

## Environmental Appraisal Report CROMARTY HYDROGEN PROJECT

CRHY-PR-RP-0014-A01



## RSK GENERAL NOTES

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**Project No.:** 663356

**Title:** Cromarty Hydrogen Project: Environmental Appraisal Report

**Client:** ScottishPower Energy Retail Limited and Storegga Hydrogen Limited

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## EXECUTIVE SUMMARY

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ScottishPower Energy Retail Limited (SPERL) and Storegga Hydrogen Limited have appointed RSK to prepare this Environmental Appraisal Report (EAR) as part of the application documents to accompany the planning application for the erection of a hydrogen production and storage facility (Class 5 - General Industry), road haul tanker loading facility, underground electricity connection, import substation, improvements to existing access road, site offices, parking, gatehouse and perimeter fencing, temporary construction and laydown area, and ancillary development (hereafter the 'Proposed Development') at land to the east of the Beinn Tharsuinn Windfarm (National Grid Reference (NGR) NH 64225 81469) for which planning permission is sought under Section 32 of the Town and Country Planning (Scotland) Act 1997 .

The environmental appraisals which form this EAR have been prepared to address the potential environmental effects which are considered pertinent to construction, operational and decommissioning phases of the Proposed Development, including the following topics:

- Landscape and Visual Impacts;
- Ecology and Ornithology;
- Hydrology, Hydrogeology, Geology and Soils; and
- Noise Impacts.

It is demonstrated within this EAR there would be no substantial adverse effects arising as a result of the Proposed Development. Where necessary, mitigation measures and enhancements form an integral part of the proposals to ensure that the environment is suitably protected. A Schedule of Mitigation and an Outline Biodiversity Enhancement Plan are included as Technical Appendices and would form part of the Applicant's environmental commitments should the Proposed Development be consented. A separate Construction Traffic Management Plan (CTMP) would be required and a framework version has been prepared as part of the Transport Statement submitted with the application.

The findings of the EAR demonstrate that there are no overriding environmental constraints which would preclude the construction, operation and de-commissioning of the Proposed Development.

In addition to this EAR, the application documents also comprise the following reports:

- Supporting Statement;
- Planning Statement;
- Pre-application Consultation (PAC) Report;
- Design and Access Statement (DAS); and
- Transport Statement.

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## GLOSSARY

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Ambient	Of or relating to the immediate surroundings of something (e.g. ambient noise level).
Ambient sound	The total sound at a given place, usually a composite of sounds from many sources near and far.
Assessment	Process by which information about effects of a proposed plan, project or intervention is collected, assessed and used to inform decision making.
Avoidance	Form of mitigation consisting in preventing the impact from happening. E.g. placement of access roads outside of rare habitats.
Background sound, LA90,T	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval.
Baseline conditions	Environment as it appears (or would appear) immediately prior to the implementation of the project together with any known or foreseeable future changes that will take place before completion of the project
Baseline studies	Work done to determine and describe the environmental conditions against which any future changes can be measured or predicted and assessed.
Biodiversity	Variety of life forms; different plants, animals and microorganisms; the genes they contain; and the ecosystems they form.
Catchment	Drainage/basin area within which precipitation drains into a river system and eventually into the sea.
Compensation	Measures taken to offset the unavoidable negative environmental impacts of a development by counterbalancing them with environmental gains, aiming to achieve a net neutral or beneficial outcome
Competent authority	Authority responsible for determining the application for consent, permission, licence or other authorisation to proceed with a development.
Construction phase	Period during which the building or assembling of a proposed development and its infrastructure is undertaken.
Consultation	Process by which those organisations or individuals with an interest in the area associated with the Proposed Development are identified and engaged as part of the EIA process.
dB	Decibel. Scale for expressing sound pressure level. It is defined as 20 times the logarithm of the ratio between the root mean square pressure of the sound field and a reference pressure i.e. $2 \times 10^{-5}$ Pascal.

dB(A)	<p>A-weighted decibel. This provides a measure of the overall level of sound across the audible spectrum with a frequency weighting to compensate for the varying sensitivity of the human ear to sound at different frequencies. Example sound levels include:</p> <ul style="list-style-type: none"> <li>140 dB(A) Threshold of pain</li> <li>120 dB(A) Threshold of feeling</li> <li>100 dB(A) Loud nightclub</li> <li>80 dB(A) Traffic at busy roadside</li> <li>60 dB(A) Normal speech level at 1m</li> <li>40 dB(A) Quiet office</li> <li>20 dB(A) Broadcasting studio</li> <li>0 dB(A) Median hearing threshold (1000 Hz)</li> </ul>
Decommissioning	<p>Period during which a development and its associated infrastructure are removed from active operation.</p>
Do-nothing scenario	<p>The conditions that would persist in the absence of the implementation of a development.</p>
Effect	<p>Term used to express the consequence of an impact (expressed as the 'significance of effect'), which is determined by correlating the magnitude of the impact with the importance (or sensitivity) of the receptor or resource in accordance with defined significance criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource.</p>
EIA Regulations	<p>Collective term for the various statutory instruments through which the previous Directives on Environmental Assessment have been implemented in the UK.</p>
Enhancement	<p>Measure that seek to improve an environmental condition and is over and above what is required to mitigate the adverse effects of a project.</p>
Environmental assessment	<p>Method and a process by which information about environmental effects is collected, assessed and used to inform decision-making. Assessment processes include strategic environmental assessment, assessment of implications on European sites, and environmental impact assessment.</p>
Environmental impact assessment	<p>Statutory process by which certain planned projects must be assessed before a formal decision to proceed can be made. Involves the collection and consideration of environmental information, which fulfils the assessment requirements of the EIA Regulations, including the publication of an EIA Report.</p>



Environmental information	Information that must be taken into account by the decision maker (the competent authority) before granting any kind of authorisation in any case where the EIA process applies. It includes the Environmental Impact Assessment Report, including any further information, any representations made by any body required by the Regulations to be invited to make representations, and any representations duly made by any other person about the environmental effects of the development.
Environmental management plan	Structured plan that outlines the mitigation, monitoring and management requirements arising from an environmental impact assessment.
European protected species	All the plant and animal species included in the Conservation (Natural Habitats, &c.) Regulations 1994 Schedule 2 and Schedule 4.
European site	Sites that make up the European ecological network (also known as Natura 2000 sites). These include sites of community importance (SCIs), special protection areas (SPAs) and potential SPAs (pSPAs), special areas of conservation (SACs) and candidate or possible SACs (cSACs or pSACs), and Ramsar sites.
Evaluation	Determination of the significance of effects. Evaluation involves making judgements as to the value of the receptor/resource that is being affected and the consequences of the effect on the receptor/resource based on the magnitude of the impact.
Existing environment	See 'baseline conditions'
Frequency	The repetition rate of a sound wave. The subjective equivalent in music is pitch. The unit of frequency is the Hertz (Hz), which is identical to cycles per second. A thousand hertz is often denoted as kHz, e.g. 2 kHz = 2000 Hz. Human hearing ranges approximately from 20 Hz to 20kHz.
Habitats Regulations	The Conservation (Natural Habitats) Regulations 1994, is more commonly known as the Habitats Regulations. The Habitats Regulations cover requirements for sites that are internationally important for threatened habitats and species (e.g. Natura sites), species that require strict protection (e.g. European protected species), and other aspects of the previous Habitats Directive.
Hydrogeology	Study of the distribution and movement of groundwater.
Impact	Change that is caused by an action; for example, land clearing (action) during construction that results in habitat loss (impact).
Invertebrates	Animals without backbones.
LAeq,T	This is defined as the notional steady sound level over a stated period of time (T), would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

Local development	Development type identified as local under the Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009.
Method statement	Document that sets out intended working or survey practices.
Mitigation	Measures intended to avoid, reduce and compensate adverse environmental effects.
Monitoring	Continuing assessment of the performance of the project, including mitigation measures. This determines if effects occur as predicted or if operations remain within acceptable limits, and if mitigation measures are as effective as predicted.
National development	Development type identified as national under the Town and Country Planning (Hierarchy of Developments) (Scotland) Regulations 2009.
NR	Noise rating. A set of curves based on the sensitivity of the human ear. They are used to give a single-figure rating for a range of frequencies.
Operation	Functioning of a development on completion of construction.
Pasture	Grassland maintained primarily for and by grazing, and on which grazing stock is kept for a large part of the year.
Phase 1 habitat survey	Recognised methodology used for collating information on the habitat structure of a particular site.
Photomontage	Superimposing of an image onto a photograph to create a realistic representation of proposed or potential changes to a view.
Planning authority	Local authority that is empowered by law to exercise planning functions for a particular area of the United Kingdom.
Pollution	Any increase of matter or energy to a level that is harmful to living organisms of their environment (when it becomes a pollutant).
Programme	Series of steps that have been identified by the applicant, or series of projects that are linked by dependency.
Project	One (or more) aspect of a programme or plan that has been identified by the applicant and usually involves a direct physical intervention.
Proposed Development	A plan or project that the applicant or promoter seeks to implement.
Ramsar	Areas designated by the UK Government under the International Ramsar Convention (the Convention on Wetlands of International Importance).
Rating level	Specific sound level of a source plus any adjustment for the characteristic features of the sound.

Receptor	Defined individual environmental feature usually associated with population, fauna, flora, water bodies, soils, landscapes and cultural heritage features with the potential to be affected by a project.
Residual effect	Those effects that remain following the implementation of mitigation measures.
Residual sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Resource	Defined, but generally collective, environmental feature usually associated with soil, water, air, climatic factors, landscape, material assets, including the architectural and archaeological heritage that has potential to be affected by a project.
run-off	Precipitation that flows as surface water from a site, catchment or region water bodies such as rivers and lakes and ultimately flows to the sea.
Schedule 1 development	Plans or projects listed Schedule 1 of the EIA Regulations.
Schedule 2 development	Plans or projects listed in Schedule 2 of the EIA Regulations
Scoping	Process of identifying the issues to be addressed by the environmental impact assessment process. It is a method of ensuring that an assessment focuses on the important issues and avoids those that are considered not significant.
Screening	Formal process undertaken to determine whether it is necessary to carry out a statutory environmental impact assessment and publish an Environmental Impact Assessment Report in accordance with the EIA Regulations.
Sediment	Organic and inorganic material that has precipitated from water to accumulate on the floor of a water body, watercourse or trap.
Significance	See 'significance of effect'.
Significance of effect	Measure of the importance or gravity of the environmental effect, defined by either generic significance criteria or criteria specific to the environmental topic.
significant environmental effect	Environmental effect considered material to the decision-making process.
Sound absorption	Process whereby sound energy is converted in to heat. Sound absorption properties is expressed as the sound absorption coefficient $\alpha$ or the sound absorption class (A-E).
Sound insulation	The reduction or attenuation of airborne sound by a solid element between source and receiver.
Special protection area	Sites designated under the previous EU Directive (79/409/EEC) for the conservation of wild birds.

Specific sound	Sound pressure level produced by the source being assessed at the assessment location.
Stakeholder	Organisation or individual with a particular interest in the project.
Study area	Spatial area within which environmental effects are assessed (i.e., extending a distance from the project footprint in which significant environmental effects are anticipated to occur). This may vary between the topic areas.
Threshold	Specified level in grading effects (e.g. the order of significance)
Vehicle movement	Movement of project vehicles only.
Visual amenity	Value of a particular view or area in terms of what is seen.
Visualisation	Computer generated wireline or photomontage illustrating change over time of the landscape where the Proposed Development will be located.
Worst case	Principle applied where environmental effects may vary (e.g. owing to seasonal variations) to ensure the most severe effect is assessed.

## ABBREVIATIONS

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AAWT	Annual average weekday traffic
AOD	Above ordnance datum
BAP	Biodiversity Action Plan
BEP	Biodiversity Enhancement Plan
BGS	British Geological Survey
BPM	Best practicable means
BS	British Standard
CAR	Controlled Activities Regulations
CEMP	Construction (or contract) environmental management plan
CIEEM	Chartered Institute of Ecology and Environmental Management
CNVMP	Construction Noise and Vibration Management Plan
CRTN	Calculation of road traffic noise
CTMP	Construction Traffic Management Plan
DAS	Design and Access Statement
DMRB	Design Manual for Roads & Bridges
dB(A)	Decibel (A-weighted), a unit of noise measurement
DIA	Drainage Impact Assessment
EAR	Environmental Appraisal Report
EIA	Environmental Impact Assessment
EU	European Union
FLS	Forestry and Land Scotland
FRA	Flood risk assessment
GDL	Garden and designed landscapes
GLVIA3	Guidelines for landscape and visual impact assessment (3 <sup>rd</sup> edition)
GWDTE	Groundwater dependent terrestrial ecosystems
HBRG	Highland Biological Recording Group
HGV	Heavy goods vehicle
HMA	Habitat management area
HNBAP	Highland Nature Biodiversity Action Plan
HRA	Habitats Regulations appraisal
HwLDP	Highland-wide local development plan

IEMA	Institute of Environmental Management and Assessment
ISO	International standard
JNCC	Joint Nature Conservation Committee
km	Kilometre
kV	Kilovolt
LCT	Landscape character types
LBAP	Local biodiversity action plan
LCT	Landscape Character Types
LDP	local development plan
LI	Landscape Institute
LiDAR	Light detection and ranging
LOAEL	Lowest observed effect level
LVA	Landscape and visual appraisal
MAGIC	Multi-Agency Geographic Information for the Countryside
NGD	Noise generating development
NGR	National Grid Reference
NPF4	National Planning Framework 4
NSA	National scenic area
NSD	Noise sensitive development
NSR	Noise sensitive receptors
NVC	National Vegetation Classification
OS	Ordnance Survey
PAC	Pre-application consultation
PAN	Planning advices notes
PEM	Proton Exchange Membrane
PMP	Peat management plan
PPC	Pollution Prevention and Control regulations
PPP	Pollution Prevention Plan
PWS	Private water supplies
RDP	Restoration and Decommissioning Plan
RSPB	Royal Society for the Protection of Birds
RVAA	Residential Visual Amenity Assessment
SAC	Special area of conservation
SBL	Scottish Biodiversity List
SEPA	Scottish Environment Protection Agency

SGRC	Steering group and review committee
SOAEL	Significant observed adverse effect level
SNH	Scottish Natural Heritage
SPA	Special protection area
SPERL	ScottishPower Energy Retail Limited
SSSI	Site of special scientific interest
SWH	Scottish Water Horizons
SWMP	Site waste management plan
THC	The Highland Council
UK	United Kingdom
UK BAP	UK Biodiversity Action Plan
UKTAG	UK Technical Advisory Group
VAR	Volt-ampere reactive
WHO	World Health Organisation
WLA	Wild land area
WQM	Water quality monitoring
ZTV	Zone of theoretical visibility

# 1 INTRODUCTION

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## 1.1 Introduction

- 1.1.1 ScottishPower Energy Retail Limited ('SPERL') (hereafter 'the applicant') is leading a joint development with Storegga Hydrogen Limited ('Storegga') for the erection of a hydrogen production and storage facility (Class 5 - General Industry), road haul tanker loading facility, underground electricity connection, import substation, improvements to existing access road, site offices, parking, gatehouse and perimeter fencing, temporary construction and laydown area, and ancillary development (hereafter the 'Proposed Development') at land to the east of the Beinn Tharsuinn Windfarm (National Grid Reference (NGR) NH 64225 81469) for which planning permission is sought under Section 32 of the Town and Country Planning (Scotland) Act 1997 ('the Act'). The location of the Proposed Development lies 12 km north of Alness and is shown on **Figure 1.1**.
- 1.1.2 Green hydrogen is so named because the process to create the hydrogen is powered by renewable energy sources like solar or wind power. These renewable sources power an electrolyser which separates water into hydrogen and oxygen gases. The hydrogen can then be used, distributed or stored. Hydrogen is incredibly versatile and can be used to support a variety of industries such as steel works, distilleries, heavy-duty transport and businesses using high temperature processes.
- 1.1.3 The intention is for the Proposed Development to be powered by 100% renewable power provided by ScottishPower Renewables from the co-located Beinn Tharsuinn Windfarm and through power purchase agreements with off-site renewable generation within the ScottishPower portfolio. It is acknowledged that the current operational lifetime of the existing Beinn Tharsuinn Windfarm is time limited by planning condition as part of the extant consent. The Applicant has discussed this issue with The Highland Council (THC) during pre-application consultation and it is proposed that a subsequent application for a grid connection would be submitted if Beinn Tharsuinn Windfarm was decommissioned (this would be a separate application).
- 1.1.4 This Proposed Development is considered a major project enabling the formation of the Cromarty Distilleries Project as part of the North of Scotland Hydrogen Programme recognised in the Scottish Government's Hydrogen Action Plan. It has been shortlisted as part of the first Hydrogen Allocation Round, which focuses on supporting initial electrolytic hydrogen production projects that will support early growth and demand in the hydrogen economy.
- 1.1.5 SPERL and Storegga have appointed RSK to prepare this Environmental Appraisal Report (EAR) to accompany the planning application. In addition to this EAR, the application documents also comprise the following reports:
- Supporting Statement;
  - Planning Statement;
  - Pre-application Consultation (PAC) Report;
  - Design and Access Statement (DAS); and



- Transport Statement.

## 1.2 The Applicant

- 1.2.1 ScottishPower Energy Retail Limited (SPERL) is part of Iberdrola, a world leader in clean energy with an installed capacity of over 28,000 Megawatt and the leading wind energy producer worldwide. Iberdrola is a global leader in tackling climate change, with a commitment to reaching carbon neutrality by 2050. As part of the energy transition to zero carbon, ScottishPower, of which SPERL is a part, is developing a network of hydrogen production facilities utilising renewable energy to create hydrogen for a range of industrial and transportation uses.
- 1.2.2 Storegga Hydrogen Limited is part of the Storegga Group. Storegga is an independent, UK-based decarbonisation development business. It develops early-stage carbon capture and storage and hydrogen projects in the UK and internationally to contribute to achieving Net Zero targets. The company employs approximately 80 people in the UK, US, and Singapore, with its head office in London.
- 1.2.3 Storegga is a private company backed by GIC, Mitsui & Co. Ltd., M&G Investments, Macquarie Group and Snam.

## 1.3 Requirements of the legislation

*The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017*

- 1.3.1 The Proposed Development does not qualify as a Schedule 1 development so mandatory Environmental Impact Assessment (EIA) is not required. The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 require that a proposed development which falls within the description of a 'Schedule 2 Development' within the meaning of the Regulations, will require an EIA where the development is likely to have significant effects on the environment by virtue of such factors as its nature, size or location (Regulation 2).
- 1.3.2 Given that the application site exceeds the screening threshold in Schedule 2 of 0.5 hectares site area (there is no direct specification that fits the operations that are proposed but this is the threshold for both energy and infrastructure projects, which are considered the best fits), the proposals were screened with the Local Planning Authority (The Highland Council (THC)).

A request for a Screening Opinion from THC under Regulation 8 paragraph (1) was made on 22 December 2022. A Screening Opinion was received on 1 February 2023, which confirmed that an EIA is not required for the Proposed Development.

## 1.4 Purpose and structure of the Environmental Appraisal Report

- 1.4.1 The EAR sets out the methodology, baseline conditions, predicted impacts of the Proposed Development, and mitigation and enhancement measures as required. Relevant Planning Policy considerations have also been included within each appraisal. A separate Planning Statement has been prepared as part of the application documents which identifies the context of the site and surrounding area, and the need for the Proposed Development, and includes an assessment of how it

accords with relevant national and local planning policies and against other planning material considerations.

1.4.2 The environmental appraisals commissioned to form this EAR have been prepared to address the potential environmental effects which are considered pertinent to construction, operational and decommissioning phases of the Proposed Development, as agreed in consultation with statutory bodies (consultation related to each discipline included is in the technical chapters (**Chapters 2-5**). The topics are as follows:

- Landscape and Visual Impacts;
- Ecology and Ornithology;
- Hydrology, Hydrogeology, Geology and Soils; and
- Noise Impacts.

## 1.5 Terminology

1.5.1 **Table 1.1** lists the key terminology used throughout the EAR.

**Table 1.1: Terminology**

Terminology	Definition / Explanation
the Applicant	ScottishPower Energy Retail Limited
developable area	Areas of land adjacent to the existing access track between the site access junction and north west of the main site area. This developable area was based on known constraints at the time and was used for initial site feasibility to identify an Area of Search for the Hydrogen Production Facility.
Area of Search	Following initial site feasibility this area was identified as preferred for the Hydrogen Production Facility as it was the least sensitive from an environmental and planning perspective. The Area of Search was larger than the area required for the Hydrogen Production Facility so further siting and design evolution could respond to ongoing environmental investigation and pre-application consultation.
Proposed Development	Used to refer to the proposed hydrogen production facility.
the application site	refers to everything within the application red line boundary.
site access	Comprises the existing junction with the B9176 Struie road, approximately 2 km to the east, and Beinn Tharsuinn Windfarm access track up to the main site area ( <b>Figure 1.5</b> ).
main site area	The area where the hydrogen production facility would be sited ( <b>Figure 1.5</b> ).
cable route corridor	The area comprising the existing access track plus a 10-15m buffer, running between the main site area and the existing Beinn Tharsuinn Wind Farm substation ( <b>Figure 1.5</b> ).

## 1.6 Site selection and design evolution

1.6.1 The Cromarty Firth Area has been identified as a candidate regional hydrogen hub under national policy and there is a requirement for a small-scale, decentralised hydrogen production facility as part of the Cromarty Distilleries Project. Decentralised production in

this location offers strong synergies and 'win-win' potential to address overlapping challenges around maximising Scotland's renewable energy potential and reducing possible curtailment that might arise due to electricity grid network constraints, creating new revenue and diversification opportunities for renewables operators, and accelerating the decarbonisation of energy intensive activities and sectors. Further detail regarding the need for this development in the Cromarty region and the advantages of this application site are included in the Supporting Statement.

1.6.2 The development partners identified the area near the existing Beinn Tharsuinn Windfarm for the location of a hydrogen production facility within the Cromarty region due primarily to the availability of existing infrastructure, proximity to a source of renewable energy, and proximity to potential end users and Cromarty Green Freeport bid area.

1.6.3 From project outset, key design principles that reflect relevant national and local policy were adopted to provide a framework within which the overall siting, layout and design of the Proposed Development could be refined. Following this an overall design objective was distilled:

*“To identify a technically feasible and economically viable Proposed Development. The final site, layout and design should, on balance, cause the least disturbance to the environment and the people who live, work and enjoy recreation within it”*

1.6.4 A developable area within the vicinity of the existing Beinn Tharsuinn Wind Farm access track was defined and an initial feasibility assessment was completed in order to identify an Area of Search for the Proposed Development footprint. Site feasibility work included:

- undertaking site surveys;
  - Extended Phase 1 habitat survey; and
  - Phase 1 peat depth survey.
- desk based assessments;
  - Landscape appraisal.
- a review of previous environmental reports and planning submissions for the Beinn Tharsuinn Windfarm;
- a baseline data search of local and national constraints; and
- pre-application consultation with THC.

1.6.5 The Area of Search was selected for the following reasons, principally:

- avoids designated and protected environmental resources;
- maintains appropriate setback distances from natural watercourse;
- avoids areas of deepest peat within the land available;
- provides good potential for visual screening via the natural landscape and topography;
- absence of residential properties in close proximity;
- avoids an established habitat management area (HMA) (associated with Beinn Tharsuinn Windfarm);
- avoids areas of steeper slope; and
- avoids potential impacts on existing overhead lines.

- 1.6.6 The size of the Area of Search exceeded the land take required for the Proposed Development so that due consideration could be given to refining the design whilst taking cognisance of consultee comments and constraints identified through ongoing environmental surveys and appraisals. This approach facilitates the identification of a final site location and, ultimately, a final design that minimises potential environmental impacts. It is the Area of Search that was taken forward for EIA Screening.
- 1.6.7 The final site location was chosen to minimise impacts on sensitive habitats while maintaining a balance with other physical constraints (specifically those mentioned in THC's Physical Constraints Supplementary Guidance, such as areas of excessive slope) and technical considerations. The location adjacent to the existing track and on the flatter area of land within the Area of Search minimises the potential ground disturbance and volume of excavations.
- 1.6.8 The evolution from developable area to the main site area is shown on **Figure 1.3**. More detail regarding siting and design evolution is provided in the DAS, including detail of how consideration was given to relevant design policies and environmental constraints to develop a design solution that satisfies the key design principles and objective.
- 1.6.9 The site selection and design of the Hydrogen Production Facility has been optimised in terms of avoiding and reducing potential impacts on the receiving environment but the Applicant is requesting a micrositing allowance of 100 m within the extent of the application site. This is to allow flexibility to take into account localised ground conditions and other environmental constraints that may be identified pre-construction, which will provide further opportunity for mitigation to reduce effects. Where environmental features may be potentially impacted by micrositing this would be managed in consultation with an Environmental Clerk of Works (ECoW) for the Proposed Development and with consideration of the onsite constraints detailed in this EAR. The applicant would seek to agree the use of a planning condition requiring all micrositing to be agreed with the Highland Council.

## 1.7 Site description

- 1.7.1 The site is on land located adjacent to the east of the operational Beinn Tharsuinn Windfarm, approximately 12 km north of Alness (**Figure 1.2**). It comprises the main site area, site access and the cable route corridor (**Figure 5**). The application site is approximately 11.9 ha.
- 1.7.2 The site currently comprises open moorland. In the immediate surroundings there are steep slopes, including Cnoc Muigh-bhlàraidh to the north, valleys and numerous watercourses. There is a HMA associated with Beinn Tharsuinn Wind Farm adjoining the main site area and the access track<sup>1</sup>. North west of the main site area there is a restored borrow pit that was in use during the construction of the Beinn Tharsuinn Wind Farm. There are two overhead power lines that run largely parallel with the B9176 and cross the proposed access track. The wider area comprises upland moorland, broad rounded hills and forestry plantation, with limited development

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<sup>1</sup> ScottishPower Renewables, who manage the HMA, have been consulted to ensure that any scheme proposed within the Area of Search would not impact on the HMA.

except for windfarms. The nearest properties are approximately 2 km to the east at Aultnamain.

- 1.7.3 There are no designated sites within the application site. Relevant designated sites within the surrounding area have been considered on a topic-by-topic basis (**Chapters 2-5**).

## 1.8 Description of the Proposed Development

### Physical characteristics

- 1.8.1 The Proposed Development would comprise the following components:
- Hydrogen production and storage facility comprising:
    - hydrogen electrolyzers
    - hydrogen purification plant
    - hydrogen and oxygen processing plant
    - compression and cooling equipment
    - low and high pressure storage vessels
  - Road haul tanker loading facility and transport access roads;
  - Power import infrastructure: including underground cabling, substation, transformer(s) and switchgear;
  - Water import, buffer storage and water demineralisation package;
  - Waste water treatment infrastructure: including effluent treatment plant and holding tanks;
  - Chemical storage and dosing equipment (if alkaline electrolyser technology is selected);
  - Site office, control room, admin and welfare facilities, gatehouse, internal access roads, parking and hardstanding and perimeter security fencing;
  - Improvements to existing access road;
  - Temporary construction and laydown area; and
  - Ancillary infrastructure, incl. flood mitigation and site drainage, stand by power generation and emergency equipment.
- 1.8.2 The indicative site layout is shown on **Figure 1.4** and the general arrangement of the indicative Hydrogen Production Facility is shown on **Figure 1.5** and engineering drawings of the key components of the Proposed Development are included in **Figures 1.6-1.14**.
- Hydrogen production facility*
- 1.8.3 Whilst relatively compact in footprint, the hydrogen production facility would include the following infrastructure as shown in **Table 1.2**.

**Table 1.2: Indicative balance of plant and associated infrastructure**

Plant Information	Indicative dimensions		
	Length (m)	Width (m)	Height (m)
Vent stack	0.5 m in diameter		25
Electrolyser building	72.5	25.7	15
Compression building	36.8	11.6	9.5
Fire protection system	12	2.5	3
Warehouse / Workshop	15	22	7
Electrical building	13	8	8
Administration control building	19	19	4.5
Water treatment plant	12	10	4.5
Air compressor building	12	2.5	3
Waste storage	5	2	2
Controlled storage	2	1	2
Standby generator	6	2.5	3
Generator system	12	2.5	3
Chemical dosing and storage (if alkaline electrolyser technology is selected)	12	2.5	3
Security gate house	6	2.5	3
Waste water treatment	12	2.5	3

*Cabling and grid connection*

- 1.8.4 Electricity would be supplied via the existing Beinn Tharsuinn Wind Farm substation. Power supply is required by means of HV cable transfer at 33 kV. Underground cabling would link the hydrogen production facility to the existing Beinn Tharsuinn Wind Farm substation. **Figure 1.12** shows an indicative cable trench cross-section. Detailed construction and trenching specifications would depend on the ground conditions encountered at the time. To minimise ground disturbance, cables would be laid in the road verge or alongside the site access tracks where possible and plant and equipment to enable grid connection would operate from the access track.

*Access, traffic and transport*

- 1.8.5 During construction, it is anticipated traffic would originate from the A9 to the south of the B9176 Struie Road. During operation it is anticipated that traffic would approach and depart from the site by travelling south along the B9176 towards the A9 and then continuing the journey east or west along the A9.
- 1.8.6 It is not anticipated that abnormal loads would be required to support the delivery of site infrastructure ; however if such requirement arises, further routing studies and swept path analysis would be undertaken. Standard heavy goods vehicles (HGV) movements for the delivery of the site infrastructure have been predicted.
- 1.8.7 Access to the Proposed Development would come from the existing Beinn Tharsuinn Windfarm access track which runs from the B9176 “Struie Road” (to the north of Aultnamain at NGR NH 66321 81768), approximately 2 km to the east. This section of track is approximately 2.6 km long. There could be localised resurfacing as required from the windfarm access track, between the site access junction with the Struie Road and the entrance to the Proposed Development, to provide a road suitable for HGV use; however, there would be no change to the footprint of the access track and no groundworks along the access track are proposed.
- 1.8.8 Operationally in respect of the Proposed Development, it is anticipated that the hydrogen is exported via metering to tube trailers. Based on the Applicant’s current understanding of the compressed Hydrogen transportation trailer market, we have assumed single trailers could be filled or decanted in 3 to 10 hours depending on trailer manufacturer and sizing. As per the transport statement we have assumed a frequency for transport movements during operations based on 840 kg tube trailers. However, these values are indicative based on current market specifications and both fill/decanting rate and tube trailer capacity could change in the future. It is intended that tube-trailers would enter the main site area from the west and be able to directly access six filling bays for their use only. These filling bays are located directly adjacent to the high-pressure hydrogen storage vessels. The contracted Transporter would drive low emission vehicles to haul the trailers to Offtaker sites.
- 1.8.9 General vehicles would use the same access route via the access track and would access the hydrogen production facility via the same designed access point. General vehicles would then go onwards to the administration and control building and associated staff and visitor parking. There would be provision for charging electric vehicles in the parking facilities.
- 1.8.10 It is anticipated that, prior to construction works being undertaken, a Construction Traffic Management Plan (CTMP) would be prepared in line with best practice guidance, and the applicant anticipates that such a requirement would form a condition of any consent granted.
- 1.8.11 Further information in relation to the access, traffic and transport arrangements for the Proposed Development is included in the Transport Statement and accompanying CTMP submitted as part of the application documents.

### *Temporary construction compound*

- 1.8.12 Associated with the Proposed Development would be a temporary construction laydown area approximately 0.26 ha. The compound would be enclosed by means of security fencing and details of onsite security during construction would be finalised prior to the commencement of construction activities. The compound would be restored following completion of the construction works.

### *Construction, operation and decommissioning*

- 1.8.13 Construction activities across all components of the Proposed Development would occur on a 7 day per week basis for an approximate 18 month construction programme. Construction works that may give rise to audible noise at the properties in the locality and HGV deliveries to the application site would be limited to the hours 07:00 to 19:00 Monday to Friday and 07:00 to 13:00 on Saturdays, unless otherwise approved in advance by THC (except in case of an emergency). There would be a small workforce onsite during construction with an estimated 22 HGV and 22 light goods vehicles travelling to and from the site on a daily basis during construction (see the Transport Statement for further detail).
- 1.8.14 The applicant's proposition is that the Proposed Development would operate in the same way as a business and industrial development and there is no operational need or statutory or legislative limit to the lifetime of the development. Therefore, consent is being sought for the Proposed Development and its components in perpetuity.
- 1.8.15 In the operational phase, the plant would be capable of operating 24 hours/day and 7 days/week (however, the actual operational routine for the Proposed Development would be determined by a range of factors, such as customer demand, available storage capacity, and transportation schedules) with regular deliveries from the site; this equates to 29 Full Time Equivalent jobs through 5 shifts of 5 crew, and 10 HGV drivers on shift patterns. Facilities would be available for a small on-site staff presence, including car parking, office and welfare facilities.
- 1.8.16 Decommissioning of components would take account of the environmental legislation and technology available at the time of decommissioning. As consent is sought in perpetuity it is proposed that decommissioning would only occur when a component, or section of, reaches the end of its operational lifespan (it is anticipated that replacement works would occur on a like for like basis). In consultation with THC it has been suggested that there would be a suitably worded planning condition regarding decommissioning of the Proposed Development if it were inactive for substantial period and there was no evidence to suggest that it was to be repaired/used again. The Applicant agrees to such an approach and the terms of any such condition would be agreed in consultation with THC. An Interim Restoration and Decommissioning Plan (RDP) has been included at the request of THC (**Technical Appendix 1.3**). Due to estimated advances in technology, changes in working methods and good practice guidelines it is proposed that a finalised RDP would be prepared in consultation with stakeholders prior to decommissioning if required. It is anticipated that the requirement for the RDP would form a condition of consent.

### *Health and safety*

- 1.8.17 The hydrogen production facility is considered remote to the majority of sensitive receptors, although it is within a location accessible via existing windfarm access



tracks. To ensure further protection of both component and receptors, the hydrogen production facility would be enclosed by means of security fencing and gated access and would be monitored during their operation via CCTV.

1.8.18 Health and safety during construction and decommissioning falls within the Construction (Design and Management) Regulations 2015. While full details of the health and safety strategy are yet to be determined in relation to construction and decommissioning activities, it is anticipated that these would include:

- production of a pre-construction information pack for contractors;
- the appointment of a Construction Project Manager and nominated personnel responsible for the production of a Construction Phasing Plan in relation to health and safety (Health and Safety Plan) alongside the creation, completion and monitoring of a site Safety File and direct liaison with the applicant; and
- restriction of public access to the application site throughout the period of the construction programme with existing areas of public access being reinstated post-construction.

#### *Environmental commitments*

1.8.19 Embedded mitigation has been incorporated into the siting and design of the Proposed Development. Additional mitigation measures identified within the technical chapters have been collated in a Schedule of Mitigation in **Technical Appendix 1.2**.

1.8.20 The delivery of the applicant's environmental commitments, requiring environmental management, in regard to construction and operation, including internal policies, schedule of mitigation, planning conditions and environmental obligations under applicable environmental legislation, would be detailed in an environmental management plan, which is anticipated to include:

- Surface Water Management;
- Oil and Chemical delivery and storage;
- Wastewater and Water supply monitoring and control;
- Waste and Resource Management including Circular Economy;
- Traffic and Transport;
- Air, Noise & Vibration, Land Management including Archaeology, Flora and Fauna;
- Environmental Incident Response; and
- Method Statements and Risk Assessments.

1.8.21 A separate CTMP would be required and a framework version has been prepared as part of the Transport Statement submitted with the application.

1.8.22 It is anticipated that the requirement for the Construction Environmental Management Plan (CEMP) and CTMP would form conditions of consent.

#### *Biodiversity net gain*

1.8.23 Production of a Biodiversity Enhancement Plan (BEP) will be a condition of any approval for the Proposed Development. The BEP will be written in consultation with NatureScot, THC and any relevant stakeholders, as required by THC. The BEP will

aim to enhance local biodiversity, increase habitat resilience within the wider landscape, and improve connections between nature networks, in line with NPF4. The BEP will be developed post-consent, delivering biodiversity enhancement required by NPF4 (Scottish Government, 2023), and contributing towards the objectives set out within the Scottish Biodiversity Strategy to 2045: Tackling the Nature Emergency in Scotland (Scottish Government, 2023).

- 1.8.24 Furthermore, management prescriptions which will be detailed in the BEP will contribute towards actions, commitments and priority species included within the Highland Nature Biodiversity Action Plan 2021-2026 (HNBAP) (The Highland Environment Forum, 2021), and will be set in accordance with guidance on priority peatland habitats in development management (NatureScot, 2023).
- 1.8.25 A steering group and review committee (SGRC) would be established prior to the finalisation of the BEP to oversee the implementation of the BEP, monitoring results and recommendations for any amendments to the BEP.
- 1.8.26 It is anticipated the BEP will include a combination of the following measures, with exact prescriptions to be confirmed when the detailed design has been completed:
- Enhancement of bog habitats;
  - Enhancement of heath habitats; and
  - Native riparian tree planting.
- 1.8.27 The measures detailed in the BEP will ensure a holistic approach to habitat enhancement to complement those enhancement measures being adopted for the adjacent operational Beinn Tharsuinn wind farm and comprise targeting the same ecologically important habitat types (bog and heath), as well as increasing the extent of native tree planting, whilst taking into account the safeguarding of peatland habitats.
- 1.8.28 It is considered that the outline enhancement measures provided as part of the Proposed Development, based on surveys and assessment of the wider area in the vicinity of the application site, demonstrate that biodiversity net gain is feasible. Further details of the proposed biodiversity enhancement measures are included in **Chapter 3: Ecology**.

#### *Water supply*

- 1.8.29 Scottish Water Horizons (SWH) would supply the water for the Proposed Development. SWH feasibility studies have identified a preferred water supply, sourced from the River Glass approximately 14 km to the south west near Alness, under an existing abstraction licence. The water would be supplied to the Proposed Development by a new pipeline from the Newmore Water Treatment Works in Alness. The additional demand required for the Proposed Development should be met without the need to carry out any upgrade on the existing asset. A report setting out the feasibility work undertaken is included in **Technical Appendix 1.4**. The final route of the water pipeline is still being determined and would be subject to a separate consent application and thus is not considered further in this report; however, initial feasibility shows a preferred 20.5 km pipeline (c. 180mm diameter) route installed in the verges along existing roads and the existing site access track and so no material environmental or health and safety effects are anticipated at this stage.

## Description of operations

### *Technology overview*

- 1.8.30 The Proposed Development would use electrolysis which uses electricity to break water into hydrogen and oxygen. Electrolysis produces hydrogen when produced solely from renewable power. The hydrogen production facility has a predicted capacity for supply up to 6,480 kg of hydrogen per day.

### *Use of resources*

- 1.8.31 The two primary resources for the hydrogen production facility are electricity and water. The water supply would be metered, filtered and deionised in a packaged demineralization unit before being pumped to the operating pressure of the electrolyser.

### *Electrolysis*

- 1.8.32 The project is considering containerised modular units of electrolysers to provide hydrogen that would be >99.9998% pure. Two types of electrolyser technology are being considered by the project:

- Pressurised Alkaline Electrolysis
  - Alkaline electrolysis deploy low-cost, porous diaphragm separator and catalyst materials. The low cost of alkaline electrolysers comes at the cost of more limited operational flexibility: the diaphragm is permeable to gases dissolved in the electrolyte, limiting the lower operational load to ~20% of the nominal load and requiring gas purging cycles during cold starts, which results in long start-up times. In addition, the efficiency of the electrolyser declines during turndown operation. The ideal project environment for alkaline electrolysers are large-scale industrial installations requiring a steady hydrogen output at low pressure levels.
- Proton Exchange Membrane (PEM)
  - The acidic environment of PEM and operating temperature of 80°C entails the need for costly electrode materials such as platinum-based catalysts, an ion exchange membrane, and titanium-based electrodes. This leads to PEM usually being more expensive than alkaline. The key advantages of PEM electrolysers result from the membrane's high gas barrier properties that enable a rapid cold-start, and a wide operational load window. PEM also uses only demineralised water negating the requirement to handle chemicals. The energy demand of PEM electrolysers is typically slightly higher than alkaline however this can be compensated by a lower compression demand. PEM electrolysers are therefore well suited for off-grid installations powered by highly variable renewable energy sources (e.g., wind turbines or solar panels). The fast start-up and wide operational load window enable an increased utilisation compared to an alkaline system.

- 1.8.33 The selection of technology would be made considering several factors including:

- cost;

- efficiency of hydrogen generation versus power consumption;
- availability/reliability;
- water consumption;
- delivery schedule;
- safety; and
- environmental impact.

1.8.34 The appraisals in this EAR have assumed a worst case scenario so that potential impacts arising from either technology have been robustly considered.

*Production of waste*

1.8.35 It is expected that waste could include:

- excavated material;
- welfare facility waste (construction);
- packaging;
- chemicals, fuels and oils;
- metals;
- waste water (dewatering and cleaning activities); and
- general construction waste.

1.8.36 A Site Waste Management Plan (SWMP) would detail how waste streams are managed. The Waste Hierarchy (Scottish Government, 2017) of prevention, reuse, recycle, recover and disposal to landfill - as a last resort - would be applied to the methodology of the SWMP.

1.8.37 It is not anticipated that the Proposed Development would give rise to waste in large quantities once operational.

*Pollution and nuisance*

1.8.38 The Proposed Development is covered by the Pollution Prevention and Control (Scotland) Regulations 2012 ('the PPC Regulations') which relate to potential emissions to environmental media, including air, surface water, groundwater, sewer, land and emissions of noise and odour. A Pollution Prevention and Control Permit would be applied for if required.

1.8.39 The outputs from the electrolysis process are Hydrogen (H<sub>2</sub>) and Oxygen (O<sub>2</sub>) gases. The hydrogen would be transported to the end users, as described above, and there is also the ability to vent small quantities of hydrogen as required for operational use of the Proposed Development. The oxygen produced during the process is currently intended to be vented to atmosphere although it could be collected if required in the future. Oxygen is not classified as a polluting substance under Schedule 5 of the PPC Regulations. Also due to the heat created during the electrolysis process – necessary to split the H<sub>2</sub> and O<sub>2</sub> – water vapour is produced in limited amounts. In cold atmospheric conditions, as the water vapour is released it may condense in the atmosphere creating localised plumes, however as no additional chemical reactions occur due to the nature of the electrolysis process, this water vapour is clean.

- 1.8.40 Residual water from the process would be treated as required prior to discharge. The intention is to discharge water to a new sewerage connection. Details of the new sewerage connection would be provided as part of the application for the water supply and is therefore not considered further in this appraisal.
- 1.8.41 Suitable drainage would be installed around Proposed Development infrastructure, including around the hydrogen production facility, the substation and new track sections. This would provide continuity of flow across these areas. Any required modified or additional drainage within the application site/main site area would not discharge directly into or upslope of identified sensitive habitat areas. All drainage infrastructure would be designed to accommodate a 1-in-200 year storm plus allowance for climate change. Further details regarding drainage are included in **Technical Appendix 4.2. Drainage Impact Assessment**.

#### *Health and safety*

- 1.8.42 The Proposed Development would comply with all relevant UK and international legislation and standards throughout the design life, including during the design, build and operation of the Proposed Development. All equipment would be installed, and maintained, by a competent person.

## **1.9 Factors scoped out of further appraisal**

- 1.9.1 Based on the description of the Proposed Development the following factors have been scoped out from further appraisal as potential impacts are considered unlikely.

#### **Archaeology and cultural heritage**

- 1.9.2 A desk-based review and initial assessment found that there was no known heritage assets within the developable area. Historical mapping and previous survey work undertaken for the development and construction of Beinn Tharsuinn Windfarm also indicated there is negligible potential for unknown archaeological remains within the developable area. It was also considered unlikely that the developable area contributes to the significance of any heritage assets and the nature and scale of the Proposed Development is unlikely to challenge the prominence of any monuments. Therefore, potential impacts that may affect the preservation of a heritage asset or the setting of heritage assets are considered unlikely. It was agreed with THC that this could be scoped out of further appraisal.

#### **Vulnerability to risk of major accidents**

- 1.9.3 The Proposed Development is not in a location which is susceptible to natural disasters or extreme weather sufficient to compromise the integrity of the plant. Therefore, there is not considered to be any significant risks for major accidents or disasters to occur.
- 1.9.4 As published mapping confirms that most of the site is not located in an area identified as being at risk of flooding it is considered unlikely that flooding would pose a significant risk to the operation of the electrolyser nor would its construction contribute to flooding elsewhere. Therefore, it is considered unlikely that significant effects would arise as a result of the Proposed Development.

1.9.5 Due to siting and design, none of the following climate trends identified in UKCP18 could affect the Proposed Development:

- increased temperature;
- changes in the frequency, intensity, and distribution of rainfall events (e.g. an increase in the contribution to winter rainfall from heavy precipitation events and decreases in summer rainfall); and
- sea level rise and associated coastal flood risk.

### **Air quality**

1.9.6 The potential for adverse effects on local air quality during construction is considered to be not significant as impacts would be minor and temporary and would be further reduced with the implementation of best practice measures that would be set out in the CEMP.

1.9.7 During operation, water vapour is produced in limited amounts; however as no additional chemical reactions occur due to the nature of the electrolysis process, this water vapour is clean and presents no detrimental impact on air quality.

## **1.10 References**

- Pollution Prevention and Control (Scotland) Regulations 2012. Available at: <https://www.legislation.gov.uk/ssi/2012/360/contents/made> [Accessed 28/08/2023]
- Scottish Government (2022). Hydrogen Action Plan. Available at: <https://www.gov.scot/publications/hydrogen-action-plan/> [Accessed 28/08/2023]
- The Highland Council. Physical Constraints Supplementary Guidance. Available at: [https://www.highland.gov.uk/downloads/file/2899/physical\\_constraints\\_supplementary\\_guidance](https://www.highland.gov.uk/downloads/file/2899/physical_constraints_supplementary_guidance) [Accessed 28/08/2023]
- The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017. Available at: <https://www.legislation.gov.uk/ssi/2017/102/contents/made> [Accessed 28/08/2023]
- Town and Country Planning (Scotland) Act 1997. Available at: <https://www.legislation.gov.uk/ukpga/1997/8/contents> [Accessed 28/08/2023]



## 2 LANDSCAPE AND VISUAL APPRAISAL

### 2.1 Introduction

#### *Scope of LVA*

2.1.1 The Landscape and Visual Appraisal (LVA) considers the potential effects upon:

- landscape fabric;
- landscape character;
- the special qualities of any landscape designations; and
- visual receptors including residential, transport and recreational receptors.

#### *Structure and terminology of LVA*

2.1.2 The LVA consists of the Chapter and accompanying Technical Appendices and Figures. Technical Appendices have been prepared that supplement the sections regarding methodology, planning policy and baseline. The appendices are important to the appraisal and should be read alongside this report. The Figures and Visualisations aid the baseline description and to illustrate the potential impacts. The full suite of supporting materials are shown in **Table 2.1**.

**Table 2.1: Landscape and visual appraisal supporting materials**

	Figures
2.1	Site Location and Landscape Context
2.2	Topography and Landcover
2.3	Landscape Character
2.4	ZTV Bare Ground
2.5	ZTV Screening
The Highland Council Visualisations	
2.6a-c	VIEWPOINT 1 - Beinn Tharsuinn wind farm access track
2.7a-c	VIEWPOINT 2 - B9176
2.8a-c	VIEWPOINT 3 - B9176, Aultnamain
2.9	VIEWPOINT 4 - Unclassified road west of Balleigh
2.10a-c	VIEWPOINT 5 - Beinn Tharsuinn
2.11	VIEWPOINT 6 - Unclassified road at Rhanich
2.12	VIEWPOINT 7 - B9176, Strathy junction
Technical Appendices	
4.1	LVA Methodology
4.2	Visuals Methodology
4.3	Landscape Sensitivity



4.4	Viewpoint Appraisal
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- 2.1.3 The appraisal defines the existing landscape and visual baseline environment; assesses its sensitivity to change; describes the key landscape and visual related aspects of the Proposed Development; describes the nature of the anticipated changes and assesses the effects arising during construction and once completed.
- 2.1.4 The LVA has been undertaken in accordance with published best practice namely the Guidelines for Landscape and Visual Impact Assessment (Third Edition), Landscape Institute (LI) and IEMA 2013 (GLVIA3) and associated technical guidance notes published by the LI (referenced as appropriate in the LVA).
- 2.1.5 Although linked, landscape and visual effects are considered separately. Landscape effects derive from changes in the landscape fabric, which may result in changes to the character, whereas visual effects are the effect of these changes as experienced by people (visual receptors).
- 2.1.6 Key terms used within the appraisal are described in **Section 2.2** and **Appendix 2.1** which sets out the methodology used for this LVA.

*The application site and proposals*

- 2.1.7 **Figures 2.1** and **2.2** (Site Location and Landscape Context, and Topography and Landcover), place the Proposed Development within its local context. The site is set on the southern slope of Cnoc Muigh-bhlaraidh, and consists of peatland, with its immediate surrounds and rural setting formed by upland moorland, broad rounded hills and forestry plantation.
- 2.1.8 Beinn Tharsuinn Windfarm, formed by 17 turbines, is located to the west of the site and access to the Proposed Development would be from the existing wind farm track. The site access runs from the B9176, Struie Road and is located within the site, up to and including the southern boundary of the main site area. Beinn nan Oighrean Windfarm, consisting of two turbines is also located to the west of the site and appears as an extension of Beinn Tharsuinn Windfarm.
- 2.1.9 The Proposed Development is for the construction of the Hydrogen Production Facility, with several buildings and structures including an electrolyser, warehouse/workshop, single stack, and control and administrative building. The site would be enclosed by perimeter fencing, with internal access roads and security lighting. Further details of the Proposed Development are included in **Section 2.5** of this Chapter and in detail in **Chapter 1: Introduction**.

*Competence*

- 2.1.10 This LVA along with the design and mitigation of the Proposed Development has been prepared by Chartered Landscape Architects at Stephenson Halliday ('the Practice'). The Practice has over 20 years' experience working on energy



development proposals throughout the UK. Key individuals working on this project have over 20 years' experience as chartered landscape architects.

- 2.1.11 The Practice is a LI and Institute of Environmental Management and Assessment (IEMA) registered practice, and all work is prepared and reviewed internally by senior highly experienced landscape planners with Public Inquiry experience.
- 2.1.12 To inform the LVA, a site visit was undertaken to various locations within the study area, including, but not restricted to, representative viewpoints, by Stephenson Halliday's assessment team during August 2022.

*Stakeholder consultation*

- 2.1.13 An introductory meeting was held with THC in October 2021 to discuss the initial design and siting of the Proposed Development, with a formal pre-application advice meeting attended by key stakeholders on 8 June 2022. During the pre-application meeting, the scope of the LVA, methodology, study area and viewpoint selection were discussed. Matters raised during this meeting and within the pre-application response

pack, along with how they have been addressed in this LVA are detailed in **Table 2.2** below.

**Table 2.2: Summary of Stakeholder Consultation**

Consultee	Matters raised	How this is addressed
THC	The General pre-application and scoping advice for onshore wind farms (NatureScot, 2022) may provide useful guidance for the LVA.	This document has been considered with a particular focus on the referred guidance on siting and design, visual representation and designated landscapes.
THC	Sensitive receptors should be considered, particularly people who live and visit the area. Details of design iterations to reduce effects should be included.	Sensitive receptors within the study area have been identified through the review of the Zone of Theoretical Visibility studies ( <b>Figures 2.4</b> and <b>2.5</b> ) and viewpoint analysis, in <b>Technical Appendix 2.4</b> ). Key changes during the iterative design process have been noted.
THC	Clarification of the plume from the stack and scope of airborne emissions is required.	Details of the steam plume is detailed in Section 2.5 of this Chapter and in Chapter 1.
NatureScot	Potential landscape and visual impacts on designated sites including the Dornoch Firth National Scenic Area (NSA), Skibo Castle Garden and Designed Landscape (GDL), and Rhiddoroch – Beinn Daerg – Ben Wyvis Wild Land Area (WLA).	This LVA includes an assessment of landscape designations within the study area and those where there would be an impact on the physical landscape and/or potential visibility of the Proposed Development, as per the ZTVs, shown on <b>Figures 2.4</b> and <b>2.5</b> .

2.1.14 In addition to the above, there has been ongoing correspondence with THC Landscape Officer regarding viewpoint selection. At the early stages of design, the then Zone of theoretical visibility (ZTV) indicated that there was potential visibility from an unclassified road, west of Balleigh and the B9176, at Strathy Junction. These locations are included in the LVA as Viewpoints 4 and 7, respectively. Given, the ongoing design and siting of the Proposed Development, there is no visibility from these locations, but they are included as part of the LVA for completeness. The final

list of viewpoints agreed through consultation is described separately in **Technical Appendix 2.4** and **Table 2.8** of this Chapter.

### *Scope of appraisal*

#### **Scoped in**

- 2.1.15 The scope of the LVA is detailed in **Section 2.1**, with other considerations for the appraisal, that have been scoped in and scoped out detailed below. **Cumulative Assessment**
- 2.1.16 Cumulative assessment relates to the assessment of the effects of more than one development. The approach to cumulative assessment is set out within **Technical Appendix 2.1**.
- 2.1.17 Through the baseline assessment, no other hydrogen facilities within the study area were identified. However, other built structures of a similar scale and influence within the study area include wind farms. Two operational wind farms- Beinn Tharsuinn and Beinn nan Oighrean are located in the west of the study area with Coire na Cloiche further west, beyond 5 km study area for the Proposed Development. In addition to these existing wind farms, Strathroy Windfarm is consented and located in the south of the study area. These wind farms are considered as part of the baseline, within the Viewpoint Analysis (**Technical Appendix 2.4**).

#### **Scoped out**

##### **Night-time Assessment**

- 2.1.18 The Proposed Development includes temporary lighting during the construction phase and permanent lighting when the facility is operational. Lighting associated with construction would be over the 18 month build period with agreed hours for lighting work areas and for security.
- 2.1.19 Permanent night-time lighting is proposed along the perimeter of the site and at the entrance, and where possible, directed downward and carefully designed not to contribute to light pollution. Night-time effects are considered to be minimal and not considered further in this Chapter.

##### **Residential Amenity**

- 2.1.20 As set out within LI Technical Guidance Note 02//19 'Residential Visual Amenity Assessment (RVAA)':
- 2.1.21 *"Changes in views and visual amenity are considered in the planning process. In respect of private views and visual amenity, it is widely known that, no one has 'a right to a view.' ..."*
- 2.1.22 *It is not uncommon for significant adverse effects on views and visual amenity to be experienced by people at their place of residence as a result of introducing a new development into the landscape. In itself this does not necessarily cause particular planning concern. However, there are situations where the effect on the outlook / visual amenity of a residential property is so great that it is not generally considered*

*to be in the public interest to permit such conditions to occur where they did not exist before.”*

- 2.1.23 This LVA does not include an assessment of residential visual amenity as it is judged that the Proposed Development would not give rise to effects meeting the threshold described above. Views to the Proposed Development from the nearest residential properties within the study area, at Aultnamain, are considered in **Section 2.6**, on visual receptor groups.

*Study area*

- 2.1.24 GLVIA3 recommends that the study area for the consideration of landscape effects should *‘include the site itself and the full extent of the wider landscape around it which the proposed development may influence in a significant manner.’* It also recommends that the LVA should consider the area from which the Proposed Development would potentially be visible but that the emphasis *‘must be on a reasonable approach which is proportional to the scale and nature of the Proposed Development.’*
- 2.1.25 In this case, a study area of 5 km has been used, as shown by **Figures 2.1 – 2.5**. This study area is adequate to identify all non-negligible effects on landscape and views given the extent of screening from rolling hills and forestry plantation, particularly in the north, north west and southeast (as illustrated on **Figure 2.2**).

## 2.2 Appraisal methodology

2.2.1 The detail of the methodology is described in **Technical Appendix 2.1**. A summary of the main appraisal criteria is provided below.

### *Sensitivity*

2.2.2 Sensitivity is judged taking into account the component judgments about the value and susceptibility of the receptor as illustrated by the table below. Where sensitivity is judged to lie between levels, an intermediate assessment will be adopted. A slightly greater weight is given to susceptibility in judging sensitivity of visual receptors as indicated below:

**Table 2.3: Landscape Sensitivity**

LANDSCAPE RECEPTORS		Susceptibility		
		High	Medium	Low
Value	National	High	High/Medium	Medium
	Regional	High/Medium	Medium	Medium/Low
	Community	Medium	Medium/Low	Low

**Table 2.4: Visual Sensitivity**

VISUAL RECEPTORS		Susceptibility		
		High	Medium	Low
Value	National	High	High/Medium	Medium
	Regional	High/Medium	High/Medium	Medium/Low
	Community	High/Medium	Medium	Low

### *Magnitude of change*

2.2.3 Scale of effect is the primary factor in determining magnitude; which may be higher if the effect is particularly widespread and/or long lasting, or lower if it is constrained in

geographic extent and/or timescale. The **Table 2.5** below illustrates how this judgement is considered as a two-step process.

**Table 2.5: Magnitude of change**

Scale / extent	Large	Medium	Small	Negligible
Wide	<b>Substantial</b>			
Intermediate		<b>Moderate</b>		
Localised			<b>Slight</b>	
Limited				<b>Negligible</b>

Stage 1 Result / Duration	Substantial	Moderate	Slight	Negligible
<b>Permanent</b>	<b>Substantial</b>			
<b>Long-term</b>		<b>Moderate</b>		
<b>Medium-term</b>			<b>Slight</b>	
<b>Short-term</b>				<b>Negligible</b>

2.2.4 Where magnitude is judged to lie between levels, an intermediate assessment will be adopted.

*Level of effects*

2.2.5 The level of any identified landscape or visual effect is assessed as major, moderate, minor or negligible. These categories are based on the consideration of sensitivity with the predicted magnitude of change. The table below is not used as a prescriptive tool and illustrates the typical outcomes, allowing for the exercise of professional

judgement. In some instances, a particular parameter may be considered as having a determining effect on the analysis.

**Table 2.6: Identifying the Level of effect**

		Magnitude of Change			
		Substantial	Moderate	Slight	Negligible
Receptor Sensitivity	High	Major	Major/ Moderate	Moderate	Minor
	Medium	Major/ Moderate	Moderate	Moderate/ Minor	Minor/ Negligible
	Low	Moderate	Moderate/ Minor	Minor	Negligible

### Beneficial/ Adverse

- 2.2.6 Landscape and visual effects can be beneficial or adverse and in some instances may be considered neutral. Neutral effects are those which overall are neither adverse nor positive but may incorporate a combination of both.
- 2.2.7 Taking a precautionary stance, changes to rural landscapes involving construction of man-made objects of a large scale are generally considered to be adverse.

### *Distances*

- 2.2.8 Distances in the assessment are approximate distances between the nearest part of the site boundary and the nearest part of the receptor in question, unless explicitly stated otherwise. For the selected viewpoints, the distances between these and the main site area, i.e. the proposed buildings and structures as well as distances to the access track are provided.

### *Visual aids*

- 2.2.9 Annotated photographs have been provided for selected viewpoints used in this LVA (Viewpoint Photosheets 4, 6 and 7). The annotated photographs accord with guidance for 'Type 1' visualisations as defined in LI Technical Guidance Note 06/19 (TGN 06/19). This type of visualisation was selected in part due to the fact that the Proposed Development was screened as not requiring EIA and also that none of these viewpoints are located within a designated landscape. Table 1 of TGN 06/19 confirms that Type 1 visualisations are appropriate for '*Planning applications for most non-EIA development accompanied by LVA, where there are concerns about landscape and visual effects and effective mitigation is required.*'
- 2.2.10 In addition, four viewpoints (Viewpoints 1-3 and 5) have been chosen, in consultation with THC, to be prepared as photomontages, representing the Proposed Development at completion and at completion with embedded mitigation, a green rendered finish, to blend in with the surrounding landscape. This type of visualisation



is referred to as Type 3 photomontage in Technical Guidance Note 06/19 (TGN 06/19) and detailed in **Technical Appendix 2.2**.

## 2.3 Planning policy

### *National planning policy*

- 2.3.1 National Planning Framework 4 (NPF4) was adopted in February 2023 and sets out the national spatial framework for Scotland, articulated in detail within a series of national planning policies. The Planning Statement, which accompanies this application, describes the key elements of national policy with regard to sustainable places and energy development, with additional detail concerning solar developments.
- 2.3.2 With regard to landscape and visual matters, NPF4 Policy 11 requires that *inter alia* energy development projects should show impacts are addressed, including “...significant landscape and visual impacts, recognising that such impacts are to be expected for some forms of renewable energy. Where impacts are localised and/or appropriate design mitigation has been applied, they will generally be considered to be acceptable.” In addition, NPF4 Policy 29 Rural Development states that “...Development proposals in rural areas should be suitably scaled, sited and designed to be in keeping with the character of the area...”.

### *Local planning policy*

- 2.3.3 Current local planning policy is described in the adopted Highland-wide Local Development Plan (HwLDP) (April 2012) and the emerging Inner Moray Firth Local Development Plan 2 (Plan as Submitted to Scottish Ministers, March 2023). The policies in each document relevant to this appraisal, are outlined below:

#### **The Highland Wide Local Development Plan (HwLDP) (April 2012)**

**Policy 36 Development in the Wider Countryside** sets out the criteria for proposals outwith settlement areas including sensitive siting and design, consideration of existing patterns of surrounding development, and landscape character and capacity. The site has been identified as being within the Wider Countryside, as per the LDP proposals maps.

**Policy 57 Natural, Built and Cultural Heritage** states that proposals would be assessed taking into account impacts on built, natural and cultural heritage designations and features. The policy notes the Council’s intention to adopt a supplementary guidance on Wild Land considering the preservation of key qualities and any adverse effects brought on by proposals outwith these areas.

As per the LDP proposals maps, the site is shown as being surrounded by areas of local/ regional importance, although these are not specified. The maps also show the Dornoch Firth NSA, located in the north of the study area.

**Policy 61 Landscape** aims to safeguard the defining landscape character and special qualities of an area, so that new developments are of an appropriate scale, form, pattern and finish. Other considerations include potential cumulative effects and measures to enhance the character or sense of place of an area.

**Policy 67 Renewable Energy Development** states that the Council would support renewable developments where it is satisfied that their location, siting and design

would not significantly detrimentally effect elements and features of the area and its use as listed in this policy. This includes impacts on views and landscape character and the policy notes that ‘... *the design and location of the proposal should reflect the scale and character of the landscape and seek to minimise landscape and visual impact ...*’.

### **Inner Moray Firth Local Development Plan 2 (Plan as Submitted to Scottish Ministers, March 2023)**

**Policy 2- Nature Protection, Preservation and Enhancement** applies to both local and national, major and EIA developments. This policy not only relates to habitats and biodiversity but also minimising, through careful planning and design, impacts on the natural environment. The policy also mentions understanding the existing characteristics of the site and mitigation in keeping with the character of the area.

#### *Local guidance and baseline studies*

- 2.3.4 The landscape character of the Study Area is defined by the NatureScot National Landscape Character Assessment (2019), which is a national dataset of 389 Landscape Character Types (LCT). Details of the landscape character within the study area are detailed in **Section 2.4**.

## **2.4 Baseline**

### *Introduction*

- 2.4.1 An overview of the baseline study results is provided in this section with the full baseline description of the individual landscape and visual receptors provided alongside in this chapter, in **Section 2.6** for ease of reference.
- 2.4.2 This Section identifies those landscape and visual receptors which merit detailed consideration in the assessment of effects, and those which are not taken forward for further appraisal as effects “*have been judged unlikely to occur or so insignificant that it is not essential to consider them further*” (GLVIA3, para. 3.19).
- 2.4.3 Both this baseline section and the effects section describe landscape character and visual receptors before considering designated areas as it is common for designations to encompass both character and visual considerations within their special qualities or purposes of designation.

### *ZTV study*

- 2.4.4 Bare ground and screening ZTV studies have been generated based on the proposed design and indicates areas of potential visibility. The ZTV study was used to aid the identification of those receptors that are likely to be most affected by the Proposed Development and those that do not require detailed consideration.
- 2.4.5 The bare ground ZTV (**Figure 2.4**) for the Proposed Development shows that the main area of visibility is across slopes surrounding the site including Cnoc Muigh-bhlaraidh and Meall a Bhreacain, as well as along the B9176 road, to the immediate east. Predicted visibility extends south and further east along hill sides and across

dense areas of forestry plantation, and south west over scattered elevated areas, from where there would be longer views.

- 2.4.6 The landform to the north and west of the study area limits visibility of the Proposed Development in these directions with large blocks of plantation in remaining parts of the study area restricting visibility along hills slopes and within the strath.
- 2.4.7 Beyond the 5 km study area, there would be potential visibility of the Proposed Development to the north east, including from the northern edge of the village of Edderton and scattered properties nearby. As well as slopes covered in forestry plantation to the south. However, it is anticipated that at this distance, the Proposed Development would be partly screened by intervening landform and/or vegetation and would appear as a small part of the overall view to hills and moorland.
- 2.4.8 In addition to the bare ground ZTV, a screening ZTV (**Figure 2.5**) was produced using a topographic model and includes the screening effects of buildings (modelled at a height of 7.5m) and trees (modelled at a height of 15m), including dense areas of forestry plantation to the south and east of the site. When compared to the bare ground ZTV, the screened ZTV indicates a reduction in areas of theoretical visibility mainly to the east where large areas of forestry are present. These area include: at Edderton and environs including NCN route 1, at Balleigh and environs including Core Paths RC15.09 and RC15.05, along the minor road between Balleigh and Admiral's Farm to the south, along the minor road between Balleigh and Rhanich and the area of land to the west including Core Path RC15.03. The reduction in areas of theoretical visibility occurs
- 2.4.9 Effects on landscape and visual receptors outside the areas of visibility shown on the ZTV study would be **Negligible** and are not assessed in detail.

#### *Landscape character*

- 2.4.10 The baseline landscape character is described in the NatureScot Landscape Character Assessment (2019). Landscape character types within the study area are shown on **Figure 2.3** and listed below:
- LCT 330 Rounded Hills and Moorland Slopes – Ross and Cromarty (0 km, coincides with the site).
  - LCT 341 Forest Edge Farming (1.7 km, north east and 4.3 km south).
  - LCT 135 Rounded Hills – Caithness and Sutherland (4.2 km, north west).
  - LCT 345 Farmed and Forested Slopes – Ross and Cromarty (4.5 km, north east).
- 2.4.11 The site lies within the Rounded Hills and Moorland Slopes – Ross and Cromarty LCT, which extends across the majority of the study area, as shown on **Figure 2.3**. The NatureScot assessment describes the key characteristics of this LCT as being the broad and rounded hills, which, along with upland moorlands and broad straths, create an undulating skyline. The character type occurs between and around the more dramatic LCTs of the Rounded Mountain Massif and the Rugged Mountain

Massif – Ross and Cromarty. There is a sense of wildness with these surrounding LCTs, together with the large scale host landscape and its remote interior.

- 2.4.12 Straths within the host LCT contain meandering rivers, occasional improved pasture and major trunk roads, with small groups of buildings at road junctions. Wind farms, pylons and reservoirs are found within the LCT but are not regular features within this large scale landscape. There are large areas of uniform moorland, riparian woodland and extensive coniferous forest on lower hills slopes.
- 2.4.13 As noted above, the NatureScot assessment describes the perceptions of the LCT as two different experiences with built features in contrast with the simple form of hills and remote interior parts of the LCT. It is noted that most people experience the LCT from the roadside and human activity here is limited. From hill tops, “...*the eye is drawn along the rounded ridges of the hills looking for a dominant focal point, frequently moving to the more distant mountain tops, plains and firths of the surrounding areas*”.
- 2.4.14 The effects of the Proposed Development on the Rounded Hills and Moorland Slopes – Ross and Cromarty LCT are considered in **Section 2.6**.
- 2.4.15 The ZTV study also illustrates potential visibility from the Forest Edge Farming LCT and the Farmed and Forested Slopes – Ross and Cromarty LCT, although visibility is sparse and for the latter LCT, towards the 5 km extents of the study area. Three viewpoints are located within the Forest Edge Farming LCT and effects on landscape character are included in **Technical Appendix 2.4**. Given the limited visibility and distance from the Proposed Development, LCTs apart from the host character area are excluded from the detailed assessment on the basis that effects are likely to be **Negligible**.

#### *Visual receptors*

- 2.4.16 Visual receptors are “*the different groups of people who may experience views of the development*” (GLVIA, 3rd edition, para 6.3). In order to identify those groups who may be significantly affected the ZTV study, baseline desk study and site visits have been used.
- 2.4.17 The different types of groups assessed within this LVA encompass local residents; people using key routes such as roads; cycle ways, people within accessible or recreational landscapes; people using rights of way or people visiting key viewpoints. In dealing with areas of settlement, rights of way and local roads, receptors are grouped into areas where effects might be expected to be broadly similar, or areas which share particular factors in common.
- 2.4.18 Representative viewpoints have been selected to aid the assessment of effects on visual receptors.

#### **Baseline visual environment**

- 2.4.19 As shown in **Figure 2.1**, the site is on the southern slopes of Cnoc Muigh-bhlaraidh, close to the base of Meall a Bhreacain and to the north of large blocks of pine plantation within lower-lying areas. The site’s immediate surrounds consist of broad

hills and upland moorland with built structures, including pylons, wind turbines and the B9176.

- 2.4.20 Visibility to and from the site is restricted in parts by the rolling landform and dense intervening forestry plantation, including those views from scattered properties in the north east of the study area, as well as large stretches of long-distance routes and Core Paths.

### **Visual receptor groups**

- 2.4.21 The following visual receptor groups are located within the study area and are likely to have visibility of the Proposed Development, as shown on the ZTV (**Figure 2.4**) and are considered further in **Section 2.6**:
- Residents at Aultnamain and road users on the Moray Firth Tourist Route (0 km – 1 km southeast); and
  - Recreational receptors on hills surrounding the site and in the south west of the study area (0 km – 5 km south west).

### **Key routes**

#### *Roads and long-distance routes*

- 2.4.22 Key routes are shown on **Figure 2.1**, with no railway lines within the study area and the only main road being the B9176. The B9176 runs in a north to south direction and forms part of the Moray Firth Tourist Route. This long-distance route is located between Inverness and Loch Fleet and road users can experience views to the rugged landscapes of Sutherland and Easter Ross.

#### *Core Paths*

- 2.4.23 As shown on **Figure 2.1**, there are a number of Core Paths within the study area, particularly in the north east and southeast. These paths are found within and towards low-lying areas; and run adjacent to or within dense woodland and plantation and near to watercourses.

#### *Specific viewpoints*

- 2.4.24 One panoramic viewpoint is marked on OS mapping, in the north of the study area, 4.2 km north of the Proposed Development. This viewpoint is located adjacent to the B9176 and is aligned to the north east to take in views of the Dornoch Firth and across the Dornoch Firth NSA. An additional viewpoint is located towards the centre of the study area, 2.4 km north east of the Proposed Development. This viewpoint is not marked on OS mapping but is referenced as Dornoch Firth Viewpoint and is also adjacent to the B9176 road. From here, views are directed east, along the river and

towards the mouth of the Dornoch Firth, with surrounding hills creating a sense of enclosure.

- 2.4.25 Both viewpoints are set to focus views in the opposite direction to the site and no visibility is shown to the Proposed Development from either. Visitors to these valued viewpoints are not considered further as effects would be **Negligible**.

#### *Landscape designations and value*

#### **Designated areas**

##### *National Scenic Areas*

- 2.4.26 The only designated landscape within the study area is the Dornoch Firth NSA, located 3.5 km north of the site. 'The special qualities of National Scenic Areas' (NatureScot, 2010) document describes the special qualities of this designation as a variety of landscapes between enclosed western parts and expansive areas in the east, inhabited spaces with wilder surrounding hills and moors, a diversity of woodland and watercourses, and the undeveloped coastline creating a sense of tranquillity.
- 2.4.27 The ZTV study indicates no potential visibility from the NSA within the study area, although there would be bands of visibility beyond 5 km between the settlements of Ardmore and Edderton and across and beyond the Dornoch Firth, towards Skibo Castle GDL. Given the angle of view, it is unlikely the majority of the buildings that form the Proposed Development would be visible, with upper parts of the stack and electrolyser most likely seen from this part of the NSA. Also, from this direction and at these distances, the Proposed Development is unlikely to have any notable effects on the designated qualities of the NSA. Effects would be no greater than **Negligible** and are not considered further.

##### *Wild Land*

- 2.4.28 As part of the consultation process, THC raised concern over potential effects on The Rhiddoroch – Beinn Daerg – Ben Wyvis WLA. The WLA is located 9.7 km west of the Proposed Development and thereby outwith the study area.
- 2.4.29 The key attributes and qualities of the WLA are listed below:
- *A range of awe-inspiring massive, high rounded hills and plateaux, as well as steep rocky peaks and ridges, offering elevated panoramas.*
  - *Long and deep penetrating glens with steep, arresting side slopes that limit views, some containing access routes and clearly influenced by estate management.*
  - *A very large interior with a strong sense of remoteness and sanctuary that seems even more extensive where appearing to continue into neighbouring wild land areas.*

- *Rocky hills, cnocan and peatland slopes that appear simple and awe-inspiring at a broad scale, but harbour intricate features at a local level, as well as a strong sense of sanctuary and solitude.*

2.4.30 Given the separation distance, the Proposed Development would not change the above qualities of the WLA and would be barely discernible in overall views to the landscapes surrounding this WLA. Effects would be no greater than **Negligible** and are not considered further.

## 2.5 The proposed development

### *Physical characteristics*

- 2.5.1 The Proposed Development is described in detail in **Chapter 1**. In summary, the site consists of the following main buildings and structures:
- Electrolyser building, located towards the eastern site boundary and at a height of 15 m to its roof pitch.
  - Compression building (9.5 m at its maximum height), warehouse/ workshop (8.2 m to the roof pitch), and administration and control building (5.8 m to the roof pitch), all located towards the southern site boundary.
  - Hydrogen vent stack at 25 m in height and located towards in the north of the site. It is noted that water vapour released from the stack is in limited amounts and there may be localised plumes in cold atmospheric conditions.
  - Perimeter fencing, incorporating deer fencing at 2 m in height.
  - Internal access routes.
  - Security lighting and CCTV.

### *Embedded mitigation*

- 2.5.2 The design approach is described in full within the Design and Access Statement.
- 2.5.3 As per Section 3 (Planning Policy) of this Chapter, Policy 36 of the HwLDP states that development proposals should be ‘... *acceptable in terms of siting and design*’ and ‘*avoid incremental expansion of one particular development type within a landscape whose distinct character relies on an intrinsic mix/ distribution of a range of characteristics.*’ The Proposed Development is sited on the hill slope of Cnoc Muigh-bhlaraidh, to reduce visual effects and so taller buildings and structures would be seen against the backdrop of the surrounding landscape, rather than break the skyline.
- 2.5.4 Through the design progression and pre-application consultation, it was agreed that mitigation planting, in the form of trees for screening, along the perimeter of the Proposed Development would not be suitable given the open nature of the surrounding landscape. Although, peatland would be reinstated to replace the area displaced by the Proposed Development. Embedded mitigation, in the form of a rendered finish to buildings, structures and fencing would be in a muted hue of grey, green and / or brown to reduce the visual presence of the Proposed Development, and this is shown for selected viewpoints with photomontages (**Figures 2.6, 2.7, 2.8 and 2.10**).

### *Construction*

- 2.5.5 The construction of the Proposed Development would take approximately 18 months. It would involve the erection of perimeter fencing and access tracks followed by the installation of the hydrogen facility and ancillary buildings and structures. Construction activities would be serviced from a temporary site compound and laydown area in the east of the site, adjacent to the Hydrogen Production Facility.



## 2.6 Landscape and visual effects

### *Introduction*

- 2.6.1 This section sets out the effects that the Proposed Development would have on landscape and visual receptors.
- 2.6.2 Effects during construction (short-term) and for the completed development (permanent effects) are considered for each landscape and visual receptor.

### *Description of change to site fabric*

- 2.6.3 The Proposed Development would include altering the slope of Cnoc Muigh-bhlaraidh to form a flat area for the site, and the loss of peatland. In addition to this, 2.3 km of underground cabling is proposed to the west of the main site area, and the ground returned to its former state on completion of construction works. These changes would be limited to the main site area itself and over a small part of the hill slope.

### *Viewpoint Analysis*

- 2.6.4 The viewpoint locations are shown on **Figures 2.1 - 2.5** and the visualisations (comprising photographs of the existing view, photosheets and photomontages) are illustrated with reference to Viewpoints 1 to 7, on **Figures 2.6 - 2.12**.
- 2.6.5 The full viewpoint analysis is contained within **Technical Appendix 2.4: Viewpoint Analysis**. The findings are summarised below in **Table 2.7**. In each case, distances are listed in relation to the main site area, i.e., the proposed buildings and structures and where relevant the access track. Full details of distances from the Proposed Development to the main site area and the access track, which forms the eastern extents of the site are recorded in **Technical Appendix 2.4**.
- 2.6.6 It should be noted that **Technical Appendix 2.4** considers the nature and scale of change to character and scale of effect to views at each viewpoint location only. The sensitivity of receptors and wider extent of the effect (beyond the individual viewpoint location) and its duration are considered in the main body of the assessment text below as part of the consideration of the magnitude of change and level of effect.

**Table 2.7: Viewpoint Analysis Summary**

Viewpoint No.	Viewpoint	Distance / direction from the Proposed Development	Scale of Landscape Change	Scale of Visual Effect
1	Beinn Tharsuinn Windfarm access track	240 m, south east	Construction: Large, Adverse Permanent: Large, Adverse	Construction: Large, Adverse Permanent: Large, Adverse

Viewpoint No.	Viewpoint	Distance / direction from the Proposed Development	Scale of Landscape Change	Scale of Visual Effect
2	B9176	1.8 km, east	Construction: Medium, Adverse Permanent: Small, Adverse	Construction: Medium, Adverse Permanent: Small, Adverse
3	B9176, Aulnamain	2.1 km, east	Construction: Small, Adverse Permanent: Small, Adverse	Construction: Small, Adverse Permanent: Small, Adverse
4	Unclassified road west of Balleigh	3.4 km, north east (1.9km, north east of the access track)	Construction: Negligible, Neutral Permanent: Negligible, Neutral	Construction: Negligible, Neutral Permanent: Negligible, Neutral
5	Beinn Tharsuinn	4.0 km, south west	Construction: Small, Adverse Permanent: Small, Adverse	Construction: Medium, Adverse Permanent: Small, Adverse
6	Unclassified road at Rhanich	6.4 km, east (and 4.6 km, east of the access track)	Construction: Small, Adverse Permanent: Small, Adverse	Construction: Small, Adverse Permanent: Small, Adverse
7	B9176 Strathy junction	5.5 km, south (and 5 km, south of the access track)	Construction: Negligible, Neutral Permanent: Negligible, Neutral	Construction: Negligible, Neutral Permanent: Negligible, Neutral

2.6.7 Each of the viewpoints is a 'sample' of the potential effects, representing a wide range of receptors – including not only those actually at the viewpoint, but also those nearby, at a similar distance and/or direction. From these viewpoints it can be seen that the distribution of effects would be as follows:

2.6.8 Effects on character:

- During construction there would be a Large to Medium scale of effect on landscape character which is limited to the site and facing hill slopes due to the physical change to the hill slope of Cnoc Muigh-bhlaraidh and the loss of peatland. These changes would be localised, with physical changes contained within the site itself. Once completed the Proposed Development would result in these Large to Medium Scale effects remaining within this localised extent. The scale of effect reduces with distance from the site, with

the wider landscape and characteristic features of rounded hills, moorland and dense plantation becoming apparent.

#### 2.6.9 Effects on views:

- There would be a Large to Medium scale of visual effect within the immediate context of the site and Small scale effects from more elevated views with visibility of the Site. The extent of change from elevated views would be localised, as the Proposed Development would appear as an additional feature, seen at a lower angle, and within broader panoramic views. The scale of effect would generally remain consistent between the construction and operational stages, although it would reduce once operational where there are open views to machinery, and construction traffic and activity..
- Embedded mitigation, in the form of materials and finish to the proposed buildings, structures and fencing would also reduce the presence of the Proposed Development, particularly in more distant views.

#### *Effects on landscape character*

- 2.6.10 As noted in **Section 2.4**, the site and its immediate surrounds are located within LCT330 Rounded Hills and Moorland Slopes – Ross and Cromarty. The key characteristics of this LCT are described in **Section 2.4** and those relevant to the assessment include the broad and rounded hills, upland moorland and distant views to the surrounding landscape including mountain tops, plains and firths.
- 2.6.11 The Proposed Development would introduce built form to part of the southern slope of Cnoc Muigh-bhlaraidh, which would result in a Large scale of change, although this change would be limited to the site itself. The Proposed Development would create a development plateau within the continual undulating nature of the hillscape locally; but would not notably change the character of the surrounding upland moorland areas or parts of the LCT that have a sense of wildness. Within the wider LCT there would be no discernible change.
- 2.6.12 As the viewpoint analysis indicates, outside of the site boundary, the Proposed Development would only be visible from hill slopes and lowland areas within the immediate vicinity of the site and from elevated locations. The resultant change to the landscape character from the introduction of further built form within the LCT would be of a Medium to Small scale, and over a limited extent, the effect would be permanent. However, it would not disrupt views to more rugged hills to the north and distant views, notably to the Dornoch Firth. Embedded mitigation, by cladding the Proposed Development using colours that complement the surrounding landscape will help to reduce the presence of the proposed buildings and structures, particularly in more distant views across the character area where the buildings generally sit below the skyline.
- 2.6.13 The sensitivity of the host LCT, as appraised in **Technical Appendix 2.3**, is judged to be High/ Medium. Combining with the overall Moderate magnitude of change both during both the construction and operational phases of the Proposed Development would result in a **Moderate, Adverse** level of effect on the Rounded Hills and

Moorland Slopes – Ross and Cromarty LCT over an extent limited to the site and its immediate surrounds.

*Visual Effects*

- 2.6.14 **Section 2.4** identifies the visual receptors to be included in the appraisal of effects.

**Visual receptor groups**

*Residents at Aultnamain and road users on the Moray Firth Tourist Route (0 km – 1 km east)*

- 2.6.15 This receptor group includes a cluster of residential properties at Aultnamain, located approximately 2.1 km east of the site and represented by Viewpoint 3, and road users on the Moray Firth Tourist Route, represented by Viewpoints 2 (adjacent to the site access, off the B9176) and 3. The viewpoint analysis, set out in **Technical Appendix 2.4** indicates that the scale of visual effect at Viewpoint 2 would be Medium during the construction phase and reducing to Small when the hydrogen facility is operational. A lesser scale of visual effect would be experienced at Viewpoint 3, given the greater separation distance and intervening vegetation.
- 2.6.16 The properties at Aultnamain are located adjacent to the B9176 and orientated to take in views to the east and west, across the strath and to surrounding hills, including towards the site. Garden trees and roadside vegetation provide some screening from the B9176 and properties setback from the B-road have filtered views between other properties. The northern property, adjacent to the B9176 has the most open aspect towards the site with birch trees within the front garden providing little screening, particularly in winter months. During the construction stage, machinery and traffic on the access track and site would be visible along the hill slope, and the scale of change from this property would be Medium, reducing to Small, when the hydrogen facility is operating.
- 2.6.17 Within the study area, the Moray Firth Tourist Route follows the B9176, from this route, road users experience views to the surrounding rugged landscape. There would be a Medium scale of effect over a limited extent of the route during the construction stage due to the proximity to the site access, as assessed for Viewpoint 2. Northbound road users travelling from Aultnamain would have open views to construction traffic on the approach to the site access road entrance as well as towards the site along this route. These views would be experienced along approximately a 1 km stretch of the route. During the operational stage, the scale of effect would reduce to Small and be experienced over a limited extent.
- 2.6.18 For both residential receptors and road users on the tourist route their susceptibility is considered to be high, while the value of views is Community for residential receptors and Regional for users of the tourists route. Overall, their sensitivity is therefore High/Medium. During construction, the magnitude of change would be Moderate, reducing to Slight once operational. Factoring in sensitivity, the level of

effect would be Moderate at the construction phase, reducing to **Moderate / Minor** and **Adverse** when the Proposed Development is in operation.

*Recreational receptors on hills surrounding the site and in the south west of the study area (0 km – 5 km south west)*

- 2.6.19 In the study area the slopes and summits of hills, including Beinn Tharsuinn and Torr Leathann, located to the south west of the site may be used by hillwalkers. Unclassified roads providing access to Forestry, wind farms and a former small scale quarry provide easy access within lower hill slopes and valley areas.
- 2.6.20 The ZTV (**Figure 2.4**) shows visibility to the Proposed Development from a number of hill slopes facing the site, to the immediate north (Cnoc Muigh-bhlaraidh) and west (Meall a Bhreacain). As well as hills to the south west, between 4- 5 km in distance of the Proposed Development – Beinn Tharsuinn, Torr Leathann and Cnoc an t-Strathaidh. Receptors on hill slopes within close proximity of the site would experience open views to the Proposed Development due to the limited separation distance and lack of intervening landform or vegetation. Walkers on hills towards the extents of the study area would have more distant views towards the site where visibility allows from upper slopes and summits. Viewpoint 5 which is located near the summit of Beinn Tharsuinn demonstrates this with the Proposed Development seen in combination with the turbines of Beinn Tharsuinn and Beinn nan Oighrean wind farms. Receptors on these hills slopes and summits would view the Proposed Development below the height of surrounding hills and as a small element in the wider landscape.
- 2.6.21 For recreational receptors, views are considered to be of Regional value, with a medium susceptibility and sensitivity. During construction there would be a Medium scale of effect over a limited extent of the view due to the prominence of building works and machinery within a largely natural context. This would result in a Moderate magnitude of change, which, when factoring in the sensitivity, would have an effect that was **Moderate** and **Adverse**. There would be similar effects once the Proposed Development is operational from hills adjoining the site, as captured in Viewpoint 1. The scale of effect from more distant slopes and summits would reduce to Small once the Proposed Development is operational as the building would partially assimilate into the surrounding environment due to the use of complementary colours of cladding and as the movement of construction traffic and building works would cease. This would result in a Slight magnitude of change and **Moderate/ Minor** and **Adverse** effects.

### Key Routes

- 2.6.22 **B9176** – as detailed in **Section 2.4** and shown on **Figure 2.1**, the B9176 road is located towards the centre of the study area and runs in a north-south direction, also forming part of the Moray Firth Tourist Route. The site access, leading to the main site area immediately adjoins the B9176, with the hydrogen facility located 1.8 km west of the road. For road users on the B9176, views are of a Regional value, while their susceptibility is medium, and thereby having a High/ Medium sensitivity to change.
- 2.6.23 The ZTV (**Figure 2.4**) illustrates that there would be views from the B9176 within 1 km of the site. The Proposed Development would be visible, particularly to

northbound road users, along a stretch of the road over a localised length of approximately 1.5 km. Although with the screening effects of forestry plantation, this length would be closer to 1 km. As the site is in an elevated position in relation to the road, the Proposed Development would appear relatively noticeable in oblique views, although this would be over a limited extent and against the backdrop of hills and moorland. Considering the short duration of views, the scale of effect would be Small. The magnitude of change would be Slight during construction, reducing to Slight/ Negligible once operational. The Proposed Development would have **Moderate** to **Moderate/ Minor** and **Adverse** effects on road users during the construction period reducing to **Minor** and **Adverse** effects once operational.

- 2.6.24 **Core Paths** – **Figure 2.1** shows the majority of Core Paths located in the east and north east of the study area. The ZTV (**Figure 2.4**) shows potential visibility to the Proposed Development from Core Paths RC15.01, RC15.02, RC15.03, RC15.05, RC15.08 and RC15.09. With the exception of RC15.08, the remaining Core Paths are generally located within or adjacent to dense forestry plantation and where visible, the eastern and upper parts of the Proposed Development consisting of the electrolyser would most likely be partly visible. The screening effects of dense plantation is seen on **Figure 2.5**, which shows that potential visibility of the Proposed Development would be experienced mainly by users of Core Path RC15.08
- 2.6.25 Core Path RC15.08 is located towards the eastern boundary of the study area passing within 6.2 km of the hydrogen facility at its closest point. The path is also an access track to a property at Upper Bogrow. The Core Path runs in a north to south direction, with views across the strath and towards rugged hills to the north west. Views east are limited by dense plantation on the adjoining lower hill slope.
- 2.6.26 The ZTVs (**Figures 2.4** and **2.5**) show that there would be views to the Proposed Development over a section of approximately 1.5 km in length within the study area. Views along the Core Path would be similar to those at Viewpoint 6, where construction activity would be more apparent, given the movement of machinery and building works. However, oblique views would extend further than Viewpoint 6 and over a distance of approximately 6.2 km, forming a small part of an overall view dominated by the surrounding hills.
- 2.6.27 Views from this Core Path are considered to be of a Regional value, and the susceptibility of users considered to be high, resulting in a sensitivity of High/ Medium. The scale of effect would be Small, considering the separation distance to the Proposed Development and the limited extent of visibility. The magnitude of change would be Slight during construction and reducing to Slight/ Negligible once operational. The Proposed Development would have **Moderate** to **Moderate/ Minor** and **Adverse** construction effects, reducing to **Minor** and **Adverse** operational effects for users of this Core Path.

## 2.7 Summary of landscape and visual effects

- 2.7.1 Effects on the receptors assessed are summarised in the table overpage.
- 2.7.2 There would be limited effects on the existing landscape fabric, with changes to the southern slope of Cnoc Muigh-bhlairaidh to form a plateau for the Proposed Development to be built and the loss of peatland within the site. Any vegetation lost during construction would be replicated through restoration and enhancement

measures (**Section 3.7**), although this would not be for screening purposes as it has been agreed, through pre-application consultation that any substantial planting would not be suitable in this open hillside location. However, the Proposed Development would be rendered in a colour to match the sites surrounds, which would help reduce the presence of the proposed buildings and structures.

- 2.7.3 Effects on the host landscape character (Rounded Hills and Moorland Slopes – Ross and Cromarty LCT 330) would be limited to the site and its immediate surrounds. The site is relatively well-screened from the broader LCT which extends in all directions, particularly further west, from the study area, and the landscape effects would be Moderate and Adverse. From the majority of the LCT and other LCTs in the study area, the Proposed Development would be imperceptible due to screening by topography and dense vegetation.
- 2.7.4 Views experienced by road users on the Moray Firth Tourist Route and recreational receptors on hill slopes and summits are key to their experience of the undulating and rugged landscape of the area. Construction activity, in particular the movement of machinery and the limited separation or elevated views have the greatest effects, although this would reduce once the Proposed Development is built, for users of the tourist route. There would be similar effects for residents at Aulnamain, with the northern most property having an open view to the site. The effects on recreational receptors on hills would be permanent, as the Proposed Development would add another built feature into views where wind turbines and pylons are already visible on the upper slopes. However, the hydrogen facility would be viewed at a lower height to these turbines and generally against the backdrop of the surrounding hills and wider views of landscapes beyond.
- 2.7.5 Visual effects on users of the B9176 would reduce over time as construction activity ceases and the Proposed Development would be viewed as small part of overall, fleeting views, resulting in Minor and Adverse effects which would be permanent. Effects would also reduce for users of Core Paths, particularly Core Path RC15.08, as the movement of construction traffic and the building works would be more apparent in long views, reducing to Moderate/ Minor and Adverse, permanently.

## 2.8 Conclusion

- 2.8.1 The LVA concludes that there would be Moderate effects on the receiving landscape character although this would be limited to the site itself and its immediate surrounds. Effects in the remaining study area are limited with no notable change to the key characteristics of the greater LCT330 Rounded Hills and Moorland Slopes – Ross and Cromarty. There would be Moderate to Minor residual effects on visual receptors where the Proposed Development would be seen either across short distances or from more distant views where the majority of the Proposed Development would be visible. However, it would form a small part of a wider view to surrounding hills and to more rugged and coastal landscapes beyond.

In summary, landscape and visual effects are largely limited to the area immediately adjacent to the site. Given the wider expansive landscape and the location of the Proposed Development below the skyline in all but the immediate context of the site it is therefore considered that the landscape has the capacity to accommodate the Proposed Development.

**Table 2.8 Summary of Effects**

Receptor	Description	Sensitivity	Magnitude of change at construction (short-term)	Level of effect (short-term)	Magnitude of change at operation (permanent)	Level of effect (permanent)
<b>Landscape Character</b>						
Rounded Hills and Moorland Slopes – Ross and Cromarty LCT (330)	Effects on the site itself, including the change of use, however the key characteristics of the LCT would not be changed and views to the Proposed Development would be localised.	High/ Medium	Moderate	Moderate, Adverse, although limited to the site and immediate surrounds	Moderate	Moderate, Adverse, although limited to the site and immediate surrounds
<b>Visual Receptor Groups</b>						
Residents at Aultnamain and road users on the Moray Firth Tourist Route	Greater effects at construction with the presence of machinery and building works, within close proximity and in open views from a section of the tourist route near to the site and the northern most property at Aultnamain.	High/ Medium	Moderate	Moderate, Adverse	Slight	Moderate/ Minor, Adverse
Recreational receptors on hills surrounding the site and in the south west of the study area	Open and mainly elevated views towards the site, from where the Proposed Development would be visible but would not be the focal point in panoramic views.	Medium	Moderate	Moderate, Adverse	Moderate	Moderate/ Minor, Adverse



Receptor	Description	Sensitivity	Magnitude of change at construction (short-term)	Level of effect (short-term)	Magnitude of change at operation (permanent)	Level of effect (permanent)
Key Routes						
B9176	Open views to the more elevated Proposed Development, which would be visible in fleeting, oblique views along a section of the B9176 of approximately 1 km.	High/ Medium	Slight	Moderate to Moderate/ Minor, Adverse	Slight/ Negligible	Minor, Adverse
Core Paths, specifically RC15.08	Visual effects more apparent during construction, with the focus of the view across the surrounding hills.	High/ Medium	Slight	Moderate to Moderate/ Minor, Adverse	Slight/ Negligible	Minor, Adverse

## 2.9 References

- General pre-application and scoping advice for onshore wind farms. NatureScot (2022).
- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition (GLVIA 3). Landscape Institute and the Institute for Environmental Management and Assessment (IEMA) (2013).
- Landscape Sensitivity Assessment Guidance. NatureScot (2022).
- National Landscape Character Assessment (Online- [Landscape Character Assessment | NatureScot](#)). NatureScot, formerly Scottish Natural Heritage (2019).
- The special qualities of the National Scenic Areas. NatureScot, formerly Scottish Natural Heritage (Commissioned Report No.374) (2010).
- Highland Wide Local Development Plan. The Highland Council (2012).
- Inner Moray Firth Local Development Plan 2. The Highland Council (2023).
- National Planning Framework 4. The Scottish Government (2023).
- Technical Guidance Note 02/21 Assessing landscape value outside national designations. Landscape Institute (2021).
- Technical Guidance Note 6/19 Visual Representation of Development Proposals. Landscape Institute (2019).

## 3 ECOLOGY

### 3.1 Introduction

- 3.1.1 This chapter reports the outcome of the assessment of potential impacts arising from Cromarty Hydrogen Project (hereafter the Proposed Development) upon ecology during construction, operation and decommissioning.
- 3.1.2 This chapter (and its associated figures and appendices) is intended to be read as part of the wider Environmental Appraisal Report (EAR), with particular reference to **Chapter 1 Introduction, Chapter 4 Hydrology, Hydrogeology, Geology and Soils and Section 3.7.**

### 3.2 Consultation, scope and study area

#### Consultation undertaken to date

- 3.2.1 The Highland Council (THC) with advice from NatureScot provided a Pre-Application Advice Response which was issued on 7 July 2022. Furthermore, subsequent correspondence with THC and NatureScot has been undertaken. Responses with relevance to ecology are provided in **Table 3.1**, and these are responses provided as Pre-Application Advice, unless otherwise stated (and the date provided by subsequent correspondence). Note, the stated correspondence was for an original larger-scaled scheme which has subsequently been reduced in scale and extent to the Proposed Development.

**Table 3.1 Pre-application consultation responses relevant to ecology**

Consultee	Key concerns	Response
THC <sup>2</sup>	The main site area is mapped as nationally important Class 1 and Class 2 peatland. Would require information on peatlands to be at the NVC level. Recommend surveys include appropriate buffer and any additional areas to be affected.	NVC surveys were undertaken of the main site area, with the information detailed in <b>Section 3.4</b> and <b>Figure 3.5</b> .
	Recommends the Proposed Development aims to avoid impacts on blanket bog. Where impacts on peatland cannot be avoided, they should be minimised, and opportunities for mitigation and/or compensation identified within the Habitat Management Plan (HMP).	The Proposed Development layout has minimised potential impacts on bog habitat, although some effects have been unavoidable due to the extent of the bog habitat. Opportunities for appropriate mitigation/compensation (peatland restoration) in the

<sup>2</sup> As advised by NatureScot.

Consultee	Key concerns	Response
	<p>Recommends protected species survey work covers the main site area (and appropriate buffers).</p> <p>By email correspondence dated 16 May 2023, THC confirmed that the extended phase 1 habitat survey undertaken (which recorded any evidence of protected species) was adequate, providing suitable species methodologies were adopted.</p>	<p>wider area have been provided in <b>Section 3.7</b> below.</p> <p>Noted. Protected species were considered during the extended phase 1 habitat survey (which extended beyond the main site area), with the methodology summarised in <b>Section 3.3</b> and results provided in <b>Section 3.4</b>.</p>
	<p>Recommends consideration of potential effects on wider countryside birds, including in combination with any other relevant developments.</p>	<p>The application site was appraised for its potential to support birds, and desk study information was gathered for context. Given the small-scale nature of the main site area, and limited extent of suitable breeding habitat, targeted bird surveys were not considered proportionate. Pre-construction surveys to be undertaken, as detailed in the CEMP, would include nesting bird checks to ensure works are undertaken in a legally compliant manner (e.g. no damage to active nests).</p>
	<p>Impacts on the Morangie Forest Special Protection Area (SPA) which has capercaillie as a qualifying feature should be included in assessment, and a Habitats Regulations Appraisal (HRA) is a likely requirement for the Proposed Development. Recommends Forestry and Land Scotland (FLS) and Royal Society for the Protection of Birds (RSPB) are contacted for capercaillie records to inform the assessment. Impacts through disturbance and/or displacement should be considered, for the Proposed</p>	<p>Desk study records have been gathered from RSPB and FLS. Effects on the Morangie Forest SPA (and capercaillie <i>Tetrao urogallus</i>) are included in assessment (see Sections <b>3.6</b> and <b>3.9</b>, with information to inform HRA provided as <b>Section 3.10</b>). Given the limited scale of the Proposed Development and no anticipated effects on the Morangie Forest SPA (see <b>Sections 3.6, 3.9</b> and <b>3.10</b>), in combination effects with other projects are discounted from the assessment.</p>

Consultee	Key concerns	Response
	Development alone and in combination with other projects.	
	Any off-site infrastructure or works such as water discharge should consider effects on any nearby designated sites.	It is considered that the Proposed Development is unlikely to give rise to a substantial adverse effects on designated sites either on its' own or when combined with the other elements of this project.
	Via email correspondence dated 4 May 2023, need to consider National Planning Framework 4 (NPF4) policy 3 for biodiversity enhancement. A minimum of 10 % biodiversity enhancement gain is likely to be required.	This has been considered in <b>Section 3.7</b> below.
NatureScot	Via email correspondence dated 29 March 2023, consider NatureScot's <i>Developing with Nature</i> guidance (NatureScot, 2023a) to identify opportunities to avoid and minimise impacts and restore biodiversity.	Avoidance of notable habitats has been considered in scheme design, and measures to restore biodiversity detailed in <b>Section 3.7</b> have been considered in accordance with such relevant NatureScot guidance.

### Scope of the assessment

- 3.2.2 The scope of this assessment has been established through Environmental Impact Assessment (EIA) Screening and pre-application consultation.

#### *Ecological features scoped out of further assessment*

- 3.2.3 **Table 3.2** presents the ecological features that are scoped out of further assessment, together with appropriate justification. The receptors that have been scoped out, were done so under the agreement of consultees during the pre-application process. Note, given the limited works proposed for the site access (with works scheduled to be undertaken within the footprint of the existing Beinn Tharsuinn Wind Farm access track) and cable route corridor (where the cable would be buried in the existing road verge and works would be undertaken from the existing access track and any disturbance to habitats would be reinstated), matters related to ecology for these elements of the Proposed Development are scoped out from assessment (with the

exception of potential effects of these elements on the Morangie Forest SPA and capercaillie) given the effects would be localised and negligible in extent.

**Table 3.2 Ecological features scoped out of further assessment**

Matter	Phase	Justification	Change since EIA screening?
Impacts on statutory (and non-statutory) designated sites with ecological features.	Construction, operation and decommissioning	Based on the distances of designated sites from the application site, and the features for which they are designated, there is considered to be no connectivity (and thus no potential for impacts) between the application site and all designated sites. The only exception to this is Morangie Forest SPA, which is scoped into the assessment as requested by NatureScot.	Yes (see also Table 3.3 below).
Impacts on protected species (including terrestrial mammals, amphibians, fish, bats and birds).	Construction, operation and decommissioning	Based on the small size and limited habitats within the main site area (with no trees or watercourses present), as well as the amount of similar habitat in the wider area. Furthermore, the extended phase 1 habitat survey (including for potential for bird species) identified no evidence for protected species and sub-optimal habitat for ground-nesting species, such as curlew <i>Numenius arquata</i> and golden plover <i>Pluvialis apricaria</i> . There are also no trees within the main site area which would provide a potential roost site for bats. Pre-construction surveys would be undertaken to record any evidence of protected species, to ensure construction works	No. The pre-application responses from THC/NatureScot stated that protected species and birds should be considered, and surveys undertaken. Results of surveys (and desk study) are provided, but potential impacts are scoped out of the assessment.

Matter	Phase	Justification	Change since EIA screening?
		progress in a legally compliant way.	
Indirect effects on habitats <sup>3</sup> .	Construction (and decommissioning)	Through the implementation of a Construction Environmental Management Plan (CEMP) and/or Pollution Prevention Plan (PPP), as part of the Proposed Development application, such effects are scoped out.	No. It was agreed that this receptor/matter can be scoped out of further assessment.
Effects on habitats.	Operation	No further effects (direct nor indirect) to habitats are anticipated during operation, and maintenance visits would be rare and unlikely to result in disturbance.	No. It was agreed that this receptor/matter can be scoped out of further assessment.

*Ecological features scoped into further assessment*

3.2.4 **Table 3.3** presents the ecological features that are scoped into further assessment, together with appropriate justification.

**Table 3.3 Ecological features scoped into further assessment**

Matter	Phase	Justification	Change since EIA screening?
Direct effects on notable habitats.	Construction and decommissioning	Notable habitats (such as Annex 1 and Scottish Biodiversity List (SBL) habitats) have potential to be directly affected.	It was agreed that this receptor/matter should be scoped into further assessment.
Morangie Forest SPA	Construction, operation and decommissioning	The SPA is designated for capercaillie and this species has potential to use suitable habitat outside the SPA boundary. Potential effects on capercaillie and on the Morangie	Yes. Effects on the Morangie Forest SPA (including all works and activities within the application site) are now scoped into the assessment following the pre-

<sup>3</sup> Note, as a precaution indirect effects on habitats adjacent to direct, permanent loss areas (within 10m) through potential drying effects or habitat degradation are considered in the assessment as a precaution, and the scoped-out matter in **Table 3.2** concerns indirect effects outside the 10m buffer (such as possible pollution/run-off into watercourses, etc).

Matter	Phase	Justification	Change since EIA screening?
		Forest SPA are thus considered.	application consultation summarised in <b>Table 3.1.</b>

### Extent of the study area

- 3.2.5 As provided and agreed with THC and NatureScot, a maximum study area of 5 km from the main site area was adopted to consider relevant statutory designated sites and capercaillie records in this assessment. A 2 km study area from the main site area was adopted to consider existing protected and notable species and non-statutory designated sites, with the exception of capercaillie records, for which a search area out to 5 km from the main site area has been used. The study area adopted during the habitat surveys was the main site area and typically out to at least 100 m. Note, the area surveyed during the extended phase 1 habitat survey was more extensive (and included a considerable area along the site access) but following scheme evolution the study area was refined. For the purpose of this report, results from within the increased area surveyed for the phase 1 habitat surveys are presented, although these are given less consideration given these areas would be unaffected by the Proposed Development. The study areas considered for this assessment are shown on **Figures 3.1-3.6.**

## 3.3 Approach and methodology

### Applicable guidance

- 3.3.1 The following key guidance, legislation and planning policy have been used during the preparation of this chapter:
- Convention on Wetlands of International Importance especially as Waterfowl Habitat 1971 (hereafter referred to as the ‘the Ramsar Convention’);
  - Convention on the Conservation of European Wildlife and Natural Habitats 1979 (hereafter referred to as the ‘the Bern Convention’);
  - UNESCO convention on the protection of the World Cultural and Natural Heritage (1972);
  - Habitats Directive (Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora);
  - Birds Directive (Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds);
  - The Conservation (Natural Habitats &c.) Regulations 1994 in Scotland via the Conservation (Natural Habitats, &c.) (EU Exit) (Scotland) (Amendment) Regulations 2019 (“The Habitats Regulations”);
  - The Wildlife and Countryside Act 1981;
  - The Wildlife and Natural Environment (Scotland) Act 2011;
  - The Nature Conservation (Scotland) Act 2004;



- The Invasive Alien Species (Enforcement and Permitting) Order 2019;
- National Planning Framework 4 (2023);
- Guidelines for Preliminary Ecological Appraisal CIEEM (2017);
- Assessing Connectivity with Special Protection Areas (SPAs) (SNH, 2016);
- Birds of Conservation Concern 5 (Stanbury *et al.*, 2021);
- Highland-wide Local Development Plan (adopted 2012), specifically:
  - Policy 57 – Natural, Built and Cultural Heritage;
  - Policy 58 – Protected Species;
  - Policy 59 – Other Important Species; and
  - Policy 60 – Other Important Habitats.
- Highland Nature: Biodiversity Action Plan 2021-2026;
- Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition (Collins, 2016);
- Bat Surveys: Good Practice Guidance 2nd edition (Hundt, 2012);
- Guidance on Assessing the Impacts of Groundwater Abstractions and Groundwater Dependant Terrestrial Ecosystems (GWDTEs) (Scottish Environment Protection Agency (SEPA), 2017);
- SEPA (2014) Land use planning system SEPA guidance Note 31;
- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018);
- Developing with Nature guidance (NatureScot, 2023a);
- Advising on peatland, carbon-rich soils and priority peatland habitats in development management (NatureScot, 2023b);
- NatureScot Carbon and Peatland map (SNH, 2016);
- Standing Advice for Planning Consultations – Badgers (NatureScot, 2020a);
- Standing Advice for Planning Consultations – Bats (NatureScot, 2020b);
- Standing Advice for Planning Consultations – Otters (NatureScot, 2020c);
- Standing Advice for Planning Consultations – Pine Martens (NatureScot, 2020d);
- Standing Advice for Planning Consultations – Red Squirrels (NatureScot, 2020e); and
- Standing Advice for Planning Consultations – Water Voles (NatureScot, 2020f).

3.3.2 The ‘UK Post-2010 Biodiversity Framework’ succeeds the UK Biodiversity Action Plan (UK BAP) and ‘Conserving Biodiversity – the UK Approach’. Biodiversity priorities in Scotland are set out in the SBL and in regional LBAPs, however the lists of priority species and habitats agreed under UK BAP still form the basis of much biodiversity work and are therefore considered within this report where relevant.

### **Data sources to inform the baseline characterisation**

3.3.3 A number of data sources have been used to inform the baseline characterisation; the main sources are detailed below:

- Ordnance Survey (OS) topographical mapping at 1:25,000 scale;
- Google maps website;
- NatureScot's Sitelink website;
- The Multi Agency Geographic Information for the Countryside (MAGIC) website;
- FLS for capercaillie records;
- Highland Biological Recording Group (HBRG) – non-statutory sites and protected/notable species;
- RSPB for capercaillie records;
- Publicly available documentation for the Beinn Tharsuinn Wind Farm (THC Planning Ref: 03/00784/FULRC); and
- Publicly available documentation for the Strathroy Wind Farm Re-Design (THC Planning Ref: 22/02442/FUL).

#### **Surveys to inform the baseline characterisation**

3.3.4 An extended phase 1 habitat survey was undertaken in September 2021 of the main site area and typically out to a minimum of 100 m as shown in **Figure 3.3**. The survey followed UK industry standard JNCC phase 1 habitat methodology (JNCC, 2010) which was extended to include the additional recording of specific features indicating the presence or likely presence of, or suitable habitat for, protected species, invasive species and other species of conservation significance. The survey identified whether further targeted protected species surveys would be required. Note, however that a wider area was surveyed as shown in **Figure 3.4**, which included habitats adjacent to the site access.

3.3.5 A National Vegetation Classification (NVC) survey was undertaken in July 2022, with the study area shown in **Figure 3.5**. The survey was undertaken to further classify any noteworthy<sup>4</sup> or wetland habitats and identified their potential GWDTE status (as per SNIFFER guidance, 2009) for subsequent consideration and assessment by a suitably experienced hydrologist.

3.3.6 An additional habitat survey was undertaken in August 2023 on the wider estate north of the main site area to appraise the habitats for their potential to be enhanced to satisfy Policy 3 of the NPF4. The study area for this survey is shown on **Figure 3.7**.

#### **Assessment methodology**

3.3.7 This assessment was undertaken through a desk study and site inspection of existing ecological features within and surrounding the main site area. The existing conditions at the main site area are described in **Section 3.4** and potential risks that may be

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<sup>4</sup> Including any EC Habitats Directive Annex 1 and/or UKBAP Priority Habitats in accordance with SNH guidance (2016).

associated with the Proposed Development are identified and assessed in **Section 4.6**.

- 3.3.8 The information obtained from the review of existing data, site surveys and guidance documentation formed the basis of assessment of the potential effects associated with the Proposed Development, on ecological features during the construction, operational and decommissioning stages. Control and mitigation measures have been proposed, if required, to reduce the magnitude of any impacts so that there is no resultant significant effect on ecological features.
- 3.3.9 Embedded mitigation measures are built into the Proposed Development. To produce an assessment which is proportionate to the likely effects of the Proposed Development, this embedded mitigation, including avoidance through the design process and application of industry standard good practice, is considered at the outset of the assessment. Further ecological impact assessment has then only been carried out where there is still considered to be the potential for significant adverse effects to ecological or ornithological features arising from the Proposed Development after the application of these embedded mitigation measures.
- 3.3.10 Opportunities for enhancement have been considered in accordance with *Developing with Nature* guidance (NatureScot, 2023a) and *Advising on peatland, carbon-rich soils and priority peatland habitats in development management* (NatureScot, 2023b). The opportunities for enhancement (**Section 3.7**) should be read in conjunction with the Peat management plan (PMP) which has been prepared and is provided as **Technical Appendix 4.1**.

## 3.4 Baseline conditions

### Existing environment

*Desk study*

#### Statutory designated sites

- 3.4.1 A summary of statutory designated sites for nature conservation located within 5 km of the main site area is provided in **Table 3.3**, and shown in **Figure 3.2**. Sites

designated solely for geological and/or earth sciences reasons are not of relevance to this ecological assessment and so are excluded.

- 3.4.2 The application site is not located within any statutory designated sites, and the closest to the main site area is Morangie Forest SPA which is approximately 4.04 km, and Craigroy Burn SSSI is the closest to the site access (2.6 km).

**Table 3.4 Statutory designated sites for nature conservation within 5 km**

Site Name	Approximate Distance from the main site area (km)	Approximate Distance from the application site (km)	Qualifying Interests
Morangie Forest SPA	4.04 km south east	3.36 km south east	Capercaillie, breeding.
Craigroy Burn SSSI	4.05 km north east	2.6 km north east	Upland birch woodland.
Easter Fearn SSSI	4.7 km, north	4.5 km, north	Upland birch woodland.
Kinrive – Strathroy SSSI	5.13 km, south east	4.23 km, south east	- Native pinewood - Springs (incl. flushes).

Non-statutory designated sites

- 3.4.3 The main site area is not located within any non-statutory designated sites, nor is it within 2 km of any such designated site.

Protected and notable species and habitats

- 3.4.4 A total of 41 capercaillie records (35 from RSPB and six from FLS), from 2012 to 2022, were returned from within 5 km of the main site area, with records shown in Confidential **Figure 3.6**. This included some lekking males and single females, but most records were of signs (droppings/latrines). The majority of records were older than five years old, with only four records from 2018 (the latest is one record in 2022). The nearest record (droppings) is 1.74 km south east of the main site area and 1.1 km south of the site access. The nearest confirmed male capercaillie record is 2.37 km south east of the main site area, and 1.44 km south of the site access. A review of aerial maps reveals that there has been some clear-fell of plantation where some of the capercaillie were recorded, particularly to the south east of the application site, so the forestry habitat may have degraded since the majority of capercaillie records

were made. The timelapse function on Google Earth<sup>5</sup> suggests that there was notable clear-felling south east of the site access between 2015 and 2016.

- 3.4.5 The HBRG did not hold any records of protected or notable species within 2 km of the main site area.
- 3.4.6 A review of the publicly available Environmental Impact Assessment documentation which supported the operational Beinn Tharsuinn Wind Farm revealed the presence of brown hare *Lepus europaeus* and reptiles at the locality. The documentation also confirmed a modest bird assemblage at the locality, which did not meet the criteria for international, national, regional or local importance. Bird species of note comprised two golden plover breeding territories within 2 km of the main site area, and three curlew breeding territories adjacent to the site access.
- 3.4.7 The documentation which accompanied the Strathroy Wind Farm (re-design) which is currently under consideration (after the original Strathroy Wind Farm was consented) to the south of the main site area revealed that the principal habitat is mire (wet modified bog and blanket bog), with lesser extents of habitats like dry modified bog, dry heath and commercial plantation. Although much of the information related to protected species was redacted and not publicly available, the assessment considered bats, otter *Lutra lutra*, reptiles and fish and thus this fauna is present at the locality. Ornithology surveys which supported the wind farm (re-design) application revealed the presence of modest breeding bird assemblage comprising lekking black grouse *Tetrao tetrix*, and breeding curlew, lapwing *Vanellus vanellus* and snipe *Gallinago gallinago*. Surveys also revealed over-flying species including red kite *Milvus milvus* and pink-footed goose *Anser brachyrhynchus*. All records were greater than 2 km from the application site. Field surveys did not identify any evidence of capercaillie.

#### *Field surveys*

#### Extended phase 1 habitat survey

- 3.4.8 Habitats within the main site area comprise 3.42 ha of marshy grassland (B5) and 2.95 ha of blanket bog (E1.6.1). The existing access track (J5) to the operational Beinn Tharsuinn Wind Farm runs along the southern boundary. Marshy grassland (B5) and blanket bog (E1.6.1) are the dominant habitats within 100 m of the main site area, although there are areas of wet heath (D2), and dry heath (D1) and bracken (C1) mosaic in the west of the 100 m buffer. Habitats present in the study area are

<sup>5</sup> [https://earth.google.com/web/search/Cromarty+Firth/@57.78667395,-4.24130811,233.96279169a,10131.78680759d,35y,0h,0t,0r/data=CloSMBIqNTQ0MGExNzMxYzI1MTEFIYTk0NDM4YmI2ODk0NDUyOTciDG1haW5Ob1JhbmRvbSImCiQJ\\_iVTxpBZN8ARoTBeyITKN8AZ70IMn24QR8Ahxm1B-D-SOR8A](https://earth.google.com/web/search/Cromarty+Firth/@57.78667395,-4.24130811,233.96279169a,10131.78680759d,35y,0h,0t,0r/data=CloSMBIqNTQ0MGExNzMxYzI1MTEFIYTk0NDM4YmI2ODk0NDUyOTciDG1haW5Ob1JhbmRvbSImCiQJ_iVTxpBZN8ARoTBeyITKN8AZ70IMn24QR8Ahxm1B-D-SOR8A) (Accessed 22 August 2023).

typical of dominant habitats within the wider landscape at the locality, as can be seen in **Figure 3.4**.

- 3.4.9 A summary of phase 1 habitats recorded in the study area is provided in **Table 3.5** and are shown in **Figure 3.3**.

**Table 3.5 Habitats recorded during the extended phase 1 habitat survey**

Phase 1 Code	Habitat description	Notes
E1.6.1	Blanket bog	Blanket bog covers just under half (46.3%) of the main site area. It is confined to the flat and gently sloping parts. It is largely dominated by tussocks of hare's-tail cottongrass <i>Eriophorum vaginatum</i> interspersed with clumps of common heather <i>Calluna vulgaris</i> , deerglass <i>Trichopohrum cespitosum</i> , and typical bog plants including some rich areas of bog asphodel <i>Narthecium ossifragum</i> , round-leaved sundew <i>Drosera rotundifolia</i> , red bogmoss <i>Sphagnum capillifolium</i> and papillose peatmoss <i>Sphagnum papillosum</i> . Cross-leaved heath <i>Erica tetralix</i> is also numerous and <i>Cladonia</i> lichens are common.
B5	Marshy grassland	Marshy grassland covers just over half (53.7%) of the main site area. The marshy grassland cuts through the centre of the bog communities following a wide depression. The habitat is largely dominated by soft rush <i>Juncus effusus</i> , but also contains some purple moorgrass <i>Molinia caerulea</i> , with the main herbs present consisting of sorrel <i>Rumex acetosa</i> , tormentil <i>Potentilla erecta</i> , with locally numerous heath bedstraw <i>Galium saxatile</i> , devil's-bit scabious <i>Succisa pratensis</i> , marsh violet <i>Viola palustris</i> and common sedge <i>Carex nigra</i> . Mosses are abundant throughout this habitat, chiefly common haircap <i>Polytrichum commune</i> and flat-topped bogmoss

Phase 1 Code	Habitat description	Notes
		<p><i>Sphagnum fallax</i>, with occasional blunt-leaved bogmoss <i>Sphagnum palustre</i>. There is also tufted hairgrass <i>Deschampsia cespitosa</i>, although this is sporadic.</p>
D2	Wet heath	<p>Wet heath is not present within the main site area but is present in the south west corner of the 100 m buffer around the main site area, north of the existing access track.</p> <p>It is largely dominated by deergrass and common cottongrass <i>Eriophorum angustifolium</i>, with an abundance of cross-leaved heath and bog asphodel. There is also a high proportion of reindeer lichen <i>Cladonia rangiferina</i> and shrubby cup lichen <i>Cladonia arbuscula</i>, and mosses like red bogmoss. There is a limited amount of common heather.</p>
D1/C1 mosaic	Dry heath/bracken mosaic	<p>The mosaic habitat is not present within the main site area but is present in the south west corner of the 100 m buffer around the main site area, south of the existing access track. This habitat is confined to better drained areas, where it mosaics with bracken. It is dominated by common heather, with some bell heather <i>Erica cinerea</i> and blaeberry <i>Vaccinium myrtillus</i>. Other plants present include common sedge, green-ribbed sedge <i>Carex binervis</i>, tormentil, sheep's fescue <i>Festuca ovina</i>, and mosses like mountain fern moss <i>Hylocomium splendens</i> and heath plait-moss <i>Hypnum jutlandicum</i>.</p>
J5	Other habitat: hard-standing	<p>The access track to the operational Beinn Tharsuinn Wind Farm runs adjacent to the southern boundary of the main site area.</p>

NVC survey

3.4.10 NVC habitats within the main site area comprise:

- 3.48 ha of M19a *Calluna vulgaris* – *Eriophorum vaginatum* mire;
- 2.75 ha of M6c *Carex echinata* – *Sphagnum fallax* flush; and
- 0.14 ha of U4a *Festuca ovina* – *Agrostis capillaris* – *Gallium saxatile* grassland/ H12b *Calluna vulgaris* – *Vaccinium myrtillus* heath mosaic.

3.4.11 M19a mire and M6c flush are the dominant NVC habitats within 100m of the main site area, although there are areas of H12b heath, and U4a *Festuca ovina* – *Agrostis capillaris* – *Gallium saxatile* grassland/ H12b *Calluna vulgaris* – *Vaccinium myrtillus* heath/ M6c *Carex echinata* – *Sphagnum fallax* flush mosaic in the west of the 100m buffer. NVC habitats present in the study area are considered likely typical of dominant NVC habitats within the wider landscape at the locality.

3.4.12 A summary of NVC communities recorded in the study area is provided in **Table 3.6** and are shown in **Figure 3.5**.

**Table 3.6 NVC communities recorded during the NVC survey**

NVC Community	Conservation Status	Potential GWDTes 1=High, 2=moderate, 3=low.	Notes
M19a <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> mire	<i>Annex I</i> H7130 Active Blanket Bog  <i>SBL</i> Blanket bog  <i>Highland Biodiversity Action Plan</i> Blanket bog	3	This is the most extensive community within the main site area (making up 54.6 % of area) and occupies large swathes of the gently sloping hillside. This bog is relatively dry with no surface water. The vegetation is dominated by a rough mix of mature common heather and hare’s-tail cottongrass tussocks. There is also some cross-leaved heath to a lesser extent. Other species include bog asphodel, occasional crowberry, and a mixture of <i>Hypnoid</i> and <i>Sphagnum</i> mosses, mostly red bogmoss, with the occasional flat-topped bogmoss. Grazing pressure is limited.
M6c	<i>SBL</i>	1 However, it is possible the	This flush community covers a considerable proportion of the main site area (43.2 %),



NVC Community	Conservation Status	Potential GWDTes 1=High, 2=moderate, 3=low.	Notes
<i>Carex echinata-Sphagnum fallax</i> flush	Upland flushes, fens & swamps  <i>Highland Biodiversity Action Plan</i>  Upland flushes, fens & swamps	habitat is more supported by water emerging from the peat bog above.	occurring within damp hollows that have formed as the water drains downhill from the bog. The community is quite damp. The vegetation is dominated by soft rush, but below there is a thick carpet of blunt-leaved bogmoss, flat-topped bogmoss and common haircap moss, and star sedge is quite numerous. Other species include creeping soft grass, common marsh-bedstraw and tormentil. Grazing pressure is limited.
H12b <i>Calluna vulgaris-Vaccinium myrtillus</i> heath	<i>Annex I</i> 4030 European dry heath  <i>SBL</i> Upland Heathland  <i>Highland Biodiversity Action Plan</i> Upland heathland	3	This heath community is only present within a limited part of the main site area where it mosaics with U4a grassland (2.2 % extent of main site area). Within 100 m of the main site area, there is a small area of H12b heath, in the south west, and an area where H12b mosaics with U4a grassland M6c flush habitats, also in the south west. The H12b community is mainly associated the steep slopes of a former borrow pit adjacent to the existing access track. The community exists on shallow, well drained peat. The vegetation is heavily dominated by common heather with a lesser amount of blaeberry and occasional bell heather. The community is species-poor, mainly being limited to a mixture of hypnoid mosses, including woolly fringe-moss, and a few species of Cladonia lichen. Grazing pressure is limited.  Where H12b mosaics with other habitats, it would not qualify as Annex I, SBL or Highland Biodiversity Action Plan habitats.
U4a	None	3	This acid grassland community is limited within the main site area and is only present where it

NVC Community	Conservation Status	Potential GWDTEs 1=High, 2=moderate, 3=low.	Notes
<i>Festuca ovina-Agrostis capillaris-Galium saxatile</i> grassland, typical sub-community			mosaics with H12b heath (2.2% extent of main site area). Within 100 m of the main site area U4a grassland also mosaics with H12b heath and M6c flush in the south west. U4a occurs on shallow, well drained, dry soil with the vegetation largely being dominated by grasses such as sheep's fescue, sweet vernal grass and common bent. Typically for subcommunity U4a, the herb diversity is quite limited with heath bedstraw and tormentil being the most numerous with a few others present like yarrow and white clover. A few <i>Hypnoid</i> mosses are also present throughout but is not abundant. Grazing pressure is limited.

Protected species (non-ornithology)

- 3.4.13 During the extended baseline habitat surveys, there was no evidence recorded of any protected or notable faunal species, within the study area (main site area plus 100 m), or in the wider survey area (as shown as the habitat mapped area in **Figure 3.4**). Furthermore, there are no suitable structures or trees that have potential to support roosting bats, or ponds that could be used by great crested newts *Triturus cristatus*, nor was there any habitat that could be used for establishment of a badger *Meles meles* sett.
- 3.4.14 The main site area is considered unsuitable for otter and water vole given the lack of suitable watercourses. Use of the watercourses in the surrounding area by otter and water vole cannot be discounted (particularly as otter was identified during baseline data gathering for the Strathroy Wind Farm (Re-Design)).
- 3.4.15 Although not recorded during surveys, there is the potential for species of reptile to be present throughout the application site. This is considered likely as reptiles were identified during the baseline data gathering for both nearby wind farms schemes (Beinn Tharsuinn Wind Farm and Strathroy Wind Farm (Re-Design)).
- 3.4.16 The Proposed Development, and the associated construction works, are of a limited scale, particularly in the context of the two nearby wind farm developments operational (Beinn Tharsuinn) and proposed (Strathroy). The review of the previous wind farm applications highlighted that the key faunal species identified were brown hare and reptiles (Beinn Tharsuinn) and bats, otter, reptiles and fish (Strathroy). There is no evidence that the application site is regularly used by, or is of importance

to, any protected faunal species. The application site is located in an exposed, upland landscape, and thus unlikely to offer important foraging grounds for bats and, furthermore, the main site area does not have features that would be considered likely to support species such as riparian mammals (watercourses) or roosting bats (like trees). Given this, the potential for any adverse effect on local populations of any protected faunal species arising as a result of impacts associated with construction of the Proposed Development is discounted. Further, embedded mitigation measures, including pre-construction surveys and protection measures to be implemented via the CEMP, would prevent breaches of legislation pertaining to protected faunal species (such as reptiles) during the construction phase. As such, construction-phase impacts to protected faunal species are not considered further in this report.

- 3.4.17 There are also no anticipated effects on protected faunal species during the operation of the Proposed Development, and such effects are similarly not considered further in this report. Decommissioning works associated with the Proposed Development would be comparable to the construction phase and accordingly measures within the CEMP would be extended for inclusion of the decommissioning stage (with production of a Restoration and Decommissioning Plan, an outline version of this is included in **Technical Appendix 1.3**).
- 3.4.18 Furthermore, habitat enhancement measures to be adopted in the wider estate (see **Section 3.7** below) would benefit a range of protected species including reptiles and amphibians. As such, effects of the Proposed Development on protected and notable faunal species are not considered in the assessment within this report.

#### Birds

- 3.4.19 No key ornithological species were recorded within the study area (main site area plus 100 m) during the baseline habitat surveys.
- 3.4.20 A review of the data gathering for the Beinn Tharsuinn and Strathroy (Re-Design) Wind Farms revealed the presence of black grouse (including lekking birds), breeding curlew, snipe, golden plover, lapwing and over-flying species like pink-footed goose and red kite, and historical records of capercaillie and peregrine *Falco peregrinus*. These species are therefore considered likely to be present/active at the locality or in the wider vicinity, but the majority of the listed bird species are unlikely to be associated with the application site.
- 3.4.21 The application site may support open moorland passerine species which are considered likely to be abundant in the locality and could include species like skylark *Alauda arvensis* and meadow pipit *Anthus pratensis*. However, the habitats present within the application site are appraised as having low potential for supporting species such as ground-nesting wetland species like curlew and golden plover, given the limited extent of habitats, largely wet/marsh nature of the habitats present, and the presence of the existing access track to the Beinn Tharsuinn Wind Farm. Even in the event that the main site area does support ground-nesting waders, such as snipe or waders post-nesting, given the limited extent of the habitats, it is likely to be only modest numbers of breeding (or post-breeding) birds supported.
- 3.4.22 The application site is also unlikely to represent key foraging habitat for other species, such as raptors and owls, given the limited extent of the area, lack of suitable feeding/resting perches, and modest records of key bird species from the nearby

Beinn Tharsuinn and Strathroy Wind Farm applications. The application site is appraised as being unsuitable for supporting overwintering waterfowl (for both foraging and roosting) given the lack of suitable habitat for such birds and the application site not being within a key foraging area for over-wintering geese (reviewed in Mitchell, 2012). It can therefore be anticipated that migrating waterfowl passing over the site will do so at height.

- 3.4.23 The land take for the Proposed Development is minimal (2.91 ha of permanent habitat loss, plus 0.42 ha temporarily lost as a result of the temporary compound). This equates to 54.3% of the habitats within the main site area being retained. Given, most of the habitat within the main site area is to be retained and because there is extensive suitable habitat in the surrounding area, displacement effects on any birds that use the main site area are expected to be negligible. Embedded mitigation to be implemented under the CEMP (and RDP) would prevent a breach of legislation pertaining to breeding birds.
- 3.4.24 Furthermore, habitat enhancement measures to be adopted at the locality (see **Section 3.7** below) would benefit species such as ground-nesting birds. As such disturbance and displacement impacts to birds are not considered further in the assessment within this report.
- 3.4.25 Habitats within the application site are not suitable to capercaillie, as the site consists only of open (non-arboreal) habitats and the application site does not lie between blocks of forestry; but effects on the species are considered in **Section 3.6** as a precaution, and as advised by THC/NatureScot (see **Table 3.1**).

#### **Sensitive receptors**

- 3.4.26 The following sensitive receptors have been assessed:
- Notable habitats (i.e. Annex I/SBL/HBAP habitats) within the main site area; and
  - Morangie Forest SPA (qualifying feature capercaillie).
- 3.4.27 Key sensitive receptor locations are shown on **Figures 3.3-3.5** (habitats) and **Figures 3.2 and 3.6** (Morangie Forest SPA).

#### **Future baseline**

- 3.4.28 In the absence of the Proposed Development, assuming a "do-nothing" scenario or gap between baseline surveys and the commencement of construction of the Proposed Development, modest changes in baseline ecology conditions (i.e., distributions and populations) are most likely to result from habitat modifications within or surrounding the application site due to land management practices (principally limited levels of livestock grazing). Vehicular activity on the existing Beinn Tharsuinn Wind Farm access track is likely to remain limited in the absence of the Proposed Development, with no tangible effects of continuing traffic levels on the application site.
- 3.4.29 The application site is not subject to any other development pressures or management which would affect the habitats or species in such a way that the present baseline conditions presented here would become substantively different.

- 3.4.30 Although not within the application site, commercial forestry in the wider area (which supported capercaillie, through records obtained from the desk study) is likely to be subject to further harvesting (with some clear-fell having been undertaken already). It is likely that over time, the forestry would be subject to some further felling, which may degrade the habitat and reduce its suitability for capercaillie further.
- 3.4.31 Whilst short-term and small-scale variability in populations and distributions may occur, and revisions to conservation statuses and designations are possible, such changes would be unlikely to qualitatively alter the conclusion of the assessment presented within and have been accounted for through application of a precautionary approach and appropriate mitigation.
- 3.4.32 It is possible that the existing baseline described above may be subject to change in the future due to the effects of climate change. Given the potential for increased temperatures, wetter winters, drier summers and an increase in the severity of 1-in-100-year rainfall events across Northern Scotland, there may be a variety of impacts on the ecology receptors within the application site, particularly with regards to the habitats present. Drier summers and higher temperatures may act to dry out bog, marsh and flush habitats, while drying peatland habitats can lead to loss of biodiversity, as species (such as botanical species) which are reliant on wet conditions die out.
- 3.4.33 It is important to note that the future baseline is a projection, with a range of possible future conditions (particularly where it regards the unpredictable effects of climatic change), and it is subject to uncertainty associated with the available projections. Across the lifetime of the Proposed Development, it is considered highly likely that the future baseline would be broadly comparable to the existing baseline described above.

## 3.5 Primary mitigation

- 3.5.1 Certain measures have been adopted as part of the Proposed Development in order to reduce the potential for impacts to ecological receptors. These measures include the following:
- Existing tracks have been incorporated within the Proposed Development as far as possible, which would minimise the disturbance of adjacent habitats.
  - Cable installation works would be completed in the road verge with all workers and plant primarily working from the existing access track to minimise ground disturbance outwith the track footprint. Furthermore, road verge habitats where cables would be installed would be fully re-instated so no habitat loss is considered.
  - Habitat, where the temporary compound would be located, would be fully reinstated once it is removed (as detailed in **Chapter 1: Introduction**).
  - Design of the Proposed Development has sought to reduce impacts on those higher ecological value habitats (bog and flush) whilst appreciating that given the extent of these habitats present, some effects are unavoidable.
  - The Proposed Development is appropriately located from habitat features which could potentially support protected species including watercourses (the nearest watercourse is c.120 m from the main site area, with no watercourses to be constructed), c.1.3 km from the nearest waterbody (Loch Muigh-bhlàraidh), c.450 m from the nearest area of (commercial) forestry.

- The footprint of the Proposed Development is limited in extent (1.93 ha permanent loss in the main site area) and permanent habitat loss constitutes only 30.3% of the total area of the main site area (which is only 6.37 ha).

### 3.6 Assessment of potential effects, additional mitigation and residual effects

#### Development characteristics

- 3.6.1 The construction phase of the Proposed Development would involve a number of different elements. **Chapter 1: Introduction** of the EAR describes the scheme elements in detail. The elements with particular relevance to ecology are as follows:
- creation of a temporary construction compound;
  - creation of a hydrogen production facility; and
  - creation of a substation.
- 3.6.2 An assessment of potential effects during construction is provided in **Table 4.10**.
- 3.6.3 During operation of the Proposed Development, activities with particular relevance to ecology are as follows:
- movement of maintenance vehicles associated with the Proposed Development.
- 3.6.4 Noise (Chapter 5: Noise) and lighting levels (Chapter 2: Landscape and Visual Appraisal) for the Proposed Development will be minimal and thus effects on ecology from these aspects of operation are discounted from assessment.
- 3.6.5 An assessment of potential effects during operation is provided in **Table 4.11**.

#### Construction phase

**Table 3.7 Assessment of potential effects, additional mitigation, residual effects and monitoring during construction**

Receptor	Potential Effects/Additional (Secondary and Tertiary) Mitigation/Residual Effects and Monitoring	
Notable habitats (bog and flush)	Potential effects from construction of Proposed Development – habitat loss	Proposed construction would directly affect 0.68 ha of M19a bog and 1.17 ha of M6c flush habitats which are both Annex I, SBL and HBAP listed habitats. This constitutes 29 % of the habitats within the main site area (which is 6.37 ha). A further indirect loss (habitat within 10 m of permanent loss areas), due to potential drying out/degradation of adjacent habitats, of 0.22 ha and 0.43 ha respectively is considered. An additional 0.1 ha and 0.16 ha would be lost respectively by the temporary compound, although this would

Receptor	Potential Effects/Additional (Secondary and Tertiary) Mitigation/Residual Effects and Monitoring	
		be reinstated. Note, such mire habitats are common and widespread in the wider area at the locality.
	Additional (secondary and tertiary) mitigation	<p>Good practice protocols included as part of the CEMP would ensure effects on bog and flush habitats are minimised.</p> <p>Given the requirements of Policy 3 of the NPF4, and the new NatureScot guidance (2023b) it is considered that the loss of the M19a bog (which is considered a likely 'priority peatland') would need compensated by peatland restoration in the order of 1:11 (lost:restored), to ensure a tangible biodiversity enhancement from the Proposed Development is achieved in addition to that required for mitigation and compensation. This would mean that for the 0.9 ha of M19a to be lost (includes 0.22 ha indirect loss as a precaution), based on the NatureScot guidance, a minimum of 9.9 ha of peatland would need to be restored in the wider estate as detailed in <b>Section 3.7</b> below.</p>
	Monitoring	Monitoring of the peatland restoration areas in the wider estate is a requirement in <b>Section 3.7</b> below.
Morangie Forest SPA (capercaillie as qualifying feature)	Potential effects from construction works of the Proposed Development	Construction phase works (including within the main site area, but also works, including construction works vehicle movements along the existing wind farm access track) have potential to disturb capercaillie from Morangie Forest SPA, if birds use habitats out with the SPA boundary.
	Additional (secondary and tertiary) mitigation	None required. Habitats within the application site are unsuitable for capercaillie, but nearby forestry may be suitable. Following guidance (Goodship and Furness, 2022) capercaillie disturbance distances are 500 m – 1 km for lekking males, 100 m for nesting females and 100 m for non-breeding birds. All capercaillie records returned from the desk study were >1 km from the application site, with the nearest record (droppings) to the main site area 1.74 km and the nearest confirmed male record 2.37 km from the main site area. The nearest capercaillie records to the site access were 1.1 km (droppings) and 1.44 km to the nearest confirmed male

Receptor	Potential Effects/Additional (Secondary and Tertiary) Mitigation/Residual Effects and Monitoring	
		<p>record. All records were therefore outside the acknowledged disturbance distances of 100 m – 1 km for capercaillie.</p> <p>Many of the records are &gt;5 years old, with only a limited number of recent records (within the last five years).</p> <p>It is considered that given the documented disturbance buffers for capercaillie and the proximity of the application site to the habitats, which support capercaillie, disturbance and displacement of breeding and non-breeding capercaillie is discounted. The status of the local capercaillie population will therefore not be affected by the Proposed Development, with pressures within the forest likely driving the noted decline. Should the local population recover, the impacts will be unchanged, in the absence of suitable habitat closer to the site.</p> <p>The main site area is not located between blocks of forestry as it is located to the north of the Morangie Forest complex. Therefore, it can be expected that dispersing birds will pass over the site very rarely, if at all.</p> <p>Morangie Forest SPA is 4.04 km from the main site area and 3.36 km from the site access so direct effects on birds within the SPA boundary are also accordingly discounted.</p>
	Monitoring	None required.

### Operational phase

**Table 3.8 Assessment of potential effects, additional mitigation, residual effects and monitoring during operation**

Receptor	Potential Effects/Additional (Secondary and Tertiary) Mitigation/Residual Effects and Monitoring	
Morangie Forest SPA (capercaillie as qualifying feature)	Potential effects from operation of the Proposed Development	Operational works would be relatively limited to the daily movements of approximately 42 vehicles associated with the Proposed Development along the site access (32 vehicles to off take hydrogen fuel, plus ten additional vehicles for staff). The modest increase in vehicular traffic on the existing track has potential to disturb



Receptor	Potential Effects/Additional (Secondary and Tertiary) Mitigation/Residual Effects and Monitoring	
		capercaillie from Morangie Forest SPA, as birds could use habitats out-with the SPA boundary.
	Additional (secondary and tertiary) mitigation	None required. Justification as to why effects on capercaillie (including those from the SPA) are discounted mirror that in <b>Table 3.7</b> .
	Monitoring	None required.

3.6.6 With the proposed embedded and additional mitigation measures, alongside the proposed monitoring, it is considered the residual effects have been reduced to manageable levels.

#### **Decommissioning phase**

3.6.7 Potential effects of decommissioning the Proposed Development are anticipated to be similar to those encountered during the construction phase, although generally less, as the level of activity within the application site would be lower.

3.6.8 Discussion would be held between the Applicant and the appropriate regulatory authorities prior to decommissioning to agree an appropriate Decommissioning Strategy and Restoration Plan. An outline version of this is included in **Technical Appendix 1.3**).

#### **Assessment against future baseline**

3.6.9 As discussed in **Section 3.4** the future baseline conditions within the application site is unlikely to alter notably from the current baseline conditions, but could be subject to change due to the effects of climate change. Changes may include increased drying out/degradation of bog and flush habitats. It is possible that these changes may increase the likelihood and/or severity of the impacts detailed in **Table 3.7**. Furthermore, the likely harvesting of commercial forestry in the wider area is likely to degrade the suitability of the habitat for supporting capercaillie which may reduce the likelihood and/or severity of the impacts detailed in **Table 4.118**. It is very likely that the proposed embedded and additional mitigation measures, alongside the proposed monitoring, would be sufficient to address any changes to the future baseline. Therefore, it is very unlikely that there would be any change to the environmental effects assessed in this EAR due to factors, such as climate change.

## 3.7 Opportunities for environmental enhancement

### Introduction

- 3.7.1 Production of a Biodiversity Enhancement Plan (BEP) will be a condition of any approval for the Proposed Development. This section sets out the proposed approach to developing, agreeing and implementing the BEP.

### Policy and guidance

- 3.7.2 A fundamental requirement for NPF4 Policy 3 is that “development proposals will contribute to the enhancement of biodiversity, including where relevant, restoring degraded habitats.”. In addition, the intent of Policy 5 is to protect carbon-rich soils, restore peatlands and minimise disturbance to soils from development. Policy 5d, requires that “where development on peatland, carbon-rich soils or priority peatland is proposed, a detailed site-specific assessment will be required”. NatureScot (2023) have published guidance for development on peatland, ‘Advising on peatland, carbon-rich soils and priority peatland habitats in development management’, which has been considered. While peat depth and detailed NVC surveys have been undertaken and impacts on peat, including how avoidance and minimisation have been achieved through siting and design, considered as part of **Chapter 4: Hydrology, Hydrogeology, Geology and Soils**, there is also a requirement to demonstrate how restoration, offsetting and enhancement will be achieved.
- 3.7.3 The BEP will aim to enhance local biodiversity, increase habitat resilience within the wider landscape, and improve connections between nature networks, in line with NPF4. The BEP will be developed post-consent, delivering biodiversity enhancement required by NPF4 (Scottish Government, 2023), and contributing towards the objectives set out within the Scottish Biodiversity Strategy to 2045: Tackling the Nature Emergency in Scotland (Scottish Government, 2023).
- 3.7.4 Furthermore, management prescriptions which will be detailed in the BEP will contribute towards actions, commitments and priority species included within the Highland Nature Biodiversity Action Plan 2021-2026 (HNBAP) (The Highland Environment Forum, 2021), and will be set in accordance with guidance on priority peatland habitats in development management (NatureScot, 2023b).

### Baseline and scope

- 3.7.5 The habitat surveys for the Proposed Development revealed that the application site comprises of 3.42 ha of marshy grassland and 2.95 ha of blanket bog. The blanket bog did not meet the indicator criteria for ‘near-natural and of high quality’ blanket bog as provided in the JNCC guidelines for the selection of biological Site of Special Scientific Interest (SSSI) – Chapter 8 – Bogs, as advised in NatureScot guidance (2023), although it is appreciated that this guidance is typically targeted, and applicable, to appraise more extensive areas of bog habitat (e.g., ≥10 ha). Detailed NVC surveys revealed that the application site comprised of 3.48 ha of M19a *Calluna vulgaris* – *Eriophorum vaginatum* mire, 2.75 ha of M6c *Carex echinata* – *Sphagnum fallax* flush and 0.14 ha of U4a *Festuca ovina* – *Agrostis capillaris* – *Gallium saxatile*

grassland/ H12b *Calluna vulgaris* – *Vaccinium myrtillus* heath mosaic (see **Figure 3.5**).

- 3.7.6 Construction for the Proposed Development would directly affect 0.68 ha of M19a bog and 1.17 ha of M6c flush habitats. A further indirect loss (habitat within 10 m of permanent loss areas), due to potential drying out/degradation of adjacent habitats, of 0.22 ha and 0.43 ha respectively is considered.
- 3.7.7 An appraisal of the wider area revealed that these mire habitats are common and widespread in the wider area at the locality. Furthermore, there is considerable scope within the wider area for enhancement of mire and heath habitats as indicatively shown in **Figure 3.7**. This includes extensive areas of bog habitat considered in unfavourable condition, as well as areas of bog and heath that could benefit from scrub/invasive vegetation removal.
- 3.7.8 The Habitat Management Area (HMA) for the operational Beinn Tharsuinn Wind Farm, as shown in the Design and Access Statement, is adjacent to the area identified for enhancement. Measures for the operational wind farm, principally concern monitoring of key habitat enhancement measures previously adopted (and a commitment to undertake remedial actions as necessary), and include checking the condition of bog habitats (including recording any regenerating trees, evidence of over-grazing, indicator species of good quality bog habitat), checking for establishment and condition of native woodland planting, heath and grassland (including recording any regenerating conifers, invasive non-native species and signs of over-grazing suppressing woody species growth) and maintaining areas of improved grassland for livestock grazing, given the sensitive livestock stocking regime applied in those bog/heath habitats within the HMA.

### **Delivery and implementation**

- 3.7.9 The BEP will be written in consultation with NatureScot, THC and any relevant stakeholders, as required by THC. The BEP will be agreed pre-construction subject to an appropriate planning condition, with detailed methods and locations for peatland and heathland restoration and tree planting to be agreed during the construction phase, and to be implemented during construction and in the first year of operation of the Proposed Development. The BEP would remain in place as agreed over the operational lifetime of the Proposed Development, subject to adaptive management where required.
- 3.7.10 A SGRC would be established prior to the finalisation of the BEP to oversee the implementation of the BEP, monitoring results and recommendations for any amendments to the BEP. For the first five years of implementation (unless otherwise agreed) the SGRC would meet or correspond at least annually. The following bodies (list not exhaustive) would be invited to form part of the SGRC:
- The owners of the Proposed Development;
  - The landowners (or their representatives);
  - Independent ecologist appointed by the owners of the Proposed Development;
  - NatureScot;
  - SEPA; and
  - THC.

## Biodiversity enhancement measures

3.7.11 It is anticipated the BEP will include a combination of the following measures:

- Enhancement of bog habitats;
- Enhancement of heath habitats; and
- Native riparian tree planting.

3.7.12 The measures detailed in the BEP will ensure a holistic approach to habitat enhancement to complement those enhancement measures being adopted for the adjacent operational Beinn Tharsuinn wind farm and comprise targeting the same ecologically important habitat types (bog and heath), as well as increasing the extent of native tree planting, whilst taking into account the safeguarding of peatland habitats.

### *Enhancement of bog habitats*

- A considerable area of bog habitat in the wider area has been appraised as in unfavourable condition and potentially suitable for enhancement/restoration (see **Figure 3.7**). Some of the peatlands were identified as suffering from erosion, sagging and over-grazing/poaching. Measures to be considered and detailed in the BEP would include re-wetting areas (through ditch blocking), re-profiling areas to reduce effects of erosion/sagging and adopting a sensitive livestock stocking regime to minimise effects of over-grazing in targeted areas.
- A smaller area of bog (9.28 ha) has also been identified as unfavourable due to scrub encroachment. This included areas where trees from nearby commercial forestry have encroached, and with time these will likely dry out (and shade) the bog habitat. Measures to be considered and detailed in the BEP would include the removal of such tree specimens from bog areas.
- Combined, these areas are in excess of the 9.9 ha that would be required to compensate for the loss of M19a habitat from the Proposed Development, in accordance with NatureScot guidance (2023b). Given the requirements of Policy 3 of the NPF4, and the new NatureScot guidance (2023b) it is considered that the loss of the M19a bog (which is considered a likely 'priority peatland') would need to be compensated by peatland restoration in the order of 1:11 (lost: restored), to ensure a tangible biodiversity enhancement from the Proposed Development is achieved. This would mean that for the 0.9 ha of M19a to be lost (includes 0.22 ha indirect loss as a precaution), based on the NatureScot guidance (2023b), a minimum of 9.9 ha of peatland would need to be restored. The area of peatland habitat in unfavourable condition within the wider area far exceeds this so it is considered that the required area of peatland restoration can be facilitated within the vicinity of the application site. The details of those areas of peatlands (and heath) to be targeted for enhancement will be presented in the BEP.
- Monitoring of enhancement areas would be detailed in the BEP. This will be guided and decided by discussions with the SGRC and will likely include monitoring the condition of bog (identifying any establishing areas of tree encroachment, areas potentially drying out and effects of grazing on the bog habitats) and identifying any remedial measures required.
- The rationale for the enhancement is to restore an ecologically valuable habitat which is of international (Annex 1 of the Habitats Directive), national

(Scottish Biodiversity List habitat) and regional (HNBAP) importance. Bogs can also support a diverse ecological assemblage including rare plants, reptiles, invertebrates (such as butterflies) and ground-nesting birds, including species such as snipe, dunlin and lapwing (which are all listed as HNBAP priority species). Their importance for carbon sequestration is also well founded.

#### *Enhancement of heath habitats*

- A considerable area of dry heath habitat in the wider area has been appraised as in an unfavourable condition and potentially suitable for enhancement/restoration. Some of the dry heath was identified as suffering from bracken and scrub encroachment (total of 83.28 ha), and other dry heath areas were unfavourable due to over-grazing. Measures to be considered and detailed in the BEP would include clearance of some invasive bracken and scrub and adopting a sensitive livestock stocking regime to minimise effects of over-grazing in targeted areas. Much of the bracken colonisation is along the Allt Fearna (and along a tributary of the Allt Muigh-bhlàraidh) which are also the main areas identified for potential riparian tree planting. Any bracken removal along these watercourses will provide opportunity for lower growing out-competed ground flora to re-establish, and this could include marginal plants (foodplants) of HNBAP species like water vole.
- Monitoring of enhancement areas would be detailed in the BEP. This will be guided and decided by discussions with the SGRC and will likely include monitoring the condition of dry heath (identifying any establishing areas of invasive bracken/scrub encroachment and effects of grazing on the heath habitats) and identifying any remedial measures required.
- The rationale for the enhancement is to restore an ecologically valuable habitat which is of international (Annex 1 of the Habitats Directive), national (Scottish Biodiversity List habitat) and regional (HNBAP) importance. Like bogs, heathland can support a range of species, including rare plants, reptiles, invertebrates and ground-nesting species, including HNBAP priority species, like curlew and golden plover. Any clearance of the extensive bracken along the Allt Fearna and Allt Muigh-bhlàraidh will also encourage the growth of marginal plants/foodplants, which may benefit, if watercourse features (flow rates etc.) are optimal, the HNBAP priority species, water vole.

#### *Native riparian tree planting*

- Up to 3.46 km of watercourse within the wider area has been identified as being sparsely vegetated (if at all) and potentially suitable for native tree planting (see **Figure 3.8**). The main stretches are along the Allt Fearna, but there are also shorter, more isolated areas along the Allt Clais Bad nan Carn and a tributary of the Allt Muigh-bhlàraidh. Measures to be considered and detailed in the BEP would include planting with native trees. This would include planting to create areas of continuous and discontinuous tree dominated planting, with the planting regime chosen to be sensitive to onsite considerations, such as avoidance of areas of deeper peat and/or more ecologically valuable ground flora (such as stretches with a richer diversity of marginal plants). Tree species to be planted would be those that are of local provenance and include birch, willow, rowan, juniper, aspen, alder, as well as some Scots pine.
- Riparian planting areas would need protected from grazers, with measures such as biodegradable tree guards and/or areas being surrounded by stock

fencing considered. The stretches of watercourses chosen for tree planting will also be sensitive to the location of the operational Beinn Tharsuinn Wind Farm to the south west, in terms of ensuring that improved habitat corridors/connectivity would not encourage commuting/foraging bats towards the turbines (and potentially increase bat collision risk with operating turbine blades<sup>6</sup>).

- Monitoring of riparian planted areas would be detailed in the BEP. This will be guided and decided by discussions with the SGRC and will likely include monitoring the establishment (and conversely the failure rate) of planted trees, and identifying any remedial measures required.
- The rationale for the riparian tree planting is to benefit a variety of wildlife. This includes aquatic invertebrates and any fish in the watercourse through providing shade (to cool water and maintain high levels of oxygen) and falling leaves and other tree debris entering the watercourse providing refuge and shelter for aquatic species. Tree planting along watercourses would improve connectivity through the wider area for species such as foraging/commuting bats (HNBAP priority species) and otter. Tree planting will also benefit ornithological species, most notably the HNBAP priority species, black grouse, as well as nesting passerine species. The tree species composition to be selected (listed above) would provide additional food sources for black grouse (and other species) in the spring and winter, together with suitable cover from predation for both adults and broods. Note, black grouse is also a targeted beneficiary of the habitat management proposals within the HMA for the nearby Beinn Tharsuinn Wind Farm.

## 3.8 Difficulties and uncertainties

- 3.8.1 Specific targeted protected species surveys were not undertaken, but instead evidence of protected species was identified during the extended phase 1 habitat survey, with this survey determining whether any targeted protected species surveys would be required. This was considered appropriate and was agreed with THC (see **Table 3.1**).
- 3.8.2 Targeted ecology surveys (extended phase 1 habitat surveys) covered the main site area, and most of the site access. These surveys did not cover the cable route corridor, given these habitats would be reinstated on completion of cable laying, with associated works undertaken from the adjoining existing Beinn Tharsuinn Wind Farm track, to minimise disturbance to habitats. Although some of the 100 m buffer around the main site area was covered during ecology surveys, the entire 100 m buffer was not covered (see **Figures 3.3 – 3.5**). This included habitat to the south of the existing access track to the Beinn Tharsuinn Wind Farm. This is not considered a substantive limitation due to the habitats that will most likely be affected by the Proposed Development being appropriately covered by surveys, with the unsurveyed areas not considered as being notably different to those within the surveyed area.
- 3.8.3 Furthermore, pre-construction checks, which would be detailed in the CEMP, would check all areas to be directly affected by works, for protected species, to ensure works progress in a legally compliant manner. The study areas described in this report are

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<sup>6</sup> The nearest watercourses identified for potential riparian tree planting is ~950m from the operational wind farm.



accordingly considered appropriate and proportionate given the size, scale and nature of the Proposed Development.

### 3.9 Assessment summary

3.9.1 **Table 3.9** provides a summary of the findings of the assessment.

**Table 3.9 Summary of ecology effects**

Receptor	Potential Effects	Additional (Secondary and Tertiary) Mitigation	Monitoring
Construction Phase			
Notable habitats (bog and flush)	Proposed construction would directly affect 0.68 ha of M19a bog and 1.17 ha of M6c flush habitats which are both Annex I, SBL and HBAP listed habitats. This constitutes 29 % of the habitats within the main site area (which is 6.37 ha). A further indirect loss (habitat within 10 m of permanent loss areas), due to potential drying out/degradation of adjacent habitats, of respectively 0.22 ha and 0.43 ha is considered. An additional 0.1 ha and 0.16 ha would be respectively lost by the temporary compound, although this would be reinstated.	Good practice protocols included as part of the CEMP would ensure effects on bog and flush habitats are minimised.  The loss of M19a bog (which is considered a likely 'priority peatland') would need compensated by peatland restoration in the order of 1:11 (lost:restored). 9.9 ha of peatland in the wider estate would be chosen for peatland restoration. Final details would be agreed in the BEP.	Monitoring of the peatland restoration areas in the wider estate would be agreed as a requirement in the final BEP.
Morangie Forest SPA (capercaillie as qualifying feature)	Construction phase works (including within the main site area, but also works, including construction works vehicle movements along the existing wind farm access track) have potential to disturb capercaillie from Morangie Forest SPA, if birds use habitats out-with the SPA boundary.	None required. Habitats within the application site are unsuitable for capercaillie. All capercaillie records returned from the desk study were >1 km (disturbance distance) from the application site. Morangie Forest SPA is 4.04 km from the main site area and 3.36	None required.



Receptor	Potential Effects	Additional (Secondary and Tertiary) Mitigation	Monitoring
		km from the site access so direct effects on birds within the SPA boundary are also accordingly discounted.	
Operational Phase			
Morangie Forest SPA (capercaillie as qualifying feature)	Operational works would be limited to the daily movements of approximately 42 vehicles associated with the Proposed Development along the existing wind farm access track. The increase in vehicular traffic on the existing track has potential to disturb capercaillie from Morangie Forest SPA, if birds use habitats out-with the SPA boundary.	None required. Justification as to why effects on capercaillie from the SPA are discounted mirror that detailed above for the Construction Phase.	None required.

### **3.10 Information to inform HRA**

- 3.10.1 This section summarises information relating to the potential for Likely Significant Effects upon ornithological qualifying features of Morangie Forest SPA as a result of the Proposed Development.
- 3.10.2 The Morangie Forest SPA has capercaillie as its only qualifying species. The Morangie Forest is 3.36 km from the application site (4.04 km from the main site area).
- 3.10.3 The conservation objectives for the Morangie Forest SPA are:
- 3.10.4 To avoid deterioration of the habitats of the qualifying species or significant disturbance to the qualifying species, thus ensuring that the integrity of the site is maintained; and
- 3.10.5 To ensure for the qualifying species that the following are maintained in the long term:
- Population of the species as a viable component of the site;
  - Distribution of the species within site;
  - Distribution and extent of habitats supporting the species;
  - Structure, function and supporting processes of habitats supporting the species; and
  - No significant disturbance of the species.
- 3.10.6 Given the distance between the SPA boundary and the application site there will be no impact on the habitats within the designated site and so only impacts on the qualifying species itself require assessment.
- 3.10.7 A total of 41 capercaillie records were returned from the desk study, within 5 km of the main site area. The majority of the records are historic (greater than five years old), with only four records from 2018. The nearest capercaillie records to the application site are 1.1 km (droppings) and 1.44 km for a confirmed male record. The respective distances from the nearest records to the main site area are 1.74 km and 2.37 km. A review of aerial maps reveals that there has been some clear-fell of the forestry (outside the SPA boundary) in the interim period at the location of the closest capercaillie records and thus the forestry habitat outside the SPA boundary may have degraded and are likely to be exposed to further clear-felling/degradation as capercaillie habitat, during the timeframe of the Proposed Development.
- 3.10.8 The application site is itself unsuitable for capercaillie as it consists of open moorland habitat and the site access (existing Beinn Tharsuinn Wind Farm track). Potential suitable habitat for the species within 5 km is largely restricted to forestry greater than 1 km south and south east of the application site.

- 3.10.9 Even in the event that the capercaillie population was to increase in the SPA, the application site would remain unfavourable for the species, given its lack of suitable arboreal habitat.
- 3.10.10 Suggested buffer zones for capercaillie (as documented in Goodship and Furness, 2022) are 100 m for nesting females, and non-breeding birds, and 500 m – 1 km for lekking males. All capercaillie records were greater than 1 km from the application site, with the nearest confirmed male record 1.44 km from the application site and 2.37 km from the main site area.
- 3.10.11 The application site is located in non-arboreal habitat (open moorland) with the nearest suitable forestry habitat restricted to the south/south east (>1 km). There is no other suitable forestry habitat within 2 km of the main site area, with open moorland the common habitat type. The Proposed Development is therefore not predicted to result in a barrier effect for any dispersing capercaillie moving between suitable forestry blocks.
- 3.10.12 On the basis of the nearest records being greater than 1 km from the application site and typically exceeding 1.5 km and considering into the recommended buffer zones to avoid disturbance (<1 km), disturbance effects on capercaillie (including those outside the Morangie Forest SPA boundary) during all stages of the Proposed Development are discounted.
- 3.10.13 Given the distance between the application site and the Morangie Forest SPA (3.36 km), and the documented disturbance distances for the species (maximum 1 km), and the absence of suitable habitat within 1 km of the application site, the potential for Likely Significant Effects on the SPA (and capercaillie within the SPA boundaries) can be precluded for both the Proposed Development on its own and in-combination with other projects.
- 3.10.14 No pathway of impacts from the Proposed Development on the Morangie Forest SPA have been identified, with no impacts on the distribution, no significant disturbance and no impact on the SPA population of capercaillie predicted.

### 3.11 References

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- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater, Coastal and Marine.
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- Highland Council (2023) Highland-wide Local Development Plan (adopted 2012).  
[https://www.highland.gov.uk/info/178/development\\_plans/199/highland-wide\\_local\\_development\\_plan](https://www.highland.gov.uk/info/178/development_plans/199/highland-wide_local_development_plan) (Accessed 13/10/2023).

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- Hundt, L. (2012) Bat surveys: good practice guidelines, 2<sup>nd</sup> edition, Bat Conservation Trust.
- NatureScot (2020a) Standing Advice for Planning Consultations – Badgers.
- NatureScot (2020b) Standing Advice for Planning Consultations – Bats.
- NatureScot (2020c) Standing Advice for Planning Consultations – Otters.
- NatureScot (2020d) Standing Advice for Planning Consultations – Pine martens.
- NatureScot (2020e) Standing Advice for Planning Consultations – Red squirrels.
- NatureScot (2020f) Standing Advice for Planning Consultations – Water voles.
- NatureScot (2023a) Developing with Nature guidance. Guidance on securing positive effects for biodiversity from local development to support NPF4 policy 3(c).
- NatureScot (2023b) Advising on peatland, carbon-rich soils and priority peatland habitats in development management.
- Scottish Government (2023) National Planning Framework 4. 13 February 2023.
- SEPA (2014) Land use planning system SEPA guidance Note 31
- SEPA (2017) Guidance on Assessing the Impacts of Groundwater Abstractions and Groundwater Dependant Terrestrial Ecosystems (GWDTEs).
- SNH (2016) Carbon and Peatland map.
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## 4 HYDROLOGY, HYDROGEOLOGY, GEOLOGY AND SOILS

### 4.1 Introduction

4.1.1 This chapter reports the outcome of the assessment of potential impacts arising from the Proposed Development upon hydrology, hydrogeology, geology and soils during construction, operation and decommissioning.

4.1.2 This chapter (and its associated figures and appendices) is intended to be read as part of the wider Environmental Appraisal Report (EAR), with particular reference to **Chapter 1 Introduction** and **Chapter 3 Ecology**.

### 4.2 Consultation, scope and study area

#### Consultation undertaken to date

4.2.1 The Highland Council (THC) provided a Pre-Application Advice Response which included input from NatureScot and the Scottish Environment Protection Agency (SEPA). The Pre-Application Advice Response was issued on 7 July 2022. Responses with relevance to hydrology, hydrogeology, geology and soils are provided in **Table 3.1**. The key issues relating to the water environment include proper management of effluent arising from the Proposed Development and safeguarding of the water quality interests of the nearby abstraction areas. In relation to habitat and peat, impacts on these receptors should be minimised with assessment of effects required and mitigation proposed as required. These issues, and others raised by consultees, have been addressed as part of this Chapter as shown in **Table 4.1**.

**Table 4.1 Pre-application consultation responses relevant to hydrology, hydrogeology, geology and soils**

Key concern	Consultee comment	Response
Impact on Peat	We welcome the initial peatland habitat condition and peat depth surveys undertaken to date and are pleased see that these factors have been acknowledged as a major constraint in the project design and avoidance has been the first principle in site screening. We are also pleased to note that further detailed surveys are planned and that these will further inform the detailed site design. The peat depth surveys should be to full depth and follow the survey requirement of the Scottish Government's Guidance on Developments on Peatland –	Noted. Phase 1 and 2 peat depth surveys were undertaken to inform site design. Details of the surveys are provided in <b>Section 3.3, Section 3.4</b> and <b>Technical Appendix 4.1 Peat Management Plan</b> .

Key concern	Consultee comment	Response
	<p>Peatland Survey (2017). We would welcome early sight of the detailed peat depth surveys and peatland habitat condition report, as well as the peat re-use proposals within the Peat Management Plan.</p>	
	<p>We acknowledge that if avoidance of deep peat continues to be the first principle of mitigation, then there may not be huge volumes of peat to deal with. However, the Peat Management Plan should include a table which details the quantities of any acrotelmic, catotelmic and amorphous peat which will be excavated for each element and detail where it will be re-used during reinstatement where appropriate. Details of the proposed widths and depths of peat to be re-used and how it will be reintegrated into a functional peatland system and be kept permanently wet must be included. This means that all excavated peat will need to be reinstated close to the water table and covered with vegetated turves. We highlight that it will not be acceptable to re-use peat in any general landscaping, nor can it be transported off-site as a waste product.</p>	<p><b>Technical Appendix 4.1 Peat Management Plan</b> details the excavation, handling and reuse of acrotelmic, catotelmic and amorphous peat.</p>
	<p>SEPA would also welcome investigations which would seek to compensate for impacts to the site through compensatory measures, such as peatland restoration or other environmental management objectives on or adjacent to the application boundary which could contribute to biological net gain. We would welcome early sight of these proposals prior to the final submission.</p>	<p>Opportunities for environmental enhancement such as peat restoration and vegetation management are discussed in <b>Section 4.7, Technical Appendix 4.1 Peat Management Plan</b> and <b>Section 3.7</b>.</p>
<p>Impacts on habitats</p>	<p>The proposed development site includes areas mapped as nationally important Class 1 and Class 2 peatland. The 2016 mapping is indicative, and we note that site specific peat and habitat</p>	<p>Potential impacts on peatland are addressed in <b>Table 4.10, Table 4.11</b> and <b>Technical Appendix 4.1 Peat Management Plan</b>.</p>

Key concern	Consultee comment	Response
	<p>surveys have been carried out, with further surveys planned across the site. We recommend the surveys include an appropriate buffer and also cover any additional areas which may be affected, e.g. upgrades to existing access tracks or material laydown areas.</p>	
	<p>We would expect any future application to provide mapped information on peatland habitats to NVC level together with a detailed description of current condition and the amount of habitat that would be directly or indirectly affected. Peat survey work should conform to the Peatland Survey 2017 “Guidance on Developments on Peatland”.</p>	<p>NVC mapping is available on <b>Figure 3.5</b> Peat is discussed in <b>Section 3.4, Table 4.4</b> and <b>Table 4.5</b>, and peat depth mapping is shown on <b>Figure 4.5</b>. A full assessment of peat at the application site found in Technical Appendix 4.1 Peat Management Plan.</p>
	<p>Initial survey work shows that the site include areas of wet heath and blanket bog and we note that NVC surveys are planned. Initial peat surveys indicate that deeper peat areas correspond with the mapped blanket bog and we recommend the design and layout seeks to avoid direct and indirect impacts to these areas in particular.</p>	<p>As discussed in <b>Section 3.5</b> the Proposed Development has been designed to minimise impacts to peat in general and specifically, to avoid incursion into areas of deep peat.</p>
	<p>Where impacts to priority peatland habitats cannot be avoided, they should be minimised, and opportunities for mitigation and/or compensation be identified within Peatland and Habitat Management Plans. Although intended for wind farm developments, the applicants may find it useful to refer to our guidance at:  <a href="https://www.nature.scot/guidance-good-practice-during-windfarm-construction">https://www.nature.scot/guidance-good-practice-during-windfarm-construction</a> for further advice.</p>	<p>Potential impacts to priority peatland habitats have been minimised by careful siting and design of the Proposed Development as discussed in <b>Section 3.5</b>. Opportunities for mitigation are discussed in <b>Table 4.10</b> and <b>Table 4.11</b>. Opportunities for enhancement are discussed in <b>Section 4.7, Technical Appendix 4.1 Peat Management Plan</b> and <b>Section 3.7</b>.</p>
<p>Private Water Supplies (PWS)</p>	<p>There appear to be no PWSs on site/in close proximity to the site. There is one downstream at</p>	<p>Private water supplies are identified in <b>Table 4.9</b> and assessed in</p>

Key concern	Consultee comment	Response
	<p>Aultnamain on B9176. We have no information on this but it may take its source from the Allt na Meine which runs northeast of the site. It therefore appears unlikely that the proposal will impact any existing PWS in the construction phase if construction is limited to the watershed to the south of the site. However, the applicant should be mindful of the impact of the operational water supply for the Hydrogen Plant. We note there will be a separate application for the water supply and associated infrastructure, and that initial work on this has identified a possible abstraction source on the River Glass (ID20162) which is currently at Good status in terms of the River Basin Management Plan. Any impacts on this classified watercourse and Private Water Supplies along any length of infrastructure, both at the construction and operational phase from this separate application will need to be assessed. Our preference would be for the water supply planning application to be twin tracked with the hydrogen plant application to provide transparency and certainty to the Hydrogen Plant application. But as a minimum we recommend some initial assessment is undertaken to ascertain whether this is a feasible option for the water supply and that this is included with the application for the Hydrogen Plant as an informative to the project's feasibility.</p>	<p><b>Table 4.10</b> and <b>Table 4.11</b>.</p> <p>As per <b>Chapter 1: Introduction</b> and <b>Technical Appendix 1.4</b>, Scottish Water Horizons would supply the water for the Proposed Development. It has identified a feasible water supply, sourced from the River Glass approximately 14 km to the south west near Alness, under an existing extraction licence. The water would be supplied to the Proposed Development by a new pipeline. The final route of the water pipeline, which would be subject to a separate consent application, is being determined and is not considered further.</p>
Flood risk	<p>We confirm we have no flood risk concerns. The proposed location of the facility is relatively remote and is not close to any major watercourses. A small watercourse is shown on OS maps to the northeast and we would expect the infrastructure to be carefully sited to avoid potential flood risk from this</p>	<p>Flood risk has been scoped out of this assessment. For further details and justification see <b>Table 3.2</b>.</p>



Key concern	Consultee comment	Response
	source. The applicant should demonstrate that this will be achieved through appropriate analysis of the local topography.	
	If any new or upgraded watercourse crossings are required, small watercourse crossings should be oversized and larger scale watercourse crossings should be demonstrated to be adequately designed to accommodate the 1 in 200 year flow (including an allowance for climate change and freeboard) to avoid increasing the risk of flooding, or information provided to justify smaller structures.	No new watercourse crossings are required and no existing crossing require upgrading.
	Development or landraising within any flood plain should be avoided and proposals should generally follow SEPA's Standing Advice for Flood Risk. Should any permanent infrastructure be located within close proximity to a watercourse, a Flood Risk Assessment should be submitted to demonstrate that the development is not at risk from flooding and will not increase flood risk elsewhere. SEPA's Technical Flood Risk Guidance for Stakeholders outlines the information required to be submitted as part of a Flood Risk Assessment.	No development within any flood plain area is proposed. In line with advice from THC, flood risk is not a concern for the application site and therefore has been scoped out of the EAR. For further details and justification see <b>Table 3.2</b> .
Drainage	A Drainage Impact Assessment (DIA) written in accordance with our Supplementary Guidance: Flood Risk and Drainage Impact Assessment, is required to be submitted with the planning application. The DIA should be submitted at the first stage of planning.	For details see <b>Technical Appendix 4.2 Drainage Impact Assessment</b> .
	The DIA will need to detail the proposed surface water and foul drainage systems and include appropriate drawings and calculations. An allowance for climate change should be included in the calculations and any runoff from storms up to and including the	Details of the surface and foul water drainage systems can be found in <b>Technical Appendix 4.2 Drainage Impact Assessment</b> . Detailed drawings, calculations and

Key concern	Consultee comment	Response
	<p>1 in 200 year event should be managed within the site boundary without flooding to buildings. Clear exceedance routing plans should be provided with the planning application.</p>	<p>exceedance routing plans would be provided following the detailed design stage post-consent.</p>
	<p>Supporting evidence in the DIA should include (but not be limited to) calculations showing drainage network details, contributing area summary, control / storage structure details and simulation results tables for any new network. A site plan showing the type of treatment and location on site, where this will be discharged to, and proposed maintenance arrangements must be submitted in support of the application. The drainage should be designed in line with general Sustainable Drainage Systems (SuDS) principles. The Applicant should demonstrate, within the proposals submitted, any mitigation measures to manage the residual risk of overland flow/pluvial flooding.</p>	<p>Outline drainage information is provided in <b>Technical Appendix 4.2 Drainage Impact Assessment</b>. Detailed calculations showing drainage network details, contributing area summary, control and storage structure details, simulation results tables for any new network and a site plan would be provided at the detailed design stage post-consent.</p>
	<p>Given the location natural flood management techniques could also be applied to reduce the rate of runoff where possible. Tracks should not act as preferential pathways for runoff and efforts should be made to retain the existing drainage patterns. Appropriate drainage is required to restrict runoff to pre-development rates and to minimise erosion to existing watercourses. Refer to the Council's Flood Risk and Drainage Impact: Supplementary Guidance for further detailed requirements.</p>	<p>Impacts to surface water from pollution are discussed in <b>Table 4.10</b> and <b>Table 4.11</b>. Details of the drainage strategy for the Proposed Development can be found in <b>Technical Appendix 4.2 Drainage Impact Assessment</b>.</p>
	<p>Whilst it is anticipated that the level of foul drainage will be minimal and it is presumed primarily relate to the welfare facilities on-site (if required), HwLDP Policy 65 (Wastewater Treatment) sets a preference for foul drainage to be discharged to the public sewer. However, if one is unavailable then private means will</p>	<p>Details of foul drainage provision for the Proposed Development are discussed in <b>Table 4.10</b> and <b>Technical Appendix 4.2 Drainage Impact Assessment</b>.</p>

Key concern	Consultee comment	Response
	be considered and, as such, details should be provided.	
GWDTE	<p>GWDTE are protected under the Water Framework Directive and therefore the layout and design of the development must avoid impact on such areas. Again, we very much welcome the initial Phase 1 habitat survey informing the initial site selection process. The following information should be included in any future planning submission:</p> <p>A map demonstrating that all GWDTE are outwith a 100 m radius of all excavations shallower than 1 m and outwith 250 m of all excavations deeper than 1 m and proposed groundwater abstractions. If micro-siting is to be considered as a mitigation measure the distance of survey needs to be extended by the proposed maximum extent of micro-siting. The survey needs to extend beyond the site boundary where the distances require it.</p> <p>If the minimum buffers above cannot be achieved, a detailed site specific qualitative and/or quantitative risk assessment will be required. We are likely to seek conditions securing appropriate mitigation for all GWDTE affected.</p> <p>Please refer to Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems for further advice and the minimum information we require to be submitted.</p>	<p>Impacts upon groundwater-dependent terrestrial ecosystems (GWDTE) are considered in <b>Table 4.9</b>. GWDTE are identified in <b>Section 3.4</b> and assessed in <b>Table 4.10</b> and <b>Table 4.11</b>.</p>
Existing or proposed abstraction	<p>The abstraction of water will require a licence from SEPA under The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR). Based on the abstraction volume and risks involved, this will either be a Simple or Complex Licence. A detailed assessment of risk to nearby properties and habitats will be</p>	<p>As per <b>Chapter 1: Introduction</b> and <b>Technical Appendix 1.4</b>, Scottish Water Horizons would supply the water for the Proposed Development. It has identified a feasible water supply, sourced from the River</p>

Key concern	Consultee comment	Response
	<p>assessed as part of the application for a licence. We highly recommend that discussion with SEPA permitting team (ppcpermitting@sepa.org.uk) is undertaken as soon as possible to ascertain whether this will be acceptable in terms of CAR and to twin track this aspect of the proposal. We must highlight that it will be at the applicant's commercial risk if a suitable water supply cannot be secured at a later date.</p>	<p>Glass approximately 14 km to the south west near Alness, under an existing extraction licence. The water would be supplied to the Proposed Development by a new pipeline. The final route of the water pipeline, which would be subject to a separate consent application, is being determined and is not considered further.</p>
<p>Pollution Prevention and Control</p>	<p>Hydrogen production is a Pollution Prevention and Control (Scotland) Regulations 2012 (PPC 2012) which came into force on January 2013 to implement the requirements of the Industrial Emissions Directive (IED) activity and as such will require the submission of a PPC Permit application. We therefore advise that the applicant contact SEPA Permitting PPC team at ppcpermitting@sepa.org.uk at the earliest opportunity to discuss the proposals in detail, where the focus will be on water supply/effluent, operational noise and energy requirements. For further regulatory advice contact your local SEPA office via NHNI@sepa.org.uk to discuss any of the above.</p>	<p>Noted. SEPA's Permitting team will be contacted to discuss proposal details as part of the PPC permitting application process.</p>
<p>Designated sites</p>	<p>We also recommend that any off-site infrastructure and/or requirements related to sourcing and discharge of water and power supply are considered in the context of nearby protected areas.</p>	<p>No offsite infrastructure forms part of this planning application. As per <b>Chapter 1: Introduction</b> and <b>Technical Appendix 1.4</b>, Scottish Water Horizons would supply the water for the Proposed Development. The water would be supplied to the Proposed Development by a new pipeline. The final route of the water pipeline, which would</p>

Key concern	Consultee comment	Response
		<p>be subject to a separate consent application, is being determined and is not considered further. Details of foul drainage provision for the Proposed Development are discussed in <b>Table 4.10</b> and <b>Technical Appendix 4.2 Drainage Impact Assessment</b>.</p>
Water environment	<p>Particular attention should be paid to the water environment, ensuring that any effluent arising from the facility is appropriately managed, and that ecological and water quality interests of the nearby abstraction areas will be safeguarded.</p>	<p>A baseline for the geology, hydrology and hydrogeology of the application site is described in <b>Section 3.4</b>. Potential impacts during construction and operation are discussed in <b>Table 4.10</b> and <b>Table 4.11</b>.</p>
Peat and GWDTE	<p>The habitat and peat impacts also require further assessment albeit on initial review the principle of avoidance of areas of deep peat and ground water dependent terrestrial ecosystems seems positive. Mitigation may still be required and we encourage you to look toward peatland restoration in vicinity of the site.</p>	<p>Impacts on peatland are addressed in <b>Technical Appendix 4.1 Peat Management Plan</b>. Groundwater-dependent terrestrial ecosystems are identified in <b>Section 3.4</b> and assessed in <b>Table 4.10</b> and <b>Table 4.11</b>. Peatland restoration is discussed in <b>Section 4.7, Technical Appendix 4.2 Peat Management Plan</b> and <b>Section 3.7</b>.</p>

### Scope of the assessment

4.2.2 The scope of this assessment has been established through Environmental Impact Assessment (EIA) Screening (see **Chapter 1: Introduction**, Section 1.3 for more detail) and pre-application consultation.

*Matters scoped out of further assessment*

4.2.3 **Table 3.2** presents the matters that are scoped out of further assessment, together with appropriate justification.

**Table 4.2 Matters scoped out of further assessment**

Matter	Phase	Justification	Change since EIA screening?
Water abstraction for the operational phase of the Proposed Development.	Operation	As per <b>Chapter 1: Introduction</b> and <b>Technical Appendix 1.4</b> , Scottish Water Horizons would supply the water for the Proposed Development. It has identified a feasible water supply, sourced from the River Glass approximately 14 km to the south west near Alness, under an existing extraction licence. The water would be supplied to the Proposed Development by a new pipeline. The final route of the water pipeline, which would be subject to a separate consent application, is being determined and is not considered further.	Yes. After consideration it was agreed that this matter should be scoped out of further assessment as a full assessment of this matter would be reserved for a separate application.
Flood risk to the Proposed Development.	Construction, operation and decommissioning.	The application site is in a remote location and is not close to any major watercourses or waterbodies. Additionally, flood mapping indicates there is no risk of flooding within any part of the application site (SEPA, 2023c).	No. It was agreed that this receptor/matter should be scoped out of further assessment.
Flood risk arising from the Proposed Development.	Construction, operation and decommissioning.	The applications site is in a remote location and is not close to any major	No. It was agreed that this receptor/matter should be scoped

Matter	Phase	Justification	Change since EIA screening?
		watercourses or waterbodies.	out of further assessment.
Modification to groundwater flow paths from the Proposed Development.	Construction, operation and decommissioning.	Excavations for the construction of the substation, temporary construction compound and hydrogen production facility would only be deep enough to impact shallow sub-surface flow. The cables would be laid in the existing track verge and would make use of existing drainage and watercourse crossings, thereby avoiding impacts on groundwater flow.	No. It was agreed that this receptor/matter should be scoped out of further assessment.

*Matters scoped into further assessment*

4.2.4 **Table 3.3** presents the matters that are scoped into further assessment, together with appropriate justification.

**Table 4.3 Matters scoped into further assessment**

Matter	Phase	Justification	Change since EIA screening?
Soils and peat excavation and reuse at the Proposed Development.	Construction and decommissioning	The excavation of soils and peat during construction and decommissioning of the Proposed Development would affect the nature of the soils and peat within the application site, potentially leading to erosion, loss of structure and overall degradation.	No. It was agreed that this receptor/matter should be scoped into further assessment.
Pollution of surface watercourses and waterbodies from oils, fuels and wastewater.	Construction, operation and decommissioning	Spillage of fuels, oils, wet concrete, concrete washout water and release of foul drainage could all occur during the construction and decommissioning phases of the Proposed Development, and to a lesser extent during the	No. It was agreed that this receptor/matter should be scoped into further assessment.

Matter	Phase	Justification	Change since EIA screening?
		operational phase. This could have a direct impact on surface watercourses within the application site.	
Pollution of surface watercourses and waterbodies from sediment release via overland flow.	Construction, operation and decommissioning	All development work involving earthmoving operations would generate loose sediment, which could runoff into surface watercourses and waterbodies. This could result in damage to fish spawning habitat and changes to dissolved oxygen and nutrient levels in watercourses and waterbodies.	No. It was agreed that this receptor/matter should be scoped into further assessment.
Modification to surface water flow paths from the Proposed Development.	Construction and decommissioning	Excavations for the construction and decommissioning of the Proposed Development could impact overland drainage patterns within the application site.	No. It was agreed that this receptor/matter should be scoped into further assessment.
Changes to water supply to vulnerable receptors from the Proposed Development: GWDTE.	Construction	Excavations for the construction of the hydrogen production facility, the substation and the temporary construction compound would result in habitat loss. Additionally, works may cause permanent changes to GWDTE due to nutrient flushing.	No. It was agreed that this receptor/matter should be scoped into further assessment.
Changes to water supply to vulnerable receptors from the Proposed Development: Private Water Supplies.	Construction, operation and decommissioning	Private Water Supplies within 2 km of the application site could be at risk from activity during all phases of the Proposed Development.	No. It was agreed that this receptor/matter should be scoped into further assessment.

### Extent of the study area



- 4.2.5 For most constraints and sensitivities, a study area of up to 2 km from the application site has been assessed. For some hydrological aspects, as effects can be transmitted downstream, a distance up to 5 km downstream of the application site has been assessed. The study areas considered for this assessment are shown on **Figure 4.1**.

## 4.3 Approach and methodology

### Applicable guidance

- 4.3.1 The following guidance documents have been used during the preparation of this chapter:

- The European Water Framework Directive (2006/60/EC) and associated daughter Directives including the Groundwater Daughter Directive (Protection of Groundwater Against Pollution, 2006/118/EC);
- The European Mining Waste Directive (2007/60/EC);
- The European Floods Directive (2007/60/EC);
- The Environmental Protection Act 1990 (as amended);
- The Water Environment and Water Services (Scotland) Act 2003;
- The Water Environment (Controlled Activities) (Scotland) Regulations 2011 (as amended);
- The Pollution Prevention and Control (Scotland) Regulations 2012;
- National Planning Framework 4;
- SEPA's Position Statement WAT-PS-10-01: Assigning Groundwater Assessment Criteria for Pollutant Inputs;
- Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems. Scottish Environment Protection Agency, Land Use Planning System Guidance Note 31 (LUPS-GU31);
- The assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste act 2012 (Scottish Renewables & SEPA);
- NatureScot's Advising on peatland, carbon-rich soils and priority peatland habitats in development management (June 2023);
- Scottish Government's Planning Advice Notes (PAN):
  - PAN 51: planning, environmental protection and regulation, 2006;
  - PAN 61: sustainable urban drainage systems, 2001;
  - PAN 69: flood risk, 2015; and
  - PAN 79: water and drainage, 2006.
- Scottish Environment Protection Agency's Guidance for Pollution Prevention (GPP & PPG):
  - GPP 1: Understanding your environmental responsibilities – good environmental practices, 2013;
  - GPP 2: Above ground oil storage tanks, 2017;
  - GPP 3: Use and design of oil separators in surface water drainage systems, 2006;
  - GPP 4: Treatment and disposal of wastewater where there is no connection to the public foul sewer, 2017;

- GPP 5: Works and maintenance in or near water, 2017;
- GPP 13: Vehicle washing and cleaning, 2017;
- PPG 18: Managing fire water and major spillages, 2000;
- GPP 21: Pollution incident response planning, 2017;
- GPP 22: Dealing with spills, 2018; and
- Code of Practice for Using Plant Protection Products in Scotland.
- Scottish Government, Scottish Natural Heritage, SEPA (2017) Peatland Survey. *Guidance on Developments on Peatland*;
- Highland-wide Local Development Plan (Adopted 2012), specifically:
  - Policy 55 – Peat and Soils;
  - Policy 63 – Water Environment;
  - Policy 64 – Flood Risk;
  - Policy 65 – Wastewater Treatment;
  - Policy 66 – Surface Water Drainage; and
  - Policy 72 – Pollution.
- Highland Council Supplementary Guidance: Flood Risk & Drainage Impact Assessment (January 2013).

### **Data sources to inform the baseline characterisation**

4.3.2 A number of data sources have been used to inform the baseline characterisation; the main sources are detailed below:

- Ordnance Survey (OS) topographical mapping at 1:25,000 scale;
- British Geological Survey (BGS) geological mapping, superficial and bedrock;
- Scotland's Soils mapping;
- NatureScot's Carbon and Peatland Map 2016;
- SEPA's Land use planning system guidance note 31, *Guidance on assessing the impacts of development proposals on groundwater abstractions and groundwater dependent terrestrial ecosystems*;
- UK Technical Advisory Group on the Water Framework Directive: *Guidance on the identification and risk assessment of groundwater dependent terrestrial ecosystems*;
- Centre for Ecology and Hydrology Flood Estimation Handbook (FEH) Web Service;
- THC's Private Water Supplies online records; and,
- SEPA's Water Classification and Water Environment Hubs.

### **Surveys to inform the baseline characterisation**

4.3.3 A reconnaissance survey was undertaken in September 2021 to allow an appreciation of the application site including awareness of gradients, prevailing ground conditions, drainage patterns and access route options. The survey involved walking through and around the application site to gather visual information concerning elements such as slope, rock outcrop, ground wetness and boggy areas,

nature and type of watercourses, and the presence or absence of groundwater seepages or spring points.

- 4.3.4 In parallel with this a Phase 1 peat survey was undertaken to identify areas of peat and natural variation in the peat substrate across the area. This involved using a hand-held probe to measure peat depths on a 100 m grid across the application site and other areas being considered for the development.
- 4.3.5 Following the reconnaissance and Phase 1 peat surveys, a Phase 2 peat survey was undertaken in October 2022. This survey included peat probing on a 50 m grid across the main site area and was undertaken to ensure that there was sufficient peat depth information to support the infrastructure design process and the PMP.

### **Assessment methodology**

- 4.3.6 This assessment has been undertaken through a desk study and site inspection of existing geological, hydrogeological, hydrological and peat-related features within and surrounding the application site. The existing conditions at the application site are described in **Section 3.4** and potential risks that may be associated with the Proposed Development are identified and assessed in **Section 4.6**.
- 4.3.7 The information obtained from the review of existing data, site surveys and guidance documentation formed the basis of assessment of the potential effects associated with the Proposed Development. Control and mitigation measures have been proposed to reduce potential effects to manageable levels.
- 4.3.8 A PMP has been prepared in accordance with the Guidance on the Assessment of Peat Volumes, Reuse of Excavated Peat and the Minimisation of Waste (Scottish Renewables & SEPA, 2012). The PMP was informed by the collated peat depth probing described above, combined with a site appraisal of potential reuse opportunities. The PMP also identifies opportunities for excavated peat to be used for peatland restoration, where relevant.
- 4.3.9 An assessment of drainage requirements to manage surface runoff was undertaken for the Proposed Development.
- 4.3.10 An assessment of GWDTE was undertaken based on the NVC mapping provided by the ecology team. Areas of potentially moderate or highly GWDTE were identified,

further assessment was undertaken to identify if wetland areas are truly groundwater-dependent and assess any potential effects on these.

- 4.3.11 A risk assessment of nearby Private Water Supplies was undertaken to identify potential linkages between the Proposed Development and Private Water Supply abstractions. Where relevant, mitigation and control measures are proposed.

## 4.4 Baseline conditions

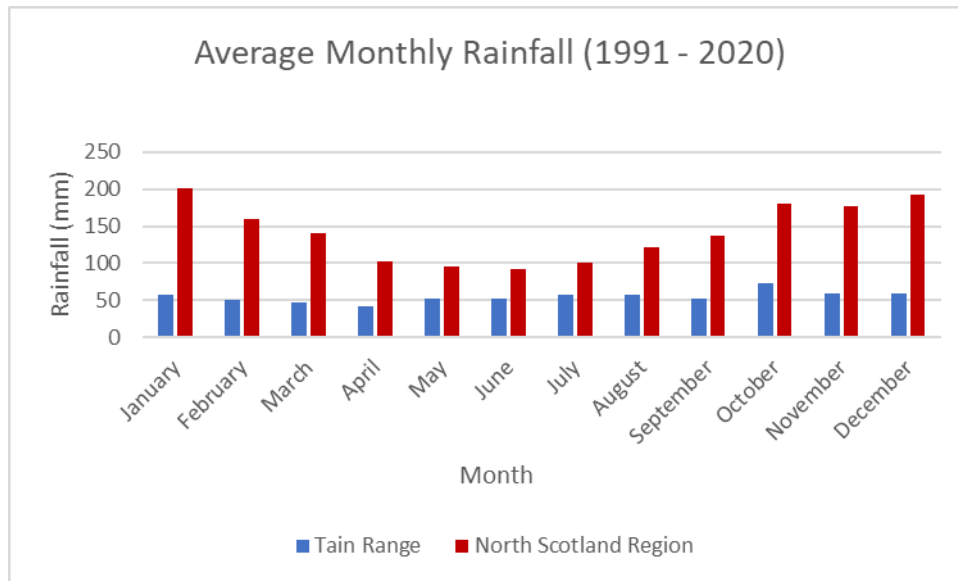
### Existing environment

#### *Meteorology and climate*

- 4.4.1 The Proposed Development is located approximately 2 km east of the operational Beinn Tharsuinn Wind Farm and is situated in the Meteorological (Met) Office's Northern Scotland climate district (Met Office, 2016). The region has temperatures that show both a seasonal and diurnal variation, with average annual temperature of 9°C in areas of lower altitude.
- 4.4.2 Northern Scotland is characterised by steep mountains, glens and sea-lochs, which contribute to the changeable weather patterns and temperatures in the region. Temperatures are highly variable depending on the topography and distance from the coast. Northern Scotland is exposed to rain-bearing westerly winds and rainfall that is generally well distributed throughout the year.

#### *Rainfall*

- 4.4.3 Tain Range climate station is situated approximately 20 km east of the Proposed Development with rainfall patterns considered likely to be similar to those observed at the application site, although it is at a higher altitude than the Tain Range station and would therefore be expected to experience slightly higher rainfall.
- 4.4.4 Average annual rainfall from 1991-2020 for the Tain Range climate station is 660.16 mm compared to 1702.31 mm for the Northern Scotland regional average. The Tain Range gets the same rainfall per month all year round except October. The altitude at the Tain Range climate station is 4 m above mean sea level.
- 4.4.5 **Graph 4.1** shows the average monthly rainfall distribution for the Tain Range climate station and the Northern Scotland climatic region for the period 1991-2020 for comparison.



**Graph 4.1: Monthly rainfall averages at Tain Range climate station with Northern Scotland Region for comparison**

### *Geology*

- 4.4.6 Geological information has been derived from the BGS GeoIndex online geological mapping at 1:50,000 scale and the BGS Lexicon of Named Rock Units (BGS, 2023). Bedrock and superficial geology are shown on **Figures 4.2** and **4.3**.

#### Bedrock geology

- 4.4.7 The bedrock within the application site is predominantly of the Tarvie Psammite Formation, part of the Moine Supergroup, and comprises thin-bedded siliceous to micaceous psammites. A psammite is a metamorphic rock derived from muddy sandstones.
- 4.4.8 The majority of the cable route corridor is underlain by the Fearn Pluton, a large granite intrusion which underlies much of the higher ground in this area. The Fearn Granite is Silurian in age and is deeply weathered in places (Johnstone & Mykura, 1989). A small section of the cable route corridor adjacent to the main site area is underlain by the Tarvie Psammite.
- 4.4.9 No faults are present within the main site area or the cable route corridor. Two large faults, trending north-east to south-west, cut through the site access at approximately NGR 264895 880814 and NGR 265946 881321. No recent movements have been recorded on either fault.

#### Mineral extraction

- 4.4.10 The Proposed Development is located in an area of open moorland, part of which has previously undergone rock extraction for aggregate, mainly associated with the construction of the Beinn Tharsuinn Wind Farm. All of these borrow pits are now closed and reinstated.

4.4.11 No active borrow pits or quarries within 2 km of the application site are identifiable on OS 1:25,000 scale mapping.

Superficial geology

4.4.12 BGS's (2023) GeoIndex indicates that there are extensive peat deposits of Quaternary age within the application site. A small area of alluvium (comprising clay, silt, sand and gravel) is present across the site access associated with the minor watercourse. An area of undifferentiated till and morainic deposits are present around the site access near the B9176.

4.4.13 No artificial ground was identified in the application site.

*Soils and peat*

4.4.14 Soil coverage within the application site is predominantly dystrophic blanket peat (Soil Survey of Scotland, 1982). Scotland's Soils (2017) describe blanket peat as: '*poorly drained upland soil with an organic surface layer more than 50 cm thick. It is unconfined and 'blankets' the landscape*'.

4.4.15 Soils within the south-west of the main site area and the southern half of the cable route corridor consist of peaty gleyed podzols of the Countesswells association. These are described as: '*acid soils with a grey leached layer just below the surface and bright orangy-brown coloured subsoils and/or dark brown to black, organic rich subsoils*'. Further details on soils within the application site are provided in **Table 4.4**.

**Table 4.4 Soil types within the application site**

Soil assoc.	Parent material	Component soils	Landforms	Vegetation	Area %
Organic Soils – deep peat	Organic deposits	Dystrophic blanket peat	Uplands and northern lowlands with gentle and strong slopes	Blanket and northern blanket bog. Upland and flying bent bog. Deer-grass bog. Sedge mires.	63.03
Countesswells	Drifts derived from granites and granitic rocks	Peaty gleyed podzols with dystrophic blanket peat	Undulating uplands with gentle and strong slopes: non-rocky	Moist Atlantic heather moor. Blanket bog. Bog heather moor.	36.97

4.4.16 NatureScot's Carbon and Peatland map has been consulted to understand the carbon-rich soils, deep peat and priority peatland habitat within the application site (NatureScot, 2016). The map classifies soils into five carbon classes, as well as three classes for mineral soils, non-soil or unknown. Classes 1 and 2 are considered to be nationally important carbon-rich soils.

4.4.17 Within the application site, the soils are predominantly assigned Class 1. Three small areas of Class 2 are identified within the cable route corridor. Class 5 is found in the

east of the site access, the west of the main site area and at several locations along the cable route corridor.

- 4.4.18 Details of each peatland class and the associated areas are provided in **Table 4.5**. Soils and peat coverage is shown on **Figure 4.4**.

**Table 4.5 Carbon and peatland classes present within the application site**

Peatland class	Description	Area %
Class 1	Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas likely to be of high conservation value.	63.87
Class 2	Nationally important carbon-rich soils, deep peat and priority peatland habitat. Areas of potentially high conservation value and restoration potential.	4.20
Class 5	Soil information takes precedence over vegetation data. No peatland habitat recorded. May also include areas of bare soil. Soils are carbon-rich and deep peat.	31.93

- 4.4.19 Two peat working sites are identified on the BGS GeoIndex (BGS, 2023). These are listed as the Aultnamain Peat Workings; however, both are outwith the application site and are categorised as ceased, so are not considered to be of significance.
- 4.4.20 A Phase 1 peat depth survey of the application site was undertaken in September 2021. A further Phase 2 peat depth and condition survey of the main site area was undertaken in October 2022. The peat surveys identified that blanket peat is not as extensive as the soils mapping (Soil Survey of Scotland, 1982) and carbon and peatland mapping (NatureScot, 2016) indicate, and that peat distribution and thickness are more variable than the mapped extents. Both the published mapping datasets are at 1:250,000 scale so it is to be expected that they do not identify local and small-scale variation particularly well. The combined peat depth surveys include a total of 109 individual peat depth records. The surveys indicate that deeper peat (>1.5 m) is present in the northernmost part of the main site area, as well as adjacent to the northern edge of the site access and cable route corridor at some locations. Within the application site the majority of peat is <1.0 m in depth, while the southernmost part of the main site area has no peat (<0.5 m in depth).
- 4.4.21 Further details of peat depth and peat depth variation are provided in **Technical Appendix 4.1**. An overview map of the peat depth distribution within the application site is provided in **Figure 4.5**.

#### *Geomorphology*

- 4.4.22 The application site is located at an altitude of 210 to 505 m AOD. The highest location is at the westernmost end of the cable route corridor, where it meets the boundary of the existing Beinn Tharsuinn Wind Farm. The lowest location is at the eastern end of the access route where it leaves the B9176.

- 4.4.23 The main site area lies between 325 and 355 m AOD, sloping generally down to the south-east.
- 4.4.24 The Proposed Development is bounded to the north by the Cnoc Muigh-bhlàraidh (546 m AOD), the main site area is located on its lower slopes. To the west lie Beinn nan Oighrean (538 m AOD) and Beinn Tharsuinn (546 m AOD). The cable route corridor is bounded to the south by Meall a' Bhreacain (527 m AOD). The Allt na Meine runs adjacent to the north of the application site, intersecting it once as it travels under the site access, and the Allt Dearg runs adjacent to the south of the application site. The eastern-most part of the application site is bounded by the B9176, providing site access.

#### *Hydrogeology*

- 4.4.25 Within the application site the bedrock is predominantly classified as a low-productivity aquifer of Tarvie Psammite Formation (part of the Loch Eil Group) (BGS, 2023). According to the BGS's (2023) GeoIndex, there are small amounts of groundwater in the near surface weathered zone and in secondary fractures. Flow is virtually all through fractures and other discontinuities.
- 4.4.26 Within the eastern area of the site access the bedrock is classified a moderately productive multi-layered aquifer of Braemore Mudstone Formation (part of the Lower Old Red Sandstone Supergroup), and is of local importance (BGS, 2023). Flow is virtually all through fractures and other discontinuities. The bedrock within the easternmost part of the site, the Raddery Sandstone Formation (part of the Middle Old Red Sandstone Supergroup) is classified as a moderately productive aquifer, yielding a small amount of groundwater (BGS, 2023). Flow is virtually all through fractures and other discontinuities.
- 4.4.27 Groundwater vulnerability is "the tendency and likelihood for general contaminants to move vertically through the unsaturated zone and reach the water table after introduction at the ground surface" (Dochartaigh *et al.*, 2011).
- 4.4.28 Groundwater vulnerability mapping (Dochartaigh *et al.*, 2011) has identified the entirety of groundwater within the main site area to have a vulnerability class of 4b.
- 4.4.29 Class 4b is considered vulnerable to those pollutants not readily absorbed or transformed, and is more likely to have clay present in superficial deposits.

#### *Groundwater-dependent terrestrial ecosystems*

- 4.4.30 GWDTE are defined by UK Technical Advisory Group (UKTAG 2004) as:

*"A terrestrial ecosystem of importance at Member State level that is directly dependent on the water level in or flow of water from a groundwater body (that is, in or from the saturated zone). Such an ecosystem may also be dependent on the concentrations of substances (and potentially pollutants) within that groundwater body, but there must be a direct hydraulic connection with the groundwater body."*

- 4.4.31 In line with guidance provided by UKTAG (2004), a dual approach to identifying GWDTE has been used. This involves detailed study of vegetation communities in order to determine the potential level of groundwater-dependency, combined with



detailed hydrogeological study in order to identify locations where groundwater reaches the surface and is therefore able to provide a source of water to associated habitats.

- 4.4.32 Determining groundwater-dependency is complex as most water-dependent terrestrial ecosystems rely on a combination of groundwater, surface water and rainwater, and many vegetation communities will use whatever source of water is available. In some topographical and hydrogeological conditions, a particular ecosystem is surface water-dependent. Seasonal patterns of water availability influence water use, providing an additional level of complexity; groundwater reliance is typically greater in the summer when rainfall and surface water are less available (Isherwood, 2013).
- 4.4.33 A combined Phase 1 habitat and NVC mapping exercise was completed as part of the ecology baseline assessment, which was used to identify potential GWDTE within the application site. The results of the habitat mapping exercise are discussed in detail in **Chapter 3 Ecology**. Potential GWDTE are shown on **Figure 4.6**. The key findings relating to groundwater-dependency are summarised below.
- 4.4.34 NVC communities identified by SEPA as likely to be highly or moderately groundwater-dependent, depending on the hydrogeological setting, are listed in SEPA's publications 'Planning advice on on-shore windfarm developments' (SEPA, 2017b) and 'Guidance on Assessing the Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems' (SEPA, 2017c).
- 4.4.35 UKTAG Annex 1 differentiates communities by class, where Class 1 is potential high groundwater-dependency, Class 2 is potential moderate groundwater-dependency and Class 3 is potential low groundwater-dependency (UKTAG, 2004; UKTAG, 2009).
- 4.4.36 The assessment has concentrated on the areas where construction activity would be focused, including those where new ground would be broken or there is likely to be disruption to groundwater flow. Therefore the assessment has considered, in detail, the main site area.
- 4.4.37 NVC's survey mapping indicates that the majority of the main site area consists of mire and blanket mire, with two small areas of heath and one area of grassland in the south-west corner of the main site area.
- 4.4.38 There are two groundwater bodies associated with the main site: area the Northern Highlands groundwater body which lies beneath the majority of the application site, and the Invergordon groundwater body which lies beneath a section of the site access to the north-east. Both are in good condition (SEPA, 2023a).

#### GWDTE water sources

- 4.4.39 The potentially groundwater-dependent NVC communities identified within the application site are found in **Table 4.6**.

**Table 4.6 Potential groundwater-dependent classification of identified NVC communities within the application site**

SEPA (2017c) potential groundwater-dependency classification	NVC community	UKTAG (2009) potential groundwater-dependency classification
N/A	H12 <i>Calluna vulgaris</i> – <i>Vaccinium myrtillus</i> heath	3 (low)
Highly groundwater-dependent	M6 <i>Carex echinata</i> – <i>Sphagnum recurvum/auriculatum</i> mire	1 (high)
N/A	M19 <i>Calluna vulgaris</i> – <i>Eriophorum vaginatum</i> blanket mire	3 (low)
N/A	U4 <i>Festuca ovina</i> - <i>Agrostis capillaris</i> - <i>Galium saxatile</i> grassland.	3 (low)

- 4.4.40 Based on these publications, M6 is likely to have high groundwater-dependency, while H12, M19 and U4 are likely to have low groundwater-dependency in Scottish situations, dependent on the hydrogeological setting. As a result, habitats H12, M19 and U4 do not require further consideration.
- 4.4.41 Peat depth surveys indicate that much of the application site is underlain by peat. While water flow through peat does occur, it is extremely slow and peat bodies are typically considered to be impermeable as a result. Water held within peat is not usually considered to form part of the groundwater body. Blanket peat, as is recorded to be present in some locations beneath the temporary construction compound and the northern section of the hydrogen production facility, is generally considered to be ombrotrophic and receives all its nutrients from rainwater (JNCC, 2023). It is recognised that peat present within the application site has a range of depths; however, the majority of the land within the main site area is recorded as peat (< 1 m depth), and it therefore remains likely that the dominant water source within the application site is rainwater with shallow through-flow within the uppermost vegetated layer.
- 4.4.42 Additionally, no springs or seepage features have been identified within the application site or immediate surroundings and the bedrock below the application site is classed as a low productivity aquifer, both of which indicate that the presence of GWDTE is unlikely.
- 4.4.43 The points set out above all lead to the conclusion that it is very unlikely that any of the NVC communities within the main site area are truly groundwater-dependent. NVC communities within the main site area are likely to rely on a combination of rainfall and surface runoff, with some direct surface water in areas adjacent to watercourses and waterbodies. However, as M6 communities, which are potentially highly groundwater-dependent, are present within the main site area; and because

construction works for the Proposed Development would be concentrated around this area, an assessment of the sensitive M6 habitat is included in **Table 4.10**.

### *Hydrology*

- 4.4.44 The application site is located across three main catchment areas: Allt Muigh-bhlàraidh, Allt Dearg and Easter Fearn Burn catchment areas are shown on **Figure 4.7**.
- 4.4.45 The main site area is located across the boundary between the Allt Muigh-bhlàraidh to the north and the Allt Dearg to the south, with the Easter Fearn Burn catchment covering the cable route corridor in the north-west of the application site.
- 4.4.46 Catchment statistics for the application site are derived from the Flood Estimation Handbook Web Service and are shown in **Table 4.7**. The catchment wetness index for the application site ranges from 0.48-0.58, indicating that soils within the application site are wet 48-58% of the time. The area has a base flow index (BFI HOST19) of between 0.26 and 0.38, indicating a low input of groundwater baseflow to surface watercourses. The standard percentage runoff (SPR HOST) is 46.6-56.6%, indicating that this percentage of rainfall on-site is converted into surface runoff from rainfall events; this represents a relatively high runoff risk where soils have a limited capacity to store rainfall and/or a slow infiltration rate and would quickly saturate, leading to rapid runoff.
- 4.4.47 There are no sites designated for features linked to hydrology or water quality within 2 km of the Proposed Development and the Proposed Development is not within a surface water Drinking Water Protection Area. Up to 5 km downstream of the Proposed development, there is one designated wetland site; the Kinrive-Strathroy Site of Special Scientific Interest (SSSI) which is located to the south-east of the Proposed Development, 4.2 km downstream of the application boundary.

**Table 4.7: Catchment statistics for the application site (CEH, 2023)**

Catchment name	Catchment wetness index (PROPWET)	Base flow index (BFI HOST19)	Standard percentage runoff (SPR HOST)	Area %
Allt Muigh-bhlàraidh	0.57	0.38	46.57	37.97
Allt Dearg	0.48	0.26	56.55	49.87
Easter Fearn Burn	0.58	0.33	53.32	12.16

### *Watercourses*

- 4.4.48 Watercourses within the application site appear to be in near-natural condition, with generally high levels of sinuosity, defined as having lots of river meanders. Key watercourses are shown on **Figure 4.7**.

Allt Muigh-bhlàraidh catchment

- 4.4.49 The Allt Muigh-bhlàraidh catchment has a total area of 28.73 km<sup>2</sup> and drains 37.97% of the application site. The catchment is an upland region mainly characterised by peatland and moorland with some areas of commercial forestry.
- 4.4.50 The Craigroy Burn provides the main drainage for this catchment. An unnamed tributary to the Allt na Meine provides the main drainage within the application site, crossing below the access track. The Allt na Meine joins the Craigroy Burn at approximately NGR 268421 883807.
- 4.4.51 An artificial connection between the Allt Muigh-bhlàraidh and Allt Dearg catchments is present just upstream of Drochaid an Uillt Ruaidh. This connects the Allt Dearg to the upper part of the Fèith Ruadh, a tributary to the Allt na Meine.

#### Allt Dearg catchment

- 4.4.52 The Allt Dearg catchment has a total area of 8.58 km<sup>2</sup> and drains 49.87% of the application site. The catchment is predominantly commercial forestry with some upland areas to the north-east and north-west which are characterised by upland moorland and peatland.
- 4.4.53 The Allt Dearg provides the main drainage for the catchment. Several unnamed tributaries to the Allt Dearg have their source to the south of the cable route corridor. These flow south-east, joining the Allt Dearg just south of the main site area.

#### Easter Fearn Burn catchment

- 4.4.54 The Easter Fearn Burn catchment has a total area of 17.30 km<sup>2</sup> and drains 12.16% of the application site. The catchment is an upland region mainly characterised by peatland and moorland, with an area of commercial forestry and some areas of agricultural land in the north-east.
- 4.4.55 The Easter Fearn Burn provides the main drainage for this catchment. Several tributaries to the Easter Fearn Burn have their source close to the north-eastern edge of the existing Beinn Tharsuinn Wind Farm. From here they flow north-east beneath the cable route corridor, forming the Allt Fearn (major tributary to the Easter Fearn Burn) at NGR 262700 882279.

### *Water quality*

#### Surface waterbodies

- 4.4.56 SEPA's Water Classification and Water Environment Hubs have been consulted to determine the existing baseline water quality for the main watercourses and waterbodies within the application site (SEPA, 2023a; SEPA, 2023b). Based on the above tools, no assessed surface waterbodies are present within the application site.

#### Groundwater

- 4.4.57 SEPA's Water Environment Hub was also consulted for groundwater quality information (SEPA, 2023b). The application site spans both the Northern Highland and Invergordon groundwater bodies. Both these groundwater bodies are classified as having 'Good' overall status.

#### Receiving waterbodies

- 4.4.58 SEPA’s Water Classification and Water Environment Hubs have also been consulted to determine the existing baseline water quality for receiving waterbodies (SEPA, 2023a; SEPA, 2023b).
- 4.4.59 The Allt na Meine and Allt Muigh-bhlàraidh are tributaries to the Craigroy Burn. The Allt Fearn drains into the Easter Fearn Burn and the Allt Dearg flows through Loch Sheilah into the Balnagown River. The details are summarised in **Table 4.8**.

**Table 4.8: Receiving waterbody quality status - summary**

Waterbody name and ID	Status		Pressures
Craigroy Burn – Balblair Distillery to source (ID: 20090)	Condition in 2014	Overall: Good Water flows & levels: High Physical condition: Good Water quality: High	None identified.
	Classification in 2020	Overall: Good Biology (fish): Good Hydromorphology: High	
Easter Fearn Burn (ID: 20088)	Condition in 2014	Overall: Moderate Water flows & levels: High Physical condition: High Water quality: Moderate	The water quality is Moderate due to nutrient levels. However, these are not negatively affecting the water body’s aquatic plant and animal communities.
	Classification in 2020	Overall: Moderate Biology (fish): Good Hydromorphology: Moderate	
Balnagown River (ID: 20141)	Condition in 2014	Overall: Moderate Water flows & levels: Moderate Physical condition: High Water quality: High	A legacy structure creates a barrier to fish migration. Water flows and levels are impacted due to water abstraction for business use.
	Classification in 2020	Overall: Moderate Biology (fish): High Hydromorphology: Moderate	

*Water resources*

- 4.4.60 There are no Private Water Supplies present within the application site according to THC’s records. Within 2 km of the application site two Private Water Supplies have been identified (**Figure 4.8**). One is located approximately 0.57 km north of the site access, adjacent to the B9176 at NGR 266057 882308. The other is located approximately 0.47 km south-east of the site access at Aultnamain (NGR 266622

881354). Both Private Water Supplies are located downstream of the application site. Details of Private Water Supplies identified are provided below in **Table 4.9**.

**Table 4.9 Private water supplies within or near the application site**

Supply name	Source location (NGR)	Source type	Properties served	Distance to project boundary	Linkage?
Muidh a Blairidh	266057 882308	Unknown	Rented Property, Edderton, Tain, IV19 1LH	0.57 km north of site access	None, located in separate subcatchment
Aultnamain	266622 881354	Ground-water - Borehole	The Cottage, Aultnamain, Edderton, Tain, Highland, IV19 1LH	0.47 km south-east of site access	Potential, located downstream of access track crossing

#### *Designated sites*

- 4.4.61 There are no sites designated for any aspect of hydrology, hydrogeology, geology or soils within the application site.
- 4.4.62 The Struie Channels SSSI is located approximately 1.7 km south-east of the site access. The Struie Channels were formed at the end of the Quaternary period and are an important example of meltwater channels, which are rare in northern Scotland (NatureScot, 2023). Given the distance from the applications site and that no proposed works would occur near this SSSI, it is not considered further in this EAR.
- 4.4.63 The Kinrive-Strathroy SSSI is located approximately 4.2 km downstream of the application boundary and is a designated wetland site. This SSSI is located in a different catchment from the application site meaning that there is no hydraulic linkage between it and the Proposed Development. Therefore it is not considered further in this EAR,

#### **Sensitive receptors**

- 4.4.64 The following sensitive receptors have been assessed:
- Surface watercourses up to 5 km downstream of the application site;
  - GWDTE within the main site area;
  - Private Water Supplies up to 2 km from the application site; and,
  - Soils and peat within the main site area.
- 4.4.65 All key sensitive receptor locations are shown on **Figures 4.4 (soils and peat), 4.6 (GWDTE), 4.7 (surface watercourses) and 4.8 (Private Water Supplies)**.

#### **Future baseline**

- 4.4.66 It is possible that the existing baseline described above may be subject to change in the future due to the effects of climate change. Given the potential for increased

temperatures, wetter winters, drier summers and an increase in the severity of 1-in-100 year rainfall events across Northern Scotland, there may be a variety of impacts on the hydrology, hydrogeology, geology and soils receptors within the application site, including:

- Erosion: increased precipitation and extreme weather events can lead to increased erosion of soils and rock, potentially leading to landslides and other geological hazards.
- Temperature changes: air temperature changes can lead to changes in the rate of weathering of rocks and soils, as well as changes in the distribution of plants and animals that can impact erosion and sedimentation patterns.
- Changes in precipitation patterns: changes in precipitation patterns can lead to changes in the availability of water resources, as well as changes in surface water flow, groundwater recharge and soil moisture.
- Changes in vegetation: changes in vegetation can affect erosion and sedimentation patterns. This may particularly affect wetland habitats if the availability of water decreases and ambient temperatures increase, raising evaporation rates.

4.4.67 Climate change also poses a threat to peat within the application site; potential impacts include:

- Extreme drying: peat soils are typically wet, but with increasing temperatures and changing rainfall patterns, they can dry out and become more susceptible to wildfires and erosion.
- Carbon emissions: peat soils store considerable amounts of carbon, and increased drying would cause this carbon to be released into the atmosphere as carbon dioxide, contributing to climate change as well as loss of an active carbon sink.
- Loss of biodiversity: drying peat soils can lead to loss of biodiversity, impacting species and habitats that are rare and only found in areas of peat soils.

4.4.68 It is important to note that the future baseline is a projection, with a range of possible future conditions, and it is subject to uncertainty associated with the available projections. Across the lifetime of the Proposed Development, it is considered highly likely that the future baseline will be broadly comparable to the existing baseline described above.

## 4.5 Primary mitigation

Certain measures have been adopted as part of the Proposed Development in order to reduce the potential for impacts to the environment. These measures include the following:

- Existing tracks have been incorporated within the Proposed Development as far as possible, which will minimise the disturbance of soils and peat.
- Cable installation works would be completed in the road verge with all workers and plant primarily working from the existing access track to minimise ground disturbance outwith the track footprint.
- Excavation of peat (especially catotelmic peat) has been avoided as far as possible by careful infrastructure design.

- Design of the Proposed Development has sought to reduce impacts on potentially GWDTE within the main site area. However, in order to minimise incursion into peat it has been necessary to site the infrastructure partly within an area of M6 habitat, classed by SEPA and UKTAG as potentially highly groundwater-dependent. In this context, peat is considered to be a more sensitive receptor and so has been afforded greater protection.

## 4.6 Assessment of potential effects, additional mitigation and residual effects

### Development characteristics

- 4.6.1 The construction phase of the Proposed Development would involve a number of different elements. **Chapter 1 Introduction** of the EAR describes the scheme elements in detail. The elements with particular relevance to hydrology, hydrogeology, geology and soils are as follows:
- creation of a temporary construction compound;
  - creation of a hydrogen production facility;
  - creation of a substation;
  - installation of drainage features around permanent infrastructure;
  - temporary welfare facilities and site utilities including water supply and wastewater disposal; and
  - removal, handling and temporary storage of peat and soils.
- 4.6.2 An assessment of potential effects during construction is provided in **Table 4.10**. An outline peat management plan (**Technical Appendix 4.1**) has been prepared as a mitigation strategy to manage potential adverse effects of the construction phase.
- 4.6.3 During operation of the Proposed Development, activities with particular relevance to hydrology, hydrogeology, geology and soils are as follows:
- surface water drainage, including treatment and discharge of surface water;
  - maintenance of tracks and trackside drainage;
  - long-term drainage around permanent infrastructure.
- 4.6.4 An assessment of potential effects during operation is provided in **Table 4.11**.



## Construction phase

**Table 4.10 Assessment of potential effects, additional mitigation, residual effects and monitoring during construction**

Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
Soils and peat within the application site.	Potential effects from soils and peat excavation and reuse.	Proposed construction activity, particularly plant and vehicle movements, soil/peat stripping and stockpiling, would affect the nature of the soil/peat within the application site. Plant movements would act to compact soil/peat through movements over unstripped ground. All activity requiring removal, transport and stockpiling of soil/peat would have potential to lead to soil/peat erosion and loss of structure, resulting in overall soil/peat degradation.
	Additional (secondary and tertiary) mitigation	<p>All proposed traffic routes would be clearly demarcated and vehicles would not be permitted access outwith these areas.</p> <p>Only tracked or low ground pressure vehicles would be permitted access to unstripped ground.</p> <p>Soil stripping would be undertaken by the Principal Contractor with care and would be restricted to as small a working area as practicable. Topsoil would be removed and laid in a storage bund, up to 2 m in height, on unstripped ground adjacent to the specific working area. It would be attempted to retain the turf layer vegetation-side-up where possible.</p> <p>Subsoils and superficial geological deposits would be removed subsequently and laid in storage bunds, also up to 2 m in height, clearly separated from the topsoil bund. Care would be taken to maintain separate stockpiles for separate soil types in order to preserve the soil quality.</p> <p>For work within areas of peat, acrotelmic peat (the uppermost 0.5 m) would be removed as for the topsoil. It would be attempted to retain the acrotelm vegetation-side-up where possible.</p> <p>The underlying catotelmic peat would be stored in bunds up to 1 m in height. Catotelmic peat is sensitive to handling, and loses its internal structure easily, so would be transported as short a distance as possible to its storage location.</p> <p>Limited smoothing or 'blading' of stockpiled soils and catotelmic peat would be undertaken by the Principal Contractor to help shed rainwater and prevent ponding of water on the stockpile. Bunds on notably sloping ground would have sediment control measures installed near the base, on the</p>

Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
		<p>downslope side, to collect and retain any sediment mobilised by rainfall. Stockpiles would be located on flat or nearly flat ground where possible.</p> <p>Excavated soil and peat would be used for restoration and rehabilitation at the end of the construction period, in order to promote fast re-establishment of vegetation cover on worked areas and areas of bare soil or peat that are not required for the operational phase. Some of the excavated peat would be reserved for peatland restoration in parts of the application site and nearby ground where suitability is identified. Soils and peat would be stored for as short a time as practicable, in order to minimise degradation through erosion and desiccation.</p> <p>Should prolonged periods of dry weather occur, a damping spray would be employed to maintain surface moisture on the soil and peat bunds. This would help to maintain vegetation growth in the turves and to retain the soil structure.</p>
	Monitoring	<p>Regular monitoring of peat in reinstated and restored areas should be undertaken to ensure that restoration measures are being effective. Remedial action should be implemented if areas of concern are identified.</p> <p>The monitoring programme and scope would be agreed post-consent.</p>
Surface watercourses within the study area.	Potential effects of pollution from oils, fuel and wastewater	<p>Spillage of fuels, oils, wet concrete or concrete washout water and foul drainage could have an adverse effect on surface water quality, and major spillages could have a potential influence on the Allt Muigh-bhlàraidh and Allt Dearg catchments, and to a lesser extent on the Easter Fearn Burn catchment as a result of the smaller infrastructure footprint in this catchment.</p>
	Additional (secondary and tertiary) mitigation	<p>Oil and fuel storage and handling within the application site would be undertaken following published guidance, in particular <i>Guidance on Pollution Prevention 2 – Above ground oil storage tanks</i> (SEPA, 2017a) and in compliance with the <i>Water Environment (Controlled Activities) (Scotland) Regulations 2011</i> as amended.</p> <p>It is anticipated that welfare facilities at the Proposed Development would include either a suitably sized holding tank, which would be emptied by tanker and removed from the application site on an appropriate timescale for</p>

Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
		<p>disposal at a suitably licensed facility, or would make use of waterless composting toilet facilities with bottled water provided for drinking and washing.</p> <p>Site Spillage and Emergency Procedures would be prominently displayed at the application site and staff would be trained in their application. The Procedures document would incorporate guidance from the relevant SEPA Guidance Notes.</p> <p>In the event of any spillage or discharge that has the potential to be harmful to or to pollute the water environment, all necessary measures would be taken to remedy the situation. These measures would include:</p> <ul style="list-style-type: none"> <li>• identifying and stopping the source of the spillage;</li> <li>• containing the spillage to prevent it spreading or entering watercourses, by means of suitable material and equipment;</li> <li>• absorbent materials, including materials capable of absorbing oils, would be available within the application site to mop up spillages. These would be in the form of oil booms and pads and, for smaller spillages, quantities of proprietary absorbent materials. Sandbags would also be readily available for use to prevent spread of spillages and create dams if appropriate;</li> <li>• where an oil/fuel spillage may have soaked into the ground, the contaminated ground would be excavated and removed from the application site by a licensed waste carrier to a suitable landfill facility;</li> <li>• the emergency contact telephone number of a specialist oil pollution control company would be displayed within the application site; and</li> <li>• sub-contractors would be made aware of the guidelines for handling of oils and fuels and of the spillage procedures at the Proposed Development.</li> </ul> <p>SEPA would be informed of any discharge or spillage that may be harmful or polluting to the water environment. Written details of the incident would be forwarded to SEPA no later than 14 days after the incident.</p>
	Monitoring	A water quality monitoring (WQM) programme would be established at key locations around the Proposed Development. Details of WQM locations

Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
		<p>are shown on <b>Figure 4.9</b>. Control locations (WQM 1 &amp; 3) are intended to help differentiate between incidents arising from, and those unrelated to, the Proposed Development.</p> <p>Details of monitoring at the Proposed Development are provided in greater detail below.</p>
<p>Surface watercourses within the study area.</p>	<p>Potential effects of pollution from sediment release via overland flow.</p>	<p>All development work involving earthmoving operations would generate loose sediment, which could potentially gain access to surface watercourses and waterbodies through entrainment in surface runoff. This could potentially have an adverse effect on the downstream watercourses through damage to fish spawning habitat and changes to dissolved oxygen and nutrient levels in watercourses and waterbodies.</p>
	<p>Additional (secondary and tertiary) mitigation</p>	<p>Surface water surrounding the cable trench and all hardstanding areas (including hardstandings for the hydrogen production facility, substation and temporary construction compound) would be prevented from entering the working areas by appropriate use of peripheral bunding and cut-off drains to divert clean water around and away from the working areas.</p> <p>During excavation of cut areas for hardstandings, silt fencing or appropriate alternative sediment control protection would be installed on the downhill side of the excavation to prevent inadvertent discharge of silty water into any watercourses within or downstream of the application site.</p> <p>All engineering work adjacent to watercourses, including track resurfacing and laying the cables, would have appropriate sediment control measures established prior to any groundworks. Vegetation would be retained along watercourse banks to act as additional protection. No in-stream works would be required as existing watercourse crossings do not require upgrading.</p> <p>For areas of larger excavation, such as for hardstandings associated with the hydrogen production facility, substation and temporary construction compound, temporary water control measures would be used. These may include use of temporary settlement ponds or the use of proprietary treatment systems such as Siltbusters, as appropriate.</p> <p>Any water collecting within excavations would be pumped out prior to further work in the excavation.</p>

Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
		<p>This water may require treatment to remove suspended solids prior to discharge to ground.</p> <p>Construction activities would be restricted during periods of wet weather, particularly for any work occurring within 20 m of a watercourse or within areas of identified deeper peat, to minimise mobilisation of sediment in heavy rainfall. For further information on guidelines for restricting construction activities see <b>Technical Appendix 4.1 Peat Management Plan</b>.</p> <p>Vegetation cover would be re-established as quickly as possible on track verges, screening bunds and cut slopes, by re-laying of excavated soil turves and peat acrotelm, to improve slope stability and provide erosion protection. Additional methods, including hydroseeding and/or use of a biodegradable geotextile, would be considered, if necessary, in specific areas and areas of particular sensitivity as identified on-site by an Environmental Clerk of Works (ECoW).</p> <p>All necessary permissions relating to construction works, plus accompanying pollution prevention plans, would be obtained prior to any construction work beginning within the application site.</p>
	Monitoring	<p>A WQM programme would be established at key locations around the Proposed Development (<b>Figure 4.9</b>). Control locations (WQM 1 &amp; 3) are intended to help differentiate between incidents arising from and those unrelated to, the Proposed Development.</p> <p>Monitoring would begin a minimum of 3 months prior to any construction works, to allow pre-construction baseline quality to be determined. Monitoring at each WQM location would occur monthly at minimum throughout construction and decommissioning. Monitoring at WQM 1 &amp; 2 would occur twice daily during construction or decommissioning activity along the cable route corridor. Monitoring at WQM 3 &amp; 4 would occur twice daily during construction or decommissioning activity within the main site area and during resurfacing of the site access.</p> <p>Details would be agreed with SEPA, but are anticipated to include visual checks for entrained sediment and in-situ measurements of pH, temperature and specific conductivity.</p> <p>Monitoring during the construction phase would be undertaken by an ECoW or suitably experienced alternative individual. Any change</p>

Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
		from baseline conditions of pH and/or specific conductivity would potentially indicate an incident and additional investigation would be required in order to identify the origin of the change.
Surface watercourses within the study area.	Potential effects of modification to surface water flow paths.	Changes to overland drainage patterns will arise principally from excavation associated with construction of the hydrogen production facility and associated substation and temporary construction compound. There may be some temporary changes to overland drainage from laying of the cables although this would be limited through use of the existing track verge.
	Additional (secondary and tertiary) mitigation	Constructed drains would be no longer and deeper than necessary to provide the required drainage for the hydrogen production facility and associated infrastructure. All drainage infrastructure would be designed with suitable capacity for a rainfall intensity of a 1-in-200 year storm event, plus allowance for climate change.
	Monitoring	None required.
GWDTE	Potential effects from changes to water supply to vulnerable receptors: GWDTE.	<p>Direct impacts would arise as a result of habitat loss through construction activity and the associated requirement to excavate vegetation and soil material within the identified sensitive habitat area.</p> <p>Indirect impacts would arise as a result of changes in the water supply to the sensitive habitat or of changes in the nutrient supply as a result of 'flushing'. Most sensitive habitats are nutrient-poor and require continued supply of nutrient-poor water to retain their structure and vegetation community. Excavation works can provide a sudden influx of nutrient material arising from the soil disturbance, which can overwhelm such nutrient-poor communities causing temporary or permanent changes to the habitat. Nutrient flushing is usually associated with changes to water supply pathways, and specifically with introduction of drainage from areas of active excavation that discharge into or upslope of such sensitive habitat areas.</p>
	Additional (secondary and tertiary) mitigation	There may be options to improve or extend areas of M6 habitats through vegetation management and/or drainage management within the rest of the application site or a designated area off-site as compensation for the unavoidable direct habitat loss. This would be discussed with an

Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
		<p>ECoW as part of the construction mitigation and is discussed in more detail in <b>Section 3.7</b>.</p> <p>Suitable drainage would be installed around Proposed Development infrastructure, including around the hydrogen production facility, the substation and new track sections. This would provide continuity of flow across these areas, helping to maintain M6 habitats downslope of construction areas. Any required modified or additional drainage within the application site/main site area would not discharge directly into or upslope of identified sensitive habitat areas, to minimise potential for water and nutrient flushing in these areas.</p>
	Monitoring	None required.
Private Water Supplies	Potential effects from changes to water supply to vulnerable receptors: Private Water Supplies .	No Private water supplies are located within the application site. Two Private Water Supplies have been identified within 2 km downstream of the application site and, as detailed in <b>Table 4.9</b> , one has potential to be at risk from the Proposed Development construction works.
	Additional (secondary and tertiary) mitigation	<p>The following mitigation would be applied to all works directly up-catchment from the Private Water Supplies:</p> <ul style="list-style-type: none"> <li>• no upgrade or maintenance works on the access track would take place until sediment protection is installed adjacent to the watercourse crossing. This would require sign-off by an ECoW prior to works beginning;</li> <li>• no vehicle maintenance or refuelling activities would take place within 250 m of the watercourse crossing on the access track;</li> <li>• sediment protection measures would remain in place, with regular checks to ensure their continued effective operation, until all upgrade and maintenance works are completed and vegetation has re-established on any exposed soil areas;</li> <li>• should any concerns regarding the water quality be raised by site staff or occupants at the Private Water Supplies site, ongoing activity within 250 m of the watercourse crossing would be restricted as far as possible to allow further investigation to be undertaken to identify the cause of the concerns and their validity. Works would remain restricted until</li> </ul>

Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
		<p>the investigation has demonstrated that it was a false alarm and/or not related to the Proposed Development works, or until additional protection measures are installed to prevent a recurrence, to the ECoW's satisfaction; and</p> <ul style="list-style-type: none"> <li>no pouring of concrete would be carried out within 500 m of any Private Water Supplies source.</li> </ul>
	Monitoring	<p>Visual and in-situ water quality monitoring of the watercourses upstream from the Private Water Supplies, at their closest points downstream of the ground works, would be undertaken on a twice-daily basis (morning and afternoon) while works are ongoing in the area of these watercourses. Any signs of siltation or suspended sediment, changes in pH or electrical conductivity in the water would be recorded and reported immediately to the ECoW for further investigation.</p>

### Operational phase

**Table 4.11 Assessment of potential effects, additional mitigation, residual effects and monitoring during operation**

Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
Surface watercourses within the study area.	Potential effects of pollution from oils, fuel and wastewater.	The risk of contamination from oils, fuel and waste water is considerably lower during operation than during construction as there would be significantly decreased levels of activity within the application boundary. The majority of potential pollutants would no longer be present. Some oils, lubricants and maintenance vehicle fuels would remain present in small quantities.
	Additional (secondary and tertiary) mitigation	The pollution prevention plan and site spillage and emergency procedures, as set out in <b>Table 4.10</b> , would remain in force throughout the operational phase. Welfare facilities for the operational phase (if required) would be the same as those set out in <b>Table 4.10</b> .
	Monitoring	None required.
Surface watercourses within the study area.	Potential effects of pollution from sediment release via overland flow.	The main operational phase work would be less than that of the construction phase and would involve routine maintenance of tracks, hardstanding and drainage infrastructure. This activity could generate loose sediment, which could potentially gain access to surface



Receptor	Potential effects/additional (secondary and tertiary) mitigation/residual effects and monitoring	
		watercourses and waterbodies through entrainment in surface runoff.
	Additional (secondary and tertiary) mitigation	Where practicable, routine maintenance of trackside and infrastructure drainage would be undertaken during dry weather. Where this is not practicable, additional sediment control measures would be established to manage silty water arising from the work.
	Monitoring	<p>Regular monitoring of the track and hardstanding condition would be undertaken, particularly following periods of heavy or prolonged rainfall and after snowfall and clearance. Any sections of track or hardstanding showing signs of excessive wear would be repaired as necessary with suitable rock from external sources.</p> <p>The drainage network would also be subject to regular monitoring to ensure that it remains fully operational. This would include regular visual inspection of drainage ditches, crossing structures and cross-drains to check for blockages, debris or damage that might impede water flow. Any identified blockage, including build-up of sediment that may lead to future blockage, or damage to structures would be remediated immediately.</p>
Private Water Supplies	Potential effects from changes to water supply to vulnerable receptors: Private Water Supplies .	As detailed above, only minor works would take place within the application site during the operational phase, to allow for necessary maintenance activities for the Proposed Development. Therefore, any works with the potential to impact Private Water Supplies would be very minor in scale.
	Additional (secondary and tertiary) mitigation	<p>Where practicable, routine maintenance of trackside and infrastructure drainage would be undertaken during dry weather. Where this is not practicable, additional sediment control measures would be established to manage silty water arising from the work.</p> <p>No vehicle maintenance or refuelling activities would take place within 250 m of the watercourse crossing on the access track.</p>
	Monitoring	Should concerns over Private Water Supplies arise during the construction phase, additional monitoring during any required operational phase maintenance works would be put in place to provide a safety check for the Private Water Supplies.

- 4.6.5 With the proposed embedded and additional mitigation measures, alongside the proposed monitoring, it is considered the residual effects have been reduced to manageable levels.

#### **Decommissioning phase**

- 4.6.6 Potential effects of decommissioning the Proposed Development are anticipated to be similar to those encountered during the construction phase, although generally less, as the level of activity within the application site would be lower.
- 4.6.7 Discussion would be held between the Applicant and the appropriate regulatory authorities prior to decommissioning to agree an appropriate Decommissioning Strategy and Restoration Plan (**Technical Appendix 1.3**).

#### **Assessment against future baseline**

- 4.6.8 As discussed in **Section 3.4** the future baseline conditions within the application site could be subject to change due to the effects of climate change. Changes may include increased erosion of soil and rock and changes to the availability of water resources, water flow and groundwater recharge. It is possible that these changes may increase the likelihood and/or severity of the impacts detailed in **Table 4.10** and **Table 4.11**. However, it is very likely that the proposed embedded and additional mitigation measures, alongside the proposed monitoring, would be sufficient to address any changes to the future baseline. Therefore it is very unlikely that there would be any change to the environmental effects assessed in this EAR due to climate change.

### **4.7 Opportunities for environmental enhancement**

- 4.7.1 Opportunities for environmental enhancement are discussed in detail in **Section 3.7**. No peat restoration is planned to take place within the application site. However, there are areas to the north of the cable route corridor, on the lower slopes of Cnoc Muigh-bhlàraidh where activities such as ditch blocking and removal of self-seeded conifer saplings may be employed to improve areas of degraded peat. Additionally, there may be opportunities to improve or extend areas of M6 habitats through vegetation management and/or drainage management within the rest of the application site or a designated area off-site as compensation for the unavoidable direct habitat loss as a result of the Proposed Development.

### **4.8 Difficulties and uncertainties**

- 4.8.1 No ground investigation was undertaken as part of the site visits. As a result, information is limited to detail that can be gathered from a visual survey of this kind. Uncertainties may arise as a result of preceding weather conditions; e.g. very wet preceding conditions may cause an over-estimation of the watercourse nature or ground bogginess than would be considered 'normal' for the area.
- 4.8.2 The information gathered during site visits has been combined with information from site visits for other disciplines (including site surveys to map habitats and vegetation classes) and available photography to give as full a picture of site conditions as possible. All reasonable attempts have been made to ensure that good coverage of the application site was included.

## 4.9 Assessment summary

4.9.1 Table 4.12 provides a summary of the findings of the assessment.

**Table 4.12 Summary of hydrology, hydrogeology, geology and soils effects**

Receptor	Potential effects	Additional (secondary and tertiary) mitigation	Monitoring
Construction phase			
Soils and peat within the application site.	Soil compaction, erosion and degradation arising from excavation, storage and vehicle movements	Handling and storage would be restricted as far as possible. Vehicle movements would be restricted to marked routes or low ground pressure vehicles. Overheight stockpiles would be avoided,	Monitoring of reinstated peat to ensure restoration is effective. To be undertaken by Principal Contractor and Site Operator. Details to be agreed post-consent.
Surface watercourses within the study area.	Pollution arising from oils, fuels, concrete and wastewater	Ensure compliance with regulations and guidance. Pollution prevention measures and site spillage and emergency procedures would be prominently displayed and all staff made aware of the procedures.	Water quality monitoring at designated locations during construction phase, undertaken by ECoW or Principal Contractor.
Surface watercourses within the study area.	Pollution arising from sediment release	Surface water around all excavations and stripped areas would be managed by use of bunds, silt fencing or catch ditches. Additional control measures would be established to protect sensitive	Water quality monitoring at designated locations during construction phase, undertaken by ECoW or Principal Contractor.

Receptor	Potential effects	Additional (secondary and tertiary) mitigation	Monitoring
		receptors, such as settlement ponds or proprietary treatment.	
Surface watercourses within the study area.	Modification to surface water flow paths	Constructed drainage would be no longer or deeper than necessary. All drainage infrastructure would be designed to accommodate a 1-in-200 year storm plus allowance for climate change.	None
GWDTE	Changes to water supply, direct loss	Micrositing. Avoidance of flushing by directing surface water away from sensitive habitats. Habitat improvement or extension to compensate for direct loss.	None
Private Water Supplies	Changes to water supply	Additional controls when working upstream of identified Private Water Supplies.	Water quality monitoring at designated locations during construction phase, undertaken by ECoW or Principal Contractor.
<b>Operational phase</b>			
Surface watercourses within the study area.	Pollution arising from oils, fuels and wastewater	Ensure compliance with regulations and guidance. Pollution prevention measures and site spillage and emergency procedures would be prominently displayed and all staff made aware of the procedures.	None

Receptor	Potential effects	Additional (secondary and tertiary) mitigation	Monitoring
Surface watercourses within the study area.	Pollution arising from sediment release	Routine maintenance to be carried out in dry weather. If not possible, sediment control measures to be established.	Regular monitoring of track and hardstanding conditions to minimise erosion damage. Regular monitoring of drainage network to prevent blockage or restriction. To be undertaken by Site Operator.
Private Water Supplies	Changes to water supply	None	Visual and <i>in situ</i> monitoring as required.

## 4.10 References

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## 5 NOISE

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### 5.1 Introduction

- 5.1.1 This Noise Impact Assessment is intended to support the proposals for the construction and operation of a hydrogen production and storage facility (The Proposed Development) on land to the east of the Beinn Tharsuinn Wind Farm, Scotland (NGR NH 64225 81469). A description of the application site and the Proposed Development are given in **Chapter 1: Introduction**.
- 5.1.2 Vehicular access to the site is proposed from the existing Beinn Tharsuinn Wind Farm access track which runs from the B9176 Struie Road, approximately 2 km to the east. Figure 1 also illustrates the location of the site access track in relation to the B9176 Struie Road and the site (road highlighted in red).
- 5.1.3 This report describes the assessment methodology, and evaluates the suitability of the development, with the aim to:
- Present relevant impact assessment thresholds from local and national guidelines;
  - Predict construction and operational noise from the development to nearest noise sensitive receptors;
  - Assess predicted noise levels against the relevant noise impact thresholds; and
  - Specify noise mitigation measures, where identified.

### 5.2 Relevant policy and guidance

#### Scottish National Planning Framework 4 (NPF4)

- 5.2.1 The Scottish NPF4 was adopted on 13 February 2023 and sets out the spatial principles, regional priorities, national developments and national planning policy. It replaces NPF3 and Scottish Planning Policy.

#### *“Policy 11 – Energy*

- a) Development proposals for all forms of renewable, low-carbon and zero emissions technologies will be supported. These include:*
- wind farms including repowering, extending, expanding and extending the life of existing wind farms;*
  - enabling works, such as grid transmission and distribution infrastructure;*
  - energy storage, such as battery storage and pumped storage hydro;*
  - small scale renewable energy generation technology;*
  - solar arrays;*



- vi. *proposals associated with negative emissions technologies and carbon capture; and*
  - vii. *proposals including co-location of these technologies.*
- e) *In addition, project design and mitigation will demonstrate how the following impacts are addressed:*
- i) *impacts on communities and individual dwellings, including, residential amenity, visual impact, noise and shadow flicker;*

*In considering these impacts, significant weight will be placed on the contribution of the proposal to renewable energy generation targets and on greenhouse gas emissions reduction targets.*

#### *Policy 23- Health and Safety*

- e) *Development proposals that are likely to raise unacceptable noise issues will not be supported. The agent of change principle applies to noise sensitive development. A Noise Impact Assessment may be required where the nature of the proposal or its location suggests that significant effects are likely.”*

#### **The Scottish Government Planning Advice Note PAN 1/2011**

- 5.2.2 Planning Advice Note (PAN) 1/2011 provides advice on the role of the planning system in helping to prevent and limit the adverse effects of noise. Information and advice on noise impact assessment methods is provided in the associated Technical Advice Note.
- 5.2.3 The PAN promotes the principles of good acoustic design and a sensitive approach to the location of new development. It promotes the appropriate location of new potentially noisy development, and a pragmatic approach to the location of new development within the vicinity of existing noise generating uses, to ensure that quality of life is not unreasonably affected, and that new development continues to support sustainable economic growth. Environmental Health Officers and/or professional acousticians should be involved at an early stage in development proposals, which are likely to have significant adverse noise impacts or be affected by existing noisy developments.

#### **The Scottish Government Technical Advice Note – Assessment of Noise**

- 5.2.4 This technical advice note provides guidance, which may assist in the technical evaluation of noise assessment. The following sections set out a framework for assessing the noise impacts that could potentially arise when either:
- A noise source is planned to be developed or, an existing noise source is to be further developed – referred to as a noise generating development (NGD); or
  - A noise sensitive development is planned or, an existing noise sensitive development is to be further developed – referred to as noise sensitive development (NSD).

5.2.5 The assessment methodology consists of five stages, which can be applied to either type of development described above.

- **Stage 1 – initial process:** the initial process requires the identification of all noise sensitive receptors (NSR) that may potentially be affected by the development and to prioritise each NSR according to their level of sensitivity. The following steps are then carried out for each NSR identified.
- **Stage 2 – quantitative assessment:** the procedure within a quantitative assessment depends on the type of development i.e. NGD or NSD. The final procedure in this stage is to determine the magnitude of the impact.
- **Stage 3 – qualitative assessment:** a qualitative assessment allows additional factors to be included in the assessment procedure to augment the quantitative evaluation. The outcome from this process allows the magnitude of impacts determined from the quantitative assessment to be adjusted accordingly.
- **Stage 4 – level of significance:** the level of significance of the noise impact at the NSR is obtained through the relationship of the receptor's sensitivity to noise and the magnitude of the noise impact. The result of this process is entered into the summary table of significance of noise impacts.
- **Stage 5 – the decision process:** the number of noise sensitive receptors within each level of significance is totalled to complete the summary table of significance. The summary table will normally form only part of the information required to inform the decision process when applying for planning permission.

5.2.6 The Technical Note recommends a method of rating the magnitude of impact from noise, allowing planning officers to make objective and balanced decisions based on the wider adverse and beneficial impacts of the development. The magnitude of adverse impact ranges from negligible to major and are analogous to the lowest observed effect level (LOAEL) and the significant observed adverse effect level (SOAEL) referenced in various standards and guidance.

5.2.7 There are methods to control noise or limit exposure to noise through effective acoustic design. These design measures should be the minimum necessary and may include one or more of the following:

- Engineering and building design;
- Reduce noise at its point of generation; for example by using quiet machines and quiet methods of working;
- Containing noise, for example by insulating buildings which house machinery and providing purpose-built barriers around a site;
- Protecting noise-sensitive buildings and areas, for example by improving sound insulation in these buildings and screening them with purpose designed acoustic barriers;
- Layout design; for example, adequate distance between source and noise-sensitive building or area; screening by natural barriers, other buildings, or non-critical rooms (e.g. garages or bathrooms) or elevations of a building; and
- Management design; for example specifying an acceptable noise-limit, limiting operating time of source or restricting activities allowed on the site.

## Calculation of Road Traffic Noise, CRTN

- 5.2.8 The Calculation of Road Traffic Noise (CRTN) describes the procedures for calculating noise from Road traffic. The memorandum uses traffic flows, % HGV's and road speed, amongst other parameters to calculate the noise level in terms of the  $L_{A10,18hr}$  and Basic Noise Level. The 18-hour assessment period is defined between 06:00 and 24:00.
- 5.2.9 CRTN also allows provision for a shortened measurement procedure which is equally appropriate for the calculation of road traffic noise. The procedure involves obtaining traffic noise measurements throughout a representative sample period within any three consecutive hours between 10:00 and 17:00. In order to calculate an equivalent daytime noise ( $L_{Aeq,16hr}$ ), the correction of  $L_{A10,3hr} - 3$  dB would be applied.

## Design Manual for Roads & Bridges (DMRB) LA 111 'Noise and vibration'

- 5.2.10 The construction phase criteria set out within DMRB LA 111 (revision 2) are summarised in Table 5.1 to Table 5.3 below. Noise levels are initially qualified against the Lowest Observed Adverse Effect Level (LOAEL), the level above which adverse effects on health and quality of life can be detected and Significant Observed Adverse Effect Level (SOAEL), the level above which significant adverse effects on health and quality of life occur. Where appropriate, the noise level changes are determined, and finally the significant effect determined.

**Table 5.1: Construction noise - LOAELs and SOAELs for all receptors**

Time period	LOAEL	SOAEL
Day (07:00 – 19:00 weekday and 07:00 – 13:00 Saturdays)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per British Standard (BS) 5228-1 Section E3.2 and Table E.1 BS 5228-1
Night (23:00 – 07:00)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 BS 5228- 1
Evening and weekends (time periods not covered above)	Baseline noise levels $L_{Aeq,T}$	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 BS 5228- 1

**Table 5.2: Construction noise – magnitude of change thresholds**

Magnitude	Increase in Basic Noise Level of closest public road used for construction traffic (dB)
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

**Table 5.3: Construction noise – significance of effects**

Magnitude	Significance
Major	Significant
Moderate	Significant
Minor <sup>[1]</sup>	Not Significant <sup>[1]</sup>
Negligible	Not Significant

**Notes**

<sup>[1]</sup> For short-term noise change where the magnitude is 'Minor', but the SOAEL for the respective time period is exceeded, this constitutes a 'Significant' effect rather than a 'Not Significant' effect.

5.2.11 The operational phase criteria set out within DMRB LA 111 are summarised in Table 5.4 to Table 5.6 below. Noise levels are initially qualified against SOAEL levels where appropriate, the short-term (5 years) and long-term (15 years) noise level changes determined, and finally the significant effect determined.

**Table 5.4: Operational noise - LOAELs and SOAELs for all receptors**

Time period	LOAEL	SOAEL
Day (06:00 – 24:00)	L <sub>A10,18hr</sub> 55 dB (façade)	L <sub>A10,18hr</sub> 68 dB (façade)
Night (23:00 – 07:00)	L <sub>night,outside</sub> 40 dB (free-field)	L <sub>night,outside</sub> 55 dB (free-field)

**Table 5.5: Operational noise – magnitude of change thresholds**

Magnitude	Short-term noise change (dB L <sub>A10,18hr</sub> or L <sub>night</sub> )	Long-term noise change (dB L <sub>A10,18hr</sub> or L <sub>night</sub> )
Major	≥ 5.0	≥ 10.0
Moderate	3.0 to 4.9	5.0 to 9.9
Minor	1.0 to 2.9	3.0 to 4.9
Negligible	< 1.0	< 3.0

**Table 5.6: Operational noise – significance of effects**

Magnitude	Significance
Major	Significant
Moderate	Significant
Minor <sup>[1]</sup>	Not Significant <sup>[1]</sup>
Negligible	Not Significant
<b>Notes</b>	
<sup>[1]</sup> For short-term noise change where the magnitude is 'Minor', but the SOAEL for the respective time period is exceeded, this constitutes a 'Significant' effect rather than a 'Not Significant' effect.	

**BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'**

- 5.2.12 BS 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Noise' sets out techniques to predict and assess the likely noise effects from construction works, based on detailed information on the type and number of plant items being used, their location, and the length of time they are in operation. The standard provides example thresholds for the assessment of the significance of noise effects.
- 5.2.13 Annex E of BS 5228 provides guidance on how to assess the significance of construction noise. Section E.3.2 details the ABC Method, applicable to residential receptors, duplicated in Table 5.7 below:

**Table 5.7: Threshold of significant effect at dwellings (BS 5228 Table E.1)**

Assessment category and threshold value period	Threshold value, L <sub>Aeq,T</sub> (dB)		
	Category A [A]	Category B [B]	Category C [C]
Night-time (23:00-07:00)	45	50	55
Evening and weekends <sup>[D]</sup>	55	60	65
Daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75
<sup>[A]</sup> Category A used when ambient noise levels (when rounded to the nearest 5dB(A)) are less than these values. <sup>[B]</sup> Category B used when ambient noise levels (when rounded to the nearest 5 dB) are the same as the category A values. <sup>[C]</sup> Category C used when the ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values. <sup>[D]</sup> 19.00 – 23.00 weekdays, 13.00-23.00 Saturdays and 07.00 – 23.00 Sundays.			
<b>Notes</b>			
<sup>[Note 1]</sup> A significant effect has been deemed to occur if the L <sub>Aeq</sub> noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level. <sup>[Note 2]</sup> If the ambient noise level exceeds the threshold values given in the table (i.e. the ambient noise levels is higher than the above values), then a potential significant effect is indicated if the total L <sub>Aeq,T</sub> noise level for the period increases by more than 3 dB due site noise.			

Assessment category and threshold value period	Threshold value, $L_{Aeq,T}$ (dB)		
	Category A [A]	Category B [B]	Category C [C]
<small>[Note 3]</small> Applied to residential receptors only.			

### BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'

- 5.2.14 British Standard 4142:2014+A1:2019 '*Methods for rating and assessing industrial and commercial sound*' describes the methods for rating and assessing noise from industrial or commercial sources. The standard is applicable to the assessment of sound affecting residential receptors, through the determination of a specific level of an industrial or commercial noise source.
- 5.2.15 Where certain acoustic features are present at the assessment location, a character correction should be applied to the specific sound level to give the rating level to be used in the assessment. Acoustic features can include tones, impulsivity, intermittency or a type of noise that is distinct from the existing noise environment.
- 5.2.16 The assessment of the impact from a commercial or industrial sound can be carried out as follows:
- A difference of around +10 dB or more, between the rating and background noise levels, is likely to be an indication of a significant adverse impact, depending on the context.
  - A difference of around +5 dB is likely to be an indication of adverse impact depending on the context.
  - Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact depending on the context.

### BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings'

- 5.2.17 Guidance on the acceptable noise levels for living rooms and bedrooms within residential buildings is given in BS 8233:2014 '*Guidance on Sound Insulation and Noise Reduction for Buildings*' (BS 8233). Advice is given on the design range of internal noise levels, depending on the use of each room and the sensitivity to noise of the operations expected to be conducted in the rooms. An extract of the indoor ambient noise levels for dwellings is reproduced Table 5.8.

**Table 5.8: Indoor ambient noise levels for dwellings (BS 8233 table 4)**

Activity	Location	Time period	
		07:00 – 23:00	23:00 – 07:00
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room / area	40 dB $L_{Aeq,8hr}$	-

Activity	Location	Time period	
		07:00 – 23:00	23:00 – 07:00
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$

5.2.18 BS 8233 states the following in relation to noise levels within external amenity areas:

*“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$ , with an upper guideline value of 55 dB  $L_{Aeq,T}$  which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.”*

### World Health Organisation guidelines: 2000

5.2.19 The World Health Organisation (WHO) Guidelines for Community Noise was published in 2000 as a response to a need for action together with a generic need for improvements in legislation at a national level. This document provides general guidance and guidelines which have been set for different health effects, using the lowest noise level that produces an adverse health effect in specific human environments. The guideline levels which are relevant to this assessment are set out in Table 5.9.

**Table 5.9: WHO guideline noise criteria**

Environment	Critical health effect(s)	$L_{eq}$ dB(A)	Time base (hours)	$L_{max,F}$ dB(A)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45 <sup>[1]</sup>
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60
<b>Notes</b>				
<sup>[1]</sup> Should not exceed 45 dB $L_{AFmax}$ more than 10-15 times per night				

### Local Authority Consultation

5.2.20 A consultation meeting was held with The Highland Council (THC) on 3<sup>rd</sup> November 2022 to discuss a suitable scope and methodology.

- 5.2.21 During the meeting an overview of the Proposed development was discussed, and agreed that a scheme of best practice measures for traffic and construction works to reduce noise effects would be implemented, which is discussed within this report.
- 5.2.22 It was noted that due to the nearest Noise Sensitive Receptors (NSRs) being around 2 km from the main site area, a baseline noise survey was not required.
- 5.2.23 It was agreed that a desk-based assessment would be undertaken for the construction and operational traffic, and operational noise from plant.

### 5.3 Road Traffic Noise Assessment

#### Traffic Count Data

- 5.3.1 Road traffic generated by the Proposed Development during the construction and operational stages have been assessed in order to quantify the potential road traffic noise impacts. Annual average weekday traffic (AAWT) data provided by the appointed traffic consultants have been used to inform these assessments (full detail relating to traffic considerations in relation to the Proposed Development is included in the Transport Statement).
- 5.3.2 The construction stage assessment considers the proposed construction traffic ‘Do-Something’ (with development) against the baseline traffic ‘Do-Minimum’ (without development) during the proposed construction year(s). For assessment purposes it was assumed 2024 as the construction year.
- 5.3.3 The short-term operational stage assessment considers the Proposed Development’s traffic movements during the proposed 2029 opening year (‘Do-Something’) against that year’s forecast of traffic flows without the development (‘Do-Minimum’). In the absence of baseline and development traffic flows for the future year (i.e. 15 years after the opening year) a long-term assessment has not been included.
- 5.3.4 Traffic count data for the construction and the short-term operational phases is presented in Table 5.10 and Table 5.11 below.

**Table 5.10: Construction stage traffic counts**

Road Link	2024 Baseline		2024 Baseline + Construction Traffic	
	AAWT 18 hour	HGV %	AAWT 18 hour	HGV %
A9 between B9176 and B817	12,711	5.9	12,802	6.3
A9 between A862 and B9176	16,807	6.4	16,897	6.6
B9176 Struie Road	1,941	7.3	2,031	9.2



**Table 5.11: Operational stage traffic counts, short-term**

Road Link	2029 Baseline		2029 Baseline + Operational Traffic	
	AAWT 18 hour	HGV %	AAWT 18 hour	HGV %
A9 between B9176 and B817	13,044	5.9	13,077	6.2
A9 between A862 and B9176	17,246	6.4	17,279	6.5
B9176 Struie Road	1,992	7.3	2,025	8.9

### Noise Level Change

- 5.3.5 The change in Basic Noise Level (in dB) has been calculated in accordance with the CRTN methodology and assessed against the significance criteria within DMRB LA 111, shown in Table 5.12.

**Table 5.12: Noise level change**

Road Link	Construction Stage		Operational Stage	
	Noise Level increase, dB $L_{A10,18hr}$	Impact	Noise Level increase, dB $L_{A10,18hr}$	Impact
A9 between B9176 and B817	0.0	Negligible	0.0	Negligible
A9 between A862 and B9176	0.0	Negligible	0.0	Negligible
B9176 Struie Road	0.2	Negligible	0.1	Negligible

- 5.3.6 The predictions show that noise arising from the development traffic during construction and operation would increase noise levels by a maximum of 0.2 dB  $L_{A10,18hr}$  along the B9176 Struie Road. An increase of this magnitude of change is classed as negligible and an initial significance of impact being 'Not significant' in accordance with DMRB.
- 5.3.7 The maximum expected increase in BNLs during site operations (short-term) is also considered to be negligible. As it is not expected a significant increase in operational traffic movements in the future year (15 years after the opening year) and considering the assessment criteria for noise change in the long-term is less restrictive than the short-term criteria, future impacts due to operational traffic are likely to be negligible. Should operational site conditions or baseline traffic be subject to significant changes in the future, the calculation of BNLs would be required to determine the magnitude of change in the long-term scenario.

## 5.4 Site Operations Assessment

### Approach Justification

- 5.4.1 The nearest NSRs considered for this assessment is the group of residential dwellings located approximately 2 km east of the Proposed Development site along the B9176 Struie Road, Aultnamain. It is considered that there is significant distance between the site and NSRs, which indicatively provides at least 66 dB of attenuation when distance correcting a 1 m measurement from a given noise source, assuming hemispherical propagation  $20 \times \text{Log}_{10}\left(\frac{2000}{1}\right)$  but excluding further losses due to atmospheric and ground absorption factors which could also be deemed significant in this context.
- 5.4.2 As discussed within section 0, a baseline survey was agreed to be scoped out with THC due to the existing distance from the proposed site to the NSRs, and the anticipated attenuation provided.

### Noise Prediction Model

- 5.4.3 Predicted noise levels likely to be generated from typical site operations have been calculated using SoundPLAN v8.2.
- 5.4.4 The noise predictions (specific sound levels at noise sensitive receptors) are based on International Standard ISO 9613-2:1996 '*Attenuation of sound during propagation outdoors – general method of calculation*'. ISO 9613 provides a method for the prediction of noise levels in the community from sources of known sound emission. The method predicts noise levels under meteorological conditions favourable to noise propagation from the sound source to the receiver, such as downwind propagation, or equivalently, propagation under a moderate ground-based temperature inversion as commonly occurs at night.
- 5.4.5 The noise prediction method described in ISO 9613 is suitable for a wide range of engineering applications where the noise level outdoors is of interest. The noise source(s) may be moving or stationary and the method considers the following major mechanisms of noise attenuation:
- Geometrical divergence (distance attenuation);
  - Atmospheric absorption;
  - Ground effect;
  - Reflection from surfaces; and
  - Screening by obstacles (barriers and buildings).
- 5.4.6 An overview of the modelling parameters is presented in Table 5.13 below.

**Table 5.13: Modelling parameters**

Item	Setting
Algorithms	International Standard: ISO 9613-2 ' <i>Attenuation of sound during propagation outdoors – general method of calculation</i> '

Item	Setting
Façade Corrections	Free-field conditions. No façade corrections have been applied
Source Modelling	Point source modelling with source data discussed in Section 0
Intervening Objects	Assumed worst case scenario of no intervening objects between the site and NSR and no acoustic plant screening
Ground Absorption	The ground absorption has been set as soft ground, with a coefficient of 0.6
Meteorological Conditions	10 degrees Celsius; 70 % humidity; and Wind from source to receiver
Terrain	LiDAR information of site and surround area not used due to difficulties , assumed flat terrain (assumption not expected to affect dramatically affect impact)
Site Layout	Plant location discussed in Section 0

### Operational Noise Source Data

5.4.7 At this stage of design of the development, detailed information on anticipated noise emissions from the Proposed Development are unknown and in agreement with the Client, assumed worst case point sources with sound power levels of 93 dB(A) (85 dB(A) at 1 m) have been modelled along the eastern boundary of the site (closest boundary to NSRs), one at a height of 1.5 m above ground to simulate ground level activities and one at 25 m high to simulate potential exhaust noise emissions from the stack. It is assumed that operations are during both daytime, 07:00 – 23:00, and night-time, 23:00 – 07:00.

### Predicted Noise Levels

5.4.8 Predicted specific sound levels at the nearest receptor for both daytime and night-time are presented in Table 5.14 with noise contours shown in Appendix B. Noise levels are predicted at first floor level (4 m height above ground).

**Table 5.14: Predicted specific sound level**

Receptor	Specific Sound Level, L <sub>s</sub> dB
Aultnamain	7

5.4.9 An external noise level of 7 dB(A) has been predicted at the nearest sensitive receptors to the site. This is considered to be a low noise level and is usually below the noise floor of sound level meters, and anticipated to be inaudible in the context of existing ambient noise levels. Due to the expected inaudibility of the Proposed Development, not acoustic character corrections have been applied

5.4.10 Noise contours are presented in Appendix B.

## **Operational Assessment**

- 5.4.11 Although no background noise levels representative of the NSRs were collected for this assessment, predicted noise levels from Proposed Development are considered to be comfortably below the LOAEL (the level above which adverse effects on health and quality of life can be detected) and below criteria set out within WHO Guidelines and BS 8233.
- 5.4.12 It is considered that noise from the Proposed Development will have a low impact upon amenity of nearby NSRs.

## **Uncertainty**

- 5.4.13 A BS 4142 assessment requires consideration for the level of uncertainty in the data and calculations as this helps to inform decisions regarding the likely significance of impact within the context of the assessment.
- 5.4.14 It is accepted that uncertainty may arise from all levels of measurement and assessment, and reasonably practicable steps have been made with the aim of reducing uncertainty. Specific sound levels have been calculated to the requirements of ISO 9613 which is the widely accepted procedure for the calculation of sound propagation (including favourable wind conditions from source to receiver).
- 5.4.15 It is understood that a level of risk is associated with the absence of background noise representative of the NSRs, and final number, location and concurrent operational details regarding the Proposed Development; however, it has to be noted that no terrain features or possible screening from intervening objects has been considered within the predictive model. As such, based on the conservativeness of the adopted emission levels and the magnitude of the expected attenuation factors, it is therefore considered that the uncertainty does not have any significance on the outcome of the assessment.

## **Construction Noise From The Site**

- 5.4.16 A review of the results of the indicative operational noise from the site shows that significant noise attenuation is achieved to the NSRs, illustrating that an attenuation of a similar magnitude would be achieved during the construction phase.
- 5.4.17 Based on the above, and considering potential noise emissions from loudest construction activities associated with the earthworks phase, it is unlikely that construction noise emissions exceed those threshold levels associated with Category A of the ABC Method (i.e. assuming the lowest threshold levels), indicating a likely negligible magnitude of impact from the construction phase.
- 5.4.18 It is anticipated that the impacts from construction noise would be assessed within a separate Construction Noise and Vibration Management Plan (CNVMP) included in a wider Construction Environmental Management Plan (CEMP). As part of the CNVMP, it would be expected that the contractor shall implement best practicable means (BPM) as part of their working methodology. This will serve to minimise and control the potential for noise and vibration impacts at receptors in the vicinity of the construction works.

5.4.19 BPM as defined in Section 72 of the Control of Pollution Act 1974 and BS 5228-1:2009+A1:2014 shall be employed at all times to reduce noise and vibration to a minimum and ensure compliance.

5.4.20 In developing the control measures best practicable means (BPM), as defined in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environmental Protection Act 1990, will be applied during all construction works to minimise noise (including vibration) at neighbouring residential properties and other sensitive receptors. In doing so, due consideration will be given to the recommendations contained within BS5228-1/2:2009+A1:2014. These are reproduced below:

- Construction vehicles to conform to the European Union (EU) emissions standards and, where reasonably practicable, their emissions should meet upcoming standards prior to the legal requirements date for the new standard.
- Machines and vehicles in intermittent use will be shut down during periods between works. For example, idling of vehicles like excavators, dumper, concrete wagon etc.
- Letter drops will be undertaken prior to any noisy works commencing that could affect local residents;
- The movement of delivery materials outside of normal working hours shall be kept to a minimum and handled in a manner that minimises noise.
- All plant, equipment and noise control measures applied to plant and equipment shall be maintained in good working order and operated such that noise emissions are minimised as far as reasonably practicable.
- All employees shall be provided with an appropriate induction and ongoing briefings regarding the management of environmental issues and BPM. This will involve emphasising the need for employees to show consideration to the sensitive receptors, including residential neighbours. They will be briefed on not generating unnecessary noise when on site or when leaving and arriving.
- All plant and equipment will comply with the noise limit and noise marking requirements prescribed by the *Noise Emission in the Environment by Equipment for Use Outdoors Regulations 2001* and the *Noise Emission in the Environment by Equipment for Use Outdoors (Amendment) Regulations 2005* implementing the EU Directive 2000/14/EC.
- All plant, equipment and noise control measures applied to plant and equipment shall be maintained in good and efficient working order and operated such that noise emissions are minimised as far as reasonably practicable. As far as reasonably practicable, any plant, equipment or items fitted with noise control equipment found to be defective will not be operated until repaired.
- Where reasonably practicable, other fixed items of construction plant should be electrically powered in preference to diesel or petrol driven.

5.4.21 The above Best Practice will be briefed to all parties via:

- Site inductions;
- Toolbox talks; and
- Start of shift briefings.

## 5.5 Conclusions

- 5.5.1 RSK Acoustics has been instructed by SPERL and Storegga to undertake a noise impact assessment to evaluate the proposed renewable (green) hydrogen production facility on land to the east of the Beinn Tharsuinn Wind Farm.
- 5.5.2 Construction and short-term Operational stages of road traffic noise have been assessed calculating Basic Noise Levels (in accordance with CRTN) and indicate that the magnitude of change due to the Proposed Development is of negligible impact along all road links considered in both stages (in accordance with DMRB), with the significance of impact deemed to not be significant.
- 5.5.3 Due to the significant distance between the Proposed Development and the closest noise sensitive receptors it was agreed with THC that a noise survey to quantify representative background levels of NSRs would not be required due to the large difference between the expected background noise level and rating level of operation.
- 5.5.4 A computer noise model has been developed which incorporates anticipated worst case plant noise emission in operation during both daytime and night-time hours.
- 5.5.5 Results of the noise model indicate that predicted rating levels are unlikely to increase existing residual sound levels, while also remaining comfortably below the WHO Guidelines and BS 8233 design targets for residential use.

## 6 SUMMARY AND CONCLUSIONS

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### 6.1 Introduction

- 6.1.1 In recognition of the potential the Proposed Development may have an effect on the environment, the applicant has appointed RSK to prepare this EAR as part of the application documents to support the planning application.
- 6.1.2 The environmental assessments commissioned to form this EAR have been prepared to address the environmental factors which are considered pertinent to construction, operational and decommissioning phases of the Proposed Development. A summary of the findings of each study is presented below.
- 6.1.3 In addition to this EAR, the application documents will also comprise the following reports:
- Supporting Statement;
  - Planning Statement;
  - PAC Report;
  - DAS; and
  - Transport Statement.

### 6.2 Landscape and visual appraisal (LVA)

- 6.2.1 The appraisal defined the existing landscape and visual baseline environment, assessed its sensitivity to change, described the key landscape and visual related aspects of the Proposed Development, described the nature of the anticipated changes, and assessed the effects arising during construction and once completed.
- 6.2.2 The LVA was undertaken in accordance with published best practice namely the Guidelines for Landscape and Visual Impact Assessment (Third Edition), Landscape Institute (LI) and IEMA 2013 (GLVIA3) and associated technical guidance notes published by the LI (referenced as appropriate in the LVA).
- 6.2.3 Although linked, landscape and visual effects are considered separately. Landscape effects derive from changes in the landscape fabric, which may result in changes to the character, whereas visual effects are the effect of these changes as experienced by people (visual receptors).
- 6.2.4 The Proposed Development is sited on the hill slope of Cnoc Muigh-bhlaraidh, which reduces visual effects as taller buildings and structures would be seen against the backdrop of the surrounding landscape, rather than break the skyline. To reduce the visual presence of the Proposed Development, the buildings, structures and fencing will have a rendered finish in a muted hue of grey, green and / or brown.
- 6.2.5 The LVA concluded that there would be Moderate effects on the receiving landscape character, although this would be limited to the main site area itself and its immediate surroundings. Effects in the wider study area are limited with no notable change to the key characteristics of the greater LCT330 Rounded Hills and Moorland Slopes -

Ross and Cromarty Landscape Character Type. There would be Moderate to Minor residual effects on visual receptors where the Proposed Development would be seen either across short distances or from more distant views where the majority of the Proposed Development would be visible. However, it would form a small part of a wider view to surrounding hills and to more rugged and coastal landscapes beyond.

- 6.2.6 In summary, landscape and visual effects are largely limited to the area immediately adjacent to the main site area. Given the wider expansive landscape and the location of the Proposed Development below the skyline in all but the immediate context of the main site area, it is therefore considered that the landscape has the capacity to accommodate the Proposed Development.

### **6.3 Ecology and ornithology**

- 6.3.1 The appraisal considered potential impacts arising from the Proposed Development upon ecology during construction, operation and decommissioning. The scope of this assessment has been established through EIA Screening and pre-application consultation and took into consideration direct effects on notable habitats and effects on Morangie Forest Special Protection Area (SPA). Other ecological features were scoped out owing to limited potential for adverse impacts.
- 6.3.2 Baseline data was collected from multiple sources and over the course of three field surveys to characterise the existing ecological features. The information obtained from the review of existing data, site surveys and guidance documentation formed the basis of assessment of the potential effects. Control and mitigation measures have been proposed, if required, to reduce the magnitude of any impacts so that there is no resultant significant effect on ecological features. To reduce the potential impacts of the Proposed Development, the design process tried to avoid sensitive ecological receptors and industry standard good practice would be adopted during construction, and these measures were considered at the outset of the assessment.
- 6.3.3 The loss of notable habitats within the infrastructure footprint and up to an additional 10 m of this (to account for drying effects etc) would be unavoidable. However, this loss would be compensated for, and these habitats are common and widespread in the wider area at the locality. Regarding potential impacts on the Morangie Forest SPA, which is designated for Capercaillie, it is considered that the application site does not offer suitable habitat for Capercaillie. Furthermore, the application site is sufficiently distant from the SPA boundary, Capercaillie records, and areas of suitable habitat, that disturbance and displacement of Capercaillie should be discounted. The status of the local capercaillie population will therefore not be affected by the Proposed Development.
- 6.3.4 The Proposed Development would also include opportunities for enhancement. It is proposed to restore notable habitats currently in an unfavourable condition and provide riparian planting in the vicinity of the application site. This would provide biodiversity net gain as per the requirements of National Planning Framework 4 and in accordance with guidance.
- 6.3.5 With the proposed embedded mitigation and habitat restoration and enhancement no effects on any ecological feature are anticipated from the proposed development.



## **6.4 Hydrology, hydrogeology, geology and soils assessment**

- 6.4.1 The Proposed Development has been assessed in relation to the potential impacts on hydrology, hydrogeology, geology and soils during the construction, operational and decommissioning phases. Information on the study area was compiled using data gathered within a desk study and verified by an extensive programme of fieldwork.
- 6.4.2 The assessment took into consideration the sensitivity of the receptors, their proximity to the application site and any primary mitigation measures which have been incorporated into the Proposed Development design. Where particularly sensitive receptors were identified, additional mitigation procedures were outlined. Private water supplies and potentially groundwater-dependent terrestrial ecosystems which are within, near or have a hydraulic linkage to the application site have been assessed individually and appropriate mitigation measures set out where linkages have been identified.
- 6.4.3 A detailed programme of peat depth and condition surveying has been completed and the results used to inform the design. An Outline Peat Management Plan has been produced for the Proposed Development, which illustrates how peat resources have been safeguarded by avoiding areas of deep peat. Additionally, the Outline Peat Management Plan demonstrates that any excavated peat would be reused on-site or nearby for peatland restoration.
- 6.4.4 A Drainage Impact Assessment has been produced for the Proposed Development which includes an Outline Drainage Strategy for the application site. Sustainable drainage systems have been proposed to ensure that the rate of runoff from the Proposed Development post-development is no greater than that prior to development. The proposed sustainable drainage systems allow the quality of water to be managed at source, prior to any discharge, thereby helping to prevent any reduction in water quality in aquifers or watercourses downstream of the application site.
- 6.4.5 With the proposed embedded and additional mitigation measures, alongside the proposed monitoring, it is considered the residual effects have been reduced to manageable levels.

## **6.5 Noise impact assessment**

- 6.5.1 Construction and short-term operational stages of road traffic noise were assessed calculating basic noise levels. The results indicate that the magnitude of change due to the Proposed Development is of negligible impact along all road links considered in both stages, with the significance of impact deemed to not be significant.
- 6.5.2 Due to the significant distance between the Proposed Development and the closest noise sensitive receptors it was agreed with The Highland Council (THC) that a noise survey to quantify representative background levels of Noise Sensitive Receptors would not be required due to the large difference between the expected background noise level and rating level of operation.

- 6.5.3 A computer noise model has been developed which incorporates anticipated worst-case plant noise emission in operation during both daytime and night-time hours.
- 6.5.4 Results of the noise model indicate that predicted rating levels are unlikely to increase existing residual sound levels, while also remaining comfortably below relevant standards.

## **6.6 Conclusions**

- 6.6.1 It has been demonstrated within this EAR residual impacts as a result of the Proposed Development are limited and are considered to have been reduced to a manageable level. Where necessary, mitigation measures and enhancements form an integral part of the proposals to ensure that the environment is suitably protected. The findings demonstrate that there are no overriding environmental constraints or planning policies which would preclude the Proposed Development. This EAR demonstrates how the proposed scheme would bring about significant benefits to the local environment and economy, whilst providing renewable energy generation in an appropriate and sustainable location. The Planning Statement which forms a separate part of the planning application demonstrates significant weight for both Planning Policy and Energy Policy which demonstrates the need for and benefits of the scheme.