewatering around the initial construction of the entrance portals for the tunnel to the power cavern will be temporary in nature until either some sheet piling or secant pile walls are constructed. By locating the construction / access tunnels away from any sensitive receptors as much as possible given the extent of peat in the area, this should avoid any significant effects and this will only be considered in brief.

10.4.2. Operation

During operation of the Development there is the potential for direct impacts on Loch Ericht from operational discharges, although at this stage it is considered that there is likely to be a significant buffering potential due to the large size and volume of the loch relative to the headpond and volumes of water to be transferred under normal operation. This may include local changes to water quality, water temperature and sensitivity to algal blooms, and the potential to scour the loch bed in the vicinity of the outlet, under both normal operation, routine maintenance, and emergency situations (i.e. in the unlikely event that the water level in the headpond needs to be drawn down quickly).

During operation there would also be direct hydrological, hydromorphological and water quality and impacts to Allt na Glaise due to construction of an embankment dam for the headpond across its tributaries. The altered flow regime has the potential to impact hydromorphology, water quality, water temperature, as well as ecological habitats and composition that are considered in Chapter 6 Terrestrial Ecology and Chapter 7 Aquatic Ecology.

Construction of the headpond would result in the loss of Loch Monaidh and a reach of channel into which it drains. Other permanent physical changes to waterbodies as a consequence of the Development include new inlet / outlet structures, a spillway and tailrace at Loch Ericht, creation of a new jetty facilities at Loch Ericht (northern end and at Corrievarkie Lodge), upgrades to existing watercourse crossings for the long permanent Site access from the south, and the creation of new watercourse crossings for new access tracks.

Increased areas of hardstanding associated with access roads and compounds have the potential to increase runoff to surface waterbodies and may include pollutants such as dissolved metals and hydrocarbons, as well as particulates, which may need to be treated using sustainable drainage measures depending on the level of risk (which will largely depend on the volume of traffic).

From the groundwater perspective, the fact that the site is underlain by generally impermeable rocks, with limited groundwater present except at shallow depths should mean that significant groundwater effects are unlikely during the operational phase; and this is therefore scoped out for this phase.

10.4.3. Decommissioning

The potential impacts that may occur during decommissioning would be similar to those described above from construction, plus the need to fully dewater the headpond. Decommissioning of the Development Site should seek to restore the Development Site to its pre-development form, restoring waterbodies and features. A pre-decommissioning survey will be required with the relevant requirements included within the decommissioning plan. As such, it is proposed to scope the decommissioning phase out of the EIAR assessment.

10.5. Likely Mitigation Measures

10.5.1. Construction

The need for mitigation measures to avoid, minimise and reduce potential adverse effects will be developed iteratively with the design and alongside further baseline data collection, surveys, impact assessment and consultation.

This will include the appropriate siting of new infrastructure to avoid waterbodies where possible, the position, depth and design of temporary and permanent inlet / outlet structures, the design of watercourse crossings, and surface water management. Sustainable drainage systems will be included to mitigate for increased runoff (including pollutants) from areas of hardstanding.

Additional regulatory processes will apply to the Development. Temporary and permanent works affecting watercourses will require a CAR Licence from SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Temporary and permanent abstractions and discharges will also require an abstraction licence and CAR licence from SEPA. Through consultation with SEPA, appropriate treatment measures for construction site runoff, conditions on operational discharges, limits and conditions on abstractions will be determined.

Construction works will be implemented in accordance with a CEMP that will describe the management arrangements for the Site and the principles of mitigation that will be adopted. It is envisaged that the CEMP will be supported by a number of management plans prepared with reference to good practice guidance and including:

- **Water Management Plan** – describing the construction phase mitigation measures that will be implemented to protect the surface water environment and any pre-, during and post-construction monitoring requirements. This plan will also describe specific measures for the management of fine sediment in construction site runoff. It is expected that a range of methods will be used including construction processes, timing of works, the use of coffer dams, silt curtains, silt fences, lamella clarifiers, silt dewatering tubes / bags, and settlement lagoons etc.);
- **Emergency Response Management Plan** – describing the approach to a pollution incident to minimise adverse environmental effects.

The groundwater mitigation methods for dealing with an adverse construction impacts could include the following measures to reduce any impact on PWS (if present) which will be secured via the Water Management Plan for construction:

- The provision of a temporary bowser with drinking water;
- Remediation of the borehole supply (either cleaning or deepening the borehole);
- The provision of an alternative water supply if serious long term derogation were to take place; and
- Monitoring of the PWS.

10.5.2. Operation

It is proposed that the water quality within the headpond is monitored on a routine basis including observations, in-situ measurements using a probe and/or Secchi disk for turbidity, and regular water samples for laboratory analysis. The purpose of the monitoring is to build up an understanding of how water quality changes whilst stored in the headpond in comparison to background water quality in Loch Ericht.

These measures are in addition to the operational requirements and daily observations which will be undertaken in the headpond and tailpond inlet / outlet, and the introduction of the screens at both Inlet / Outlets to prevent debris entrainment. The design of the headpond access is such that a full observation of the headpond waterbody can be made from all angles.

This preventative measure will support decisions about operation to ensure that unforeseen water quality impacts on Loch Ericht are avoided. If water quality monitoring results remain stable and operation of the Development is consistent it may be possible to reduce or even stop routine water quality monitoring.

10.6. Summary and Conclusions

The Development has the potential to have direct and indirect water quality and hydromorphological effects during the construction, operation and future decommissioning phases.

During construction there is the risk of pollution of waterbodies, particularly for works within or close to waterbodies. The impermeable nature of the bedrock in the Corrievarkie area would suggest little groundwater at depth. Similar effects are predicted to occur during future decommissioning of the Development Site as described for construction works, although restoration of waterbodies would be a beneficial outcome.

Any groundwater abstractions by PWS are likely to be quite shallow, with the number and location of any PWS to be confirmed via future consultation with stakeholders. Any impacts from the Development on PWS would be mitigated by measures such as provision of temporary bowsers, modifying boreholes or providing alternative supplies.

During operation there would also be direct hydrological, hydromorphological and water quality and impacts. Construction of the headpond would result in the loss of Loch Monaidh and a reach of channel into which it drains. Other new structures are proposed affecting the hydromorphology of a number of waterbodies. There is also the potential for direct impacts on Loch Ericht from operational discharges, although at this stage it is considered that there is likely to be a significant buffering potential due to the large size and volume of the loch relative to the headpond and volumes of water to be transferred under normal operation.

Overall, a water environment impact assessment will be included in the EIAR covering water quality (surface water and groundwater) and hydromorphology. This will include details of proposed mitigation or environmental enhancement measures, stating the residual effects. At this stage, further desk study and potentially site surveys are required to gather additional data in order to evaluate the magnitude and therefore significance of potential effects.

The impact assessment will be supported by a WFD assessment, which will consider the potential for deterioration or prevention of improvement in the status of WFD waterbodies that are potentially affected by the Development.

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11. Flood Risk and Water Resources

11.1. Introduction

This chapter has been informed by a desk study and considers flood risk, the impact on the hydrological parameters and behaviour of catchments and waterbodies potentially impacted by the Development. It describes the baseline sources, the surveys and assessment that will be undertaken as part of the EIA and the potential for significant environmental effects and the scope for mitigation.

This chapter is supported by the following Figures:

- Figure 11.1 Existing Tummel-Garry Hydro Scheme Infrastructure
- Figure 11.2 Direct and indirect catchment areas of Loch Ericht

11.1.1. Guidance

The following regulations and guidance docs are pertinent to the Flood Risk and Water Resources chapter, including;

- Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended).
- Water Framework Directive (2000/60/EC).
- Flood Risk Management (Scotland) Act 2009 and the Flood Risk Management (Flood Protection Schemes, Potentially Vulnerable Areas and Local Plan Districts) (Scotland) Regulations 2010
- Reservoirs (Scotland) Act 2011
- Scottish Planning Policy (SPP) 2014
- PAN 511 – Planning, Environmental Protection and Regulation (Revised 2006)
- PAN 61 – Planning and Sustainable Urban Drainage Systems (2001)
- PAN 79 – Water and Drainage (2006)
- SEPA Flood Risk Standing Advice for Planning Authorities and Developers (2020)
- SEPA Policy 41 - Planning Authority Protocol (2016)
- SEPA Engineering activities in the water environment: Good practice guide – River Crossings
- SEPA Technical Flood Risk Guidance for Stakeholders (Version 12, 2019)
- Flood Risk & Drainage Impact, Supplementary Guidance, The Highland Council (2013)
- Flood Risk and Flood Risk Assessments, Supplementary Guidance, Perth & Kinross Council (2021)
- SuDS Manual (C753), CIRIA (2015)

11.2. Baseline Conditions

11.2.1. Study Area Overview

The Development Site is located partially within the Highland Council and Perth & Kinross Council areas between Bridge of Ericht, and Dalwhinnie on the slopes above the eastern side of Loch Ericht. The Development Site is located in a rural area, with steep hills, deep valleys with land use dominated by open moorland. There is a dense drainage network of small watercourses, feeding larger watercourses and large lochs. The hydrological characteristics of the Development Site have been modified for the purposes of hydropower generation since 1928. Potentially affected watercourses in terms of water resources and flood risk are discussed below.

11.2.2. Surface Waterbodies

11.2.2.1. Loch Monaidh, Allt na Glaise, Loch Garry

Loch Monaidh is a small freshwater loch located in the headwaters of Allt na Glaise, which flows eastwards into Loch Garry. Its current surface water area is 0.2 km², and it has a very small natural catchment area of 0.5 km², the majority of which lies within the footprint of the proposed headpond.

The total catchment area of Allt na Glaise at Loch Garry is 32 km², and the total catchment area of Loch Garry is 58 km², with an additional indirect catchment from Allt Dubhaig of approximately 32 km². Loch

Garry forms part of the existing Tummel-Garry hydro electric scheme described more fully in the following sections. Water is currently abstracted from Loch Garry via a tunnel to the Loch Ericht power station on the eastern shore of Loch Ericht.

The outlet of Loch Garry at its north eastern end feeds into the River Garry, which flows south eastwards and eastwards down Glen Garry where it joins the River Tummel at Loch Faskally, north of Pitlochry.

11.2.2.2. Loch Ericht

Loch Ericht is a natural loch, raised by the construction of Ericht dam at its southern end, and bounded by Dalwhinnie Dam at its northern end. The loch is narrow and is over 24 km long, orientated on a south west to north east axis. The volume stored within the reservoir is 230 million m³ with a surface area of 23.27 km² at top water level of 359.36 mOD.

The construction of the existing dams raised the natural water level by approximately 8 m to provide additional storage and head for the upper part of the Tummel-Garry Hydro Scheme, now owned and operated by Scottish and Southern Energy. An overview of the main infrastructure of the Tummel-Garry Hydro Scheme is provided in Figure 11.1 Existing Tummel-Garry Hydro Scheme Infrastructure.

Three power stations generate electricity from Loch Ericht or its indirect catchments. To the north east of Loch Ericht, the Cuaich Power Station is fed by water collected from the direct catchment of Loch Cuaich, supplemented by water transferred from Loch an-t-Seilich, Allt na Fearnna and Allt Bhran, the headwaters of the River Spey. Water is discharged into Loch Ericht by an aqueduct at its northern end near Dalwhinnie.

Loch Ericht Power Station is located on the eastern shore of Loch Ericht approximately halfway down its length. This is fed by tunnel from Loch Garry and discharges into Loch Ericht.

Rannoch Power Station is located on the northern shore of Loch Rannoch, and is fed by pipeline and tunnel from Loch Ericht itself. When the loch level exceeds the spillway level at Ericht Dam, the spillway discharges water into the River Ericht. Both the River Ericht and the tailrace of Rannoch Power Station discharge into Loch Rannoch.

The indirect catchments feeding Loch Ericht as part of the existing Tummel-Garry hydro scheme therefore involve inter-catchment transfer of water from the headwaters of the River Spey catchment and from the River Garry catchment. These indirect catchment areas amount to an area of approximately 269 km², greater than the natural catchment of Loch Ericht of 136 km² (Figure 11.2 Direct and indirect catchment areas of Loch Ericht). During flood conditions, flows from these indirect catchments will be limited by the capacity of the tunnels and aqueducts.

11.3. Methodology

The spatial extent of the studies to inform the EIA will cover the Development Site, as well as nearby watercourses which could potentially be impacted by the Development. This will include desk studies to obtain and evaluate readily available data and information and a site visit.

Further desk study will be undertaken to determine the impact on water resources and flood flows of the Development as a result of alterations to the contributing areas feeding the watercourses and waterbodies, and the variation in level of Loch Ericht as a result of operation of the Development.

11.3.1. Water Resources Assessment

The impact on water resources from the isolation of the Loch Monaidh catchment from its natural catchment will be determined by desk study to estimate the pre and post development flow duration curves at the outlet of Loch Monaidh and for the Allt na Glaise at its inflow point to Loch Garry.

To determine the impact on flooding and water resources at Loch Ericht through the generating cycle, two levels of assessment are proposed, based on the availability of data. In the first instance, a generic assessment on the likely variation in water levels in Loch Ericht and Loch Rannoch will be made, based on the pumped and generating volumes and surface area of the lochs. In the event that the outcomes are found to be significant, further modelling of the impact will be required or mitigation measures put in place to reduce the impact.

Further modelling would involve behaviour analysis of Loch Ericht requiring a long period of historic records (daily or sub-daily) comprising loch levels and details of outflows to Rannoch power station and

compensation flows to the River Ericht. Ericht dam overflow details would also be required in order to estimate flow over the spillway. In order to confirm the spatial extent of any impact, a similar record of levels in Loch Rannoch would be required, along with Kinloch Rannoch weir information. This data is not in the public domain, but is likely to be held by SSE. If made available, this would allow the historic behaviour of Loch Ericht and downstream watercourses and waterbodies to be compared with the post development scenario over the same historic period. An assessment could then be made of the impact of the Development on both water resources, flood risk, and generation at Rannoch Power Station, and development of operational rules to mitigate impact. The Applicant is seeking to enter into dialogue with SSE and other asset operators within the catchment to ascertain whether information can be obtained. In the event this data is not made available and in the absence of data in the public domain, the Applicant would liaise with statutory consultees on an alternative approach.

11.3.2. Flood Risk Assessment

A further desk study will be undertaken to determine the impact on flood flows from the Development as a result of alterations to the contributing areas feeding the watercourses and waterbodies. This will include an assessment of the flood flows both local to the Development and at potential major flood receptors. The impact on the peak flood flows will be assessed and determined whether this results in a material change to flood risk at these receptors.

In addition to natural runoff during flood events an assessment of the discharge of water through the generation cycle into Loch Ericht during a flood event will be undertaken to assess the impact on flood flows leaving Loch Ericht. In the event that the outcomes are found to be significant, further hydraulic modelling of the impact may be required or mitigation measures put in place to reduce the impact.

In the event of a breach of the embankment associated with the headpond, a significant area would be at risk of flooding. The likelihood of such an eventuality is however extremely low and the headpond will be designed, constructed, operated and managed in line with the guidance set out under the Reservoirs Act (Scotland) 2011. On the basis of the extremely high standard of protection provided by the Reservoirs Act (Scotland) 2011, no further analysis is proposed to flood risk associated with a breach of the reservoir. This in line with SEPA's position statement that the probability of failure of a reservoir structure managed under the 2011 Act is considered to be so low that it is beyond the scope of likely probabilities considered within the Scottish Planning Flood Risk Framework.

A flood risk assessment (FRA) will be included in the EIA Report. This will be supported by a detailed FRA, the scope of which will be in accordance with SEPA's Technical Flood Risk Guidance for Stakeholders (2019) and will comply with the relevant policies by PKC and THC.

The identification of impacts will be undertaken using the source-pathway-receptor model. This model identifies the potential sources or 'causes' of impact as well as the receptors that could potentially be affected. The presence of a potential impact, source and a potential receptor does not always infer an impact; there needs to be an impact pathway or 'mechanism' via which the source can have an impact on the receptor.

The significance of an effect will be assessed with reference to best practice guidance. The assessment will firstly consider how important or how sensitive the receptor is, and secondly and independently, the likely magnitude or extent of the impact on the receptor. By combining these two elements, the significance of an effect can be derived. The assessment will take account of embedded mitigation (that incorporated within the design or delivered via management plans). Where adverse effects remain, further mitigation measures will be proposed to minimise, reduce or offset them in that hierarchy.

Information regarding the current arrangement at Loch Ericht and feeding catchments will be required from SSE to undertake such studies.

11.3.3. Hydrological Assessment

An assessment of low flows from the contributing areas will be made based on current and future contributing areas. This will be undertaken for both the area local to the Development and at the main receiving water bodies. In the event that the impacts are found to be significant a further assessment will be undertaken including the impact on water levels in Loch Ericht.

An assessment on the impact of the Development on the existing downstream abstraction arrangements within the catchment will be undertaken.

11.3.4. Headpond Design

An assessment of potential flood lift within the headpond will be undertaken together with wave carry over. The findings will feed into the head pond design and the required freeboard allowance provided between top water level and top of the embankment.

11.3.5. Assessment Methods

The assessment method that will be followed is described in Chapter 3.4.1: Approach to EIA and, where necessary, further refined below.

The assessment of the significance of individual impacts on the receiving environment will be based on criteria for the sensitivity or importance of the resources as described in Tables 11.1 Sensitivity and 11.2 Magnitude of Effect.

Table 11.1: Sensitivity

Sensitivity	Flood Risk and Water Resources
Very High	The receptor has little or no ability to absorb change without fundamentally altering its present character or functionality, is of very high environmental value, or of international importance. Flood risk - essential infrastructure or highly vulnerable development (e.g. nurseries)
High	The receptor has low ability to absorb change without fundamentally altering its present character or functionality, is of high environmental value, or of national importance. Flood risk - more vulnerable development (e.g. residential properties)
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character or functionality, has some environmental value or is of regional importance. Flood risk - less vulnerable development (e.g. offices)
Low	The receptor is tolerant of change without detriment to its character or functionality, is low environmental value, or local importance. Flood risk – water compatible development (e.g. essential transport infrastructure)
Negligible	The receptor is resistant to change and is of little environmental value (e.g. flood control infrastructure)

Source: Adapted from LA113 Revision 1 (UK Highways Agencies, 2020)

Table 11.2: Magnitude of Effect

Magnitude	Definition
Major Adverse	Increase in peak flood level (> 100mm) Major impact on licenced water resource available
Moderate Adverse	Increase in peak flood level (> 50mm) Moderate impact on licenced water resource available
Minor Adverse	Increase in peak flood level (> 10mm) Minor impact on licenced water resource available
Negligible	Negligible change to peak flood level ($\leq \pm 10$ mm) No impact on licenced water resource available
Minor Beneficial	Creation of flood storage and decrease in peak flood level (> 10mm) Minor improvement in water resource available for licenced activities
Moderate beneficial	Creation of flood storage and decrease in peak flood level (> 50mm) Moderate improvement in water resource available
Major beneficial	Creation of flood storage and decrease in peak flood level (> 100mm) Major improvement in water resource available
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction

Source: Adapted from LA113 Revision 1 (UK Highways Agencies, 2020)

The significance of effects will be determined using the matrix presented in Table 3.5. Only those effects moderate or greater are considered significant.

11.4. Likely Significant Effects

11.4.1. Construction

During construction there is potential increase in flooding due to:

- Increased runoff due to increased area of hardstanding and compacted ground from site clearance, access tracks and compounds;
- Temporary water storage (in attenuation ponds and drainage systems); and
- Increased flows due to dewatering activities.

This has the potential to affect the Allt na Glaise watercourse and Loch Garry downstream, access routes and potentially PVA 02/08/02.

11.4.2. Operation

The Development will result in the isolation of the headpond area from the local catchment. This will lead to a reduction in flow in the Allt na Glaise watercourse and Loch Garry downstream. A detailed assessment of the pre and post Development contributing areas and flows will be undertaken to determine this and flow duration curves will be compared.

The discharge of water from the headpond into Loch Ericht during both normal operation and during flood events will result in a significant volume of additional water being discharged into Loch Ericht, resulting in an increase in loch level. This will have an impact on the overflow discharge at Ericht dam into the River Ericht downstream and thereafter Loch Rannoch and possibly further downstream. A further assessment is required to determine the spatial extent of that impact and the consequence of such increases.

During periods of normal flows or drought, abstraction of water from Loch Ericht to the headpond will reduce water levels in Loch Ericht. As under such conditions, there would be no flow over the spillway and flows in the downstream watercourse are entirely controlled by compensation flow release from Ericht dam, this will not impact flows in the downstream watercourse. However it will reduce levels in Loch Ericht, with potential consequences for ecology, amenity and hydro generation at Rannoch Power Station fully investigated as part of the EIA. Further study is required to assess the significance of these consequences and develop a management regime to minimise them.

During periods of extreme rainfall, runoff from any small remaining natural catchment of the headpond and direct rainfall on its surface will result in an increase in water level and potential overtopping of the embankment. An appropriately sized spill arrangement, and conveyance route to the receiving water body will be provided together with an appropriate freeboard to prevent overtopping from both still water level and wave carryover. A further review will be undertaken based on other possible scenarios such as over pumping from Loch Ericht.

In the event of a breach of the embankment associated with the headpond, a significant area would be at risk of flooding. The likelihood of such an eventuality is however extremely low and the headpond will be designed, constructed, operated and managed in line with the guidance set out under the Reservoirs Act (Scotland) 2011. On the basis of the extremely high standard of protection provided by the Reservoirs Act (Scotland) 2011, no further analysis is proposed to flood risk associated with a breach of the reservoir. This in line with SEPA's position statement that the probability of failure of a reservoir structure managed under the 2011 Act is considered to be so low that it is beyond the scope of likely probabilities considered within the Scottish Planning Flood Risk Framework.

11.4.3. Decommissioning

Decommissioning is explained in Section 2.6.5 of Chapter 2. It is assumed that the decommissioning of the Development will require similar activities to construction, potentially with additional crushing of some construction materials and removal of drainage pipework containing residual water and sediment.

The headpond will be drained by releasing water into Loch Ericht in line with normal operational parameters. The headpond is a non-impounding reservoir and therefore loss of storage will not have an impact on flood risk downstream.

11.5. Likely Mitigation Measures

11.5.1. Construction

Additional regulatory processes will apply to the development. Temporary and permanent works affecting watercourses will require a CAR Licence from SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Temporary and permanent abstractions and discharges will also require an Abstraction Licence and CAR Licence from SEPA.

New or upgraded tracks adjacent to watercourses or lochs will be designed in such a way to ensure that they do not result in an elevation of the land within the functional floodplain as well as ensuring that they have minimal impact on natural drainage patterns.

Through consultation with SEPA and other relevant stakeholders, appropriate treatment measures for construction site runoff, conditions on operational discharges, limits and conditions on abstractions will be determined.

Construction and permanent site workers may be sensitive to flood risk and use of the site may be restricted during severe weather due to severe weather to reduce this risk.

11.5.2. Operation

The need for mitigation measures to avoid, minimise and reduce potential adverse effects will be developed iteratively with the design and alongside further baseline data collection, surveys, impact assessment and consultation. This will include the appropriate siting of new infrastructure to avoid water bodies where possible, the position, depth and design of temporary and permanent inlet / outlet structures, the design of watercourse crossings, and surface water management and spill containment for new sub-stations.

In the event that the impacts to existing downstream abstraction arrangements are found to be significant operational rules will be developed to minimise impact, assuming the required level and flow records can be made available by SSE.

The headpond will be designed, constructed, operated and managed in line with the guidance set out under the Reservoirs Act (Scotland) 2011.

Permanent works affecting watercourses will require a CAR Licence from SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Permanent abstractions and discharges will also require an Abstraction Licence and CAR Licence from SEPA.

In accordance with CAR Regulations, suitable compensation flow from the headpond eastwards into Allt na Glaise will be determined to mitigate the absence of natural outflow from Loch Monaidh.

Through iterative design and the development of robust management and monitoring strategies the potential for significant increase in flood risk and impact on water resources will be avoided, minimised and reduced.

11.5.3. Decommissioning

Works affecting watercourses will require a CAR Licence from SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended). Temporary abstractions and discharges will also require an Abstraction Licence and CAR Licence from SEPA.

Decommissioning of the headpond will comply with the Reservoirs (Scotland) Act 2011 to ensure mitigation of any temporary impacts.

11.6. Summary and Conclusions

The Development has the potential to have direct and indirect effects during both the construction and operation phase on the hydrology of a number of different water bodies including small and large lochs, and watercourses. In particular, the lochs in the study area are important for a range of attributes including nature conservation and hydroelectricity generation. The Development also sits within the upper catchment that feeds into identified Potentially Vulnerable Areas from a flood risk perspective.

A water quality and water resource impact assessment will be included in the EIA Report. This will be supported by an FRA and hydrological assessment.

11.7. References

EU Directive 2000/60/EC (Water Framework Directive (WFD), transposed into the Water Environment and Water Services Act (Scotland) 2003 ('the WEWS Act').

Flood Risk Management (Scotland) Act 2009 and the Flood Risk Management (Flood Protection Schemes, Potentially Vulnerable Areas and Local Plan Districts) (Scotland) Regulations 2010 ('the Flood Risk Management Act').

Scottish Executive (2011). Reservoirs (Scotland) Act 2011.

Scottish Executive (2011). The Water Environment (Controlled Activities) (Scotland) Regulations 2011.

Scottish Environment Protection Agency (2009). *Interim Position Statement on Planning and Flooding*.

Scottish Environment Protection Agency (2018). *Flood Risk and Land Use Vulnerability Guidance*.

Scottish Environment Protection Agency. (2019). *Technical Flood Risk Guidance for Stakeholders*.

12. Archaeology and Cultural Heritage

12.1. Introduction

Cultural heritage in this context means the above- and below-ground archaeological resource, built heritage, the historic landscape, and any other elements which may contribute to the historical and cultural heritage of the area. The aim of this section is to:

- Describe the cultural heritage assets within the study area;
- Identify the potential cultural heritage issues that may arise as a result of the Development; and
- Outline the methods and assessment to be undertaken for inclusion within the EIAR.

This chapter is supported by the following Figures:

- Figure 12.1 Designated Heritage Assets, and Non-Designated Assets recorded on Canmore within 3 km
- Figure 12.2 Designated Heritage Assets, and Non-Designated Assets Recorded on Canmore within 1 km

12.1.1. Guidance

Legislation and planning documents and guidance of relevance to this assessment include the following:

- Historic Environment Scotland Act 2014;
- Ancient Monuments and Archaeological Areas Act 1979;
- Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997;
- National Planning Framework 3 (NPF), 2014;
- Scottish Planning Policy (SPP) 2020;
- Historic Environment Policy for Scotland (HEPS) 2019;
- Historic Environment Circular 2019;
- Planning Advice Note 2/2011: Planning and Archaeology;
- Planning Advice Note 71: Conservation Area Management 2004;
- Perth and Kinross Local Development Plan 2, 2019; and
- Highland Wide Local Development Plan, 2012.

12.2. Baseline Conditions

12.2.1. Consultation

Early consultation has been undertaken with Historic Environment Scotland (HES), who provided comments on the scheme by email on the 2nd February 2021. In the response, they noted that

“We can confirm that there are no heritage assets within our statutory remit within the development site boundary or within its vicinity. On that basis, we would be content for heritage assets within our statutory remit to be scoped out of the assessment.”

Further consultation was undertaken by email on the 18th February 2021 to confirm which heritage assets fall within the HES statutory remit. In response, HES noted:

“HES is also a statutory consultee in the planning process and provides advice and comment in relation to the following:

- a. Scheduled monuments and their setting;*
- b. Category A listed buildings and their setting;*
- c. Inventory gardens and designed landscapes;*
- d. Inventory battlefields;*

e. World Heritage Sites; and

f. development of land which is situated within 800 metres from any Royal Palace or Park, and might affect the amenities of that Palace or Park 15.”

As a result, designated assets, with the exception of Category B and C listed buildings, will not be considered as part of the EIAR, except insofar as they offer contextual information on the history and archaeology of the Development Site's landscape context and the resultant archaeological potential of the Development Site. This has been incorporated into the methodology section 12.3 Methodology below.

12.2.2. Baseline Information

As part of this scoping exercise, a high-level search has been undertaken with material collected from online sources for sites within the Development Site boundary. These included:

- PastMap (www.pastmap.org.uk); and
- Historic Environment Scotland website (www.historicenvironment.scot); and
- Other readily available online sources.

A search of non-designated assets within 1 km of the red line boundary has been undertaken via the Canmore database to provide some background to the cultural heritage of the region. A wider study area of 3 km has been considered for designated assets as the extended study area would usually be considered for potential setting impacts on a scheme of this nature. The Development site boundary, as well as assets recorded within the study area are shown on Figures 12.1 Designated Heritage Assets within 10 km and 12.2 Designated Heritage Assets within 1 km Catchments.

Designated Assets

There are no designated assets within the Development site boundary. There are five listed buildings within 1 km of the red line boundary and a further six listed buildings within 3 km of the site boundary. The assets within 1 km include two Category B listed buildings linked to the Dalwhinnie Distillery near the northern end of the north access (LB6898), and three listed buildings at the south end of the southern access route. These latter sites include the Category A listed power house (LB51716) and the Category B listed valve house (LB51717) linked to the Grampian Hydro Scheme at Rannoch, and Eilean Nam Faoileag a Category B listed tower on an island in Loch Rannoch (LB12241).

The listed buildings within 3 km of the red line boundary are generally located around the shore of Loch Rannoch at the southern end of the red line boundary, together with a single listed building (a bridge on General Wades military road) to the north of the red line boundary.

There are no scheduled monuments, landscapes recorded on the Inventory of Gardens and Designated Landscapes, or battlefields on the Inventory of Historic Battlefields within the 3 km study area.

Non-Designated Assets

A formal search of the Perthshire Historic Environment Record, and the Highlands Council Historic Environment Record was not undertaken as part of the scoping exercise, with information on non-designated assets limited to the Canmore data downloaded from the HES website.

Evidence for activity has been recorded within the red line boundary from the prehistoric period onwards, with some of the earliest activity represented by prehistoric flint tools recovered from the edge of Loch Ericht (Canmore 24300). Remains of a possible hillfort tentatively dated to the later prehistoric period have also been identified near the access track to Loch Rannoch near Tom Buidhe/Tom an Stoil (Canmore 79525) immediately adjacent to the red line boundary.

Although prehistoric evidence seems relatively limited within the 1 km study area, more extensive remains have been recorded in the wider landscape, and specifically the corridor of the A9 to the east, including prehistoric burial remains within the 3 km study area on the opposite bank of the loch (Canmore 24299). This variation in the visibility of prehistoric assets could be a result of the limited archaeological surveys that have been undertaken within the Site Boundary and its associated 1 km study area, as it seems likely that Loch Ericht and the valley in which it is located, would have been used as a communications link for people passing through the landscape from the prehistoric period onwards.

No non-designated assets dating to the medieval period have been recorded within the red line boundary, or the 1 km study area. However, the site of the Battle of Allt Coir'Erra Dheargan is recorded as having taken place just outside of the western end of the 1 km study area in the 14th century.

There is extensive evidence for activity during the post-medieval period with a number of sites recorded within the red line boundary, as well as the 1 km study area. The vast majority of these are linked to transhumance, or the seasonal movement of livestock to the uplands to exploit summer grazing, with shielings recorded near the headpond (Canmore 131753), as well as near the spillway pipe and low-pressure tunnel (Canmore 131755). Further shielings have also been recorded along the access track to Rannoch (Canmore 131749-131750), as well as in the north eastern limits of the red line boundary near the proposed access track to Dalwhinnie (Canmore 117357), while a farmstead is recorded near the southern end of the red line boundary (Canmore 161317). The track that will provide the main access from Loch Rannoch is also thought to date to the post-medieval period (Canmore 357550), as is Corrvorkie Lodge located on the shore of Loch Ericht near Construction Compound 2 (Canmore 163416).

Similar remains linked to agriculture, and specifically transhumance, have been recorded in the 1 km study area including a number of shielings grounds (Canmore 357549, 24297 & 131737). Farmsteads and enclosures have also been recorded (Canmore 117355, 117356, 131736), as well as the abandoned township of Allt nan Tonnagan (Canmore 131745 & 131746). The larger, and more formal, Ben Alder Lodge lies immediately outside of the red line boundary on the western side of Loch Ericht (Canmore 109661) and represents one of a number of buildings on the Ben Alder Estate (Canmore 111796).

Dalwhinnie, the main settlement within 1 km of the red line boundary increased in size and importance during the post-medieval period, as it was a major staging post for drovers moving livestock (Smith 2001, 240). By the 18th century, mapping of the area depicts a road providing access along the north western bank of Loch Ericht (see Roy survey of 1747-55), although it is possible that this track was much older. A number of late 18th and early 19th century cartographic sources also record the slopes of Carn Dearg, located within the 1 km study area to the south west of the headpond, as the site of 'Cluny's Cage' (see Stobie survey 1783). The 'cage' was a structure used to hide Ewen MacPherson of Cluny, head of Clan MacPherson, after the Battle of Culloden, and was also used by Prince Charles Stuart, with surveys (including Stobie) noting 'Place Where C.S. hid himself Dunich-More'.

The 19th and 20th century are also well represented with a number of non-designated assets recorded. These are largely linked to the regions infrastructure and include features associated with the existing hydro schemes in the area and include dams at either end of Loch Ericht (Canmore 311739 and 288878) as well as a surge tank (Canmore 311742), and a tunnel (Canmore 311738).

At least two assets have also been recorded within Loch Ericht. The first is a marine craft, possibly a motor launch, of uncertain date but thought to be from the first half of the 20th century (Canmore 328285). The second is the site of a farmstead which was lost to the loch when the height of the water was increased (Canmore 117339).

12.3. Methodology

12.3.1. Study Area and Sources

A study area of 1 km from the Development site boundary will be used to provide detailed baseline information for the assessment. A wider study area will be used to identify assets which may have their setting affected. The study area for the assessment of setting will be limited to 3 km due to the nature of the development (the headpond will be the main above ground infrastructure visible in the wider landscape). The setting assessment will be limited to assets which fall within the Zone of Theoretical Visibility (ZTV). Some assets beyond this distance may also be considered where elements of their setting extend closer to the Development.

As noted in section 12.2.1 Consultation above, early consultation has been undertaken with Historic Environment Scotland (HES). They have stated that they have reviewed the scheme and feel that designated assets that fall within their statutory remit can be scoped out of the assessment (email dated 2nd February 2021). As a result, potential impacts on designated assets, with the exception of Category B and C listed buildings, will be scoped out of the Impact Assessment, and the impacts assessment will be limited to Category B and C listed buildings and non-designated assets.

Desk-based research will be undertaken as part of the EIA. Additional information will be gathered from the following sources

- Perthshire Historic Environment Record (HER);
- The Highlands and Islands HER;
- Perthshire Archives, Perth;
- Local History Libraries;
- PastMap website and database (www.pastmap.co.uk) for the National Monuments Record, Scheduled Monuments, listed buildings, Inventory of Designed Landscapes and Registered Battlefields;
- Historic Environment Scotland;
- National Library of Scotland for plans and maps of the study area and its environs;
- Aerial photographs available from Historic Environment Scotland;
- Geotechnical data and other assessments as appropriate and available; and
- An archaeological walkover survey to assess known sites and to determine the potential for previously unrecorded heritage sites. This will not be an exhaustive survey of the entirety of the site boundary and will focus on the headpond area, the spillways/waterways, access roads and other infrastructure.

Information collected from these sources will be used to describe the known archaeology and built heritage of the 1 km study area, and to assess the setting of heritage assets up to 3km from the site boundary. The results of the desk-based research and the layout design will be discussed with Perth and Kinross and the Highlands Council Historic Environment Teams to agree any requirement for additional field evaluation, such as geophysical survey or evaluation excavation, prior to determination.

12.3.2. Methodology for Determining Effects

The significance (heritage value) of a heritage asset is determined by professional judgement, guided but not limited to any designated status the asset may hold. The value of an asset is also judged upon a number of different factors including the special characteristics the assets might hold which can include evidential, historical, aesthetic, communal, archaeological, artistic and architectural values. This value of a heritage asset is assessed primarily in accordance with the guidance set out in Scottish Planning Policy (SPP, 2020) and the Historic Environment Policy Statement (HEPS 2019). The significance of a place is defined by the sum of its heritage values. Taking these criteria into account, each identified heritage asset can be assigned a level of significance (heritage value) in accordance with a three-point scale as set in Table 12.1 Criteria for Determining the Significance (Heritage Value) of Heritage Assets.

Table 12.2: Criteria for Determining the Significance (Heritage Value) of Heritage Assets

Significance (Heritage Value)	Criteria
High	Assets of inscribed international importance, such as World Heritage Sites, Category A and B listed buildings, Landscapes on the Inventory of Gardens and Designed Landscapes, Inventory of Historic Battlefields, Scheduled monuments, Non-designated archaeological assets of schedulable quality and importance.
Medium	Category C listed buildings, Conservation Areas, Locally listed buildings included within a conservation area Non-designated heritage assets of a regional resource value.
Low	Non-designated heritage assets of a local resource value as identified through consultation, Locally listed buildings Non-designated heritage assets whose heritage values are compromised by poor preservation or damaged so that too little remains to justify inclusion into a higher grade

Having identified the significance of the heritage asset, the next stage in the assessment is to identify the level and degree of impact to an asset arising from the development. Impacts may arise during

construction or operation and can be temporary or permanent. Impacts can occur to the physical fabric of the asset or affect its setting.

When professional judgement is considered, some sites may not fit into the specified category in this table. Each heritage asset is assessed on an individual basis and takes into account regional variations and individual qualities of sites.

The level and degree of impact (impact rating) is assigned with reference to a four-point scale as set out in Table 12.2 Criteria for Determining the Magnitude of Impact on Heritage Assets. In respect of cultural heritage an assessment of the level and degree of impact is made in consideration of any scheme design mitigation (embedded mitigation).

Table 12.2: Criteria for Determining the Magnitude of Impact on Heritage Assets

Magnitude of Impact	Description of Impact
High	Change such that the significance of the asset is totally altered or destroyed. Comprehensive change to setting affecting significance, resulting in a serious loss in our ability to understand and appreciate the asset.
Medium	Change such that the significance of the asset is affected. Noticeably different change to setting affecting significance, resulting in erosion in our ability to understand and appreciate the asset.
Low	Change such that the significance of the asset is slightly affected. Slight change to setting affecting significance resulting in a change in our ability to understand and appreciate the asset.
Negligible	Changes to the asset that hardly affect significance. Minimal change to the setting of an asset that have little effect on significance resulting in no real change in our ability to understand and appreciate the asset.

An assessment of the level of significant effect, having taken into consideration any embedded mitigation, is determined by cross-referencing between the significance (heritage value) of the asset (Table 12.1: Criteria for Determining the Significance (Heritage Value) of Heritage Assets) and the magnitude of impact (Table 12.2: Criteria for Determining the Magnitude of Impact on Heritage Assets). The resultant level of significant effect (Table 12.3: Criteria for Determining the Significance of Effect) can be negligible, adverse or beneficial.

Table 12.3: Criteria for Determining the Significance of Effect

Significance (Heritage Value)	Magnitude of Impact			
	High	Medium	Low	Negligible
High	Major	Major	Moderate	Minor
Medium	Major	Moderate	Minor	Minor
Low	Moderate	Minor	Minor	Negligible

Effects of major or moderate significance are considered to be significant.

An assessment of the predicted significance of effect is made both prior to the implementation of mitigation and after the implementation of mitigation to identify residual effects. This first highlights where mitigation may be appropriate and then demonstrates the effectiveness of mitigation and provides the framework for the assessment of significance which takes mitigation measures into consideration.

All archaeological work will be undertaken in line with guidance published by the Chartered Institute for Archaeologists (2017 & 2019). The setting assessment should follow the *Historic Environment Scotland Guidance on Managing Change in the Historic Environment: Setting (2020)*.

12.4. Likely Significant Effects

12.4.1. Construction

There are no designated assets recorded within the site boundary, with only a limited number of listed buildings within the 3 km study area considered for impacts on setting. However, none of the listed buildings fall within the current ZTV (Figure 5.3 Zone of Theoretical Visibility (Development Headpond and Tailpond)) for the headpond which represents the main element of above ground infrastructure. As a result, there are no predicted significant effects on designated assets. This has been confirmed through early consultation with HES (see Section 12.2.1 Consultation).

There is the potential for significant effects on a number of non-designated assets within the proposed site boundary. Known assets are largely linked to post-medieval agriculture, specifically transhumance, and the lack of detailed surveys in the study area as well as the presence of non-designated assets within the 1 km study area further suggests that previously unrecorded remains may survive within the red line boundary.

There is also the potential for previously unrecorded assets to survive within Loch Ericht, including structures submerged as a result of the increase in the height of the loch, as well as earlier settlement remains such as crannogs. As noted within Chapter 2 Project Description, Section 2.6.4.5 Operational Water Discharge and Abstraction, the Development has the potential to temporarily reduce the water level of the loch by up to 1 m during a single 24 hour cycle, it is possible that previously waterlogged remains will be exposed and damaged/destroyed as a result of the Development.

12.4.2. Operation

Impacts during the operational phase will be limited to impacts on the setting of heritage assets. There are no designated assets within 3 km of the red line boundary falling within the current ZTV, and as a result there are no significant impacts predicted on designated assets during the operational phase.

There is the potential for impacts on the setting of non-designated assets during the operational phase, although these are not thought to be significant at this stage/based on the current design and ZTV.

As a result, no significant impacts on the setting of designated or non-designated assets are predicted, and all impacts are assumed to be physical impacts during the construction phase.

12.4.3. Decommissioning

Decommissioning of large-scale pumped storage hydro projects is extremely rare due to the long operational lifespan of the facility. Potential decommissioning effects are therefore considered to be similar to, and associated with the components described in the operational project phase and as such will not be considered as an assessment phase of the Development.

12.5. Likely Mitigation Measures

A preliminary review of known heritage assets has been undertaken to inform the Development design proposed at Scoping Stage, and all designated assets in the area will be avoided. As the design develops, additional mitigation measures could include further design intervention to avoid physical impacts on known heritage assets. If it is not possible to avoid non-designated heritage assets, mitigation will include (but not be limited to) detailed landscape/topographic survey, archaeological excavation of features being removed and archaeological monitoring/watching brief.

12.6. Summary and Conclusions

This Scoping Report was undertaken using data available from online resources. A number of non-designated assets have been recorded within, and immediately adjacent, to the red line boundary, and within the 1 km study area around the site.

The limited number of designated assets within the 1 km study area, as well as the nature of the Development, would suggest that there will not be significant impacts on designated assets. Furthermore, HES have noted in early correspondence that impacts on designated assets can be scoped out of the impact assessment.

Non-designated heritage assets have been recorded within the red line boundary, and as a result there is the potential for physical impacts on non-designated assets during the construction phase. There is

also the potential for setting impacts on non-designated assets during the operational phase, although these are not considered to be significant.

As a result, an archaeology and cultural heritage chapter will be completed as part of the EIAR. This will focus on assessing impacts to non-designated assets either through physical impacts from the Development, or through change to their settings. Effects to designated heritage assets will be scoped out of the EIAR.

12.7. References

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ClfA (2017) Standard and Guidance for Historic Environment desk-based Assessment Reading.

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Historic Environment Scotland (2016b) Historic Environment Policy Statement.

Historic Environment Scotland (2019a) Historic Environment Policy for Scotland (HEPS).

Historic Environment Scotland (2019b) Historic Environment Circular.

Historic Environment Scotland (2020) Guidance on Managing Change in the Historic Environment: Setting.

Perth and Kinross Council (2019) Perth and Kinross Local Development Plan 2.

Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997

Scottish Government (2004) Planning Advice Note 71: Conservation Area Management.

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Scottish Government (2020) Scottish Planning Policy (SPP).

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13. Access, Traffic and Transport

13.1. Introduction

This chapter considers the anticipated access, traffic and transport impacts resulting from the construction of the Development. Hazardous loads have been scoped out of the assessment as no hazardous substances will be transported to the site. Operational and Decommissioning phases are proposed to be scoped out of further assessment as an assessment of construction traffic is more robust.

Access, traffic and transport analysis will be informed by a site visit, video surveys of proposed access routes, traffic count data and desktop assessment.

This chapter is supported by the following Figures:

- Figure 13.1 Transport Study Area: General Construction Traffic Access Route
- Figure 13.2 Transport Study Area: Abnormal and Indivisible Loads Delivery Route from Port of Corpach

13.1.1. Guidance

There is no published guidance on the assessment of traffic impacts associated with temporary construction activities. However, the methodology detailed in the Chartered Institution of Highways and Transportation's (IHT) 'Guidelines for Traffic Impact Assessments' (IHT, 1994), recommends that the environmental impact of the traffic generated by a proposed development should be assessed taking cognisance of the Institute of Environmental Assessment (IEA) 'Guidelines for the Environmental Assessment of Road Traffic, 1993' (IEA, 1993). Moving forward, the assessment methods that would be employed in the Access, Traffic and Transport Chapter of an emerging EIA will conform with those set out in the IEA Guidelines⁷ and focuses on:

- The potential impacts of construction traffic on the existing transport network and all users of this network; and
- The potential impacts on residents and occupiers of land uses fronting or accessed from the road network proposed to accommodate construction traffic.

This chapter has also been prepared with cognisance of the Design Manual for Roads and Bridges (DMRB) LA 103 (DMRB, 2020[1]) 'Scoping Projects for Environmental Assessment' with a view to the EIA Report Traffic and Transport Chapter following guidance set out in DMRB LA 104 'Environmental Assessment and Monitoring' (DMRB, 2020 [2]).

Reference has also been made to the Scottish Government's, 'Transport Assessment Guidance (TAG) 2012,' (Transport Scotland, 2012) which outlines the necessary considerations in the preparation of a Transport Assessment. It is considered at this stage that a formal Transport Assessment would not be applicable to the development proposal and that this should be scoped out with traffic impact covered within the EIA.

13.2. Baseline Conditions

13.2.1. Transport Network

Road access to the Development for construction vehicles and staff is possible via a network of Trunk, A Class and B Class Roads (The Transport Study Network). Currently it is anticipated that general construction traffic would access the site via the A9 Trunk Road (T), before joining the B8019 at Pitlochry and travelling westbound, connecting to the B846 at Tummel Bridge. A private Site access road would then be provided connecting to the B846 close to the Bridge of Erich.

Larger construction components and machinery (AILs identified within Section 2.6.2.2 Construction Vehicles, Plant and Equipment) would enter the road network from the Port of Corpach, subject to further consultation with the port operators. The delivery route for these components, which would be classed as Abnormal and Indivisible Loads (AILs), would originate at the Port of Corpach where it would

⁷ Now known as IEMA

join the A830 (T) eastbound, before joining the A82 (T) at the Lochybridge Roundabout. The route would then follow the A82 (T) northbound for approximately 12.0 km before joining the A86 (T) and subsequently the A889 (T) south of Laggan. An access for AIL deliveries is proposed from the A889 (T) north of Dalwhinnie. From this location AILs (only) would be transported through private land and finally barged over Loch Ericht to site.

The below details provide additional details on the Transport Study Network which has been established based on roads which may be impacted by traffic associated with construction:

- The A9 (T) between Pitlochry and Dalwhinnie is a 2-way single carriageway route. The route is maintained by Transport Scotland and their Operating Companies and makes up part of the A9 (T) Dualling programme currently underway. The A9 (T) within the Transport Study Network operates at National Speed Limit. No pedestrian or cycle facilities are provided on the A9 (T) in proximity to the site
- The A889 (T), A86 (T), A82 (T) and A830 (T) are all 2-way single carriageway routes subject to National Speed Limit for the majority of the proposed AIL delivery route; These roads are all operated and maintained by Transport Scotland and their operating companies.
- The B8019 joins the A9 (T) at its eastern extent and travels initially northbound before turning westbound where it crosses the River Tummel. The B8019 is approximately 19.5 km in length with the entire route included within the Transport Study Network. The B8019 is a 2-way single carriageway route with some sections less than 5 m wide and unable to accommodate two passing vehicles although passing places or road widenings are provided at regular intervals (approximately every 100 m). The B8019 connects to the B846 at the settlement of Tummel Bridge and is subject to National Speed Limit for the majority of its length other than when the road passes through small settlements such as Tummel Bridge where the speed limit reduces to 30 mph.
- The B846 originates at its southern extent in Aberfeldy before travelling north and connecting to the B8019 at Tummel Bridge. At this point the route continues westbound for approximately 37.8 km to Rannoch Railway Station. The B846 is a 2-way single carriageway route although some sections are not sufficiently wide to accommodate passing vehicles (<5 m). Passing places are provided approximately every 100 m and the B846 is subject to National Speed Limit for the majority of its length, other than when passing through small settlements.

Alternative Ports of Entry (PoE) including at Inverness Harbour, the Port of Cromarty Firth (Invergordon), Nigg Port and the Port of Rosyth have been considered at an early stage of the project as alternative origin points for AIL delivery and transport. At this stage the Port of Corpach has been identified as the preferred PoE due to constraints identified on routes to Site from other locations considered.

Other transport networks, namely walking and cycling routes, have the potential to be impacted by the Development. There is a network of paths which traverse in proximity to the proposed Transport Study Network, some of which form part of much longer distance recreational routes. These include:

- National Cycle Route (NCN) 78 The Caledonia Way at Banavie which crosses the A830 (T); and
- NCN 7 which runs alongside the A889 (T) and A9 (T) in proximity to Dalwhinnie. Construction traffic using the B8019 would also interact the NCN 7 when joining from the A9 (T).

There are also multiple informal walking routes in proximity to the Site within Transport Study Network which could be impacted by the Development. These are located along the B8019 and B846 and aimed towards leisure and recreational uses.

Furthermore, the general construction traffic route proposed crosses the Highland Main Line Railway Line at the River Garry Bridge on the B8019. Other small bridges and culverts are present along the length of the B8019 and B846 which cross multiple small streams and burns.

13.2.2. Sources of Construction Materials for Import

As much suitable material as possible used for the construction of the Development will arise from materials extracted on-site. The determination of the actual quantity of suitable material will be subject to a detailed site investigation. Any shortfall in suitable material will have to be compensated by import from external sources, but specifically quarries in the general location of the Development.

At the start of the construction phase, it will also be necessary to import materials in order to facilitate the construction of the initial internal access tracks that will be a combination of upgrading existing tracks and construction of new ones.

A desktop exercise has been undertaken to identify quarries where aggregates and materials for the concrete batching plant may be sourced. Table 13.1: Potential Location of Quarried Material Suppliers provides a summary of potential suppliers, including their address and the route required to access the Development although it should be noted that other sources may be available and that further investigations will continue. Therefore, the list in the below table should be seen as indicative at present.

Table 13.1: Potential Location of Quarried Material Suppliers

Supplier Name	Address	Proximity	Routing	Concrete	Aggregates
Breedon Shierglass Quarry	Killiecrankie, Pitlochry, PH16 5LL	56 km	A9 (T), B8019, B46	Yes	Yes
Leiths Scotland Ltd	Dornie Quarry, Fort William PH33 6SQ	134 km	A86 (T), A889 (T), A9 (T), B8019, B846	No	Yes
Mills Quarry Stockpile	A984, Dunkeld, PH8 OJH	85 km	A984, A9 (T), B8019, B846	No	Yes

13.3. Methodology

13.3.1. Baseline

Existing traffic data will be gathered and reviewed, in the first instance, to establish travel movements in and across the Transport Study Network, it is anticipated that this data may be provided from Transport Scotland, Perth and Kinross Council (PKC) and The Highland Council (THC) and via other sources such as previously submitted planning applications. Accident data on the Transport Study Network would also be reviewed and the relevant road authorities would be consulted with regards to bridges and structures. Sustrans and Network Rail would also be consulted with regards to cycle and rail infrastructure.

To establish a baseline it will be necessary to obtain traffic flow data from available sources. These sources would typically be Transport Scotland (for Trunk Roads), Local Authority (Local Roads: Principal – Tertiary) or by traffic data collection means. At the time of preparing this Scoping Report, COVID -19 lockdown restrictions are in place. Restrictions placed on travel during this period has resulted in a general reduction in road traffic. As such, traffic data collected through surveys would not be considered representative of 'normal travel behaviours' for as long as COVID-19 Lockdown Restrictions are in place. Instead traffic data would be sought from the sources listed above; namely the relevant Roads Authority, or alternatively from the Department for Transport (DfT) who also hold a library of traffic count data. Should COVID-19 restrictions allow, the collection of new traffic data could be arranged. It is anticipated that traffic surveys would have to be conducted on the B8019 and B846. Given the existing land uses along each route it is unlikely that COVID-19 travel restrictions would have a high impact in terms of traffic levels on these routes.

This data collection will confirm the existing traffic levels including light goods vehicles and heavy goods vehicles using the Construction traffic route on the A9(T), B8019 and B846. It is not proposed to assess the traffic impact of AIL movements on the wider Study Network from Corpach Port to site in terms of daily traffic volume. By combining these baseline traffic flows with the forecast levels of construction traffic it will be possible to predict the likely significant effects along the potential access routes resulting from the Development.

It is anticipated that the imported material associated with the enabling works of the construction phase, along with other plant, equipment and welfare facilities will be transported to the Development site by road via the outlined construction traffic route. Other materials may be generated onsite such as the establishment of a concrete batching plant(s), although it is recognised that construction material outwith the main source of rock excavated from the Development will be required and that this will be transported to the Development site via the Study Network. Given the location of the nearest quarries to the Development, it is anticipated that this would principally be via the A9(T), B8019 and then B846.

Thereafter, the vehicles would leave the public road network and continue their route on a network of internal access tracks to be constructed as part of the Development.

At present it has not been confirmed the method that will be used for the tunnelling works associated with the head and tail races. This may involve the use of a TBM with the likely method of transportation also being by road as an escorted Abnormal Indivisible Load (AIL). Other potential AILs could be the substation, power generating equipment and mechanical screens for the inlets and outlets.

13.3.2. Traffic Data and Growth

Traditionally, the future design year traffic flows could be forecast utilising the Department for Environment, Transport and the Regions (DETR) publication, "National Road Traffic Forecasts (Great Britain)," (NRTF) (DETR, 1997) 'low' growth assumptions. However, in light of COVID-19 travel restrictions and its impact on travel behaviours a Scenario based assessment could be undertaken subject to agreement with stakeholders.

Discussions would be held with Transport Scotland, PKC, and THC to identify any cumulative development and their associated traffic flows which would require to be considered within the Transport Study Network.

13.3.3. Impact Assessment

Sensitive Receptors

Receptors are locations or land uses categorised by their degree of sensitivity (or Environmental Value) with guidance provided in DMRB LA 104.

Table 13.2 Sensitivity of Receptors provides guidance used in this assessment to quantify the sensitivity of the receptors to the effect of the predicted traffic associated with the Development. The description for receptors in traffic terms differs slightly from those provided in Chapter 3: Scope of Environmental Impact Assessment.

Table 13.2 Sensitivity of Receptors

Sensitivity	Receptor Description
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution
Medium	Medium or high importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale

Source: DMRB, LA 104

Magnitude of Change

In terms of magnitude of effect (or magnitude of change), the IEA Guidelines point to changes (increases) in traffic in excess of 30%, 60% and 90% as being representative of 'Slight', 'Moderate' and 'Substantial' impacts respectively. The categories shown in Table 13.3: Magnitude of Change reflect IEA Guidelines and have been used in this assessment to quantify the magnitude of effect of the predicted traffic associated with the Development.

Table 13.3: Magnitude of Change

Magnitude	Description
Substantial	Considerable deterioration/improvement in local conditions or circumstances (+90% increase in traffic)
Moderate	Readily apparent change in conditions or circumstances (60 – 90% increase in traffic)
Slight	Perceptible change in conditions or circumstances (30 – 60% increase in traffic)

Magnitude	Description
Negligible	Very small change in conditions or circumstances (10 – 30% increase in traffic)

Source: IEA Guidelines 1993

Defining Significance

Criteria are applied to the percentage increases to establish whether significant environmental effects are likely. These criteria take into account the sensitivity of the receptors or the resources likely to be affected and any changes in the composition of traffic, specifically if more Heavy Goods Vehicles (HGVs) are anticipated. The criteria are a 30% or more increase in total movements or of HGVs, or a 10% increase where sensitive locations are present such as schools.

The significance of each impact is considered against the criteria within the IEA guidelines, where possible. However, the IEA guidelines state that:

“For many effects there are no simple rules or formulae which define the thresholds of significance and there is, therefore, a need for interpretation and judgement on the part of the assessor, backed-up by data or quantified information wherever possible. Such judgements will include the assessment of the numbers of people experiencing a change in environmental impact as well as the assessment of the damage to various natural resources.”

The assessment of the significance of the effect of traffic changes along the identified Transport Study Network as a result of the Development should have regard to both the magnitude of the traffic increase (change) and the receptor’s environmental value (sensitivity). The level of significance can be determined from the matrix in Table 13.4: Approach to Assessment of Effects (based upon the guidance given in DMRB LA 104).

Table 13.4: Approach to Assessment of Effects

Magnitude Change	of Sensitivity or value of resource / receptor				
	Very High	High	Medium	Low	Negligible
Substantial	Major	Major	Moderate	Moderate	Minor
Moderate	Major	Moderate	Moderate	Minor	Negligible
Slight	Moderate	Moderate	Minor	Negligible	Negligible
Negligible	Minor	Minor	Negligible	Negligible	Negligible

Source: DMRB, LA 104

The significance of the effects on receptors will therefore be evaluated against the IEA Guidelines and, where possible, in line with the criteria used for the other environmental topic areas covered in the EIA Report. These criteria are subjective but take into account the numbers of receptors affected, their sensitivity and the length of the period for which they will be impacted. Mitigation, where appropriate, will be identified and incorporated into the construction planning and design of the Development.

In accordance with the IEA Guidelines and DMRB LA 104, the methodology used will be based on a comparison between predicted construction traffic flows and the baseline / projected scenario, in percentage terms

13.4. Likely Significant Effects

13.4.1. Construction

The potential effects listed in the IEA Guidelines are listed below which will be assessed across the Transport Study Network:

- Noise and vibration (this is considered in Chapter 14 Noise and Vibration of the Scoping Report);
- Visual impact (this is considered in Chapter 5 Landscape and Visual Assessment of the Scoping Report);
- Severance (for motorists, cyclists or pedestrians);
- Increased journey times for non-construction traffic;

- Pedestrian delay, intimidation, loss of amenity;
- Road accidents and safety;
- Dust and dirt;
- Ecological impact (this is considered in Chapters 6 Terrestrial Ecology and 7 Aquatic Ecology of the Scoping Report); and
- Heritage and conservation areas (this is considered in Chapter 12 Archaeology and Cultural Heritage of the Scoping Report).

13.5. Likely Mitigation Measures

A Framework for a Construction Traffic Management Plan (CTMP) would be provided as part of the EIA. A formal CTMP would then require to be developed in consultation with PKC, THC, Transport Scotland (as necessary), Police Scotland, and other stakeholders should consent be granted. Likely headings to be included in a CTMP would include, but is not limited to, the following:

- The agreed route for construction traffic including any AILs (proposed routes have been outlined in this Chapter)
 - An Abnormal Loads Impact Assessment would be included as part of the assessment. This would include horizontal Swept Path Analysis and mitigation measures, if required, for any identified pinch points on the AIL delivery route. The Assessment will also consider escort arrangements and relevant signage;
- The necessary agreements and timing restrictions for construction traffic, for example Monday – Friday working only, prohibition during school drop-off and pick-up times, and prohibition during loading times at commercial premises;
- Details of a proposed Condition Survey on access routes;
- Proposals for maintenance of the agreed routes for the duration of the construction phase;
- Proposals for monitoring and agreeing maintenance costs
- The mechanism for managing and monitoring the CTMP; manage all aspects of the plan;
- Route signage;
- Maintaining access to commercial / business premises. For example temporary accommodation works and additional information signage;
- Details of the advanced notification to the general public warning of any construction transport movements, specifically abnormal loads;
- Preparation of a Green Travel Plan for staff;
- Details of information road signage warning road users of construction traffic movements;
- Arrangements for regular road maintenance and cleaning, e.g. road sweeping in the vicinity of the site access point as necessary, wheel cleaning / dirt control arrangements;
- Contractor speed limits; and
- Community and emergency services liaison details.

In addition to the preparation of a CTMP, other mitigation measures to reduce the traffic impact of the Development construction would also be considered subject to further investigation and landowner agreements. These include:

- The use of Park & Share facilities for construction staff;
- The promotion of electric vehicles for Park & Stride and general car / van access;
- An option to deliver construction materials to site by rail is also being explored, subject to further investigation. Specific consultation with Network Rail would be undertaken should this method be pursued.

13.6. Summary and Conclusions

The proposed Transport Study Network at this scoping stage cover an extensive network of roads, cycle paths and footpaths providing potential access routes to the Development site for construction traffic and AIL delivery. The road network impacted includes A9 (T), A830 (T), A82 (T), A86 (T), A889 (T), B8019 and B846. The assessment would also cover the walking, cycling and rail impacts of the Development.

The assessment will provide details of the proposed access route from the principal road network, the point(s) of access to the Development site and an indication of the likely number of vehicle movements and traffic management plans required during the process.

It is proposed that the EIA Report will assess the potential effects on roads due to construction traffic only. There are very few operational traffic movements, so it is proposed to scope out the effects of operational traffic movements. The decommissioning phase has been scoped out as an assessment of the construction phase is more robust.

13.7. References

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DMRB. (2020 [2]). LA 104 Environmental Assessment and Monitoring [Online]. Available: <https://www.standardsforhighways.co.uk/prod/attachments/0f6e0b6a-d08e-4673-8691-cab564d4a60a?inline=true>. [Accessed 15/02/20221]

14. Noise and Vibration

14.1. Introduction

This chapter of the EIAR will assess the potential for significant noise and vibration effects to occur as a result of the Development. The following effects are anticipated and define the scope of the assessment:

- Construction noise and vibration impacts on nearby noise sensitive receptors (NSRs);
- Construction traffic related noise effects, including changes in road traffic noise levels at NSRs in proximity to roads and noise from boats on Loch Ericht;
- Operational airborne noise impacts from any openings to underground plant, or any surface plant if required, at NSRs; and
- Operational ground borne noise and vibration impacts from underground plant at NSRs.

This chapter is supported by the following: Figure 14.1 Noise and Vibration Sensitive Receptors.

14.1.1. Guidance

The noise and vibration assessment will be carried out in accordance with the following standards and guidance:

- Institute of Environmental Management & Assessment (2014), 'Guidelines for Environmental Noise Impact Assessment'
- BS 7445: 2003 'Description and Measurement of Environmental Noise'
- BS 5228:2009+A1 2014 'Code of practice for noise and vibration control from construction and open sites' (BS 5228) Parts 1 and 2
- BS 4142:2014 + A1:2019 'Methods for rating and assessing industrial and commercial sound'
- BS 6472:2008 'Guide to evaluation of human exposure to vibration in buildings' Parts 1 and 2
- Planning Advice Note PAN 50 'Controlling the Environmental Effects of Surface Mineral Workings'
- BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'
- Association of Noise Consultants (ANC) (2020) 'Measurement and assessment of groundborne noise and vibration',
- Department of Transport/Welsh Office (1998), Calculation of Road Traffic Noise
- Highways England (2020), Design Manual for Roads and Bridges LA111

14.2. Baseline Conditions

Publicly available data have been reviewed to identify the likely sources contributing to the baseline sound climate in the vicinity. These are local road traffic, agricultural activities and wildlife. No other sources of baseline sound have been identified and it is likely that the sound climate is typical of a rural area.

Noise-sensitive ecological receptors within the vicinity of the Development will be identified in conjunction with the ecology assessment. Assessment of potential noise impacts on ecology is addressed within Chapter 6 Terrestrial Ecology, Chapter 7 Aquatic Ecology and Chapter 8 Ornithology.

The nearest human NSRs to the Development Site have been identified as the residential properties in Table 14.1 Identified NSRs, these are shown in Figure 14.1 Noise and Vibration Sensitive Receptors. The NSRs are in different administrative areas therefore these are also provided, along with an approximate distance to the headpond location.

Table 14.1: Identified NSRs

NSR	Description	Administrative Area	Distance to Headpond (km)	Easting	Northing
R1	Corrievarkie Lodge	Perth and Kinross	3.0	254950	772208

NSR	Description	Administrative Area	Distance to Headpond (km)	Easting	Northing
R2	Ardlarach and Tigh-na-bruach in Bridge of Erich	Perth and Kinross	10.1	252529	758383
R3	Ben Alder Lodge	Highland	9.2	257360	778684
R4	Residential properties in Dalwhinnie	Highland	16.5	263552	784127
R5	An Tochailt Lodge	Highland	12.9	261629	783590
R6	The Sheiling	Highland	15.7	262625	784098

R2 to R6 have been included in the assessment scope because of their proximity to potential construction access routes and/or construction compounds; hence there is the potential for associated noise and vibration impacts to result in significant effects at these NSRs. All the other potential effects identified in Section 14.1 Introduction, are associated with activities / plant which will be at or near the headpond, which is at least 9 km from R2 to R6. At this distance, the Development noise and vibration levels are not anticipated to result in significant effects. Therefore, for R2 to R6, assessment of all potential effects identified in Section 14.1 Introduction, except noise from construction traffic and compounds, are proposed to be excluded from this assessment scope.

There may be additional NSRs with the potential to be affected by Development noise and vibration as a result of the temporary worker accommodation. Once the accommodation location is known, additional NSRs (if required) will be identified and agreed with the Environmental Health Department of the relevant Local Authority.

14.3. Methodology

14.3.1. Baseline Noise Monitoring

Baseline noise monitoring locations and the monitoring regime to be employed will be agreed in advance with Perth and Kinross Council (PKC) and the Highland Council (THC) Environmental Health Departments. The monitoring procedures will conform to the requirements of BS 7445.

It is proposed to undertake a combination of long-term unmanned and short-term manned baseline monitoring at the NSRs to include weekend and weekdays times. Ideally, and subject to adequate security, a minimum five day unmanned monitoring period is preferred (Thursday – Monday suggested) but if secure locations cannot be identified this may not be possible and additional short manned measurements may be necessary.

It is assumed that there are no existing sources of vibration and therefore a baseline vibration survey is scoped out.

14.3.2. Construction Noise and Vibration

The assessment of construction impacts will be based on the available information on the likely construction programme and activities. If detailed information is available, a quantitative assessment including predicted construction noise and vibration levels at selected residential receptors will be completed following the methodology referred to as the “ABC Method” in BS 5228. Because of the likely duration of the works, headpond construction has potential to result in long-term noise impacts at receptors therefore these impacts will be assessed according to the guidance in PAN 50.

The proposed tunnelling and the operation of the turbines have the potential to generate ground borne noise. There are no UK legislative standards or criteria that define when ground borne noise becomes significant. The most relevant guidance is in the ANC publication ‘Measurement and assessment of groundborne noise and vibration’, which described a number of published guidelines for assessing impacts of ground borne noise. This includes the guidelines published by the American Public Transit Association which suggest criteria for acceptable maximum levels of ground borne noise affecting various building types. It is proposed to apply this guidance when assessing this potential impact.

The construction methodology is likely to require blasting which will generate air overpressure and vibration. Blasting vibration impacts will be assessed according to the guidance in BS 6472-2. It is not

possible to predict air overpressure generation accurately therefore this assessment will focus on the application of best practicable measures.

Additionally, noise increases due to construction traffic on public roads will be estimated based on the Calculation of Road Traffic Noise methodology for the calculation of the Basic Noise Level (BNL) at a reference distance of 10m from the nearside carriageway. The significance of this effect will be assessed based on a range of relevant guidance including the 'Design Manual for Roads and Bridges: 2020'.

14.3.3. Operational Airborne Noise

The impact of the operational noise from the proposed surface plant or openings to the surface from underground plant will be predicted using computer noise modelling software, based on information on the operating conditions and the levels of noise generated by the plant.

The significance of the noise impact of the plant will be assessed using the method given in BS 4142. This standard details a method for rating the acceptability of increases in existing noise levels at noise-sensitive receptors affected by noise from fixed plant at proposed developments. If details of fixed plant are not available, a recommendation of maximum noise levels from fixed plant will be made. The proposed criterion is that the *rating level* of the plant sound is no greater than 5 dB above the measured *background sound level* at NSRs.

It is assumed that the Development would not produce significant road traffic on local public roads and therefore an operational road traffic noise assessment is scoped out.

There may be potential for low frequency noise (LFN) from the operation of the turbines but this is deemed unlikely, due to the depth of the turbines below ground and the insulation that will be incorporated into the power house design. The potential issue of LFN will be considered throughout the detailed design for the Development and mitigated through design. Detailed assessment of LFN is therefore excluded from the scope of the EIAR.

14.3.4. Operational Ground Borne Noise and Vibration

A qualitative analysis of operational ground borne vibration and ground-borne noise will be completed. It is assumed that there will not be enough information available at this stage on the detailed design of the scheme to perform a quantitative analysis. Suitable guidance including BS 6472-1 will be considered.

14.4. Likely Significant Effects

14.4.1. Construction

The Development is located in a rural area where baseline noise levels are likely to be low. Construction of the Development may therefore give rise to temporary noise and vibration impacts upon the closest NSRs. An assessment of construction noise and vibration is scoped into the assessment.

14.4.2. Operation

With careful consideration of the location and design of any noise producing equipment (e.g. pumps) and the incorporation of appropriate mitigation measures (where required), operational airborne noise and ground borne noise and vibration impacts are not anticipated to be significant. However, an assessment of these impacts is included within the scope of the assessment.

14.4.3. Decommissioning

Decommissioning of large-scale pumped storage hydro projects is extremely rare due to the long operational lifespan of the facility. If required, this would involve the drainage of water from the headpond, the removal of equipment, blocking of waterways and tunnel entrances and the removal of above ground structures. These activities would not be expected to emit high levels of noise or vibration and it is considered that the effects of such activities would be negligible. Therefore, decommissioning is excluded from the assessment scope.

14.5. Likely Mitigation Measures

14.5.1. Construction

Specific mitigation measures to be adopted will be identified following the results of the detailed assessment.

Mitigation of construction noise and vibration will largely rely on the implementation of the CEMP, which will include a section on noise management that will detail best practice measures to mitigate potential noise and vibration effects, including:

- Fixed and semi-fixed ancillary plant such as generators, compressors etc. which can be located away from receptors to be positioned so as to cause minimum noise disturbance. If necessary, acoustic barriers or enclosures to be provided for specific items of fixed plant;
- If necessary, use of site boundary acoustic barriers/hoarding to screen neighbouring receptors;
- All plant used on site will comply with the EC Directive on Noise Emissions for Outdoor Equipment (2000/14/EC), where applicable;
- Operation of plant in accordance with the manufacturer's instructions;
- Selection of inherently quiet plant where appropriate. All major compressors to be 'sound reduced' models fitted with properly lined and sealed acoustic covers which are kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools to be fitted with mufflers or silencers of the type recommended by the manufacturers;
- All plant used on site will be regularly maintained, paying particular attention to the integrity of silencers and acoustic enclosures;
- Machines in intermittent use to be shut down in the intervening periods between work or throttled down to a minimum;
- Drop heights of materials from lorries and other plant will be kept to a minimum;
- Adherence to the codes of practice for construction working given in BS 5228 and the guidance given therein for minimising noise and vibration emissions from the Development Site;
- Provision of rest periods during any prolonged noisy activities;
- Prohibition of the use of stereos and radios on the Development Site;
- Compliance with Stirling Council's preferred working hours; and,
- Keeping local residents informed and provision of a contact name and number for any queries or complaints (also included in the CEMP).

14.5.2. Operation

Mitigation measures to control operational noise, if required, are likely to comprise commitments to include sound emission limits within the specifications for proposed plant.

14.6. Summary and Conclusions

The Development is in a rural area with very few NSRs nearby. Baseline sound measurements will be undertaken; and an assessment will be conducted of the potential Development noise and vibration effects. Given the large distance between the Development and the NSRs, with the incorporation of mitigation as required, residual noise and vibration effects are not anticipated to be significant.

14.7. References

Institute of Environmental Management & Assessment (2014). Guidelines for Environmental Noise Impact Assessment.

British Standard Institute, (2003); BS7445-2:2003 'Description and Measurement of Environmental Noise. Part 2: Guide to the Acquisition of Data Pertinent to Land Use'

British Standards Institution (2014). BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'

British Standards Institution (2014). BS 5228-2:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'

British Standards Institution (2019). BS 4142: 2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

British Standards Institute, (2008); BS 6472-1:2008 'Guide to Evaluation of Human Exposure to Vibration in Buildings'. Part 1: Vibration sources other than blasting

British Standards Institute, (2008); BS 6472-2:2008 'Guide to Evaluation of Human Exposure to Vibration in Buildings'. Part 2: Blast-induced vibration

Highways England (2020). Design Manual for Roads and Bridges LA111 Noise and vibration

Department of Transport/Welsh Office, (1988); Calculation of Road Traffic Noise.

Association of Noise Consultants (2020). Measurement and Assessment of Groundborne Noise and Vibration

15. Socio-Economics, Recreation and Tourism

15.1. Introduction

This chapter considers the socio-economic, recreational and tourism impacts resulting from the construction and operation of the Development. A project such as a PSH scheme has the potential to provide beneficial effects to a local area, such as the generation of local jobs through the use of local contractors for construction, increased spending in the local area, and use of local accommodation during the construction phase. There is also the potential for adverse effects such as impacts to tourism, community facilities, recreational routes and associated impacts on the local economy.

This chapter should be read with reference to Chapter 5 Landscape and Visual Amenity, Chapter 11 Flood Risk and Water Resources, Chapter 12 Archaeology and Cultural Heritage and Chapter 13 Access, Traffic and Transport.

15.2. Baseline Conditions

15.2.1. Site Description

The Development Site is located within a rural landscape east of Loch Ericht, west of Loch Garry and north of Loch Rannoch, approximately 9 km south west of Dalnaspidal and 11 km north of Bridge of Ericht, with the northern access into the site at Dalwhinnie, as shown on Figure 1.1 Site Location. The land within the Development Site comprises upland plateau moorland with craggy outcrops with a remote and wild character. There are scattered lodges present along Loch Ericht's waterfront (See Table 15.1 Visitor Attractions and Amenities for details) with minor tracks used for sporting, forestry or recreational access. The land use of the site is predominantly upland grazing habitat, with the land capability for agriculture map citing the majority of the site being within class 6.3 "*capable of only rough grazing due to intractable physical limitations; semi-natural vegetation provides grazing of low value*" and 6.2 "*Land capable of use as rough grazings with moderate quality plants*" on the eastern banks of Loch Ericht. (Hutton Institute).

The highest point of the site is approximately 827 m Above Sea Level (ASL). There are a number of Core Paths, public rights of way, cycle routes and recreational receptors within the immediate vicinity of the Development Site (Table 15.2 Recreational Paths). There are also a number of residential properties at Dalwhinnie (immediately north of red line boundary (RLB)), and scattered dwellings at Killichonan and Bridge of Ericht (immediately south of RLB), with Loch Ericht itself used informally for recreational activities such as kayaking and fishing. Larger settlements are present in the wider area at Blair Atholl (30 km east) and Pitlochry (38 km east). These receptors are set out in more detail within the below sections.

15.2.2. Socio-Economics, Recreation and Tourism

Visitor Attractions & Amenities

The area to the north and east of the Development Site is designated as the Cairngorms National Park. As a result of the location, tourism is important to the local community. Key local visitor attractions and community facilities in the vicinity of the Development are set out within Table 15.1 below. This table will be updated and refined for the EIA as set out in Section 15.3.1.

Table 15.1 Visitor Attractions and Amenities

Receptor	Location	Approximate Distance to RLB
Cairngorms National Park	North of RLB	500 m north of RLB
Dalwhinnie Distillery	Located within northern area of Dalwhinnie	400 m south east of RLB
Dalwhinnie railway station	Located within central area of Dalwhinnie	60 m north of RLB
Informal canoeing and wild camping around Loch Ericht	Within Loch Ericht	Within RLB
Fishing on Loch Ericht and Loch Rannoch	Within RLB and immediately south respectively	Within RLB and 50 m south respectively
Deer stalking within Ben Alder estate	Within RLB	Within RLB

Receptor	Location	Approximate Distance to RLB
Car park off the A9 at Pass of Drumochter	Along the A9 to the east of the Development Site	5 km south east of RLB
Correivarkie lodge	On eastern bank of Loch Ericht	Within RLB
Ben Alder lodge - Part of the Ben Alder estate.	Western bank of Loch Ericht	100 m west of RLB
An Tochait lodge – Part of the Ben Alder estate	North west bank Loch Ericht	Within RLB
The Shieling lodge – Part of the Ben Alder estate	North west bank Loch Ericht.	Within RLB
Dalnaspidal lodge – Part of the Ben Alder estate	North of Loch Garry south of the A9	5.5 km east of RLB
Alt An't Sluic Lodge	North of northernmost section of RLB.	500 m north west of RLB
Loch Ericht Hotel with bar and restaurant	Located in Dalwhinnie	520 m south of RLB
Holiday lodges at Bridge of Ericht, eg Camusericht lodge	On the B846, west of access point	400 m west of RLB
Hotels and holiday lodges within Kinloch Rannoch, eg Loch Rannoch Hotel, Estate and Spa and Craiganour Lodge	At the north eastern end of Loch Rannoch off the B846	15 km east of RLB
Hotels and holiday lodges within the area of Bridge of Gaur, e.g Rannoch Lodge	At the western end of Loch Rannoch	2.8 km south west of RLB
Loch Rannoch Water Sports Centre	At eastern section of Loch Rannoch off the B846	12.8 km east of RLB
Rannoch Station Tearoom and Moor of Rannoch Restaurant and Rooms	Off the B846 near Rannoch Railway Station	10 km west of RLB

Note: The above receptors have been identified from a review of available online mapping only. Other similar receptors, e.g. holiday lodges, may be present within the general area and would be assumed to be impacted on a similar scale as to the nearest identified similar receptor. All distances are approximate, as the crow flies and from the nearest point of the RLB.

Recreational Paths

There are several core paths identified within or just outwith the Development Site that could be impacted by the Development. It is not yet known if any of these would require to be diverted or closed during construction, this would be assessed and reported within the EIAR as necessary. Impacts relating to severance of core paths and National Cycle Routes across the road network that could be impacted by road widening or improvements relating to the Development will be assessed within Chapter 13 Access, Traffic and Transport. Remaining core paths that could be impacted by other elements of the Development will be assessed within this chapter. These include those listed within Table 15.2 Recreational Paths below. Visual impacts on popular recreational routes, core paths and mountain summits will be assessed within Chapter 5 Landscape and Visual Amenity. All core paths can be found on Figure 2.1 Constraints Plan:

Table 15.2 Recreational Paths

Path Code / Right of Way (RoW) Code	Description	Grid Reference	Approximate Distance to RLB
RANN/104 PKC	5.8km in length Bridge of Ericht to Loch Ericht dam.	NN515605	Within RLB, along south western boundary.
RANN/9 (RoW 11/9) PKC	12.7 km in length. Loch Rannoch to Dalnaspidal via Annat	NN625639	4 km east of the RLB
RANN/8 (RoW 11/8) PKC	12.9 km in length. Loch Rannoch to Dalwhinnie, Cairngorms NP	NN493627	2.5 km west of the RLB
Path Code BS04.01 THC	Access to Caochan Wood (south) 1.2 km in length. This path is currently undergoing	NN 63146 84422	Within northern tip of RLB, into Caochan Wood (south).

Path Code / Right of Way (RoW) Code	Description	Grid Reference	Approximate Distance to RLB
	review as part of the West Highland and Islands Amended Core Paths Plan Review.		
Path Code BS04.02 THC	Access to Caochan Wood (north) 1.6 km in length.	NN 63413 86010	Within northern tip of RLB, into Caochan Wood (north).
Path Code UBS35 CGNP	Dalwhinnie Station to Village Hall	NN 63413 86010	Within northern tip of RLB, east of railway line
Path Code UBS27 CGNP	Dalwhinnie to Loch Ericht	NN 63460 84120	300 m south of RLB at Loch Ericht Hotel
Path Code UBS9 CGNP	Part of the Sustrans Route National Cycle Network 7, onto General Wade's Military Road	Assessed within	Chapter 13 Access, Traffic and Transport
Path Code UBS28 CGNP	National Cycle Network 7	Assessed within	Chapter 13 Access, Traffic and Transport

Note: All distances are approximate, as the crow flies and from the nearest point of the RLB.

In addition to core paths, there are a number of informal tracks throughout and outwith the Development Site, including walkers walking towards landmarks such as hill summits, and other recreational users utilising the Dalwhinnie Community Trails and other informal tracks.

15.3. Methodology

There are no recognised standards or methodologies for assessing the socio-economic effects of PSH projects. However, a method for the socio-economic assessment has been broadly derived from the Design Manual for Roads and Bridges (DMRB), LA 112 Population and human health) (Highways Agency, 2020). This includes consideration of job creation, local expenditure, and potential effects on community facilities. This guidance also promotes the consideration of effects on tourism including, core paths, footpaths, cycle ways and recreational or tourist facilities.

15.3.1. Scope of Assessment

The assessment will consider the effects of the construction and operation of the Development on the local communities and associated economies in the vicinity of the Development. This includes consideration of job creation, local expenditure, and potential effects on community facilities.

Given the low population density in and around the Development Site, it is not proposed to undertake a socio-economic assessment with respect to deprivation, employment, businesses or population. A high level assessment on employment, creation of jobs and supply chain opportunities will be undertaken,

The decommissioning phase has been scoped out as impacts are considered to be similar to those of construction, albeit on a lesser scale as the main structures would remain in situ.

Additionally, tourist and visitor attractions and recreational land uses such as walking or cycling routes will also be assessed. The study area for recreational paths will be limited to those within the red line boundary that could be directly impacted by construction and extended to 1km for those that could be indirectly impacted through a reduction in use to due disturbance from construction effects. Those that could be impacted from a visual perspective will be assessed within Chapter 5 Landscape and Visual Amenity and those that could be an impacted route to site will be addressed within Chapter 13 Access, Traffic & Transport.

The study area for accommodation will be based on an acceptable commuter distance/journey time (for example 30 minute drive) for early construction/enabling works until the workers accommodation is available, and would be assessed as a temporary effect.

Effects on visual amenity of tourism and recreation receptors are considered in Chapter 5 Landscape and Visual Amenity. Impacts on hydropower schemes within the area will be addressed within Chapter 11 Flood Risk and Water Resources. Impacts on heritage assets will be address within Chapter 12 Archaeology and Cultural Heritage. Effects on increases in traffic volumes on the local road network and severance for motorists, cyclists and pedestrians will be assessed within Chapter 13 Access, Traffic and Transport.

15.3.2. Baseline Information

Baseline information will be collated from a variety of publicly available sources as well as through consultation with Perth and Kinross Council and the Highland Council and local tourism and recreational stakeholders. Some information will also be obtained through the collection of survey data. Information sources may include:

- Existing land-use
 - Review of local development plans and consultation with landowners;
- Socio-economic elements:
 - Online search of local facilities and amenities.
- For tourism and recreation:
 - Consultation with Scotways and local tourism and recreational groups;
 - Core Path Plans Review;
 - Undiscovered Scotland; and
 - Visit Scotland research and statistics reports.

15.3.3. Assessment Methodology

The Development has the potential to result in both adverse and beneficial impacts on a wide range of recreational infrastructure, tourism assets, and economic activities. In order to assess the overall significance of an effect it is necessary to establish the magnitude of the effect occurring i.e. the change to the existing baseline conditions as a result of the development and the sensitivity or importance of the receiving environment or receptor. The assessment for this chapter will follow the approach set out in Section 3.4 Approach to EIA Chapter 3 Scope of the Environmental Impact Assessment. Definitions of sensitivity criteria and magnitude criteria will be developed to be included in the EIAR.

The assessment will report the residual effects of the Development on the socio-economic, recreation and tourism receptors and any mitigation proposed.

15.4. Likely Significant Effects

15.4.1. Construction

There is the potential for the following possible effects as a result of the Development:

Potential Adverse Effects

- There will likely be some temporary land use change from current deer grazing habitat to built ground for the compounds, access tracks and headpond;
- There is the potential for visitors to tourist attractions to be deterred due to construction activities, such as from views and traffic nuisance along construction routes;
- There will likely be temporary reduction in land area for undertaking deer shooting activities;
- There will likely be temporary effects to amenity at Corrievarkie, An Tochain, The Shieling, Alt An't Sluic and Camusericht lodges during construction of the Development. These impacts include disturbance from noise and dust as well as visual disturbance for the duration of the construction period. This could in turn have economic impacts due to reduced occupancy.
- There is the potential for temporary adverse effects on tourism in the local area due to the large number of workforce (up to 500 people, peak) required to construct the Development. A reduction in the number of available accommodation for tourists due to use by construction workers could have a knock on effect on local tourist attractions and facilities.
- There will likely be localised disruption to recreational walkers and cyclists within the area, including the potential for temporary diversions or closures of Core Paths (Impacts relating to severance of Core Path users at intersections with site access routes will be assessed within Chapter 13 Access, Traffic and Transport);
- In the interest of public safety, there will be restricted access for water activities such as informal canoeing or fishing around the northern section of Loch Erich from the Loch Structure, south to the tailpond works. There will also be amenity effects on recreational loch users in proximity to the works.

Potential Beneficial Effects

- It is likely that there will be beneficial effects during the construction period as a result of up to 500 workers employed in addition to the associated supply chain during the construction phase at its peak. The construction period is anticipated to be approximately seven years. During this time, workers will need to stay in the area and will likely make use of some local accommodation as well as a workers accommodation site. This will also lead to a greater use of and expenditure in local shops and restaurants, which will be especially beneficial outside of the high tourist season.
- There is also potential for beneficial effects as a result of the offer of apprenticeships during the construction phase. This would enable young people in the local area to obtain new skills at the beginning of their careers.

15.4.2. Operation

Potential Adverse Effects

- There will be permanent land use change from current deer grazing habitat to compounds, access tracks and headpond;
- During the operation of the Development the views from lochside lodges towards the headpond may be changed from the view prior to construction. The visual impact will be assessed in Chapter 5 Landscape and Visual Amenity. The change to the view could adversely affect the number of visitors to the lodges.

Potential Beneficial Effects

- The operation of the Development has the potential to require up to 10 permanent on site jobs as a result of the operation of the Development, there is also likely to be additional jobs created in a remote control centre.
- Any recreational routes within the Development Site will be reinstated and improved (where possible and necessary), with the potential to also include signage within the locale.

15.5. Likely Mitigation Measures

15.5.1. Construction

- It is proposed that there will be a programme of early pre-construction planting carried out in defined areas to reduce the visual impact of the Development, and associated access tracks. This would be designed in combination with the landscape, ecology and design teams to produce an ecologically robust design in keeping with the local habitat. This planting plan, in combination with sympathetically designed key components of the Development, has the potential to reduce significant adverse effects from local receptors such as holiday lodges within the Development Site.
- The Applicant will establish a Community Liaison Group (CLG) comprised of local interested parties to facilitate direct, two-way discussion between the Applicant and the local community and attractions during the construction phase.
- The Applicant will liaise and continue to consult with the operators of nearby restaurants, hotels and B&B's through the application process. Through the implementation of the CTMP and the implementation of a CEMP to ensure that there is no impact to amenity, it is not anticipated that there will be any interruption to the operation of nearby businesses during construction. It is therefore anticipated that there will not be any significant adverse effects to either socio-economic or as tourist resources. The inclusion of impacts to B&B's and hotels in proximity to the Development site is therefore proposed to be scoped out of the EIAR.
- The potential mitigation for screening (i.e. offsite screen planting) nearby residents and business, such as Corrievarkie Lodge, from visual, noise and dust disturbance will be investigated in the EIAR.
- A temporary workers site will likely be required to house the vast majority of construction workers throughout the construction period. This would allow for local hotels/holiday lodges and other accommodation to be readily available for tourists.
- CTMP will be used during the construction period. The CTMP will ensure that deliveries and plant movement occur at set times which will avoid peak periods to maintain road safety and ensure users of amenities and tourist attractions are minimally impacted during construction. It would also include any need for shuttle bus services for construction workers from the temporary workers camp to the Development Site.

15.5.2. Operation

- Apprenticeship initiatives exist through organisations such as Perth and Kinross Council and Skills Development Scotland. The Applicant proposes to work with these initiatives to enable people in the local area to obtain new skills.
- There will be a programme of improvement to the condition of the recreational routes which run through the Development site. Material from the excavation works will be used to upgrade the recreational routes. In addition to this the Applicant proposes to install educational signage and maps along the routes, the subject of which to be agreed with local community, user groups and attractions.
- As well as upgrading the recreational routes, the local road network will be improved once the Development is operational.
- Potential for a landing area for canoeists is another option for improvement that the Applicant is considering should this be feasible and requested.

15.6. Summary and Conclusions

The focus of the socio-economic assessment will be to ensure potentially significant adverse effects on the local community, local economy and tourism in the area are identified and minimised. The assessment will be based upon the guidelines set out in the DMRB Volume 11 (Highways Agency, 2009) and will follow the approach to assessment detailed in Section 3.4 Approach to EIA Chapter 3 Scope of the Environmental Impact Assessment. Further consultation will be carried out with Scotways, local interest groups and the local community.

Significant effects to the operation of the lodges and other businesses within proximity to the Development site are not predicted as a result of proposed mitigation and therefore are not proposed to be included in the EIAR.

15.7. References

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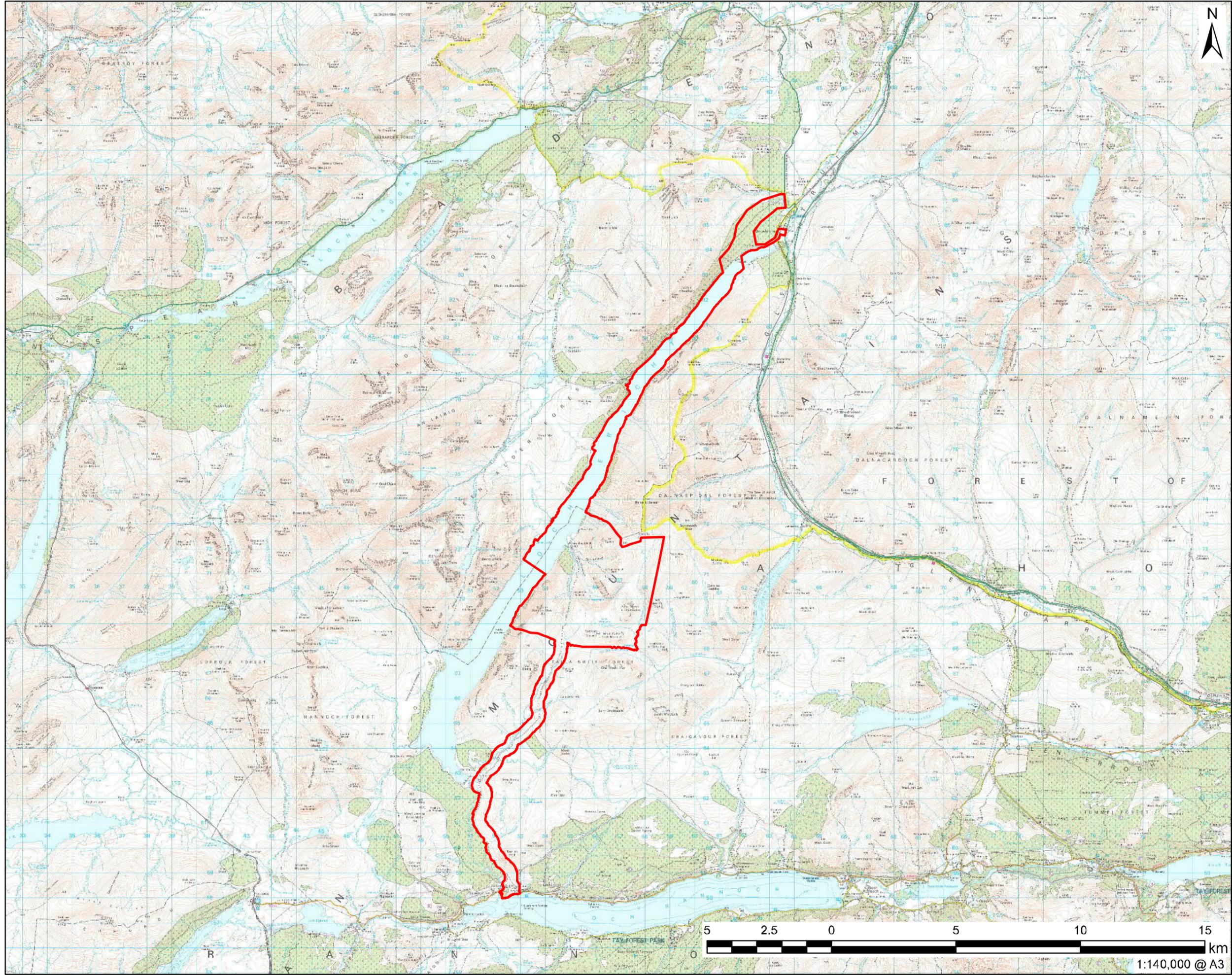
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https://www.highland.gov.uk/downloads/file/20999/west_highland_and_islands_core_path_plan_review_environmental_report

Appendix A: Figures

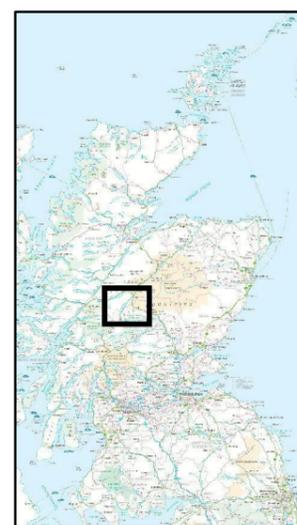


PROJECT
Corrievarkie
Pumped Storage Hydro

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LEGEND
— Development
— Boundary

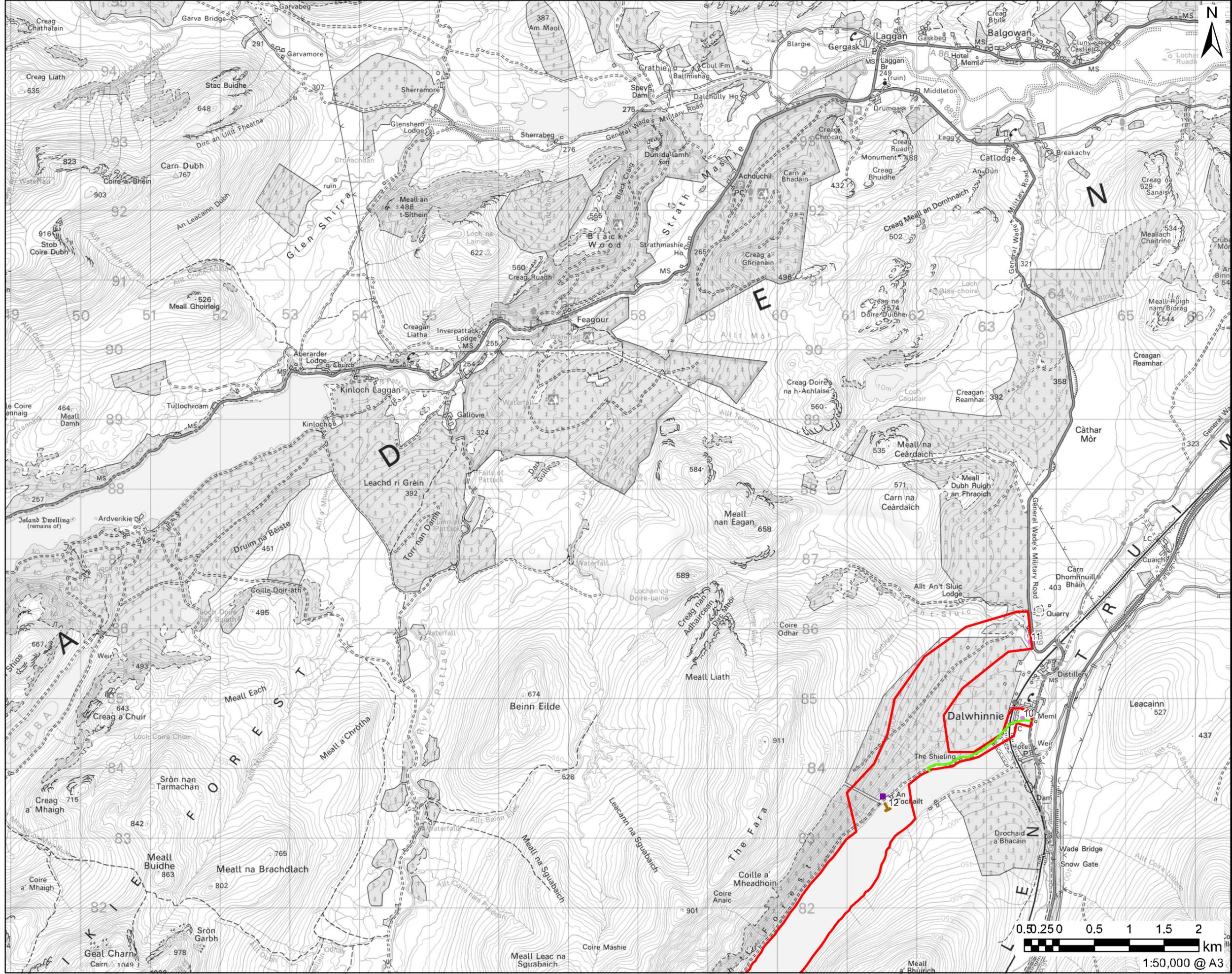


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SHEET TITLE
Site Location

SHEET NUMBER
Figure 1.1

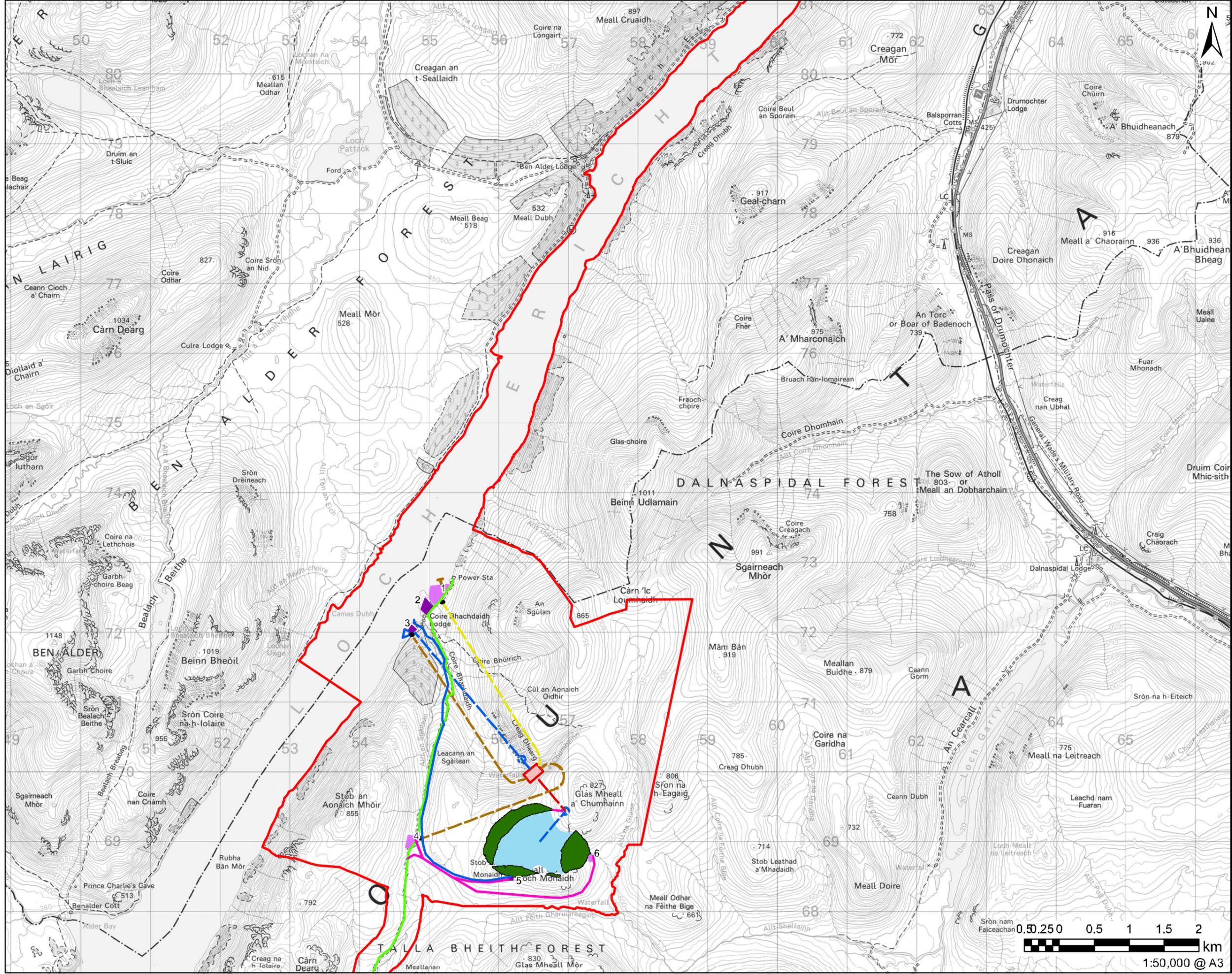
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- Development
- Boundary
- Spillway Pipe
- New Track
- Upgrade Existing Track
- Access Tunnel
- Construction Tunnel
- - - High Pressure Tunnel
- - - Low Pressure Tunnel
- Construction Compound - Permanent
- Construction Compound - Temporary
- Tailpond Inlet/Outlet
- Loch Structures
- Tunnel Portal
- Power House (Underground)
- Surge Shaft
- Headpond Impoundment
- Indicative Dam Footprint

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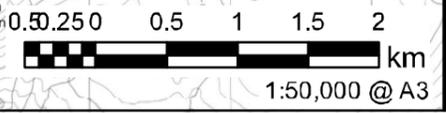


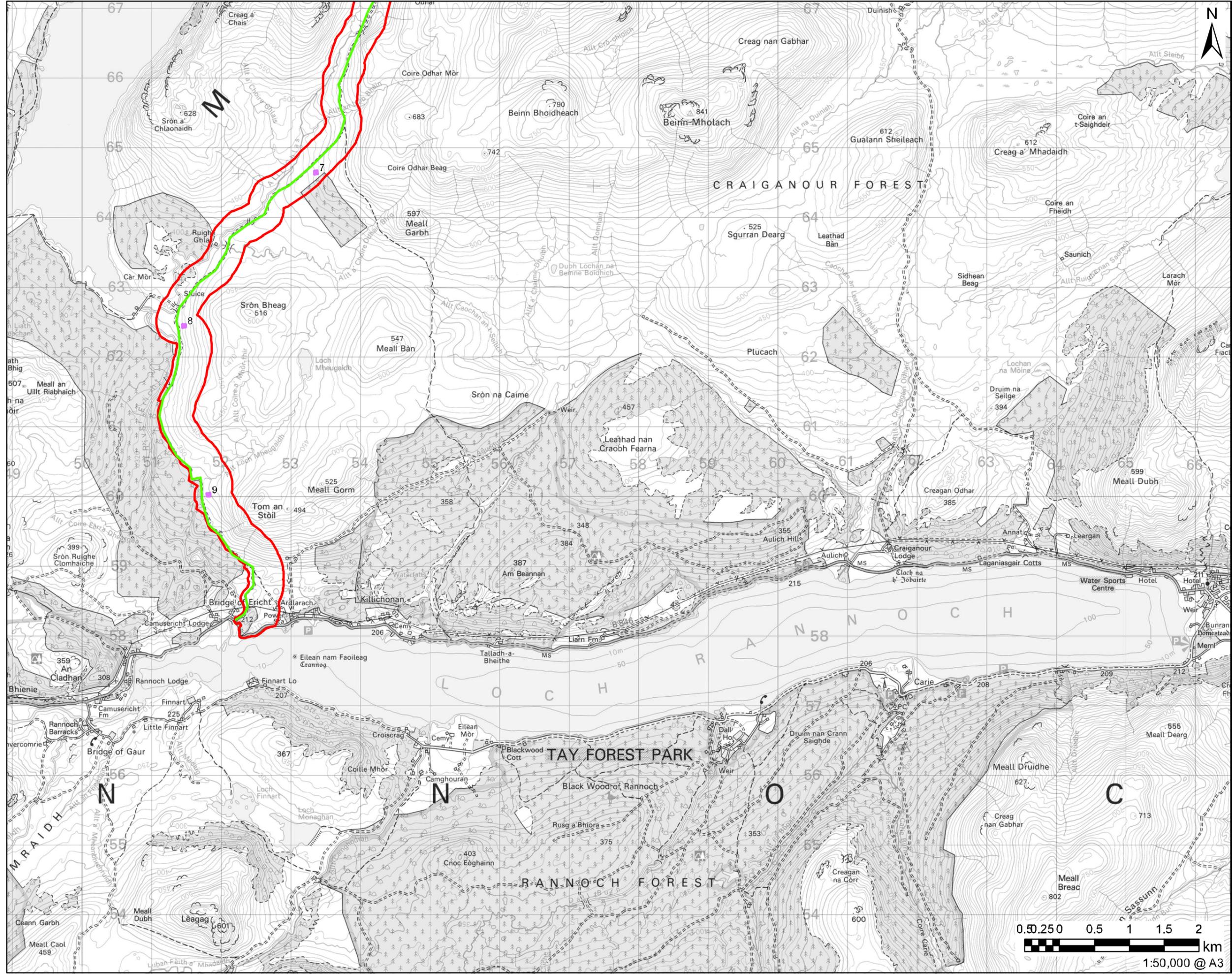
- LEGEND**
- Development Boundary
 - Spillway Pipe
 - New Track
 - Upgrade Existing Track
 - Access Tunnel
 - Construction Tunnel
 - High Pressure Tunnel
 - Low Pressure Tunnel
 - Compound - Permanent
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 Figure 1.2A Page 2 of 3





PROJECT
 Corrievarkie
 Pumped Storage Hydro

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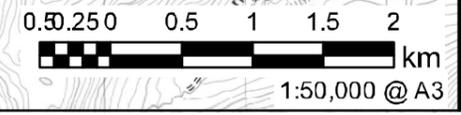
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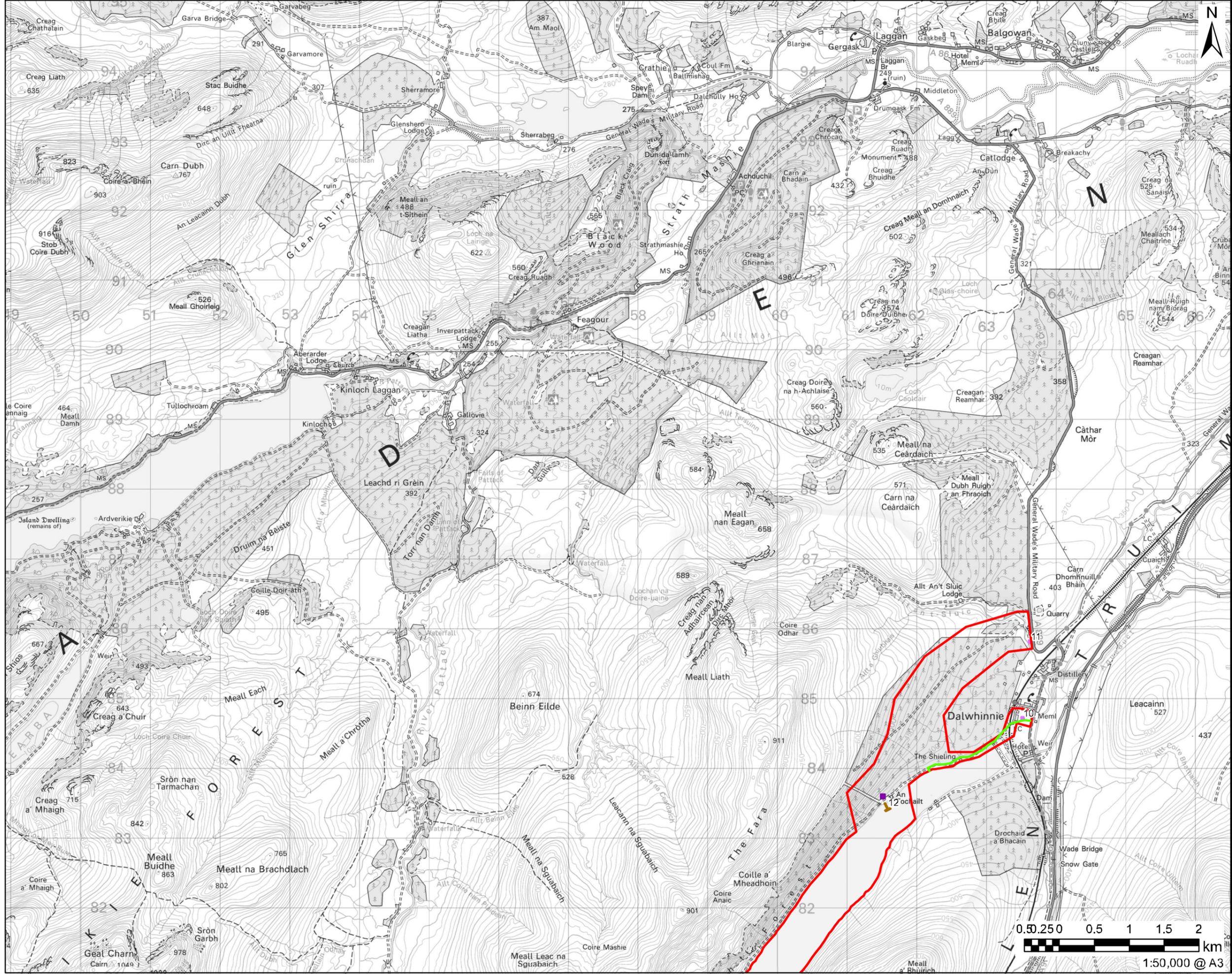
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- Development Boundary
 - Spillway Pipe
 - New Track
 - Upgrade Existing Track
 - Access Tunnel
 - Construction Tunnel
 - - - High Pressure Tunnel
 - - - Low Pressure Tunnel
 - Construction Compound - Permanent
 - Construction Compound - Temporary
 - Tailpond Inlet/Outlet
 - Loch Structures
 - Tunnel Portal
 - Power House (Underground)
 - Surge Shaft
 - Headpond Impoundment
 - Indicative Dam Footprint

NOTES
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SHEET TITLE
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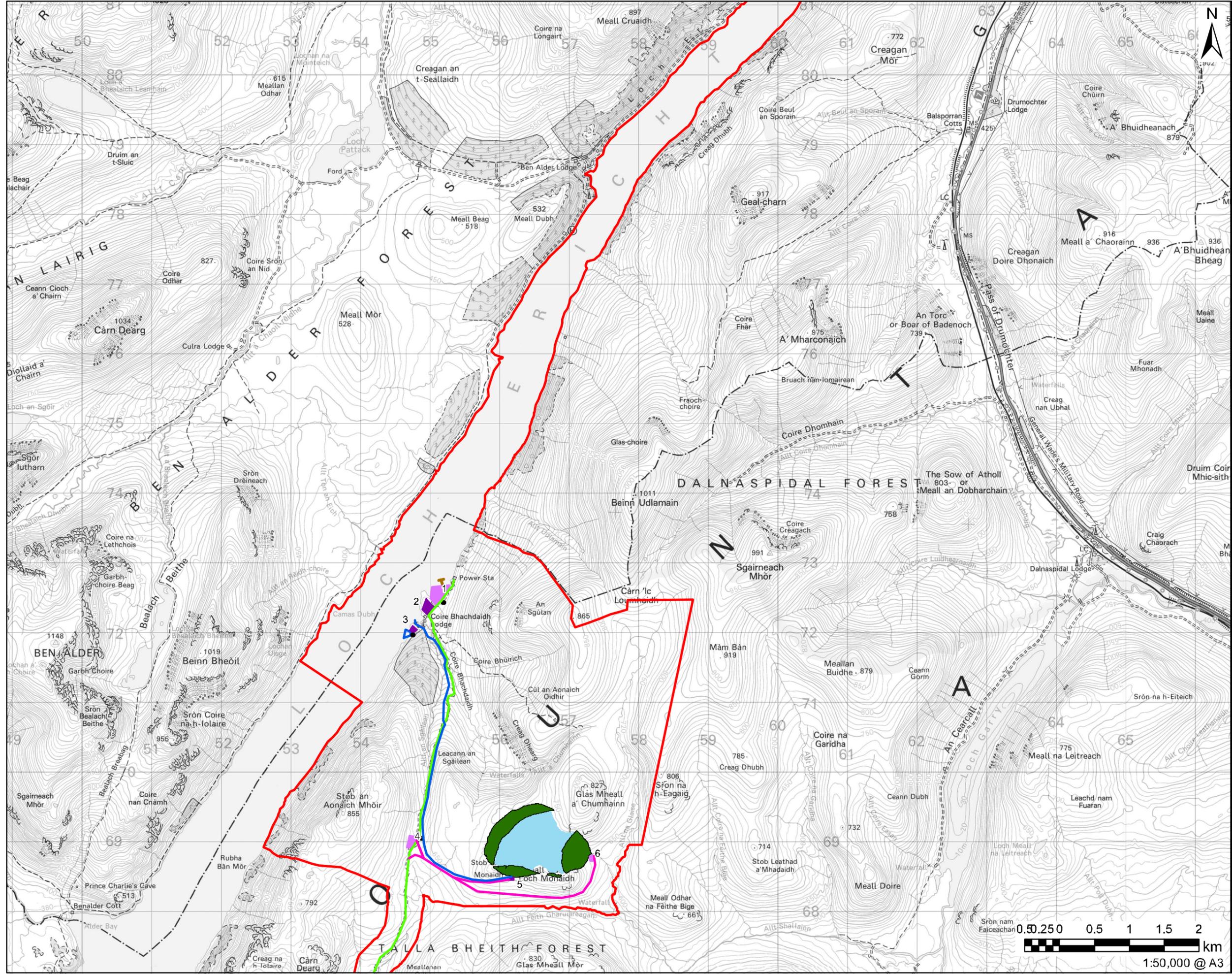
SHEET NUMBER
 Figure 1.2A Page 3 of 3





- Development Boundary
- Spillway Pipe
- New Track
- Upgrade Existing Track
- Construction Compound - Permanent
- Construction Compound - Temporary
- Loch Structures
- Tailpond Inlet/Outlet
- Tunnel Portal
- Headpond Impoundment
- Indicative Dam Footprint

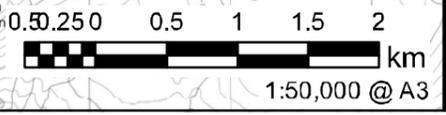
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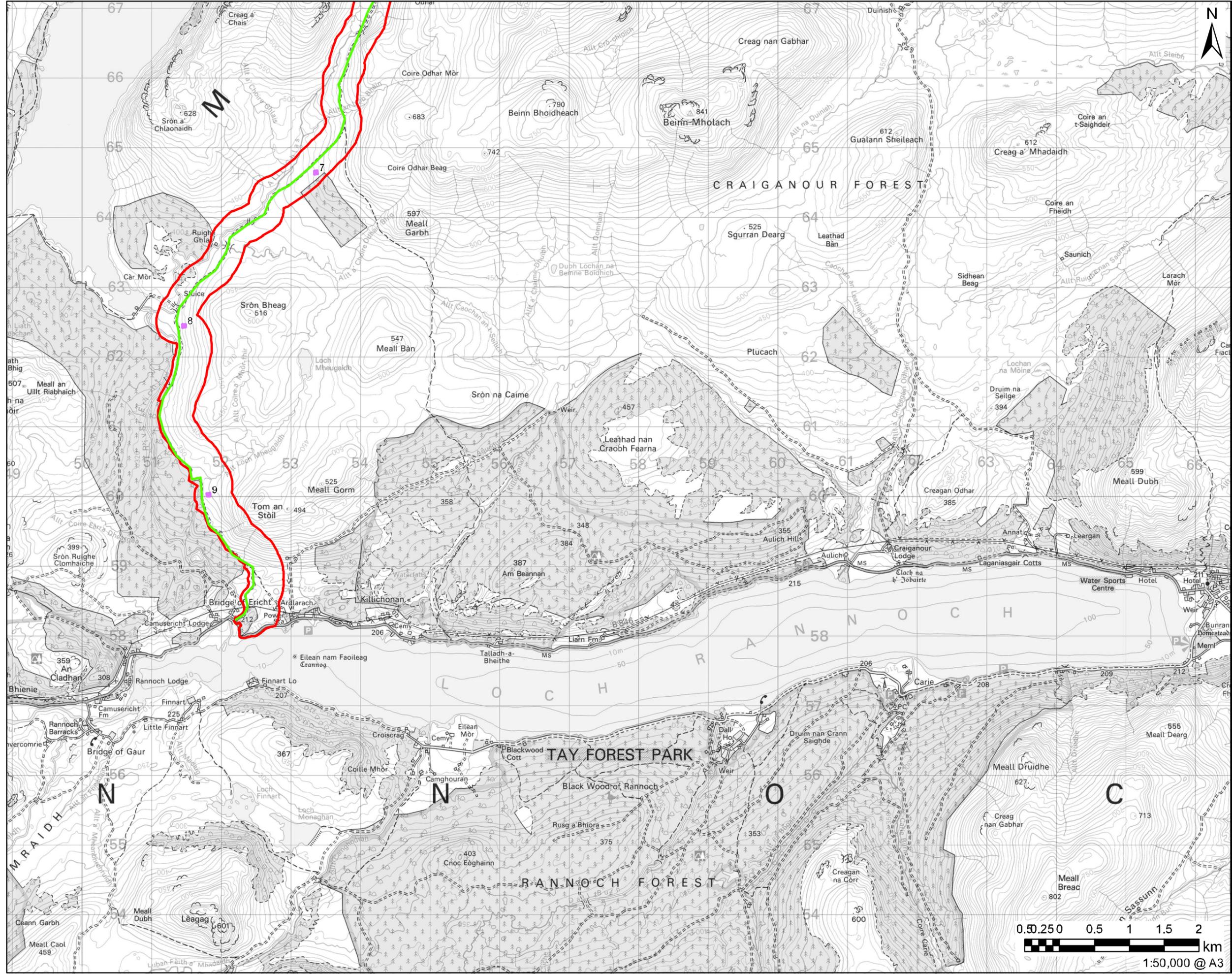


- LEGEND**
- Development Boundary
 - Spillway Pipe
 - New Track
 - Upgrade Existing Track
 - Construction Compound - Permanent
 - Construction Compound - Temporary
 - Loch Structures
 - Tailpond Inlet/Outlet
 - Tunnel Portal
 - Headpond Impoundment
 - Indicative Dam Footprint

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60570241
SHEET TITLE
Indicative Design Layout
Above Ground Infrastructure
SHEET NUMBER
Figure 1.2B Page 2 of 3





PROJECT
 Corrievarkie
 Pumped Storage Hydro

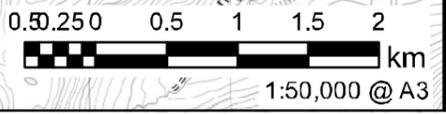
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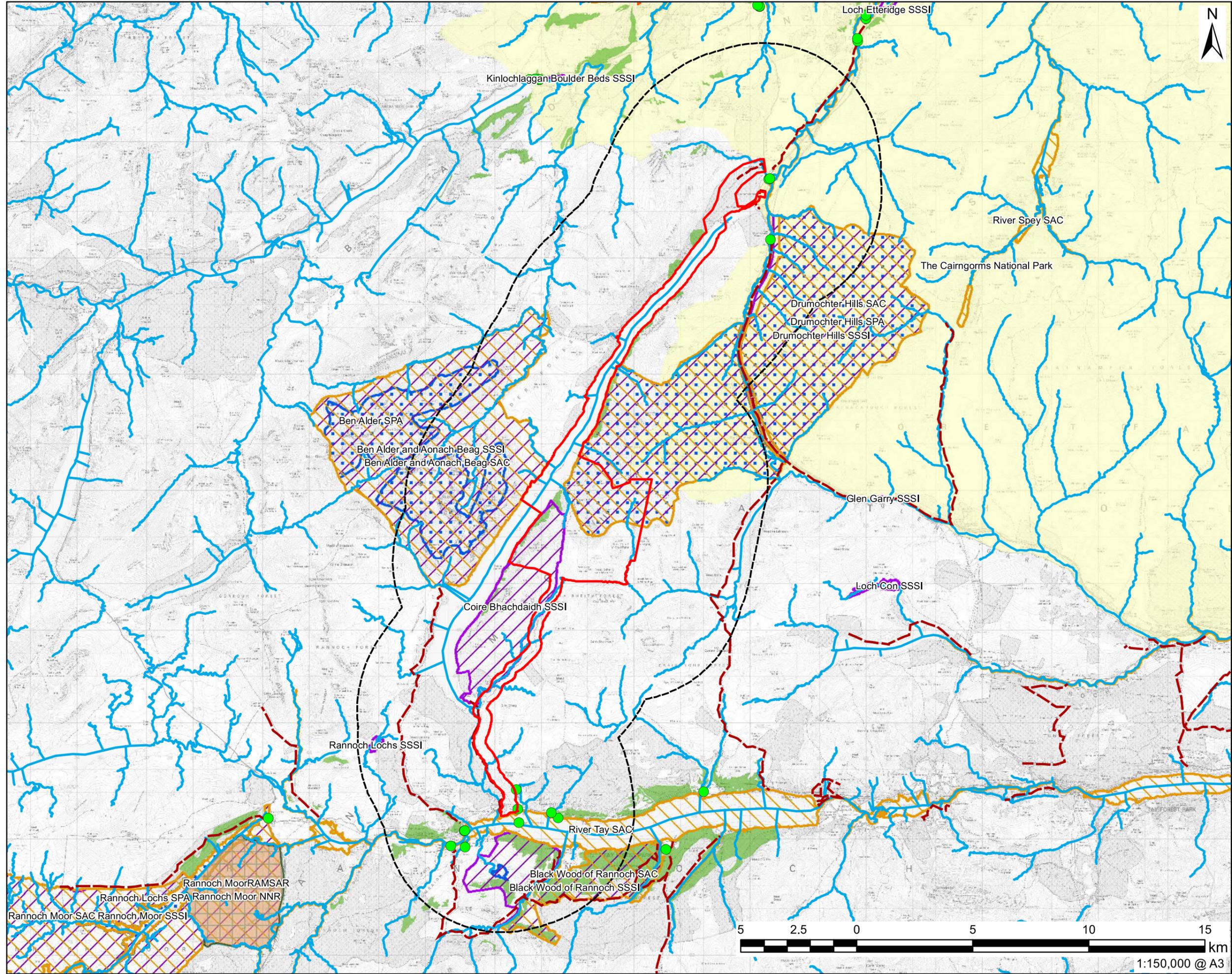
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- LEGEND**
- Development Boundary
 - Spillway Pipe
 - New Track
 - Upgrade Existing Track
 - Construction Compound - Permanent
 - Construction Compound - Temporary
 - Loch Structures
 - Tailpond Inlet/Outlet
 - Tunnel Portal
 - Headpond Impoundment
 - Indicative Dam Footprint

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SHEET TITLE
 Indicative Design Layout
 Above Ground Infrastructure
SHEET NUMBER
 Figure 1.2B Page 3 of 3





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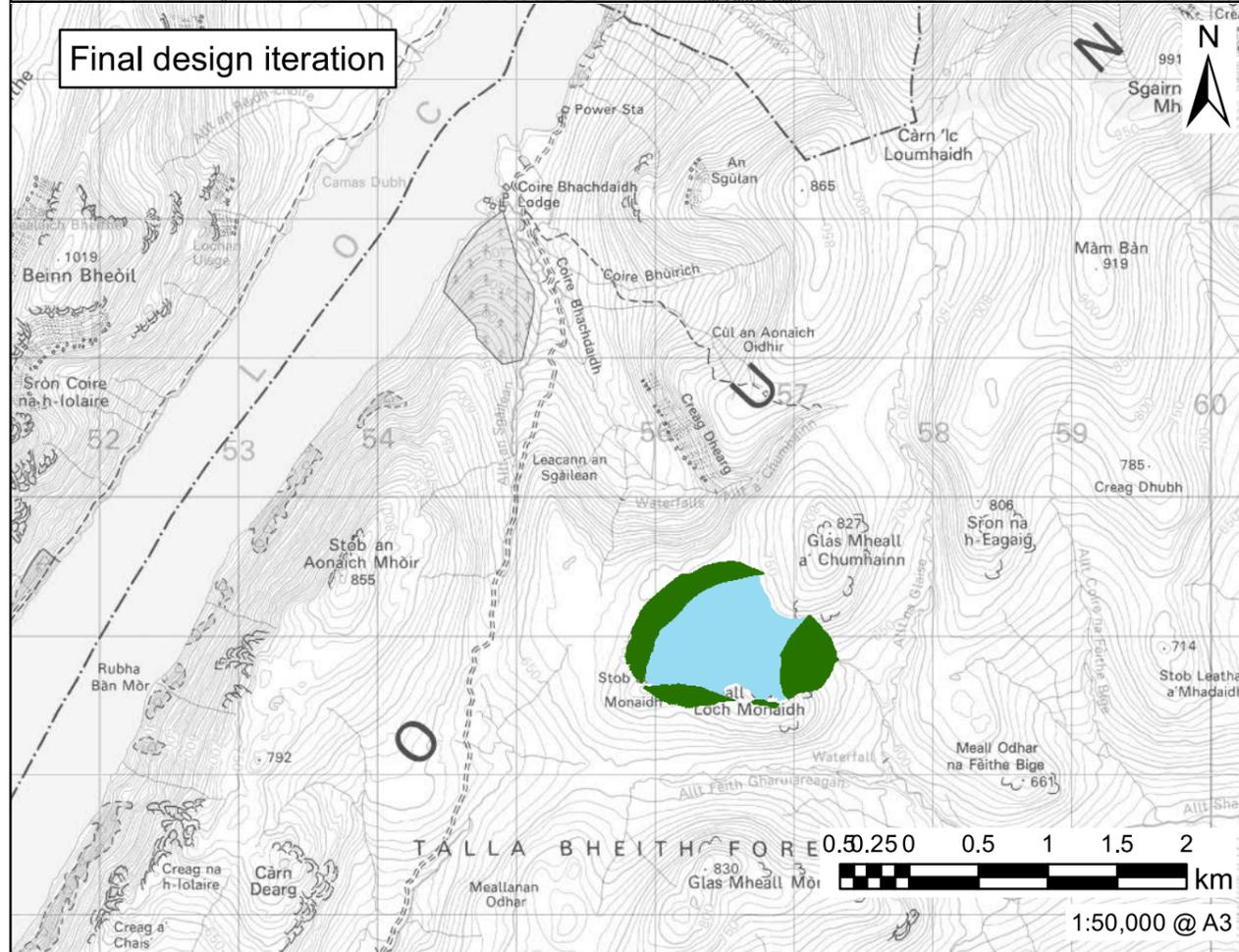
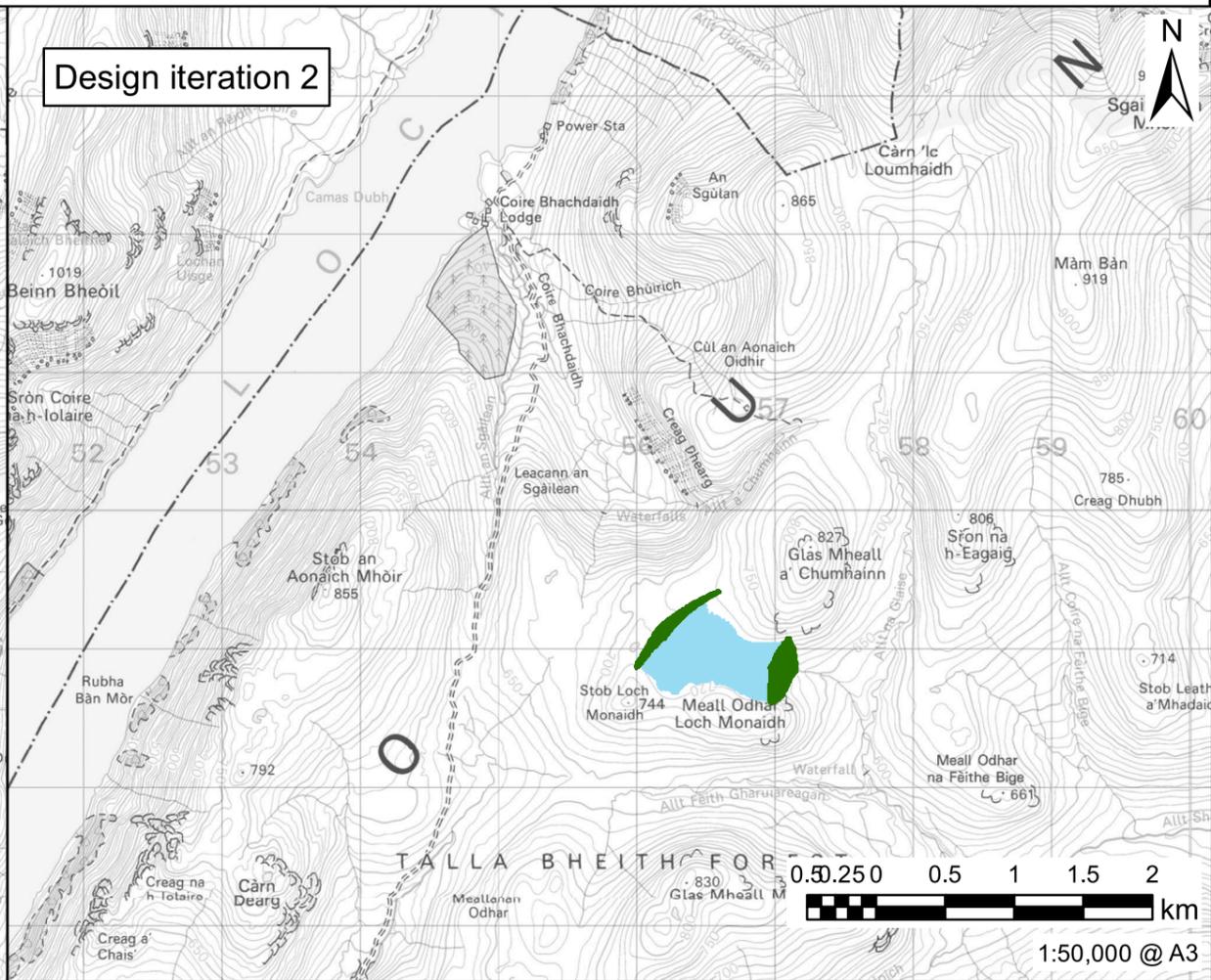
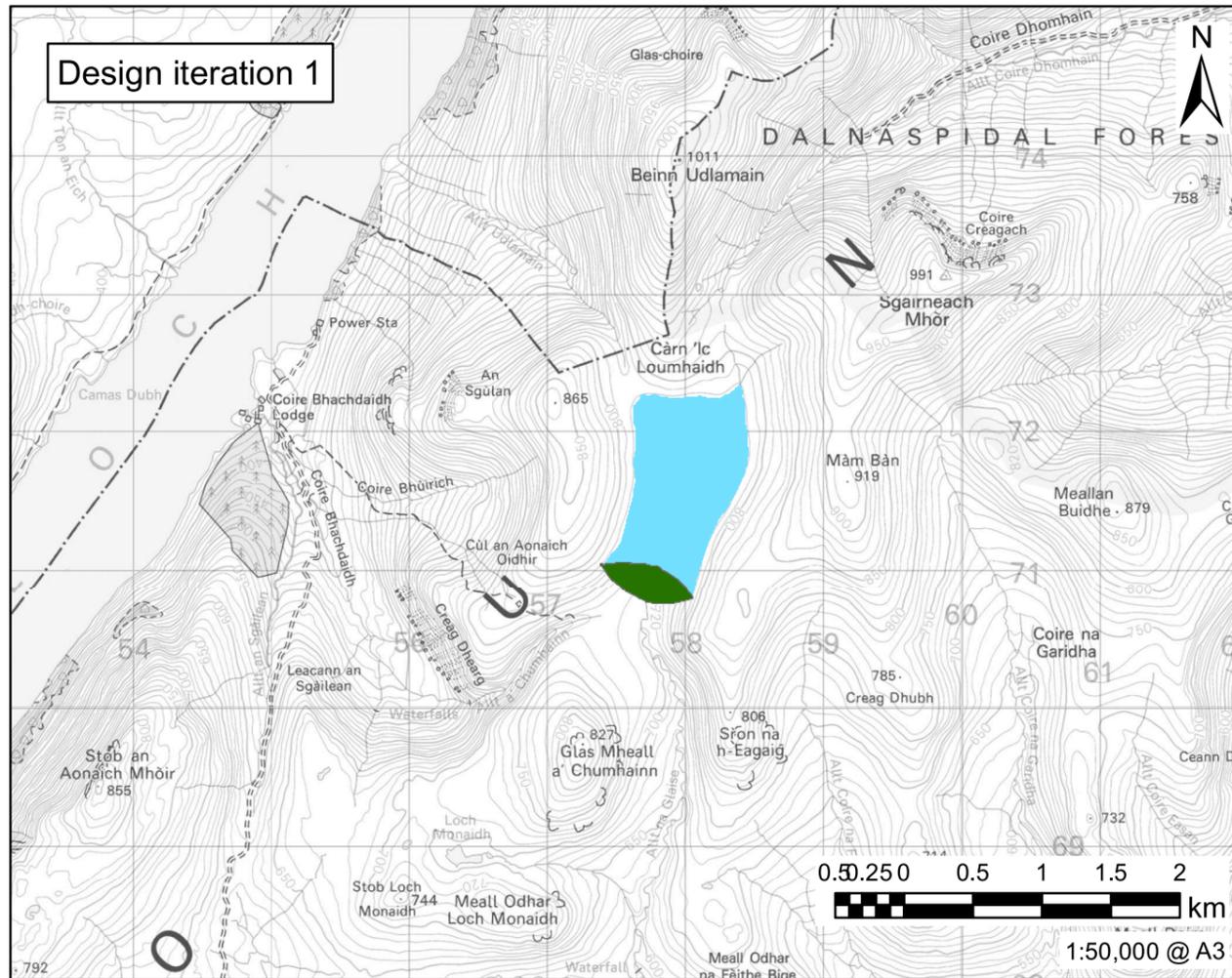
- LEGEND**
- Development Boundary
 - Development Boundary - 5km Buffer
 - Listed Building
 - Core Path
 - Watercourse
 - The Cairngorms National Park
 - Scheduled Monument
 - Ramsar Site
 - National Nature Reserve (NNR)
 - Ancient Woodland Inventory
 - Special Areas of Conservation (SAC)
 - Site of Special Scientific Interest (SSSI)
 - Special Protected Area (SPA)

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 Constraints Plan

SHEET NUMBER
 Figure 2.1

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- Headpond Impoundment
- Indicative Dam Footprint

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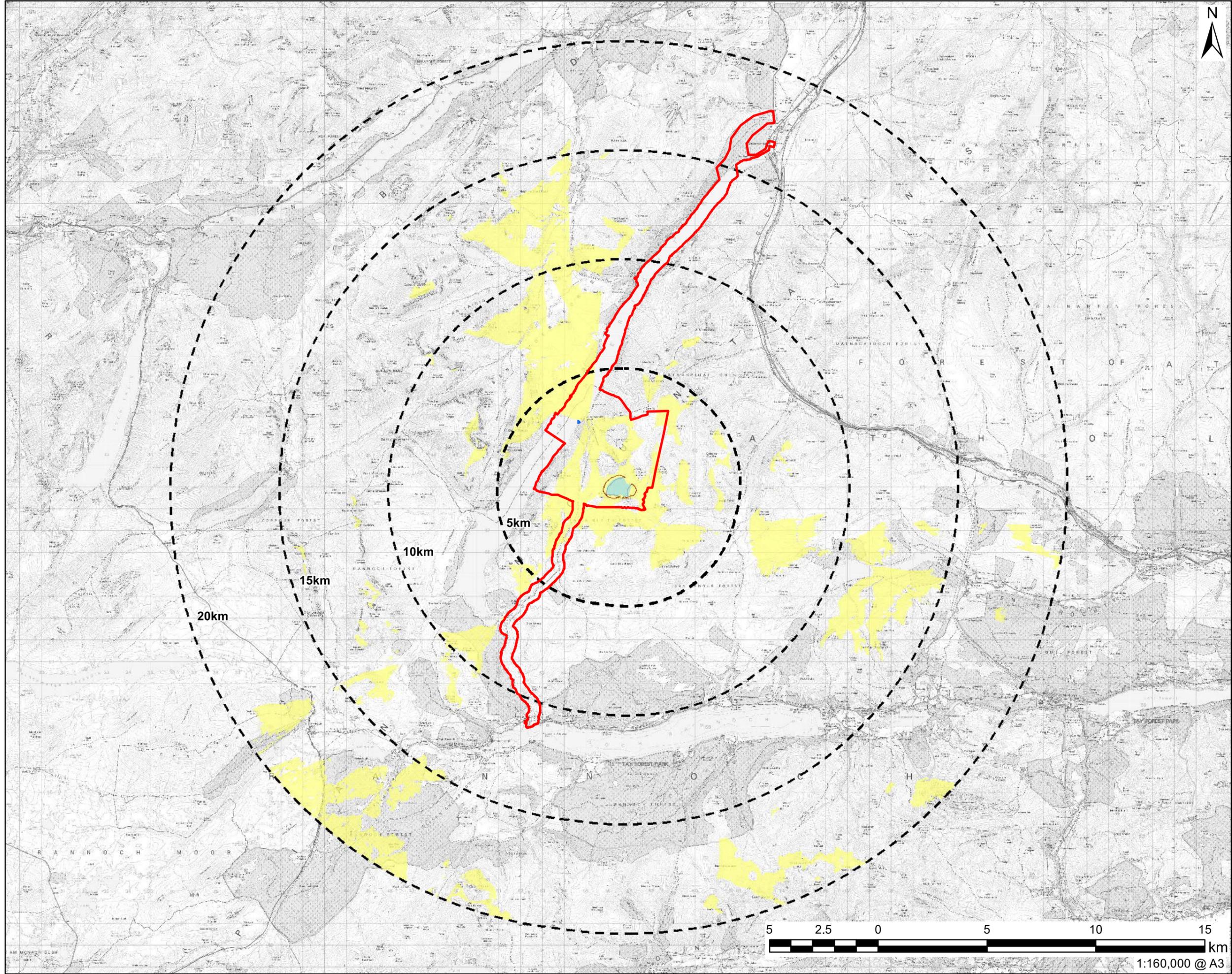
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Design Evolution

Figure 2.2

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LEGEND

- Development Boundary
- Headpond Impoundment
- Indicative Dam Footprint
- Tailpond Inlet/Outlet
- 5km Distance Bands from Headpond
- Headpond Zone of Theoretical Visibility

NOTES

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 Zone of Theoretical Visibility (ZTV) has been calculated based on a maximum height of the headpond of 735m AOD and a maximum height of 736.5m AOD for the top of the dam. Points were spaced 10m along the top of the dam and in a 10m grid over the loch surface. The ZTV was calculated with a viewer height of 1.8m.
 The Digital Terrain Model used was OS Terrain 5 which does not take account of the screening effects of vegetation, buildings or other structures.

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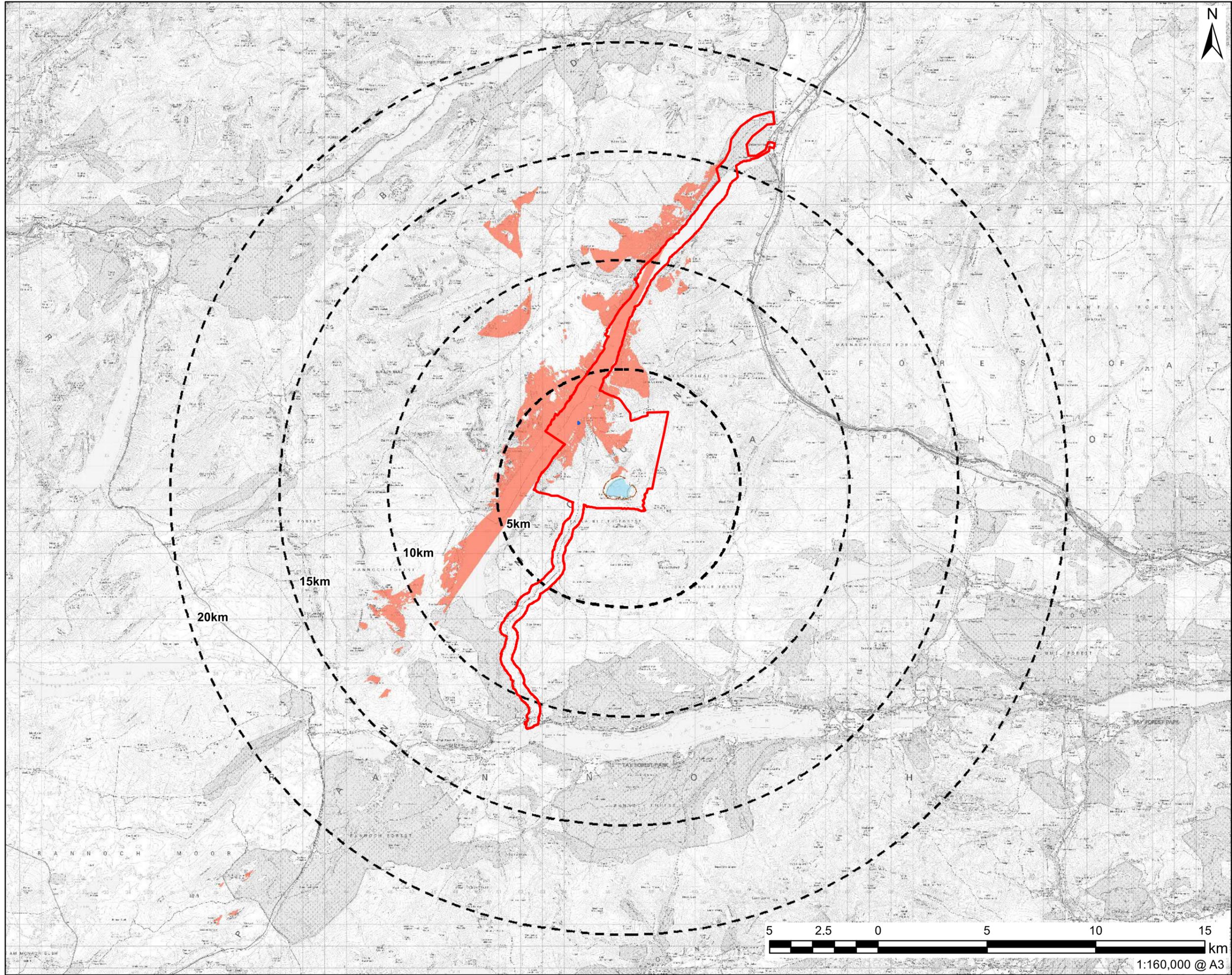
SHEET TITLE

Zone of Theoretical Visibility (Development Headpond)

SHEET NUMBER

Figure 5.1

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- Development Boundary
- Headpond Impoundment
- Indicative Dam Footprint
- Tailpond Inlet/Outlet
- 5km Distance Bands from Headpond
- Tailpond Inlet/Outlet Zone of Theoretical Visibility

NOTES

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 Zone of Theoretical Visibility (ZTV) for the tailpond inlet/outlet has been calculated based on a Maximum height of 373m AOD. The ZTV was calculated with a viewer height of 1.8m. The Digital Terrain Model used was OS Terrain 5, which does not take account of the screening effects of vegetation, buildings or other structures.

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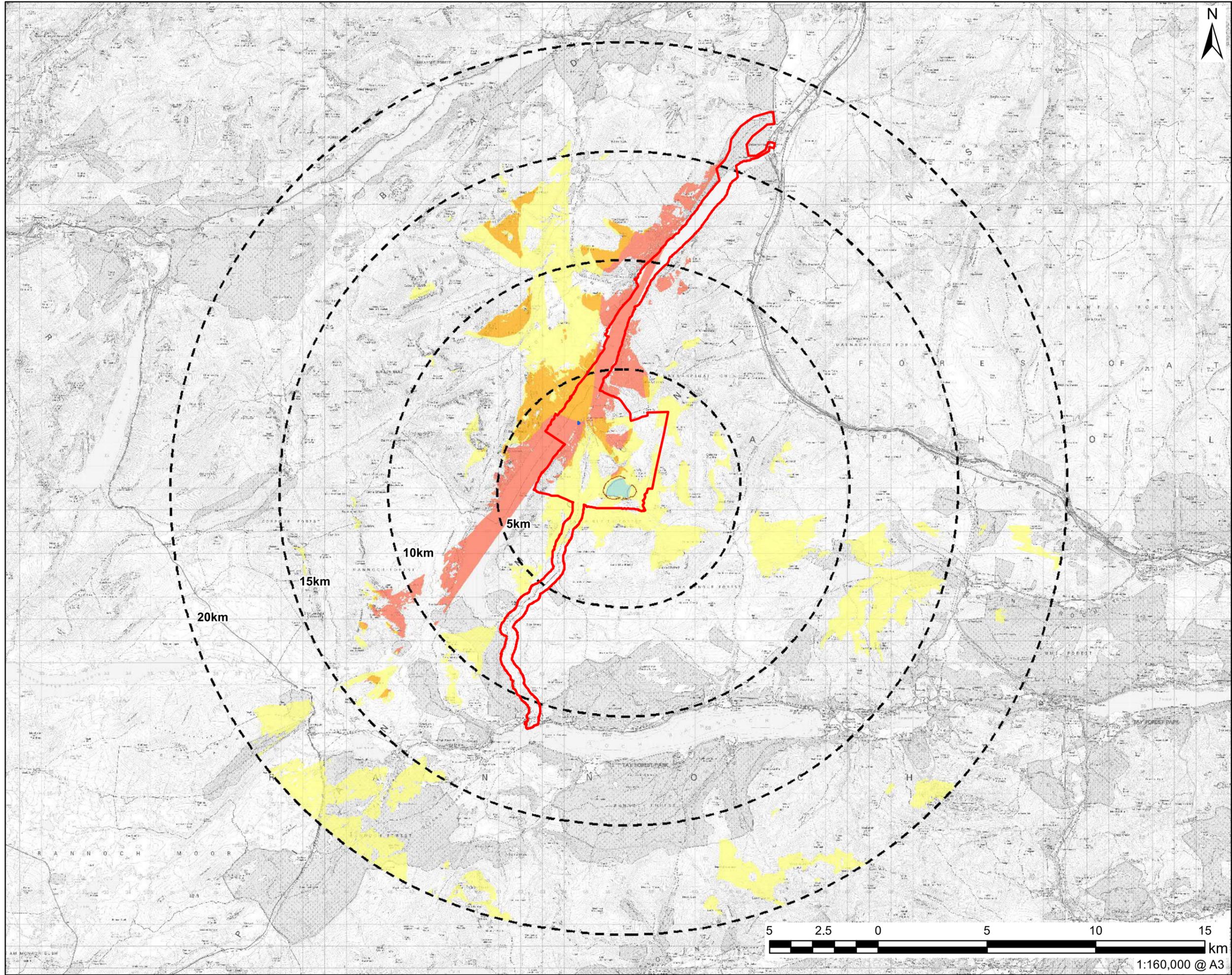
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Zone of Theoretical Visibility (Development Tailpond)

SHEET NUMBER

Figure 5.2

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- LEGEND**
- Development Boundary
 - Headpond Impoundment
 - Indicative Dam Footprint
 - Tailpond Inlet/Outlet
 - 5km Distance Bands from Headpond
 - Zone of Theoretical Visibility
 - Tailpond Visible
 - Headpond Visible
 - Headpond and Tailpond Visible

NOTES

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Zone of Theoretical Visibility (ZTV) has been calculated based on a maximum height of the headpond of 735m AOD and a maximum height of 736.5m AOD for the top of the dam. Points were spaced 10m along the top of the dam and in a 10m grid over the loch surface. The ZTV was calculated with a viewer height of 1.8m.

Zone of Theoretical Visibility (ZTV) for the tailpond inlet/outlet has been calculated based on a Maximum height of 373m AOD. The ZTV was calculated with a viewer height of 1.8m.

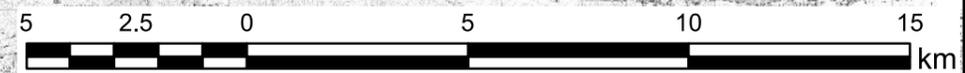
The Digital Terrain Model used was OS Terrain 5 which does not take account of the screening effects of vegetation, buildings or other structures.

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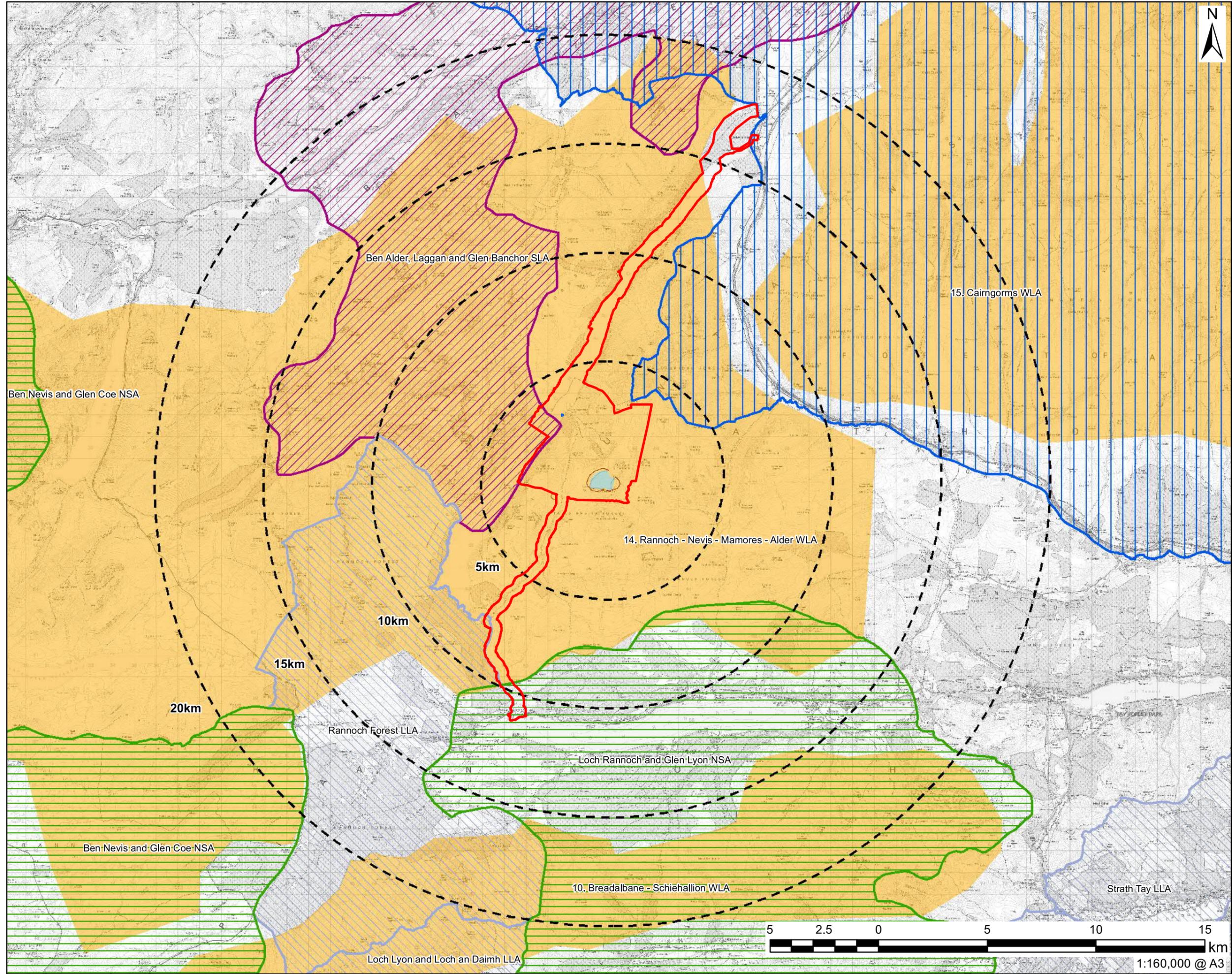
SHEET TITLE
Zone of Theoretical Visibility (Development Headpond and Tailpond)

SHEET NUMBER
Figure 5.3



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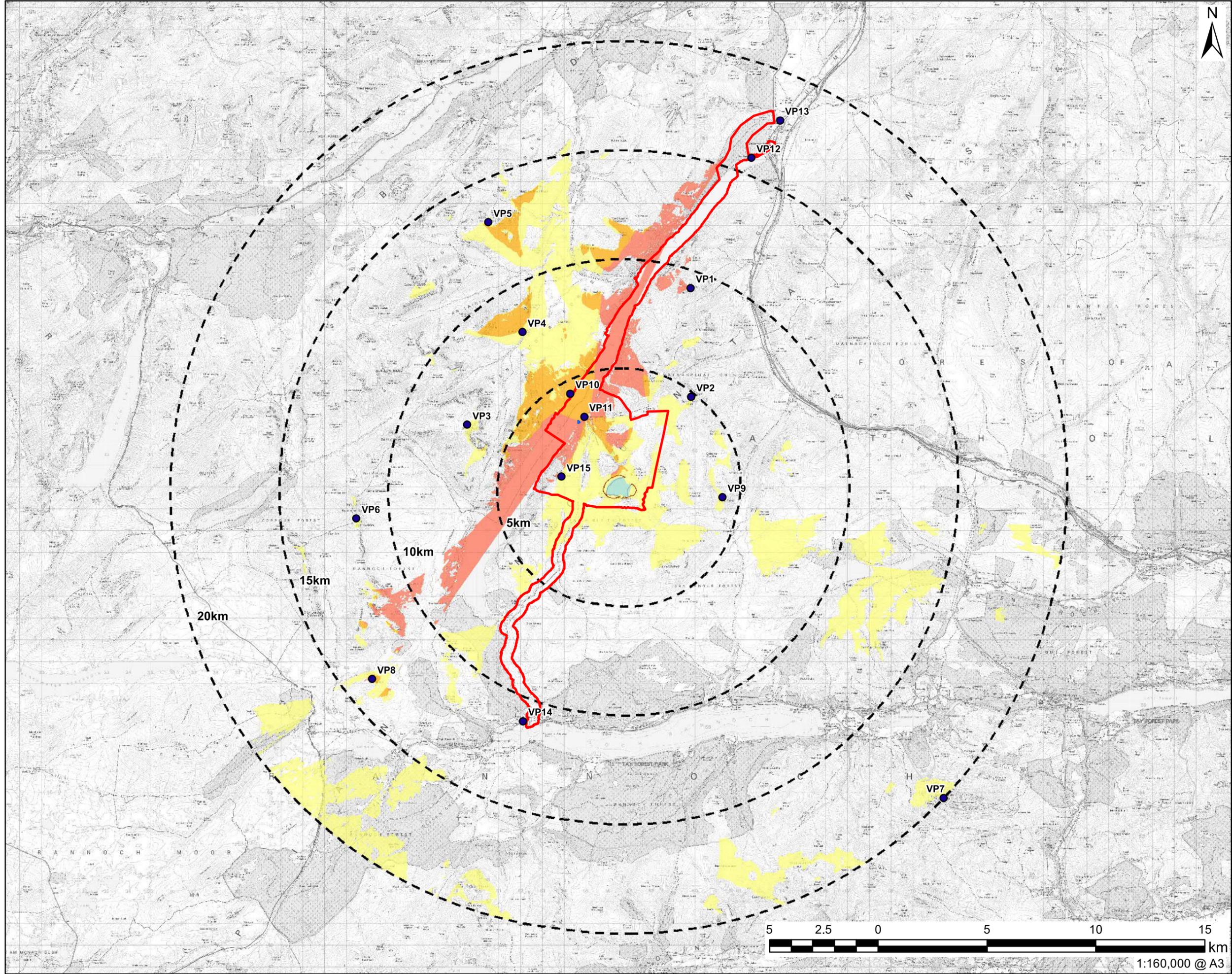
- LEGEND**
- Development Boundary
 - Headpond Impoundment
 - Indicative Dam Footprint
 - Tailpond Inlet/Outlet
 - 5km Distance Bands from Headpond
 - Special Landscape Area (SLA)(Highland Council)
 - Local Landscape Area (LLA)(Perth and Kinross Council)
 - Wild Land Area (WLA)
 - National Scenic Area (NSA)
 - Cairngorms National Park

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SHEET TITLE
 Landscape Designations

SHEET NUMBER
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LEGEND

- Development Boundary
- Headpond Impoundment
- Indicative Dam Footprint
- Tailpond Inlet/Outlet
- 5km Distance Bands from Headpond
- Proposed Viewpoints

Zone of Theoretical Visibility

- Tailpond Visible
- Headpond Visible
- Headpond and Tailpond Visible

NOTES

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Zone of Theoretical Visibility (ZTV) for the tailpond inlet/outlet has been calculated based on a Maximum height of 373m AOD. The ZTV was calculated with a viewer height of 1.8m.

The Digital Terrain Model used was OS Terrain 5 which does not take account of the screening effects of vegetation, buildings or other structures.

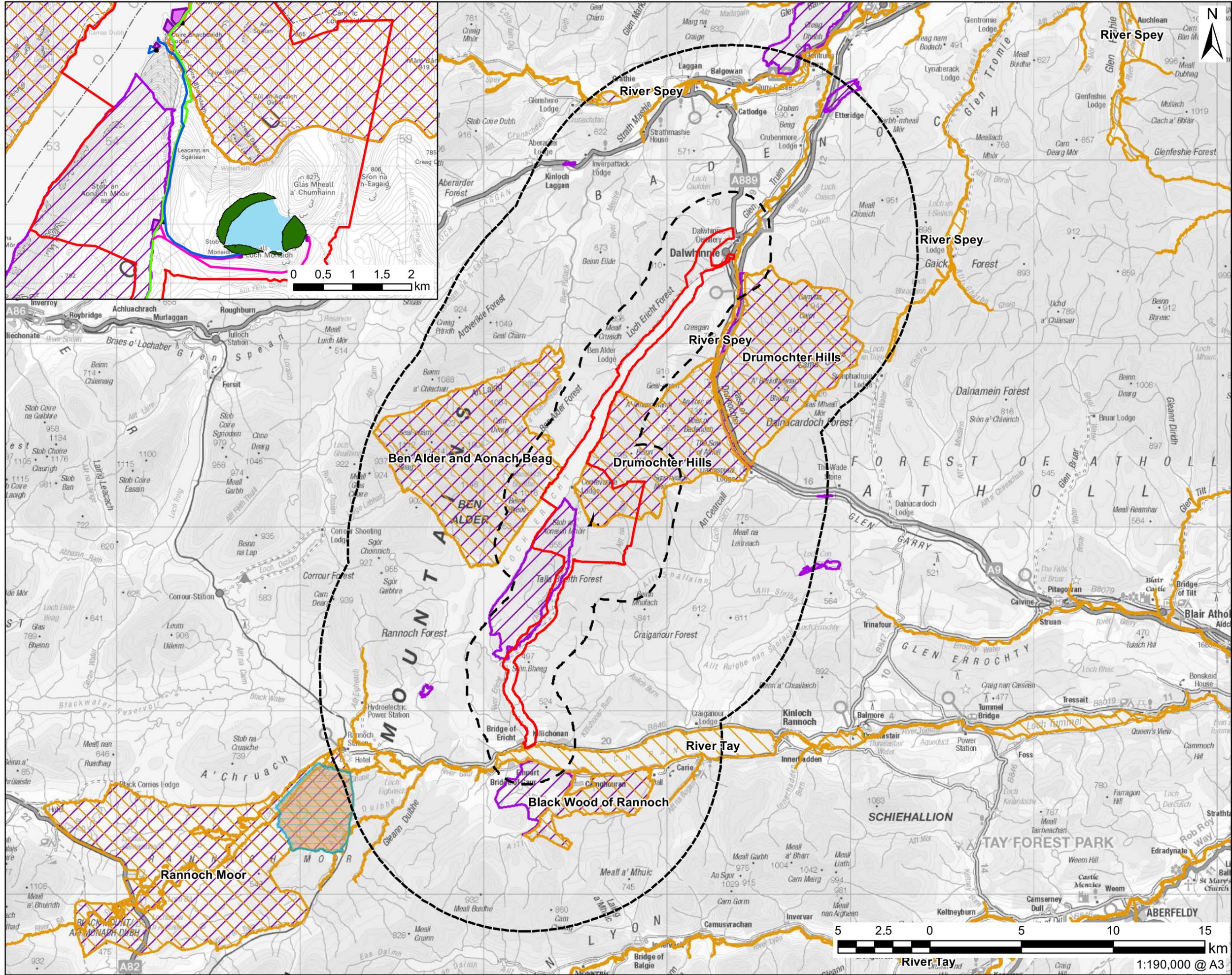
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SHEET TITLE
 Representative Viewpoints

SHEET NUMBER
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- LEGEND**
- Development Boundary
 - Development Boundary - 2km Buffer
 - Spillway Pipe
 - New Track
 - Upgrade Existing Track
 - Construction Compound
 - Tailpond Inlet/Outlet
 - Tunnel Portal
 - Headpond Impoundment
 - Indicative Dam Footprint
 - Ramsar Site
 - National nature reserve
 - Special Areas of Conservation (SAC)
 - Site of Special Scientific Interest (SSSI)

NOTES

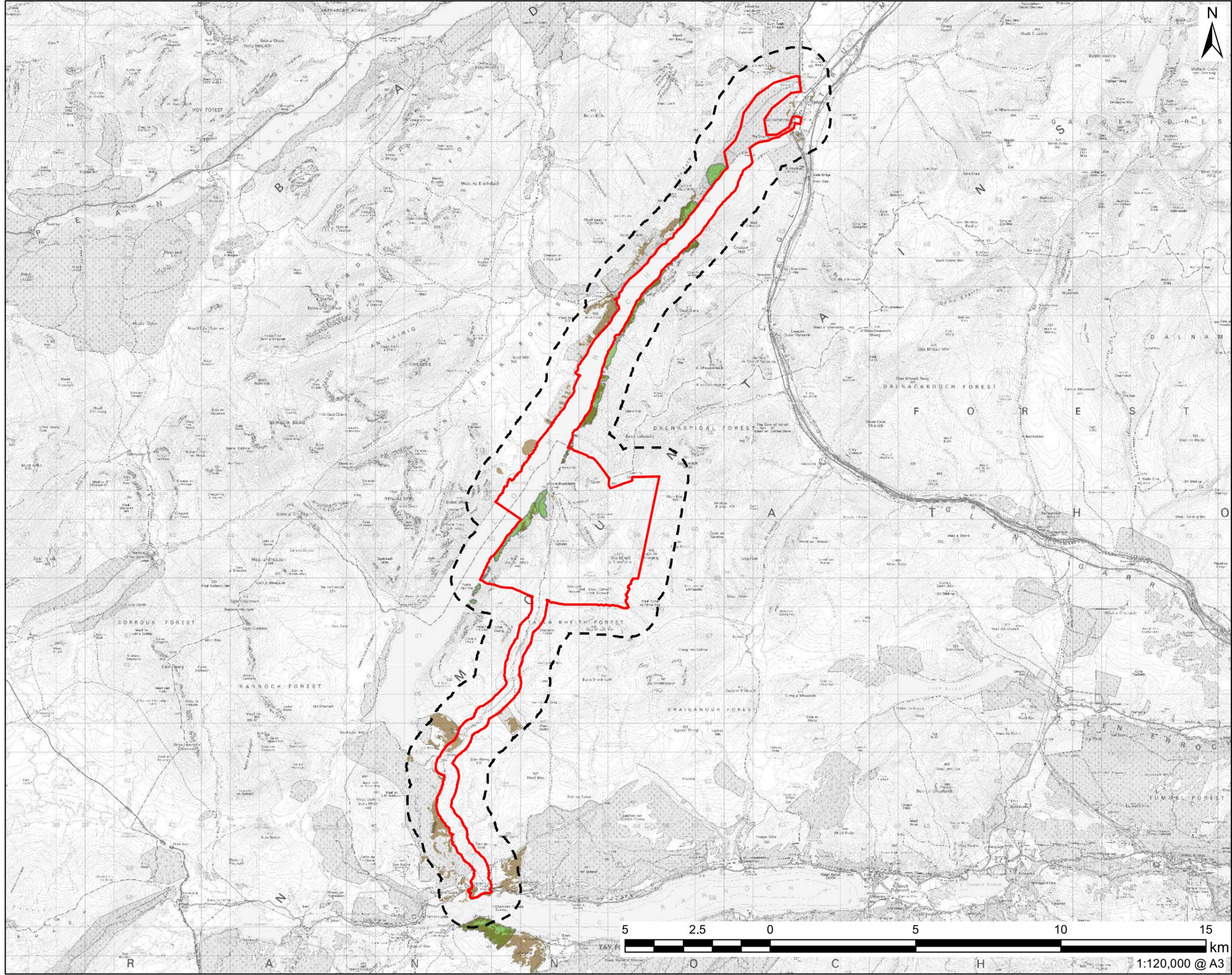
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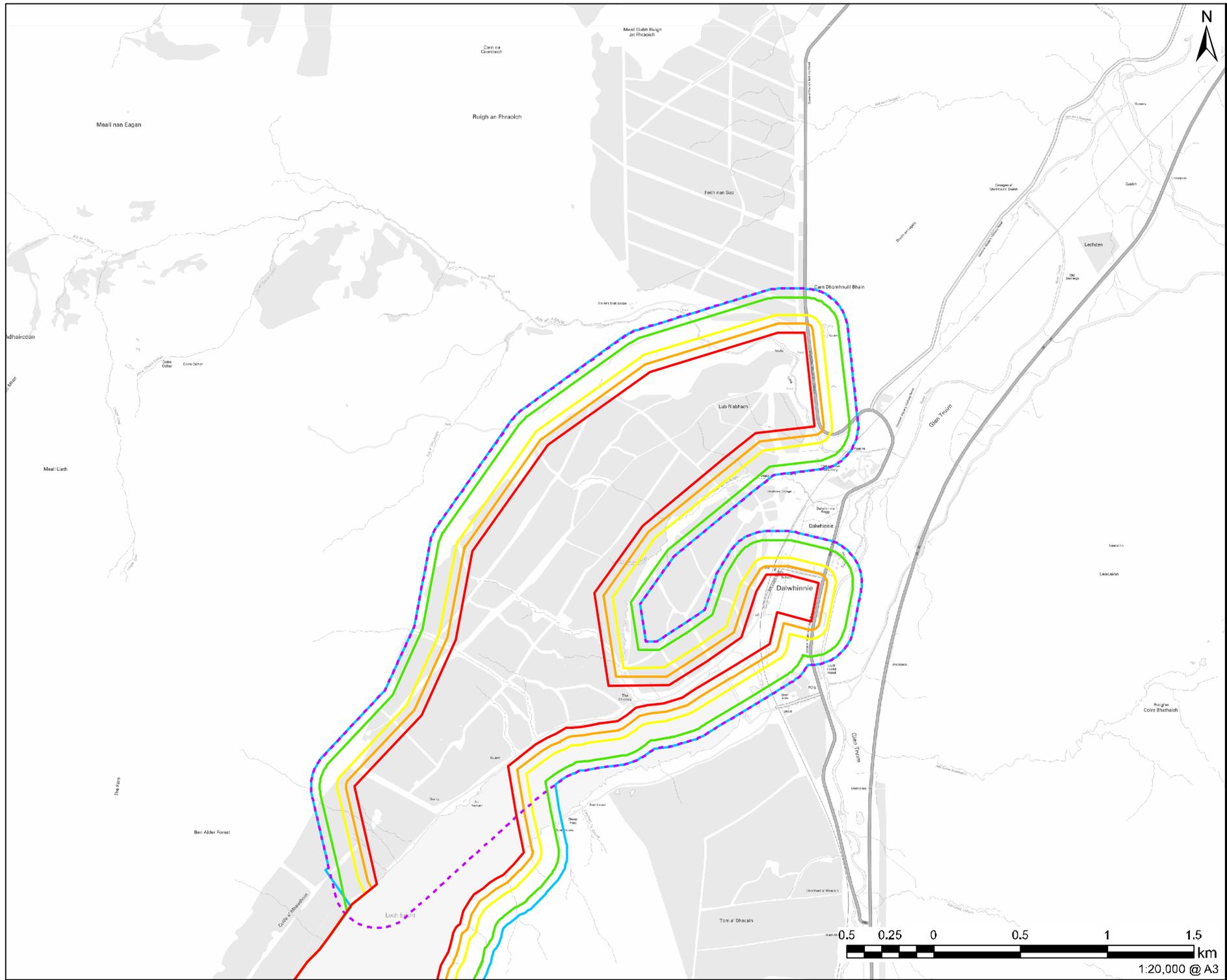
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 Statutory Designations

SHEET NUMBER
 Figure 6.1



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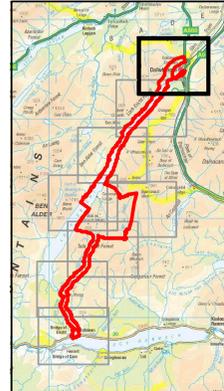


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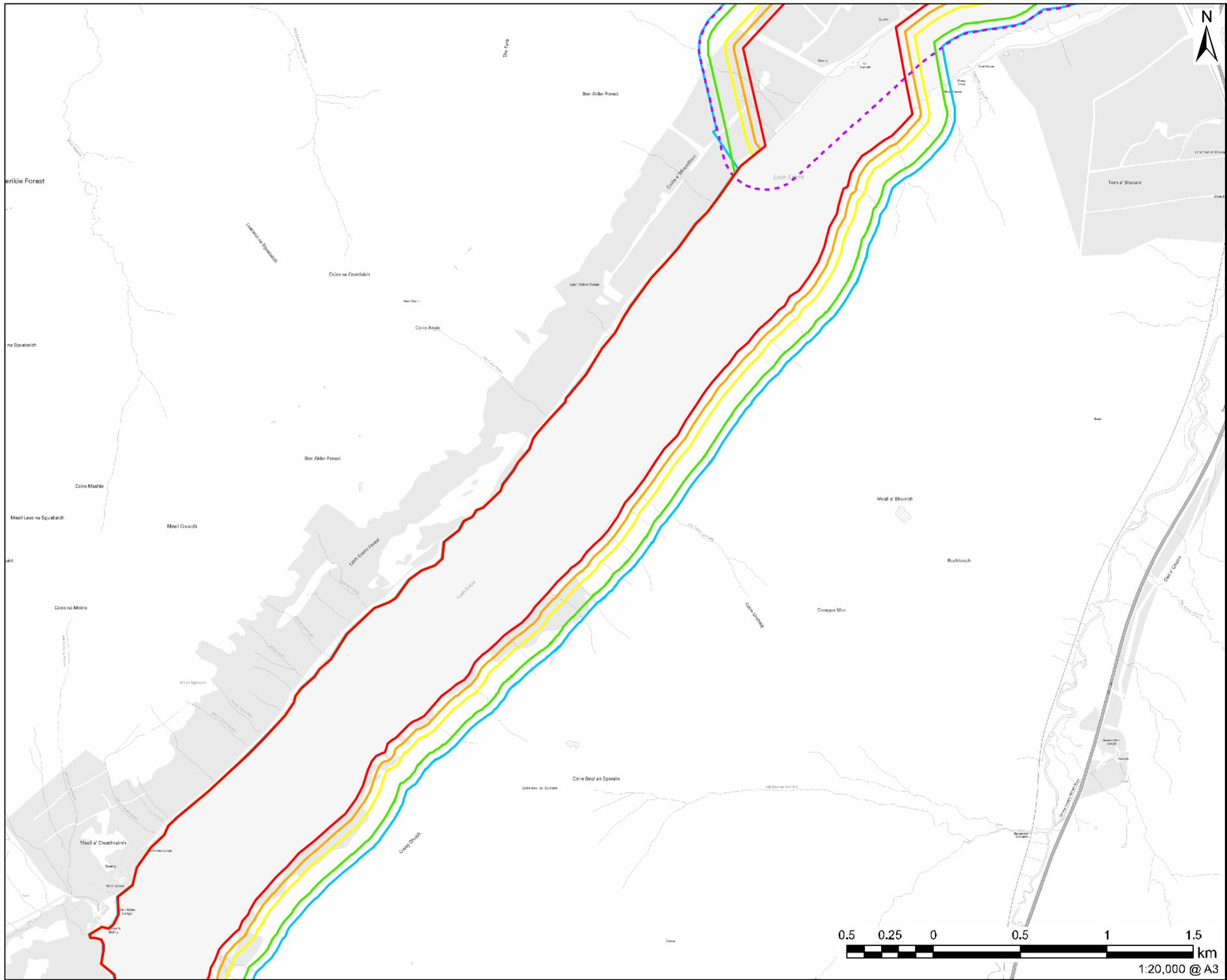
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- LEGEND**
- Development Boundary
 - Bat roost survey area
 - Phase 1 and Badger survey areas
 - Otter and Water Vole survey area
 - Pine Marten and Wildcat survey area
 - - - NVC survey area



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SHEET TITLE
 Terrestrial Ecology
 Field Survey Areas
SHEET NUMBER
 Figure 6.3-A

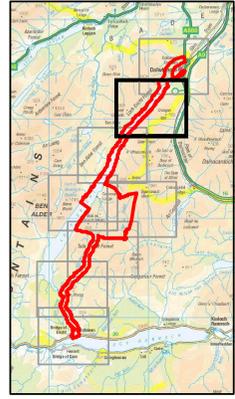


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- LEGEND**
- Development Boundary
 - Bat roost survey area
 - Phase 1 and Badger survey areas
 - Otter and Water Vole survey area
 - Pine Marten and Wildcat survey area
 - NVC survey area



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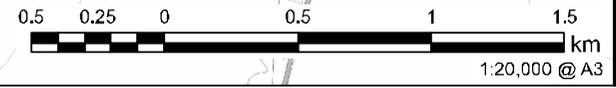
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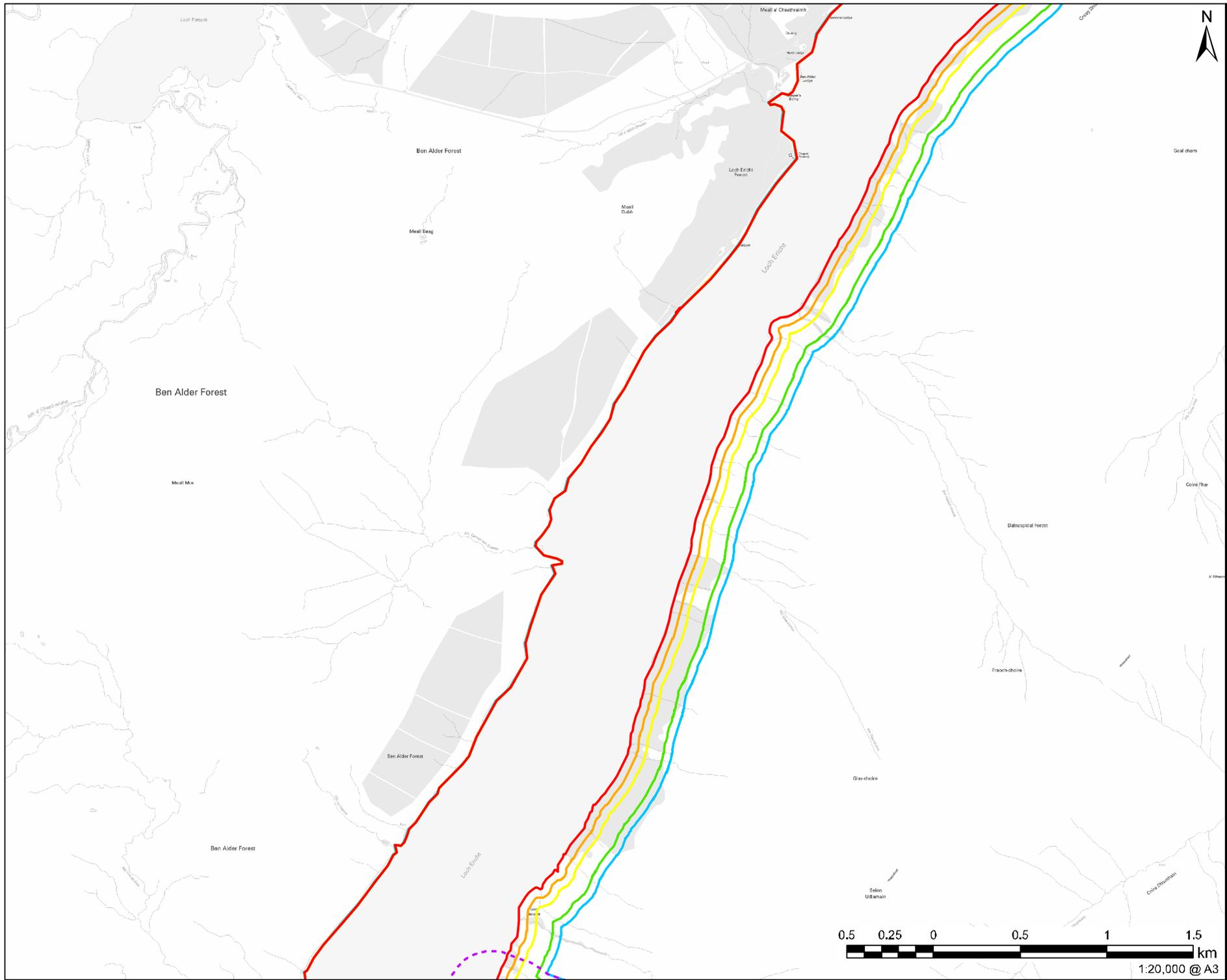
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PROJECT NUMBER

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SHEET TITLE

Terrestrial Ecology
 Field Survey Areas

SHEET NUMBER
 Figure 6.3- B





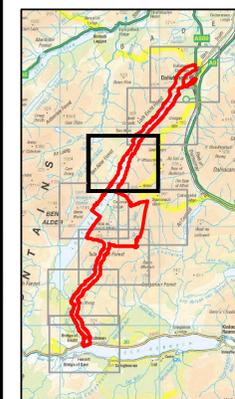
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- LEGEND**
- Development Boundary
 - Bat roost survey area
 - Phase 1 and Badger survey areas
 - Otter and Water Vole survey area
 - Pine Marten and Wildcat survey area
 - NVC survey area



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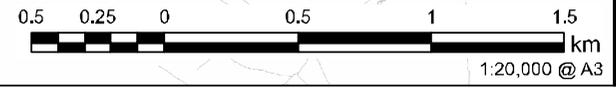
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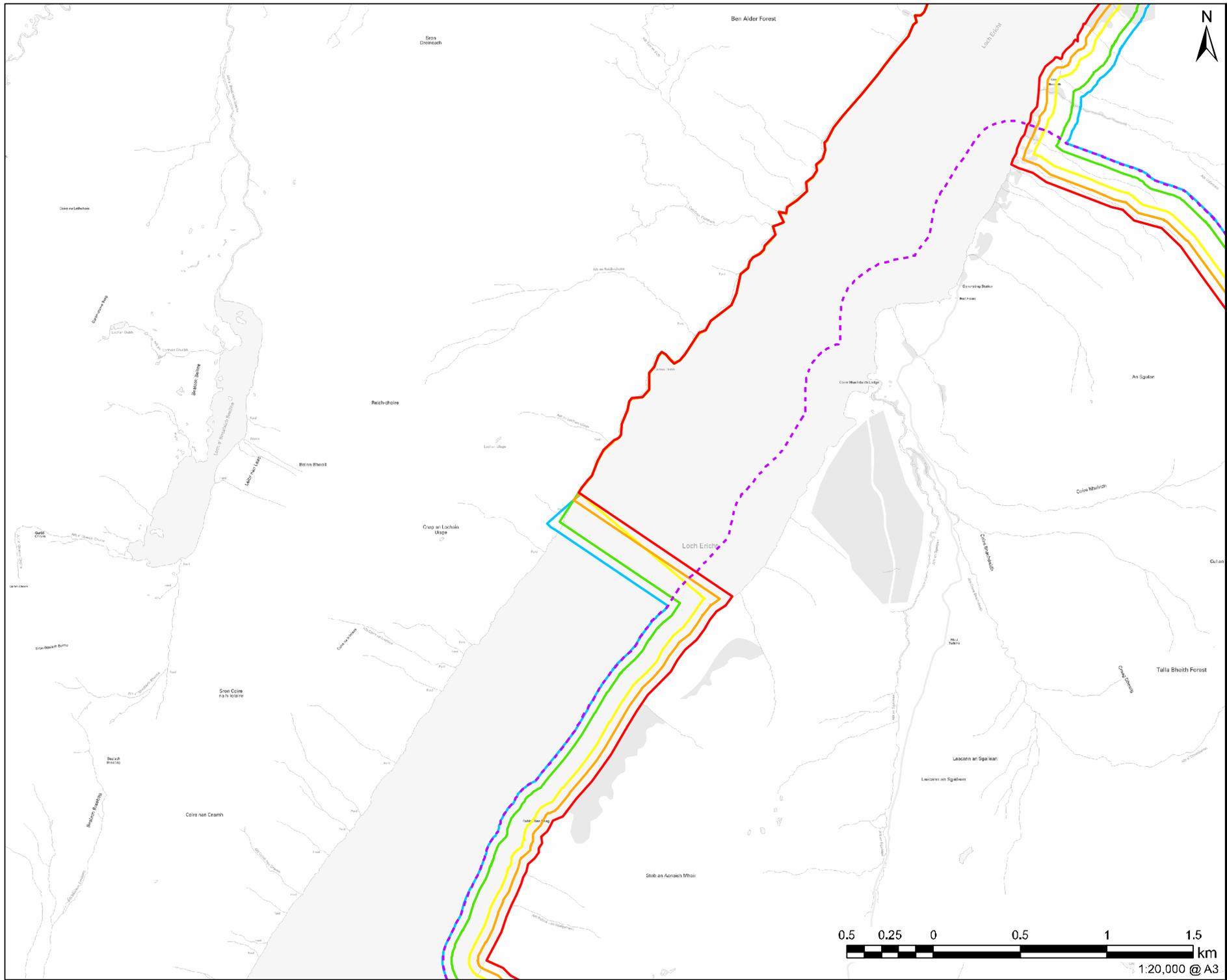
SHEET TITLE

Terrestrial Ecology
 Field Survey Areas

SHEET NUMBER

Figure 6.3- C



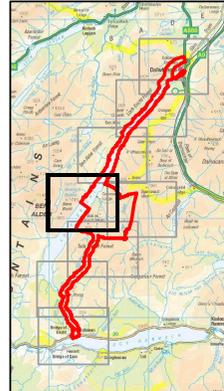


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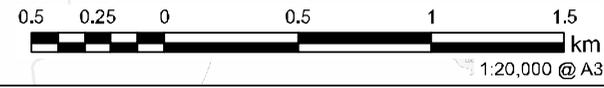
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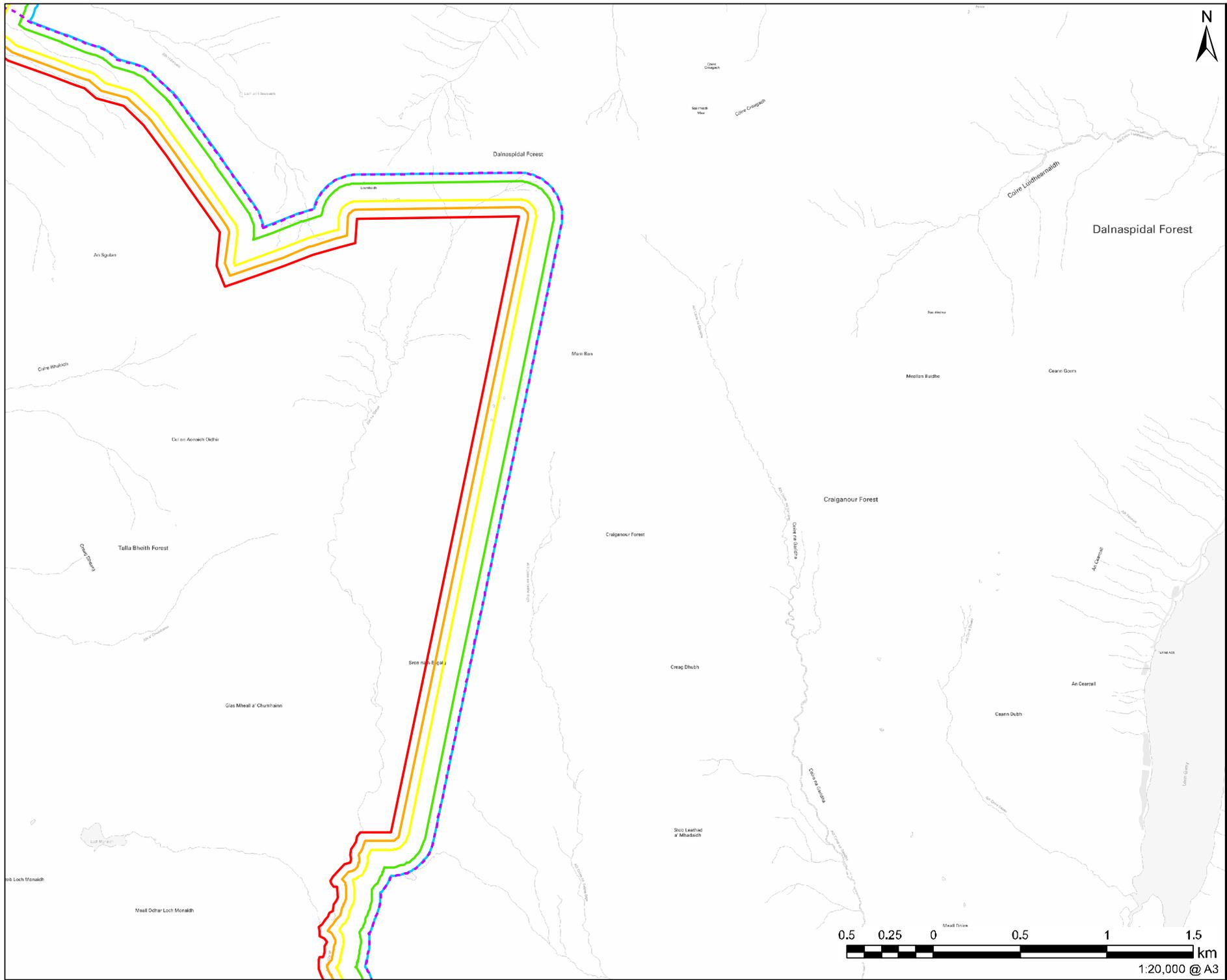
- LEGEND**
- Development Boundary
 - Bat roost survey area
 - Phase 1 and Badger survey areas
 - Otter and Water Vole survey area
 - Pine Marten and Wildcat survey area
 - NVC survey area



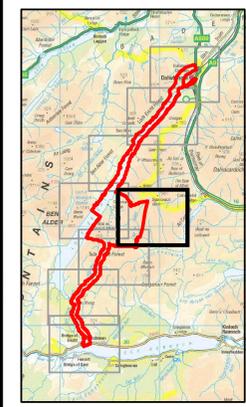
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Terrestrial Ecology
Field Survey Areas
SHEET NUMBER
Figure 6.3- D



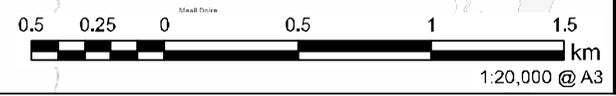


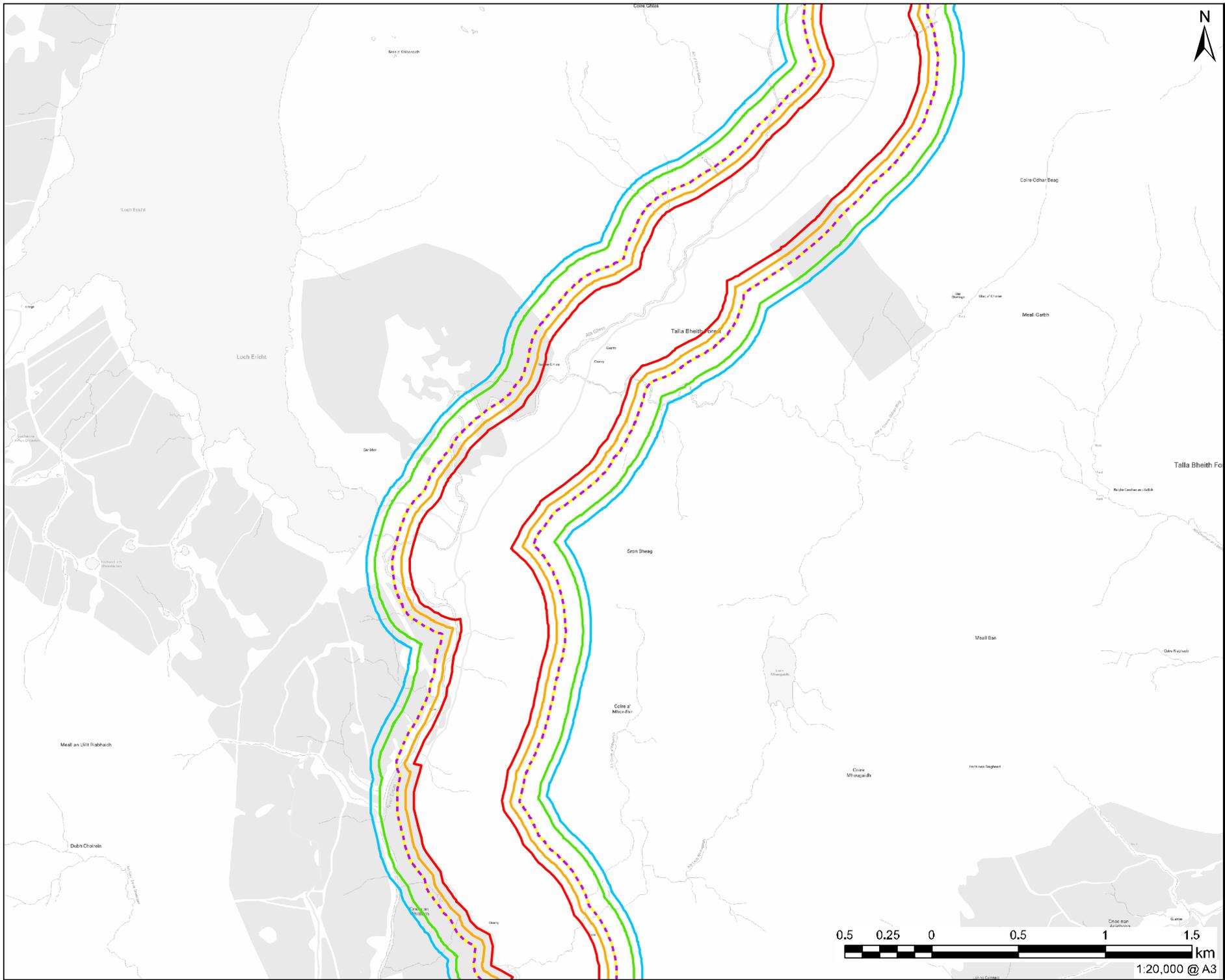
- LEGEND**
- Development Boundary
 - Bat roost survey area
 - Phasg 1 and Badger survey areas
 - Otter and Water Vole survey area
 - Pine Marten and Wildcat survey area
 - NVC survey area



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SHEET TITLE
Terrestrial Ecology
Field Survey Areas
SHEET NUMBER
Figure 6.3- E





- LEGEND**
- Development Boundary
 - Bat roost survey area
 - Phase 1 and Badger survey areas
 - Otter and Water Vole survey area
 - Pine Marten and Wildcat survey area
 - - - NVC survey area



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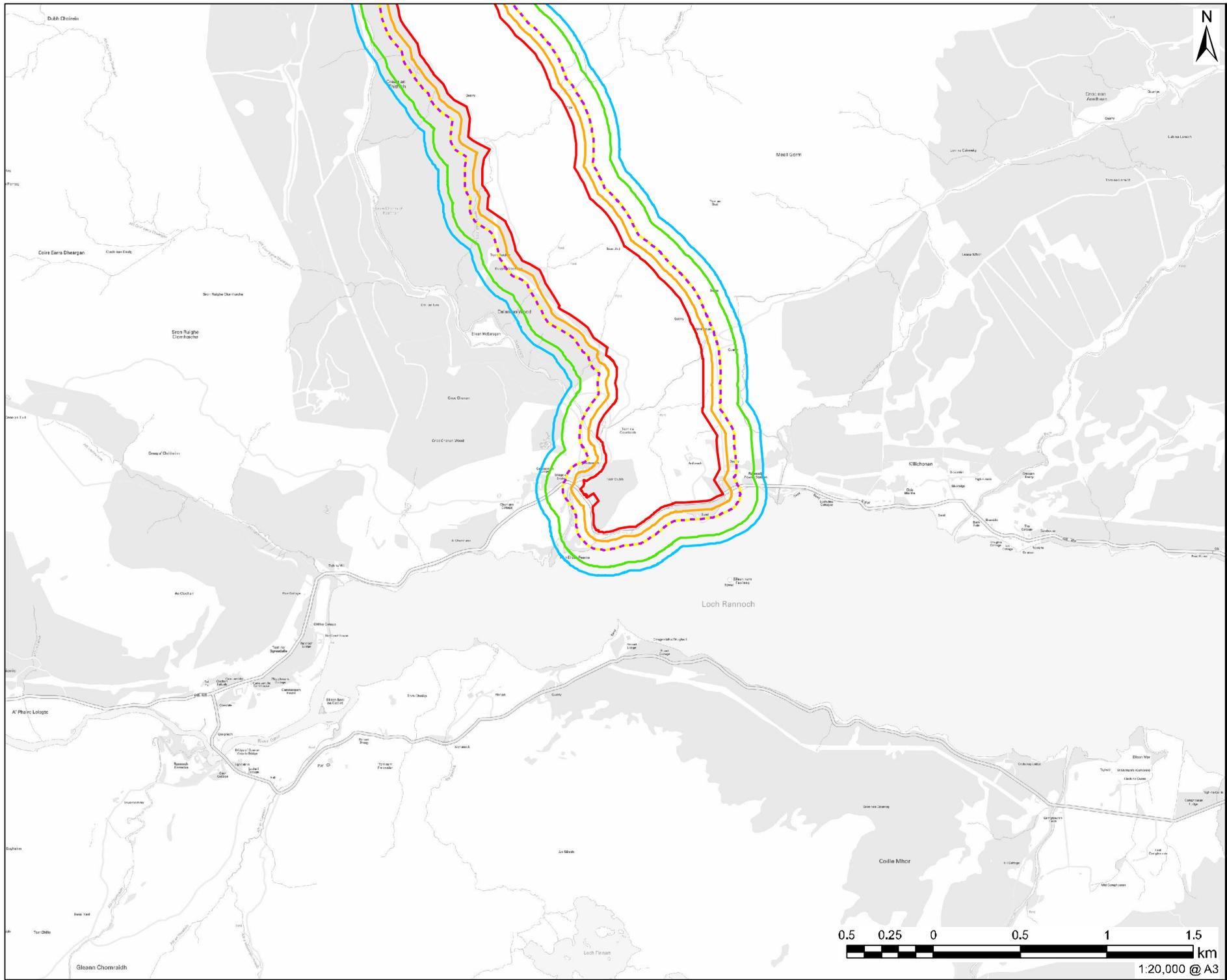
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SHEET TITLE
Terrestrial Ecology
Field Survey Areas

SHEET NUMBER
Figure 6.3- G



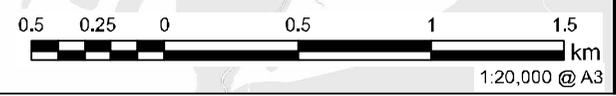


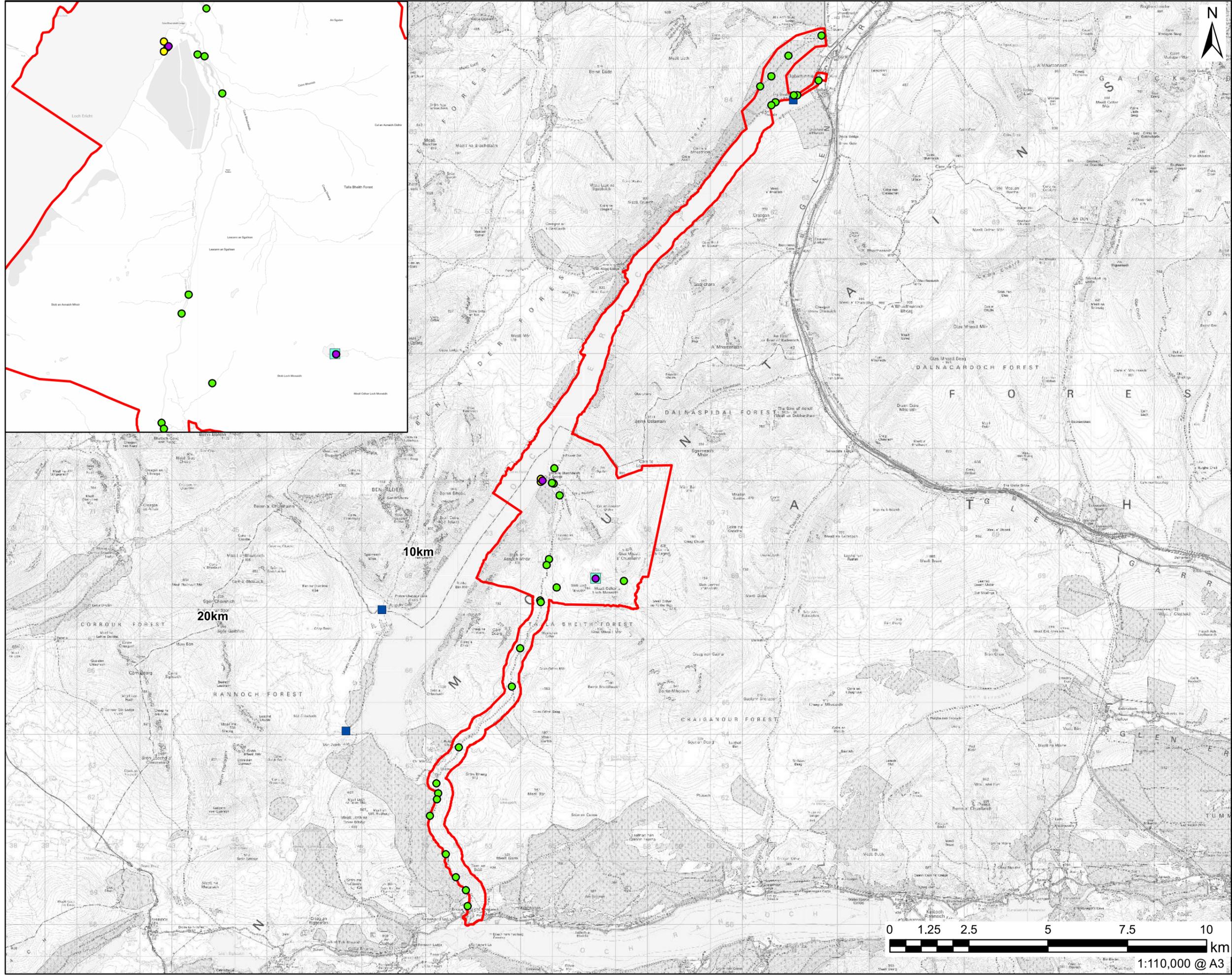
- LEGEND**
- Development Boundary
 - Bat roost survey area
 - Phase 1 and Badger survey areas
 - Otter and Water Vole survey area
 - Pine Marten and Wildcat survey area
 - NVC survey area



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ISSUE PURPOSE
 FINAL
PROJECT NUMBER
 60570241
SHEET TITLE
 Terrestrial Ecology
 Field Survey Areas
SHEET NUMBER
 Figure 6.3- H





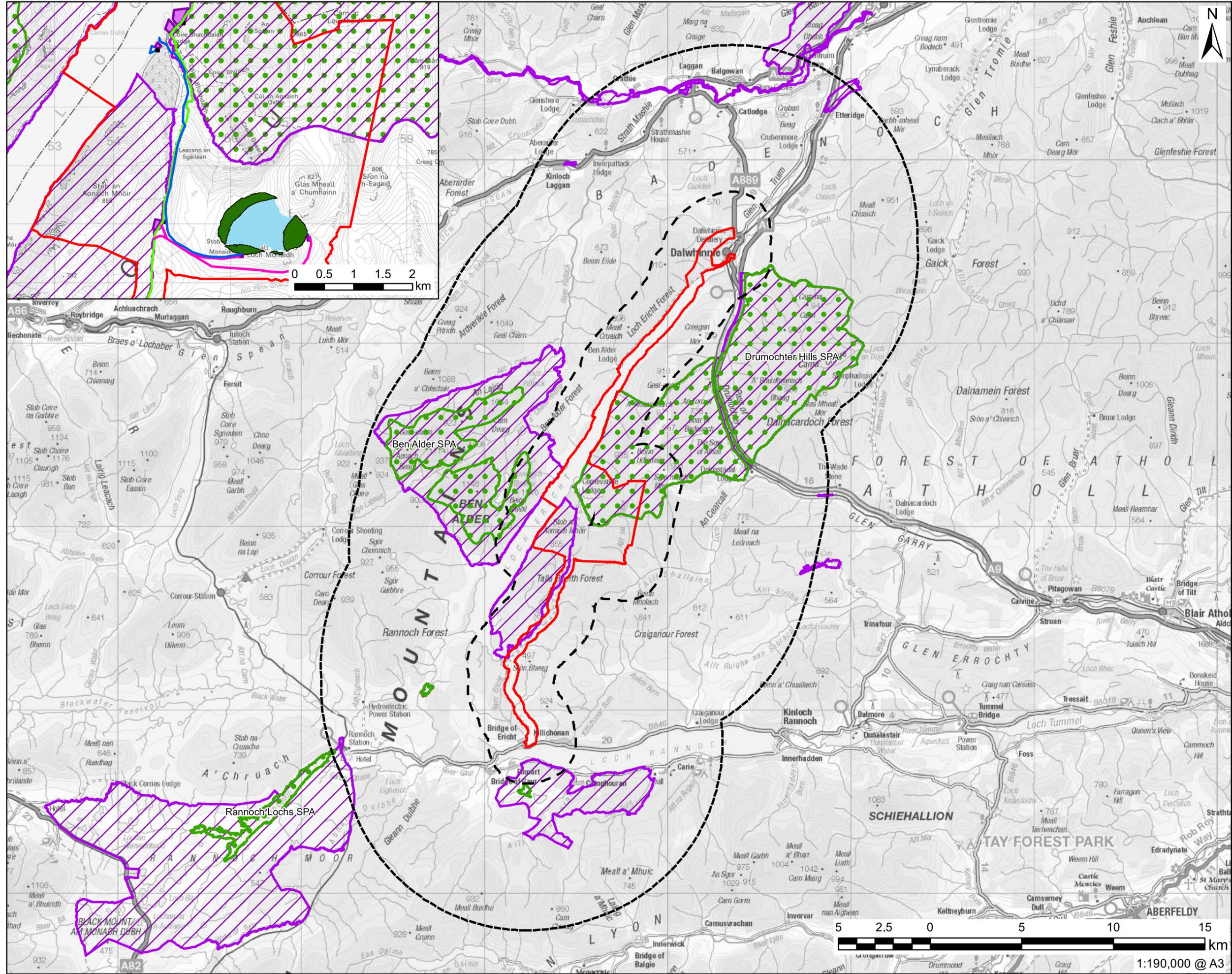
- LEGEND**
- Development Boundary
 - Aquatic invertebrate survey, fish spawning habitat survey, macrophyte survey, and FWPM habitat survey
 - Fish eDNA and fish habitat survey
 - Fish passage assessment and FWPM eDNA survey
 - Lake macrophyte survey and aquatic invertebrate survey
 - PSYM survey (aquatic invertebrate and macrophyte survey)

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ISSUE PURPOSE
 FINAL
PROJECT NUMBER
 60570241
SHEET TITLE
 Aquatic Survey Locations

SHEET NUMBER
 Figure 7.1

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Pumped Storage Hydro

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LEGEND

- Development Boundary
- Development Boundary - 2km Buffer
- Site of Special Scientific Interest (SSSI)
- Special Protection Area (SPA)
- Inset Map - Above Ground Infrastructure
- Spillway Pipe
- New Track
- Upgrade Existing Track
- Construction Compound
- Tailpond Inlet/Outlet
- Tunnel Portal
- Headpond Impoundment
- Indicative Dam Footprint

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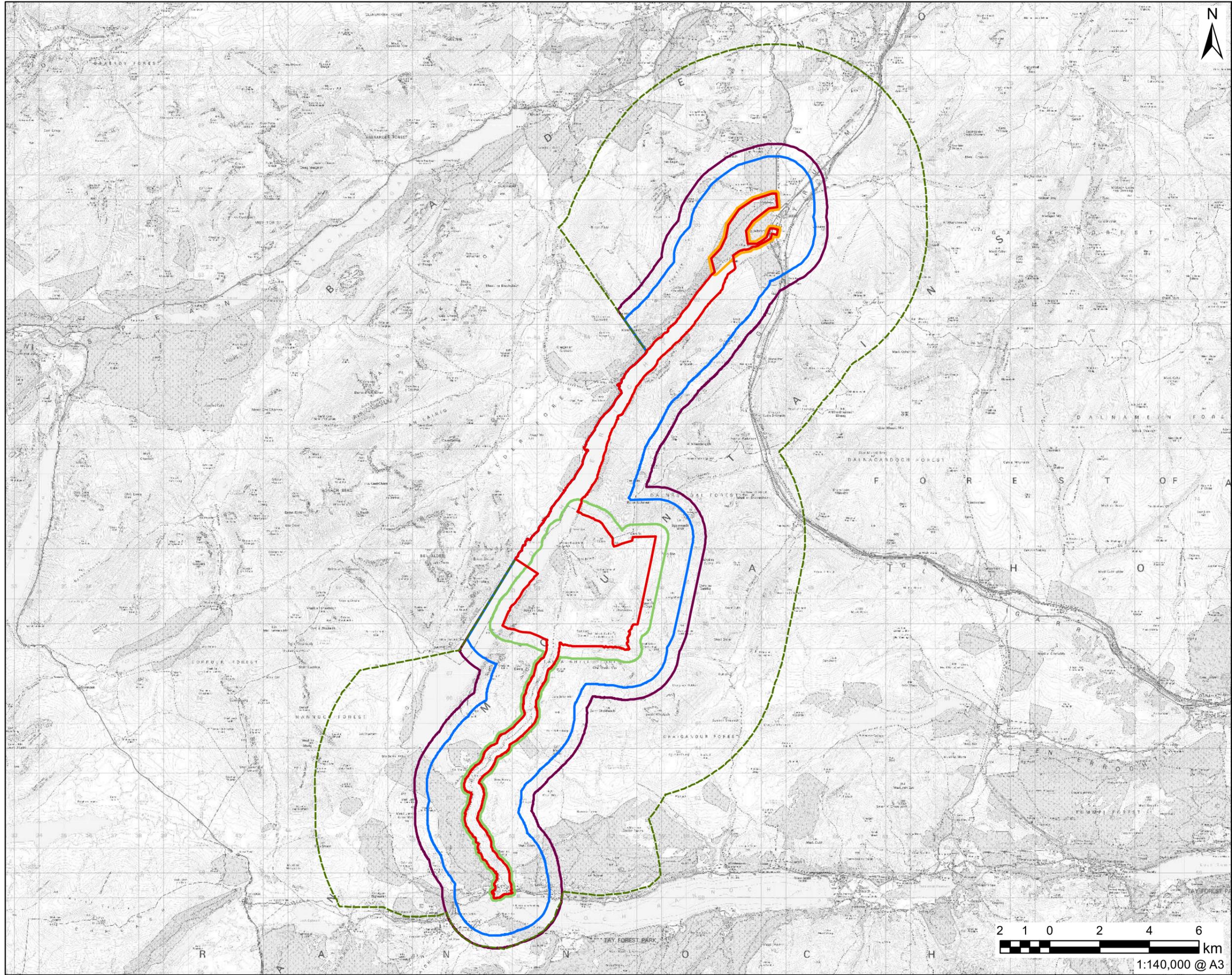
60570241

SHEET TITLE

Statutory Designations

SHEET NUMBER

Figure 8.1



- LEGEND**
- Development Boundary
 - Breeding Raptors Survey Area
 - - - Moorland Breeding Bird Survey Area
 - - - Golden Eagle Survey Area
 - Breeding Diver and Black Grouse Survey Areas
 - Common Bird Census Area

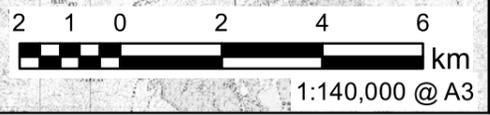
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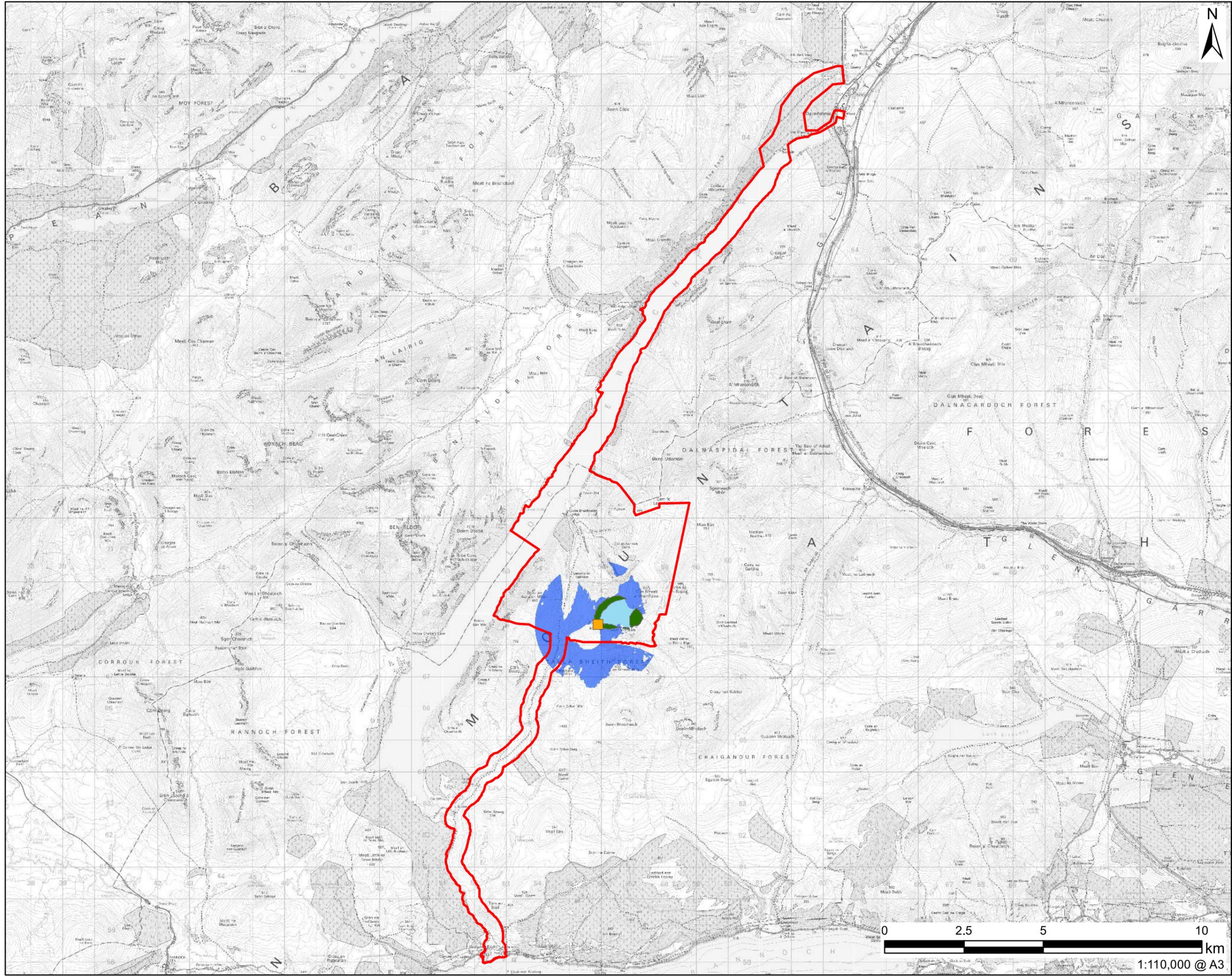
PROJECT NUMBER
60570241

SHEET TITLE
Ornithology
Field Survey Areas

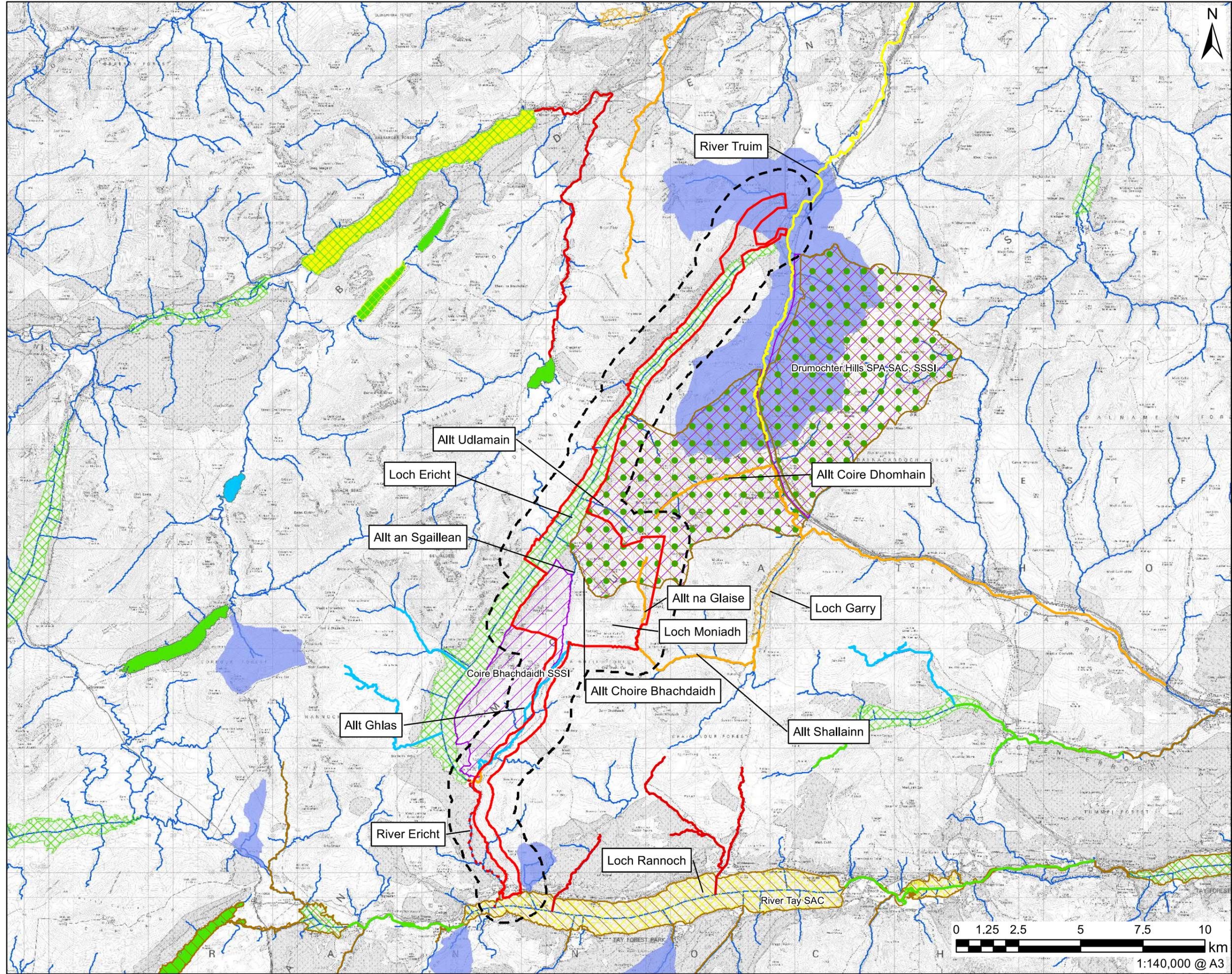
SHEET NUMBER
Figure 8.2



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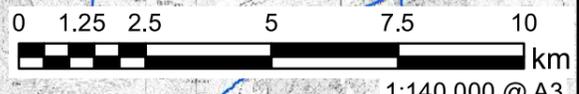
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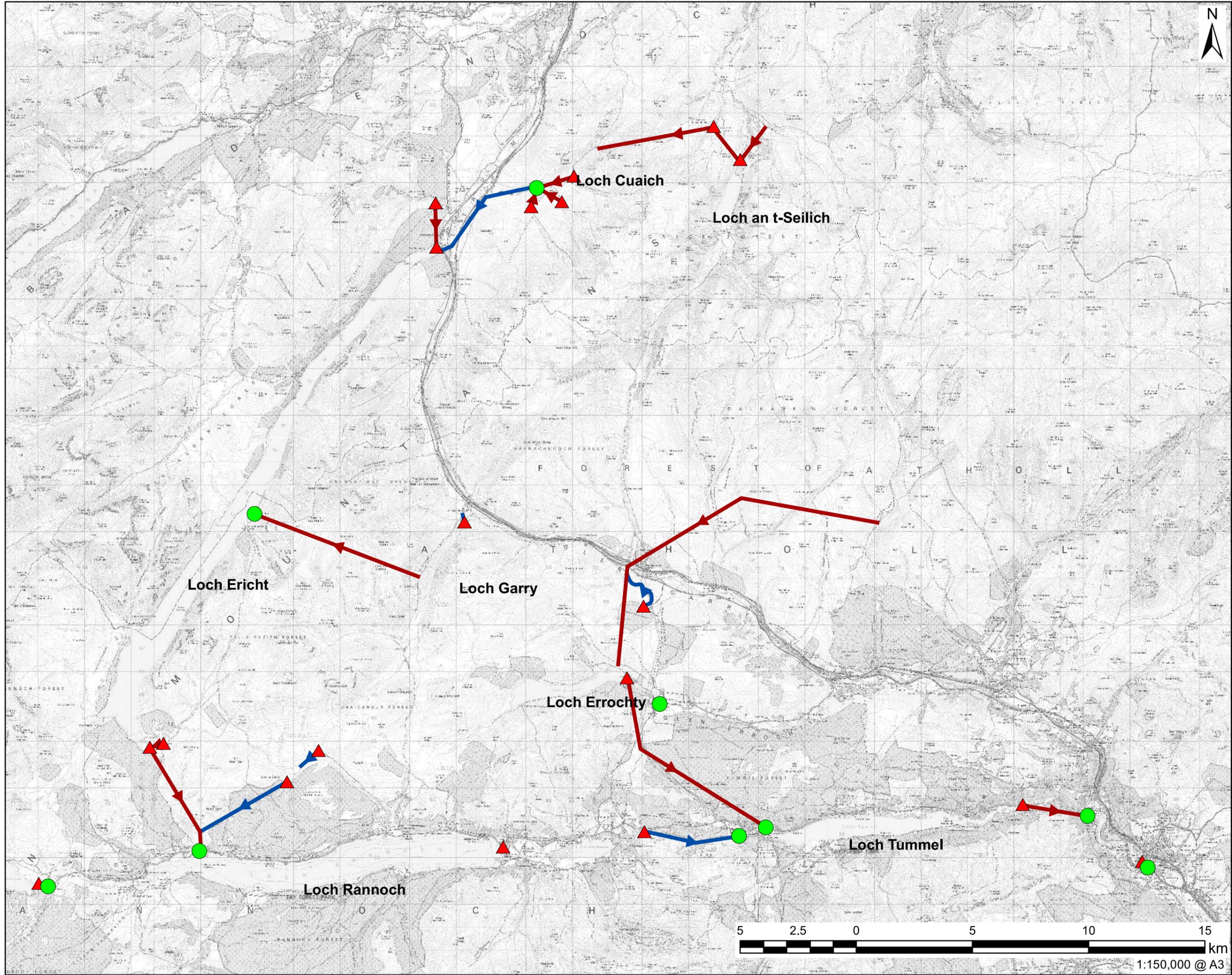


- LEGEND**
- Development Boundary
 - Development Boundary 1km Buffer
 - Special Area of Conservation (SAC)
 - Special Protection Area (SPA)
 - Site of Special Scientific Interest (SSSI)
 - Drinking Water Protected Areas
 - Watercourses
 - WFD Watercourses by Category**
 - High
 - Good
 - Moderate
 - Poor
 - Bad
 - Bad Ecological Potential
 - WFD Waterbodies by Category**
 - High
 - Good
 - Moderate
 - Poor
 - Bad
 - Maximum ecological potential
 - Good ecological potential
 - Moderate ecological potential
 - Poor ecological potential
 - Bad ecological potential

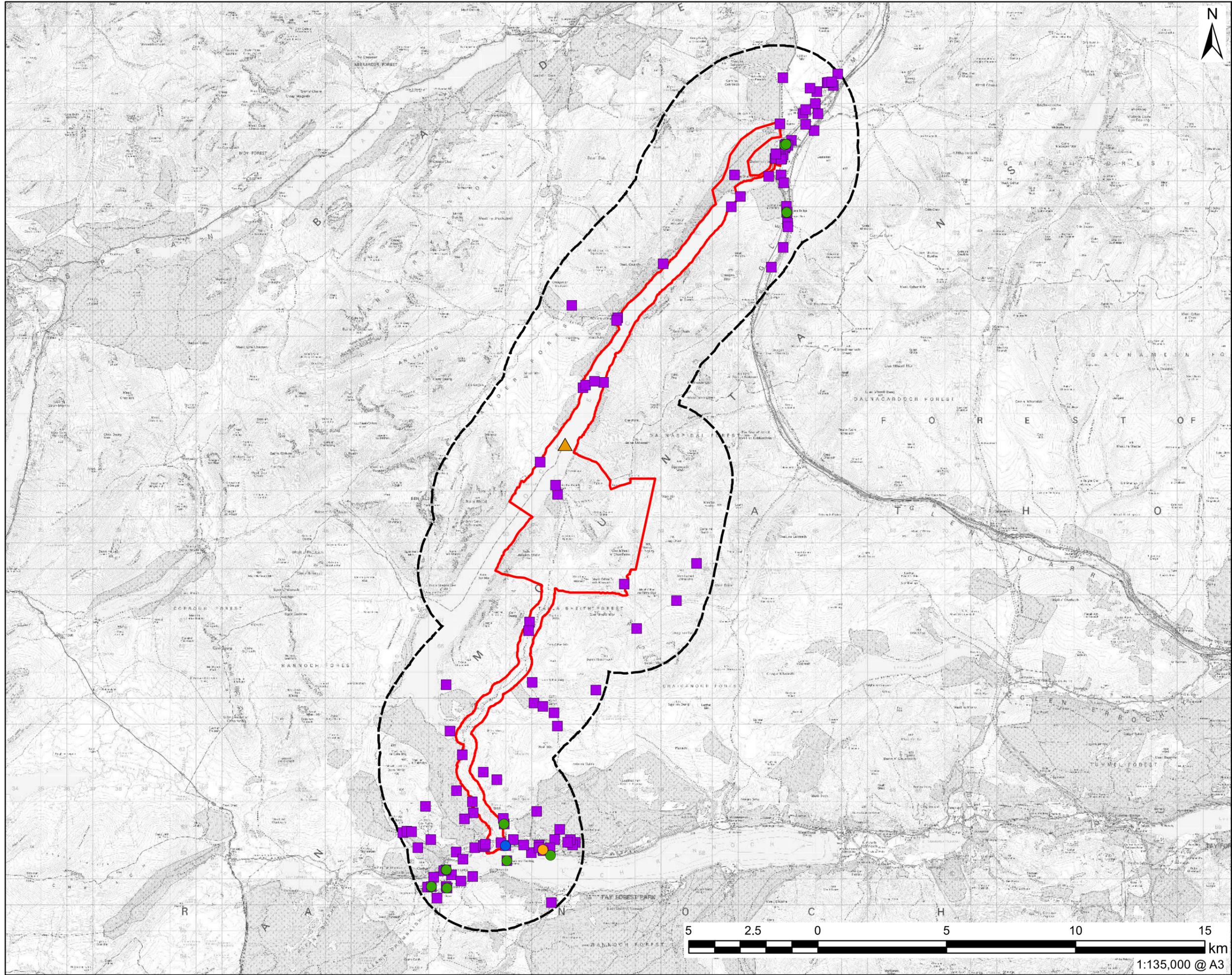
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LEGEND

- Development Boundary
- Development Boundary - 3km Buffer

Listed Buildings by Category

- A
- B
- C
- ▲ Historic Scotland Canmore Maritime Heritage
- Historic Scotland Canmore Heritage

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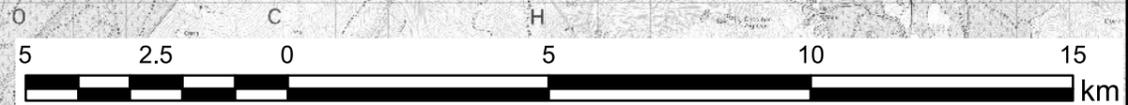
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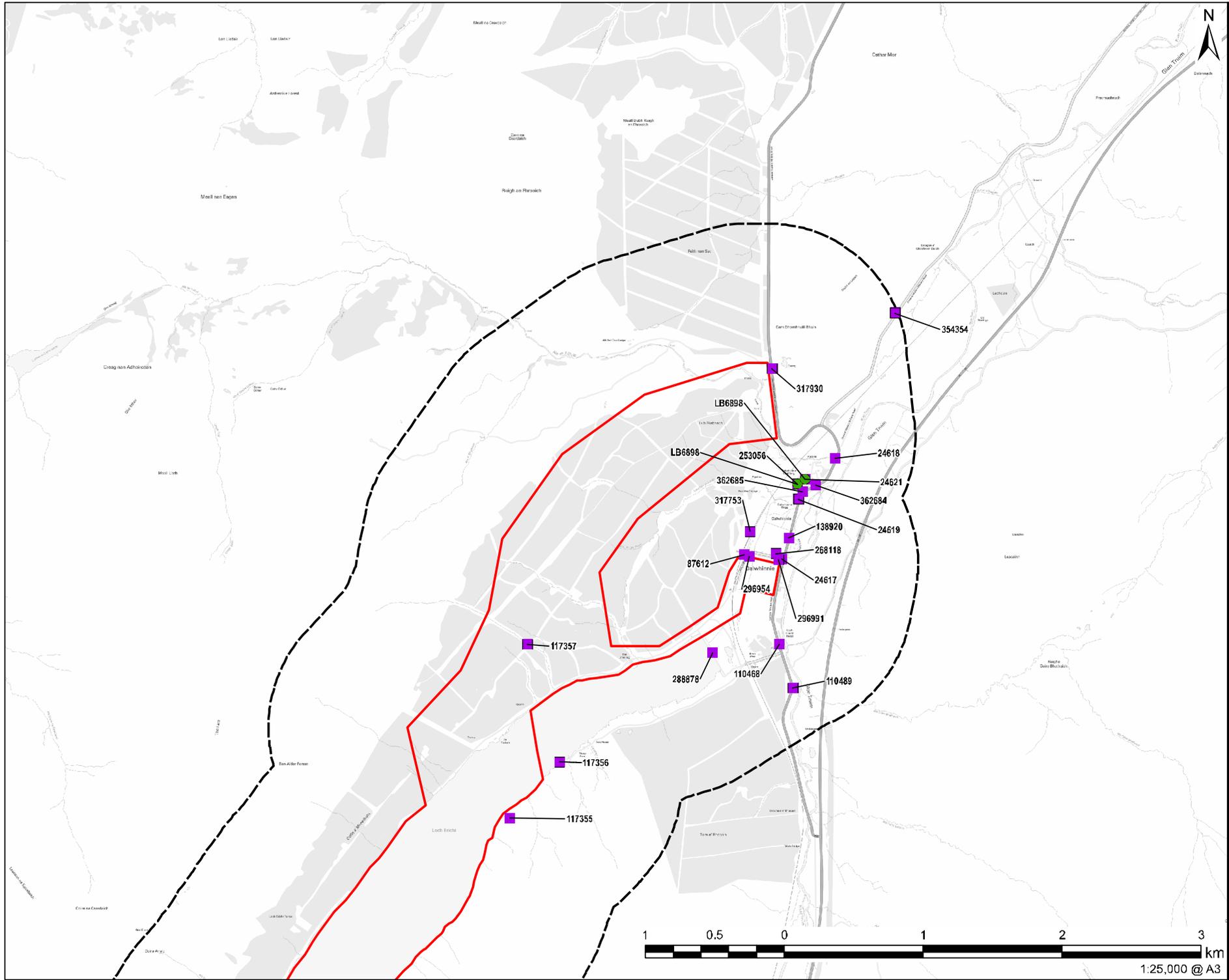
Designated Heritage Assets, and Non-Designated Assets Recorded on Canmore within 3km

SHEET NUMBER

Figure 12.1

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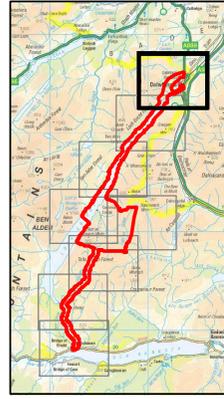
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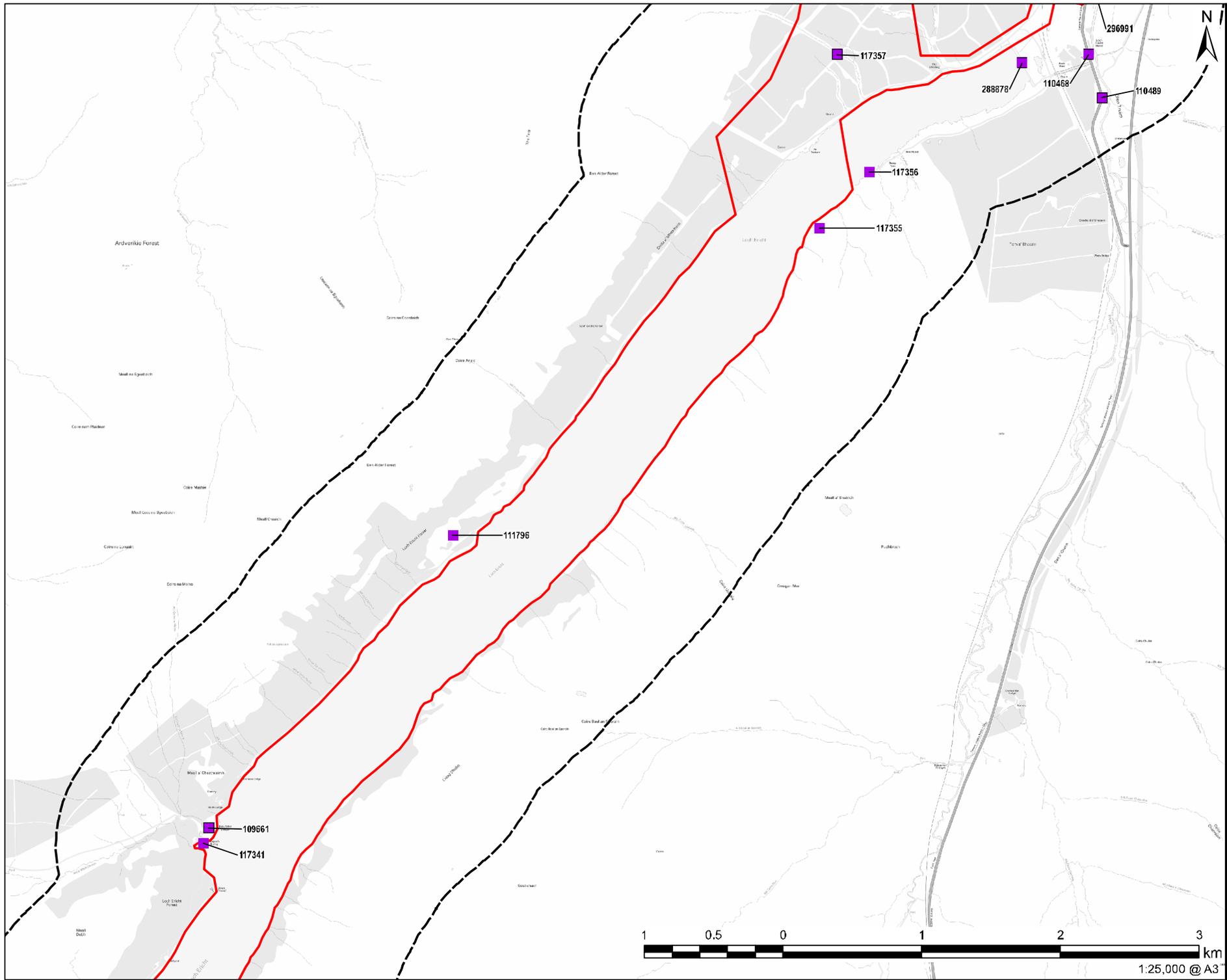
- LEGEND**
- Development
 - Boundary
 - Boundary - 1km Buffer
 - Historic Scotland Canmore Heritage

- Listed Buildings by Category
- B



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SHEET TITLE
 Designated Heritage Assets, and Non-Designated Assets Recorded on Canmore within 1km
SHEET NUMBER
 Figure 12.2- A



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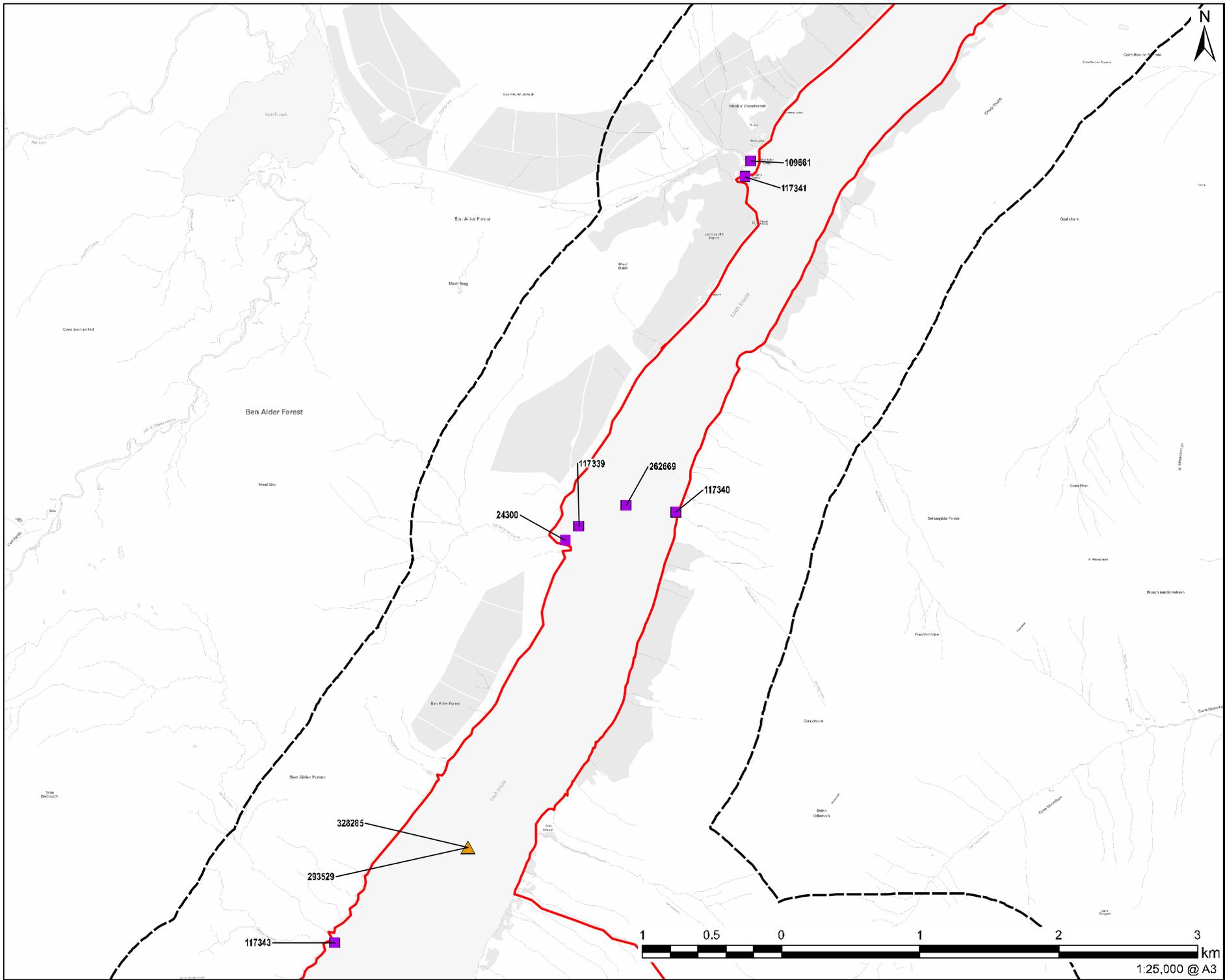
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- LEGEND**
- Development Boundary
 - Boundary - 1km Buffer
 - Historic Scotland Canmore Heritage



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SHEET TITLE
 Designated Heritage Assets,
 and Non-Designated Assets
 Recorded on Canmore
 within 1km
SHEET NUMBER
 Figure 12.2- B

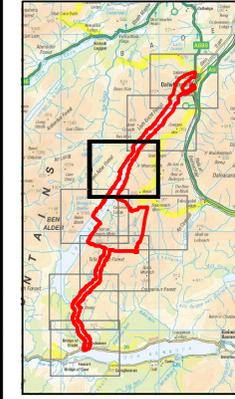


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- LEGEND**
- Development Boundary
 - Boundary - 1km Buffer
 - Historic Scotland
 - ▲ Canmore Maritime Heritage
 - Historic Scotland Canmore Heritage



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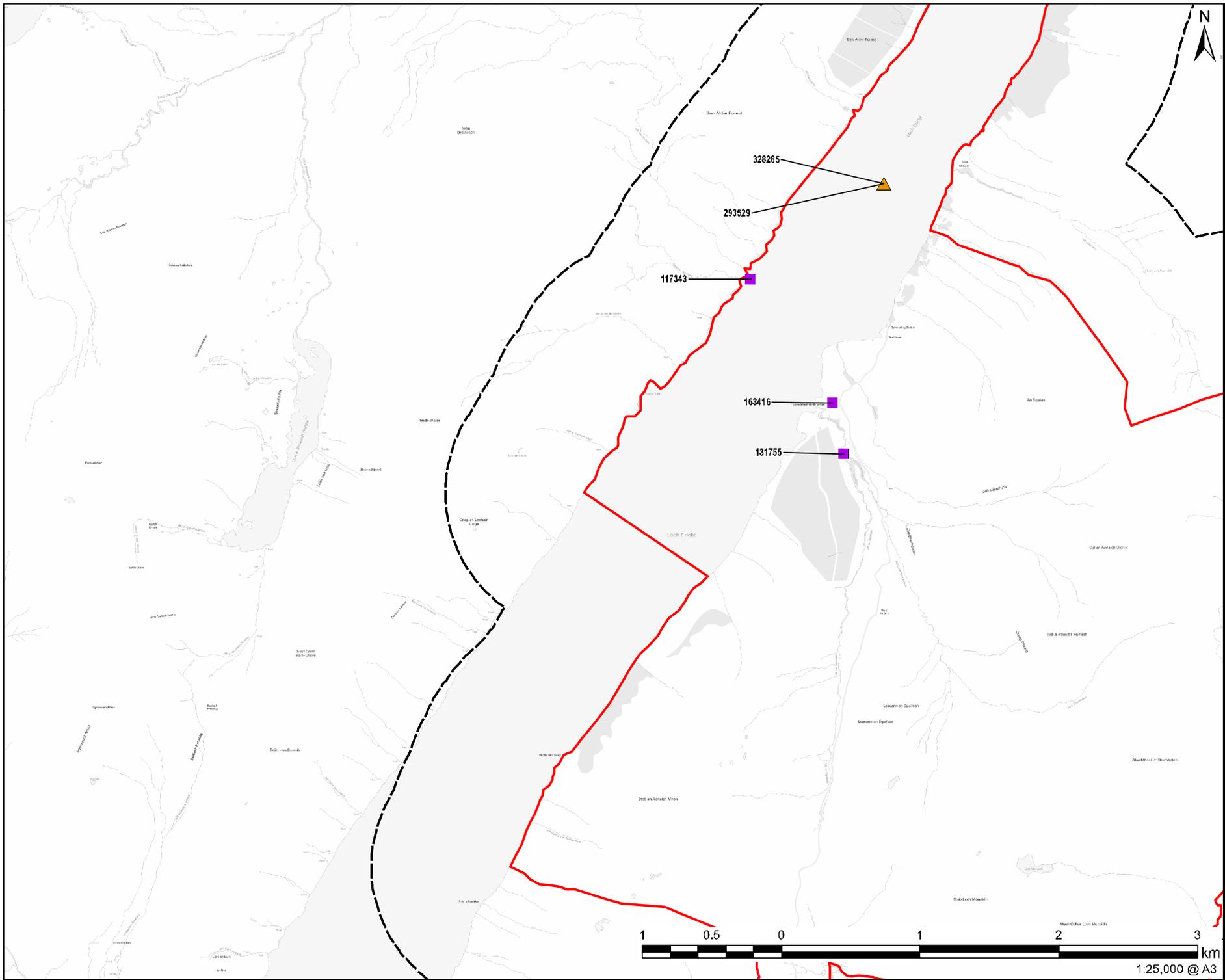
SHEET TITLE

Designated Heritage Assets, and Non-Designated Assets Recorded on Canmore within 1km

SHEET NUMBER

Figure 12.2- C



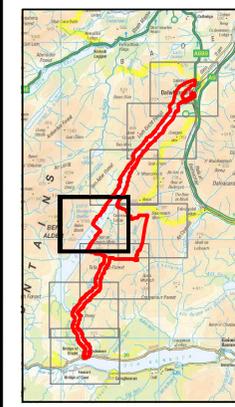


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- LEGEND**
- Development Boundary
 - Boundary - 1km Buffer
 - ▲ Historic Scotland Canmore Maritime Heritage
 - Historic Scotland Canmore Heritage



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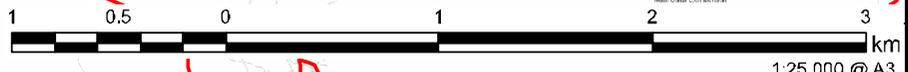
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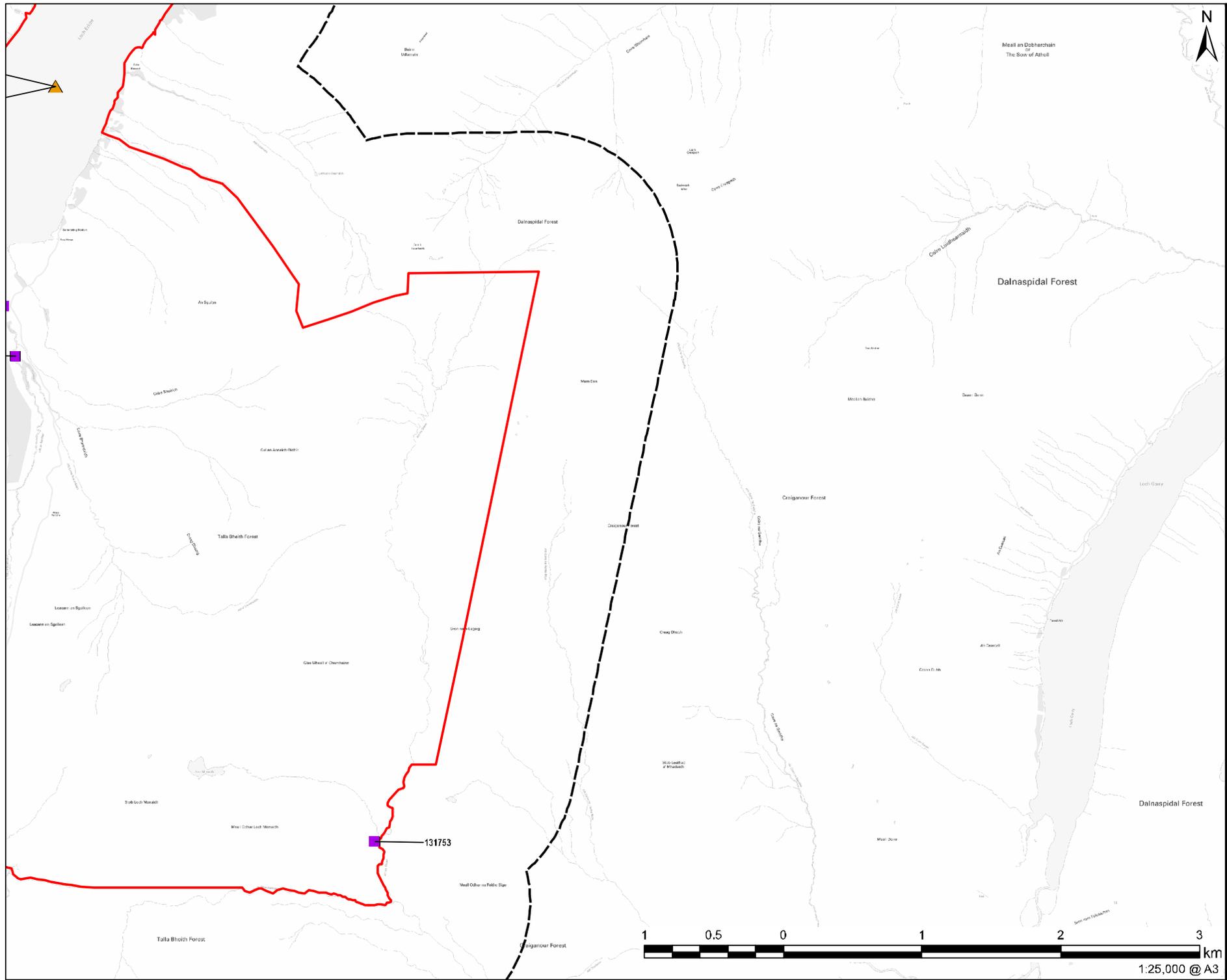
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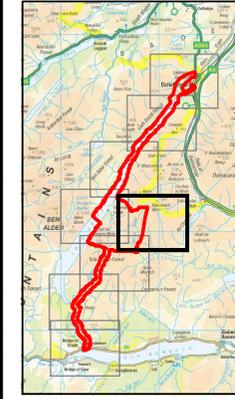
SHEET NUMBER

Figure 12.2- D





- LEGEND**
- Development Boundary
 - Development Boundary - 1km Buffer
 - ▲ Historic Scotland Canmore Maritime Heritage
 - Historic Scotland Canmore Heritage



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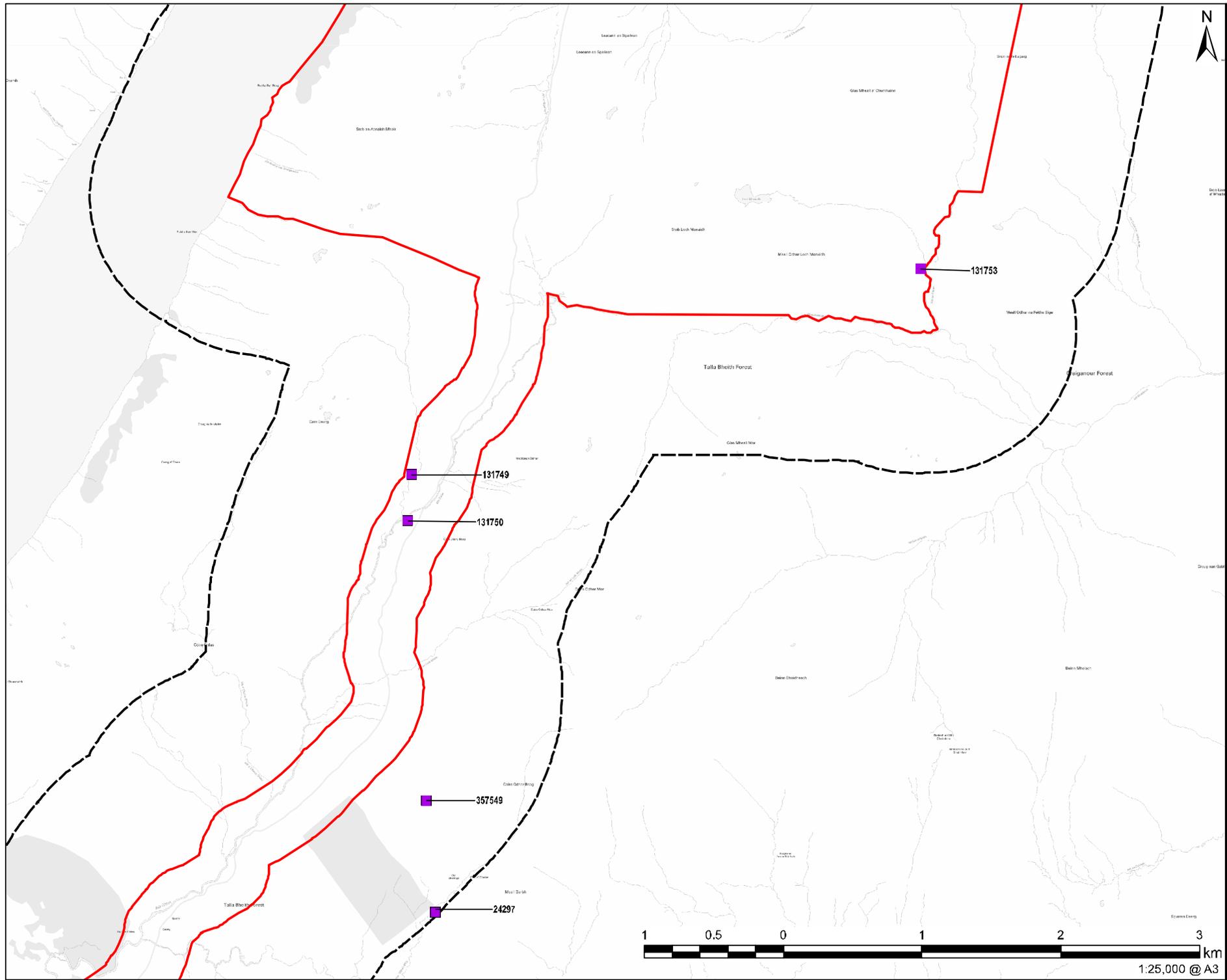
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SHEET TITLE
 Designated Heritage Assets, and Non-Designated Assets Recorded on Canmore within 1km

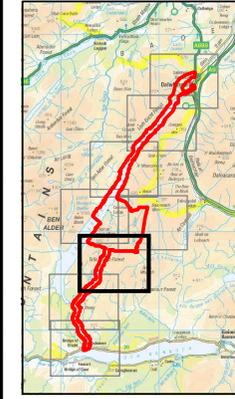
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 Figure 12.2- E



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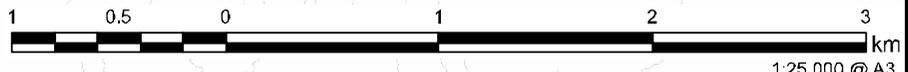


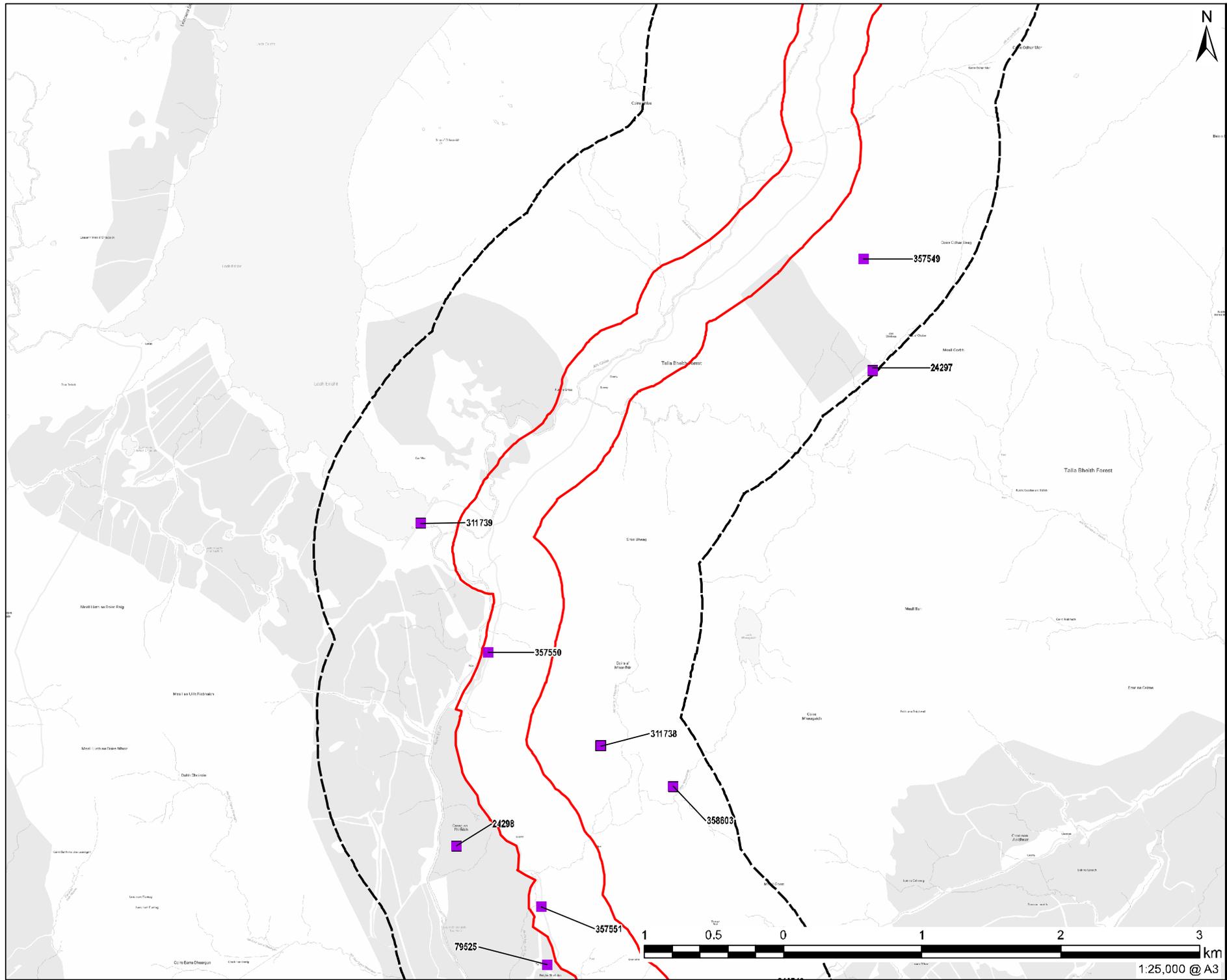
- LEGEND**
- Development
 - Boundary
 - Boundary - 1km Buffer
 - Historic Scotland
Canmore Heritage



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SHEET TITLE
Designated Heritage Assets,
and Non-Designated Assets
Recorded on Canmore
within 1km
SHEET NUMBER
Figure 12.2- F





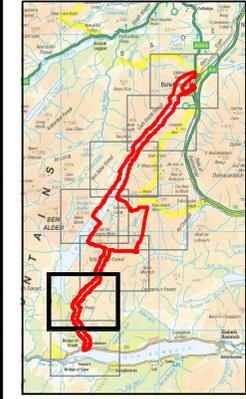
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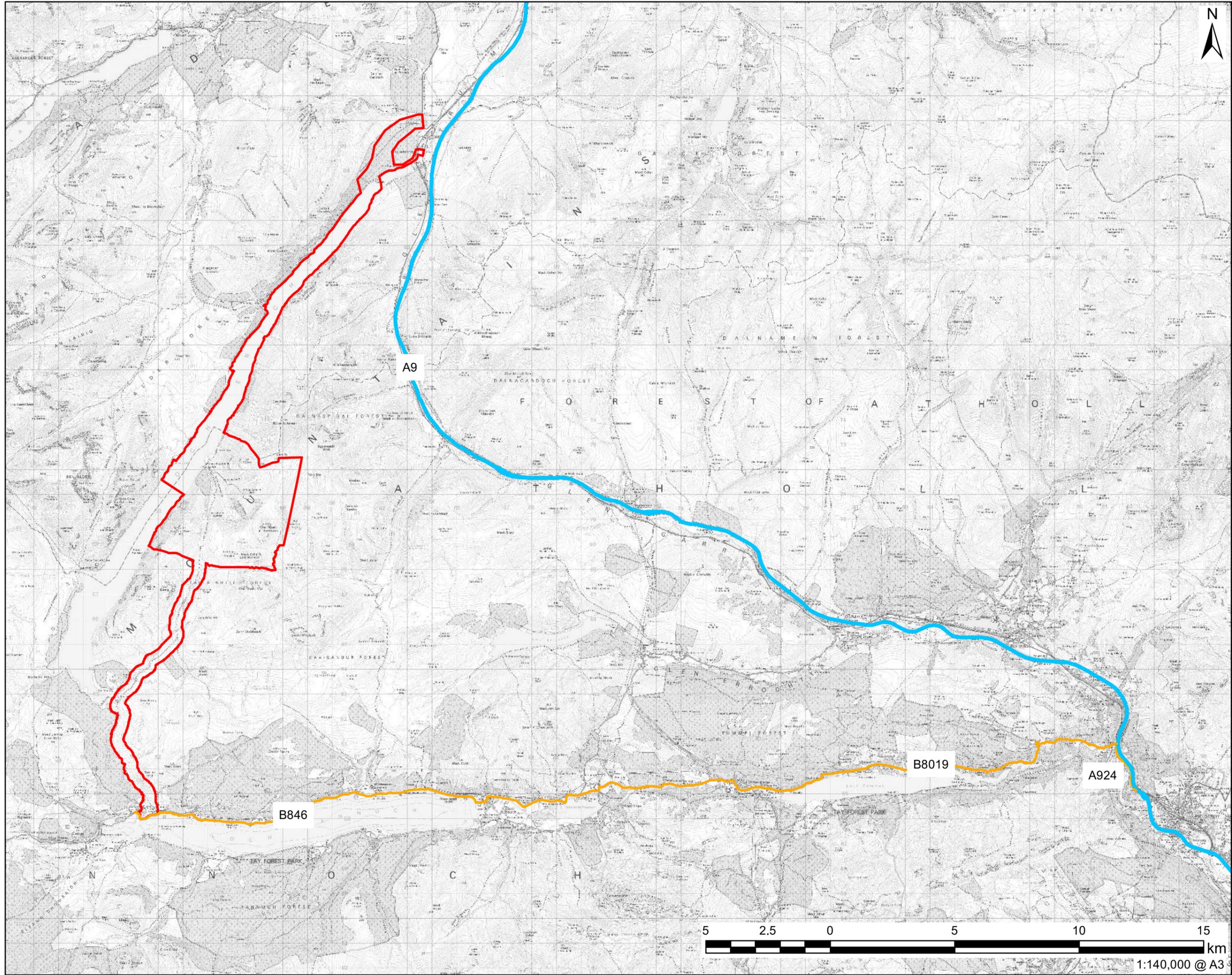
- LEGEND**
- Development
 - Boundary
 - Boundary - 1km Buffer
 - Historic Scotland
Canmore Heritage



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 Designated Heritage Assets,
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 within 1km
SHEET NUMBER
 Figure 12.2- G





- Development Boundary
- A9(T)
- B8019 to Bridge of Ericht

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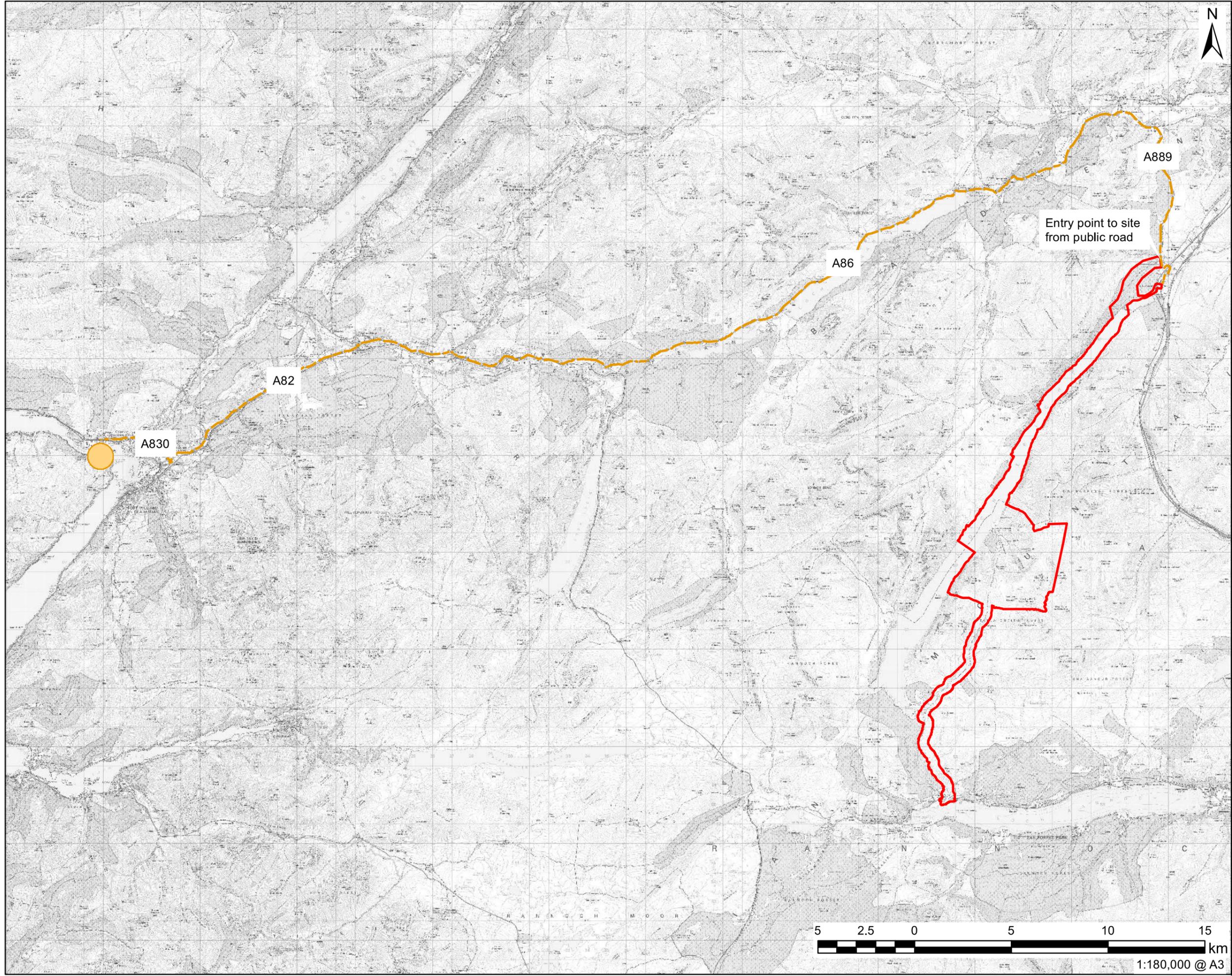
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Transport Study Area:
General Construction Traffic
Access Route

Figure 13.1

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- LEGEND**
- Development Boundary
 - Abnormal and Indivisible Loads Delivery Route from Port of Corpach
 - Port of Corpach

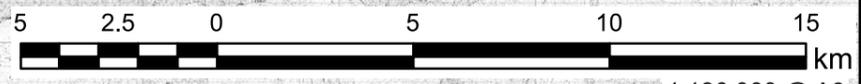
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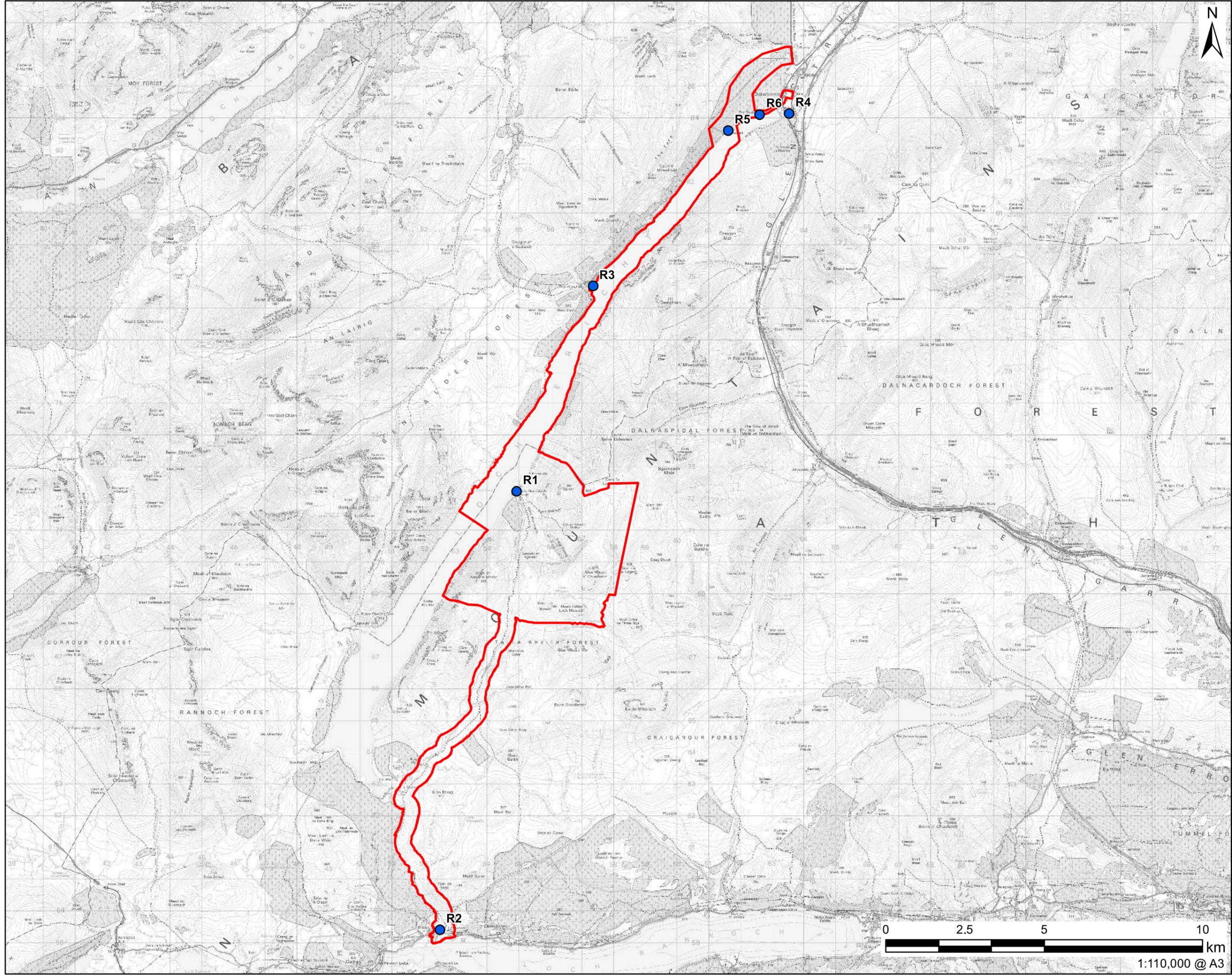
SHEET TITLE
Transport Study Area:
Abnormal and Indivisible
Loads Delivery Route from
Port of Corpach

SHEET NUMBER
Figure 13.2



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Appendix B: Terrestrial Ecology Field Survey Methods

This Appendix accompanies Chapter 6: Terrestrial Ecology and sets out the proposed field survey methods to be carried out for protected and notable habitats and species.

Phase 1 Habitat Survey

A Phase 1 habitat survey will be carried out of the Development Site plus a 100 m buffer, where safe access is possible. The Phase 1 habitat survey will be carried out in accordance with the standard survey method (JNCC, 2010), by which all areas of land within the survey area are assigned standard habitat types and ecological notes are recorded. All habitat types in the survey area will be mapped using aerial photography to maximise mapping accuracy. Notes will be made for each habitat of dominant, typical and notable (including invasive) plant species.

Any invasive non-native species of plant encountered during the Phase 1 habitat survey will be recorded and accurately mapped. Notes will be taken regarding potential infestation pathways. Any observations regarding protected species will also be noted.

National Vegetation Classification Survey

National Vegetation Classification (NVC) survey will be carried out across all affected areas by surveyors with extensive experience in this field. The survey will extend to 100 m beyond any micro-siting allowance around areas where excavations will be shallow and less than 1 m (i.e. around the existing access track from Bridge of Ericht, and other access tracks), enlarged to 250 m beyond any micro-siting allowance around areas where excavations will be more than 1 m deep (i.e. around the 'main site' and the temporary construction area south of Dalwhinnie) (see Figure 6.3 Terrestrial Ecology Field Survey Areas).

Homogenous vegetation stands will be classified according to the NVC as described in the relevant original NVC volumes (Rodwell 1991a, 1991b, 1992, 1995, 2000), with cognisance also of the NVC review and other guidance (Rodwell *et al*, 2000; Averis *et al*, 2004; Hall *et al*, 2004) that describe some additional vegetation types not covered in the original NVC volumes, or provide further information on vegetation variation. Vegetation will be assigned to sub-community (where applicable) except where it does not well fit published descriptions, where close access is not possible, or where vegetation is of low ecological value and effort will be better utilised elsewhere. Since NVC communities often occur in patches too small to map amongst more extensive communities, or in complexes that cannot be feasibly mapped within a reasonable timescale, NVC polygons will be described as mosaics as necessary, with estimated proportions of the mosaic components. Where habitats lack vegetation, or the vegetation does not correspond to a community described in the NVC volumes or other guidance, a brief descriptive term will be given (e.g. 'Conifer plantation'; 'Open water'; 'Bare rock').

Identification of NVC types will largely be performed in the field through surveyor experience. However, example quadrat samples of vegetation types will be taken in the standard manner, using the ten-point Domin scale to record plant cover and noting parameters such as slope, aspect and vegetation height, and any habitat condition factors that may be apparent. Field mapping will utilise aerial photography to maximise accuracy.

Any rare or notable plant species identified during the NVC survey will be recorded and accurately mapped.

Otter and Water Vole Survey

Otter and water vole survey will be carried out in all suitable habitat within the Development Site plus a 200 m buffer.

The survey for otter will be conducted in accordance with guidance in published literature where applicable to site survey (Chanin, 2003; Liles, 2003; Strachan, 2007). Evidence searched for will include holts, laying-up areas (couches), spraints, footprints and signs of foraging.

The survey for water vole will follow the guidelines in Dean *et al* (2016) and Strachan *et al* (2011). Field signs to be searched for include droppings, latrines, burrows, feeding stations, grazed lawns and footprints.

A single otter survey will be required, ideally carried out in early-spring before vegetation becomes so dense that it limits the ability to search for field signs of this species. In line with current guidance, two surveys for water vole will be required, unless the first survey finds that potential for water vole is negligible. The first will be conducted simultaneously with the otter survey in spring, with the second to be completed in late-summer or autumn.

Pine Marten and Wildcat Survey

A walkover survey of all suitable habitat within the Development Site plus a 250 m buffer will be carried out for pine marten and wildcat. The survey will be carried out following guidance in published literature (Cresswell *et al*, 2012) and will involve searching for field signs indicative of these species. Evidence to be searched for will include potential den sites, scats, footprints, hair and trails. The survey will particularly focus on areas of woodland, and moorland within 1 km of woodland, especially where there are features that could contain dens (such as rock outcrops, boulders and, if present, trees with large cavities), as well as existing tracks / paths which pine martens often mark with droppings. The survey will be carried out between June – August.

Camera Trapping Survey

To supplement the walkover survey for pine marten and wildcat, camera traps will be placed in locations where evidence suggests these species may occur, or where the habitat is otherwise suitable for resting sites to be present. The number of motion sensitive cameras deployed will depend upon the number of features and/or areas of suitable habitat identified by the walkover survey. The motion sensitive cameras will be deployed for an extended period during the summer when activity by these species may be higher as they provision young.

Where a resting site of either pine marten or wildcat is suspected, the use of motion sensitive trail cameras will only be conducted under licence obtained from NatureScot.

Badger Survey

Detailed survey for badger will be carried out. The survey will follow the guidance in published literature (Scottish Badgers, 2018; Harris *et al*, 1989). The survey will cover suitable habitat within the Development Site plus a 100 m buffer. Evidence searched for will include setts, spoil heaps and bedding, guard hairs, latrines, footprints, trails, scratch marks and foraging activity. If present and where possible, setts will be classed as main, annexe, satellite or outlier, and holes described as well-used, partially-used or disused.

Bat Survey

The proposed scope of bat survey work can be broken down into roost surveys and activity surveys.

Bat Roost Survey

A walkover will be carried out to assess the bat roost suitability of all trees and structures within the Development Site plus a 50 m buffer. Any potential bat roost features which are identified will be assigned a suitability category, as defined by Collins (2016).

Where a tree, building or other structure is identified which has the potential to support roosting bats and which may be impacted upon by the Development, further investigations will be carried out. These may take the form of, for example, tree climbing, internal inspections and/or dusk emergence and dawn re-entry surveys. The scope of any such further survey work will be determined following the guidelines in Collins (2016).

Bat Activity Survey

Pre-determined transect(s) will be walked to assess bat activity levels, following the guidelines in Collins (2016). The exact route of the transect(s) are yet to be finalised but will be designed to cover key areas of bat habitat and/or areas which could be subject to significant impacts from the Development.

It is considered that the habitat within the Development Site, and particularly around the Headpond and other major infrastructure, will be of 'Low' suitability for bats (in accordance with the definition provided in Collins (2016)), on the basis of high altitude and/or apparent dominance of habitat of lower value to bats. Therefore three visits only will be made to walk the transect(s), one in each of the spring, summer and autumn bat activity periods. Should bat activity levels be found to be unexpectedly high during the first or second visits, additional surveys may be carried out. Moreover in relation to the Headpond and higher altitude areas, walked transects during darkness present a substantial health and safety risk. It is therefore not proposed to conduct any transects across the higher altitude areas of bog. Instead, transects will target areas of habitat more likely to be used by bats, including around Loch Erich and the broadleaved woodland near Bridge of Erich.

However, to supplement the walked activity surveys, automated bat detectors will also be used at locations which are considered likely to be important to bats. A minimum of three static detectors will be deployed in key parts of the Development Site incurring habitat loss, including one in the area of the Headpond, and will be deployed for a minimum period of five consecutive nights per month between April and September, inclusive.

All bat surveys will be conducted using full-spectrum recorders (Elekon Batloggers and Wildlife Acoustics Song Meter 4) and analysed using Kaleidoscope Pro software, with manual verification.

References

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Appendix C: Ornithology Field Survey Methods

All ornithology field surveys will generally follow the guidance and recommendations published by NatureScot in relation to onshore wind farm developments (SNH, 2017) and the specific documents referenced in those guidelines.

Note that the survey buffers described under the headings below will not be extended to the west side of Loch Ericht, except in the area along the proposed access track from Dalwhinnie southwards to the proposed Loch Structure on Loch Ericht, as shown on Figure 8.2 Ornithology Field Survey Areas. Birds present on the west side of Loch Ericht are very unlikely to be directly impacted by the Development and it is therefore not considered that field survey in this area is necessary.

Breeding Golden Eagle and Breeding Raptor Survey

Survey for breeding raptor species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) or Annex I of the Birds Directive⁸ will be carried out in all areas of suitable habitat within 2 km of the Development Site, this being extended to 6 km for golden eagle. Surveys will be carried out between March and August, inclusive, and will be conducted under favourable weather conditions, in particular avoiding persistent heavy rainfall.

During preliminary visits, all suitable nesting habitats (such as areas of deep heather, rocky crags or other areas of dense vegetation) within the survey area will be searched for signs of occupancy. This will involve a walkover of the survey area, with short *ad hoc* vantage point watches being made from suitable locations to observe birds and any behaviour indicative of breeding (for example, displaying, alarm calling, etc.). Searches will also be made in potentially suitable locations for evidence of raptor presence, including prey remains, plucking posts, pellets, etc. All raptor species (or evidence) encountered will be recorded and mapped on to suitably scaled OS maps. Any suspected or confirmed nest sites will also be described and accurately mapped.

During subsequent survey visits, the species-specific methodologies described in Hardey *et al* (2013) will be used to target areas in which raptors have been previously encountered (including during the course of other field survey) to establish and monitor the breeding success of those birds where nesting is suspected or confirmed. Extended vantage point watches will be made from a suitable distance to avoid disturbance. Observations of activity and behaviour will be made, and the numbers of chicks / fledged birds noted where possible.

Breeding Diver Survey

Targeted searches will be conducted for breeding red-throated diver and black-throated diver. The surveys will follow the species-specific guidelines in Gilbert *et al* (1998).

All waterbodies within 1.5 km of the Development Site will be searched for the presence of divers. Viewing will initially be done from a distance using telescope and binoculars to scan the surface of the water and the shoreline. In instances where no birds are observed on a waterbody, surveyors will slowly approach and once satisfied that divers are absent, will walk the entire perimeter to look for empty nest scrapes or signs that birds may have attempted to breed but have failed (for example, broken eggshells or dead chicks). Any other notes of relevance, including the presence of disturbance sources and/or evidence of predators, such as otter and grey heron, will also be recorded.

If any divers are detected on a waterbody, their behaviour will be observed, taking particular note of evidence that breeding may be taking place, such as birds displaying, copulating or going ashore.

Lekking Black Grouse Survey

Survey for lekking (displaying) black grouse will follow the methods described for this species in Gilbert *et al* (1998).

⁸ Directive 2009/147/EC on the conservation of wild birds.

Surveys will be carried out within one hour of dawn to identify and locate the number and distribution of leks in suitable habitat within 1.5 km of the Development Site. All suitable areas will be visited on at least two occasions between the end of March – mid-May.

Surveys will be conducted in dry and calm weather and will involve surveyors walking slowly, listening for lekking black grouse and scanning from suitable vantage point locations with binoculars. Where a lek is found, the number of males present will be recorded, in addition to any females observed.

Moorland Breeding Bird Survey

Main Site

Survey for moorland breeding birds will be carried out within the boundary of the central part of the Development Site (i.e. the area encompassing the Headpond and other main permanent infrastructure) plus a 500 m buffer (see Figure 8.2 Field Survey Areas), following an adapted version of the methodology for surveying upland waders (Brown and Shepherd, 1993). In line with recommendations made by Calladine *et al* (2009), four survey visits will be made between April and July.

Pre-determined survey routes will be devised which allow surveyors to approach all parts of the survey area to within at least 100 m. Surveyors will maintain a constant speed, covering 500 m² quadrats in 20 to 25 minutes. The route taken to walk the moorland breeding bird survey transects will be varied between survey visits. Stops will be made at regular intervals to scan for birds and to listen for song and calls. Surveys will be conducted during daylight hours in favourable weather conditions and will not be carried out during persistent rainfall or in winds exceeding approximately Beaufort force 4.

Birds encountered will be recorded and mapped onto a suitably scaled OS field map using standard BTO notation, including a description of activity / behaviour. Where necessary, additional field notes will be taken.

It is not currently proposed to carry out dedicated targeted survey for dotterel or snow bunting as it is considered that these species, if present, will be identified through the moorland breeding bird survey method described above. However, should the potential presence of these species be identified through other survey and not subsequently picked up through moorland breeding bird survey, additional targeted survey will be undertaken to search for evidence of breeding by dotterel and/or snow bunting.

Southern Access Track from Bridge of Ericht

Survey for moorland breeding birds along the southern access route from Bridge of Ericht will broadly follow the methods described above for the main part of the Development Site. However, given that the Development in this area will be limited to upgrading an existing substantial and well-used track, it is proposed to limit the survey area to a buffer of approximately 100 m either side of the road (see Figure 8.2 Ornithology Field Survey Areas). Surveyors will simply walk the route of the track and will record all birds encountered, in accordance with the methods described above.

Common Bird Census

Survey for general breeding birds in the area around Dalwhinnie will follow a modified version of the Common Bird Census (CBC), as described in Bibby *et al* (2000). This will involve walking to within 50 m (as far as possible) to all parts of the Development Site in this area plus a 100 m buffer (see Figure 8.2 Ornithology Field Survey Areas) to record birds present and their behaviour.

Dense conifer plantation within the survey area will not be surveyed and may prevent access to within 50 m of all parts of the survey area.

Vantage Point Survey

Vantage point surveys have been carried out from a single VP location to the south-west of the Headpond between October – December 2020. Surveys were planned to be carried out monthly, however adverse weather conditions prevented surveyors accessing the Development Site in January 2021 (and this is likely to be the case in February 2021).

Where safe access is possible, VP surveys will resume and will follow the methods described in SNH (2017). The VP surveys will be carried out during daylight hours, including around sunrise and sunset, at which times certain species may be more active. Each survey will last for a maximum of three hours,

with a minimum of thirty minutes break between each three hour survey. The aim will be to complete six hours of survey per month until September 2021.

Target species to be recorded during the VP surveys will be:

- All raptor species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) and/or Annex I of the Birds Directive;
- All diver species;
- All wader species;
- All geese, swans and ducks; and,
- Black grouse.

Kestrels *Falco tinnunculus*, buzzards *Buteo buteo*, ravens *Corvus corax*, red grouse, grey heron *Ardea cinerea* and gulls will also be recorded as secondary species.

The flight lines of all recorded target species will be drawn. Any other observations of note will also be recorded, including evidence of territorial behaviour.

The purpose of the VP surveys is to identify and assess use of the Development Site by target species for foraging and breeding.

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