

PROPOSED GREEN HYDROGEN PRODUCTION FACILITY

Scoping Report

September 2022



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Executive Summary

Overview

SSE Generation, “the Applicant”, is proposing to submit a planning application for consent to construct and operate a Green Hydrogen Production Facility and ancillary infrastructure at Gordonbush Extension Wind Farm, near Brora, in the Highlands.

The proposed facility is anticipated to produce approximately 1,300 tonnes of green Hydrogen per annum during peak production, by splitting the elements of water into its component parts of hydrogen and oxygen, using a process called electrolysis. All hydrogen would be temporarily stored on site, in road going tube trailers, for transportation off-site.

An Environmental Impact Assessment (EIA), supported by appropriate surveys and specialist assessment, will be carried out to inform an EIA Report. This will form part of an application for planning permission under the Town & Country Planning (Scotland) Act 1997 (as amended) for permission to construct the proposed development.

This Scoping Report forms part of the EIA process and is provided to The Highland Council (THC) under Regulation 17 of the Town & Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (the EIA Regulations) in support of a request for a Scoping Opinion to determine the information to be provided within the EIA Report.

Responses to this Scoping Report should be directed to THC to ensure all responses are collated and included within the Scoping Opinion. Responses should be directed to:

The Highland Council

Glenurquhart Road

Inverness

IV3 5NX

When submitting your response to the THC, the Applicant would be grateful if you could also send a copy of your response to the address below:

Email to: Jade.OHara@sse.com or Gareth.Shields@sse.com

OR

For the Attention of Gareth Shields

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1. Introduction

1.1. BACKGROUND INFORMATION

SSE Generation (SSE), hereafter referred to as ‘the Applicant’, is proposing to construct a new Green Hydrogen Production Facility interconnected to the existing Gordonbush Wind Farm Extension, to optimise the green energy potential of the site. The proposed development is located on Gordonbush Estate, approximately 9.5 km to the north-west of Brora, Sutherland, within the Highland region of Scotland (see **Figure 1**).

The proposals for which consent under the Town and Country Planning (Scotland) Act 1997 (as amended) will be sought by the Applicant, are referred to in this report as ‘the Proposed Development’.

1.2. THE REGULATIONS

The Applicant intends to submit an application for planning permission under the Town & Country Planning (Scotland) Act 1997 (as amended).

The Town & Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017¹, hereafter referred to as the ‘EIA Regulations’, contains two schedules. Schedule 1 lists projects where EIA is mandatory. Schedule 2 lists projects where EIA may be required ‘where proposed development is considered likely to give rise to significant effects on the environment by virtue of factors such as its nature, size or location’. The Proposed Development is categorised as ‘Schedule 2’ development under the EIA Regulations.

A Screening Request was made to The Highland Council (THC) on 31st March 2022 to seek confirmation on whether or not the Proposed Development is classed as EIA Development. The Screening Opinion was received on 26th April 2022 and confirmed that the Proposed Development requires an EIA to be undertaken. The following points were highlighted in coming to this decision:

- Potential adverse effects on the water quality of the Allt a’ Mhuilinn burn and downstream watercourses, effecting otters (which form a primary designating feature of the nearby Caithness and Sutherland Peatlands Special Area of Conservation (SAC) and fish.
- Potential significant adverse effects on surface or groundwater which could also have impacts upon habitats, ecology, including any groundwater dependent terrestrial ecosystems (GWDTEs), as well as nearby private water supplies.

1.3. PURPOSE OF THIS REPORT

This Scoping Report forms part of the EIA process and is provided to THC under Regulation 17 of the EIA Regulations in support of a request for a Scoping Opinion.

The purpose of this EIA Scoping Report is to ensure that the subsequent EIA is focused on the key impacts likely to give rise to significant effects. As well as identifying aspects to be considered in the EIA, this document also identifies those aspects that are not considered necessary to assess further.

In accordance with the EIA Regulations, this Scoping Report contains:

- A plan sufficient to identify the location of the Proposed Development;

¹ The Town and Country (Environmental Impact Assessment) (Scotland) Regulations 2017, No. 102.

- A brief description of the nature and purpose of the Proposed Development and its possible effects on the environment; and
- Information and representations from the Applicant on the aspects of the Proposed Development or environment that are not considered necessary to assess further in this EIA Report.

This Scoping Report allows statutory consultees and other consultees to comment on the Proposed Development, the scope of the EIA and the proposed assessment methodologies. It also provides an opportunity for consultees to raise any issues that they consider to be relevant to the EIA process.

The aims of this document are to:

- Set out the overall approach to the EIA;
- Summarise key baseline information;
- Describe the proposed assessment methodology;
- Identify key potential effects at all stages of development;
- Identify topics not requiring further assessment that can be scoped out; and
- Describe the proposed content and structure of the EIA Report.

The document is divided into seven sections:

- Section 1: introduces the Proposed Development and provides a context for the Scoping Report;
- Section 2: describes the Proposed Development;
- Section 3: outlines the planning policy context;
- Section 4: provides information on the approach to EIA and the structure of the EIA Report;
- Section 5: details the environmental features to be assessed as part of the EIA;
- Section 6: describes those environmental features that are proposed to be scoped out of the EIA; and
- Section 7: provides a list of references.

1.4. THE NEED FOR THE PROJECT

The Climate Change Act 2008 is the basis for the UK's approach to tackling and responding to climate change. The Act commits the UK government to reduce greenhouse gas emissions by at least 80% of 1990 levels by 2050. There are separate climate change policies for each devolved administration. In Scotland, The Climate Change (Scotland) Act 2009 received Royal Assent in August 2009.

On 28th April 2019, the First Minister declared a climate emergency. Following the declaration, the Climate Change (Scotland) Act 2009 was amended by the Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, increasing the ambition of Scotland's emissions reduction targets to net zero by 2045 and revising interim and annual emissions reduction targets. The Scottish Government's Climate Change Plan update demonstrates a pathway to meeting Scotland's emissions reduction targets over the period to 2032.

In June 2019, the UK government committed to ambitious new targets of eradicating its net contribution to climate change by 2050. This commitment will amend the Climate Change Act 2008 and will mean the UK is on track to become the first G7 country to legislate for long term climate targets. The European Union's (EU) current commitment is for a reduction of 80-95% of 1990 levels by 2050 (European Commission, 2011).

The Scottish Government's Energy Strategy (Scottish Government 2017b) sets out the target of achieving the "equivalent of 50% of the energy for Scotland's heat, transport and electricity consumption... from renewable sources" by 2030. In order to meet this and wider renewable energy targets to be achieved by

2030, approximately 17GW of installed capacity will be required. In March 2021, the Scottish Government published Scotland's Energy Strategy Position Statement which provides an overview of policies in relation to energy, reinforcing the 2017 Energy Strategy commitment by supporting the energy sector in reaching net zero whilst ensuring a green, fair and resilient recovery for the Scottish economy following the Covid-19 pandemic.

The Scottish Government published a draft refresh of its Onshore Wind Policy Statement for consultation to 31st January 2022. The Policy Statement sets out the continued ambition to accommodate substantial additional onshore energy generation. It highlights the intent for continued protection of natural heritage, native flora and fauna and Scotland's most cherished landscapes, whilst acknowledging that climate change and the Scottish Government's net zero ambitions will change how Scotland looks.

Hydrogen, the most abundant element in the universe, is rapidly emerging as having a potentially revolutionary role in decarbonising power production, heavy industry and transport, as part to play in helping Scotland and the UK reach net zero carbon emission targets. The UK Government's 'Ten Point Plan for a Green Industrial Revolution' published in November 2020, establishes a framework for achieving net zero, which identifies hydrogen as a key part of the solution. This is demonstrated in a target of 5GW of low carbon hydrogen production capacity by 2030, as set out in the UK's first Hydrogen Strategy (August 2021) and the Scottish Government's Hydrogen Policy Statement (December 2020). In November 2021, the Scottish Government published a draft Hydrogen Action Plan for consultation. This is a companion document to the Policy Statement and sets out the necessary actions over the next five years to implement the key policy positions and ambitions set in the Policy Statement. Responses received during the consultation period (which ended on 26th January 2022) are currently being analysed and it is expected that a final version of the Action Plan will be published later this year.

1.5. WHY GREEN HYDROGEN AT GORDONBUSH EXTENSION

The Proposed Development is a demonstrator site for the Applicant and provides an opportunity to test the viability of using surplus wind energy for the production of green Hydrogen and the potential to co-locate at other wind farm sites.

Gordonbush Wind Farm Extension was chosen as an optimum site to co-locate an electrolyser as this is SSE's first subsidy free wind farm in Scotland, which became operational in 2021. During periods of high wind, the National Grid compensates wind farms for being turned off, and as Gordonbush Extension is one of the cheapest wind farms to turn off, it will likely experience higher than average levels of constraint. Rather than lose this energy, it is considered that a more efficient use would be to produce green Hydrogen from the underutilised generating potential of the wind farm. This would allow for the optimisation of the green energy potential of the site, by increasing the utilisation of the wind farm extension and allowing it to function even in periods of limited export to the grid.

1.6. THE APPLICANT

The Applicant is part of SSE Renewables, a leading developer, owner and operator of energy across the UK and Ireland including onshore and offshore wind farms and hydro. With an operational renewable portfolio of 4GW and a development pipeline including over 1GW of onshore wind and the largest offshore wind pipeline in the UK and Ireland at around 7GW, SSE Renewables is well placed to provide the future renewable power needed to power a green hydrogen economy.

The Applicant is committed to proactively engaging with the local supply chain to ensure that local companies are aware of and know how to tender for contracts related to the Proposed Development. SSE's Responsible Procurement Charter and Procurement Policy both highlight the importance of sustainable supply chains. Key to this is sharing economic opportunities with the people and businesses close to SSE's operations. As well as working with communities directly, SSE has a structured approach to engaging with its strategic suppliers and looks to them to form constructive local relationships so that communities gain from SSE's significant capital investments. SSE recognises that it must be an active contributor to the communities it is part of, and has an on-going commitment to share value where it has been created.

SSE Renewables' Community Investment Funds support a diverse range of community projects near our renewable developments. Since 2011, the SSE Renewables Gordonbush Community Fund has awarded over £2 million in grants for various initiatives across the East Sutherland area including improving skills and training opportunities, social care and sustainable tourism.

To help promote opportunities more widely the Applicant hosts 'Meet the Buyer' events designed to provide an opportunity for local businesses to find out about the opportunities available within the Applicant's pipeline of projects. Initiatives such as these, demonstrate the Applicant's strong commitment to maximising the positive economic effects of its projects through local companies where possible.

2. The Proposed Development

2.1. INTRODUCTION

The Proposed Development is located on Gordonbush Estate, approximately 9.5 km to the north-west of Brora, Sutherland within the Highland region of Scotland.

The Proposed Development would be located within the site boundary of Gordonbush Wind Farm Extension, which became operational in 2021. The Green Hydrogen Production facility and temporary construction compound would be located to the south-west of the turbines, on land that was formerly used as a temporary construction compound during construction of the wind farm development. The area has since been reinstated.

The principal permanent components of the Proposed Development are as follows:

- Green Hydrogen electrolyser system;
- Interconnecting cables between the electrolyser system and the wind farm onsite substation; and
- Water abstraction and discharge facilities.

In addition to the above, it is anticipated that there would be a need for a temporary construction compound.

2.2. GREEN HYDROGEN FACILITY

2.2.1. SITE DESIGN

At this stage, the detailed design of the Proposed Development has not been fully developed and a level of refinement of the scheme is expected prior to submission of a planning application. Details of the elements as they are currently envisaged is set out below and illustrated on **Figure 2**.

2.2.2. THE PROCESS

The facility would produce hydrogen via the proven method of electrolysis. This is a process by which an electrical power source is connected to two electrodes which are placed in water. When an electrical current is in the system, hydrogen will appear at the cathode and oxygen at the anode, with the production rate proportionate to the total electrical charge.

2.2.3. PERMANENT INFRASTRUCTURE

The Proposed Development would consist of an electrolyser system producing around 1,300 tonnes of Hydrogen gas per annum. The area of the site would extend to 1.87 Ha, based on the site platform of approximately 215 metres (m) x 65 m. The initial indicative layout of the facility is set out in **Figure 3** and would involve the following infrastructure:

- containerised units for the electrolyzers;
- Hydrogen storage;
- Hydrogen storage tube trailers;
- control room;
- dispenser unit;
- infrastructure for water supply and treatment;

- internal access roads;
- foundations and hardstandings (including construction of site drainage);
- perimeter security fencing; and
- security lighting.

The platform would be constructed using permeable material; however, in the limited areas of the compound where lorries would access, an impermeable surface would be required. Site drainage would be constructed around the perimeter of the facility.

The maximum height of plant would be the electrolyzers at approximately 6 m. However, lightning protection in the form of a thin copper rod would be placed on top of infrastructure within the facility, taking the maximum height of infrastructure to 9 m.

The intention is for the facility not to be manned and therefore the compound would not require to be continuously illuminated. Instead, motion-activated security lighting would be installed for access during hours of darkness. Flood lights would be installed but only used in the event of a fault requiring illumination.

As an example of how the facility would appear, **Plate 1** illustrates a small-scale version of a hydrogen facility and the infrastructure that is proposed.



Plate 1: An example of a small-scale Green Hydrogen Facility in Denmark

2.2.3.1. Electricity and Electrical Layout

Electricity required for the electrolysis process would be sourced from Gordonbush Wind Farm substation. The electrolyzers would be connected to the wind farm substation via an underground cable, as illustrated on **Figure 2**.

Between the proposed Green Hydrogen facility and the existing substation, the underground cable would run alongside existing access tracks and across open ground in the vicinity of the wind farm extension turbines, for approximately 5 km. It is proposed to install the cable using a combination of cable ploughing (see **Plate 2**) and open cut trench method (see **Plate 3**).



Plate 2: An example photo of cable ploughing



Plate 3: An example photo of a cable being laid using open cut method

2.2.3.2. Water Supply and Discharge

The hydrogen facility would require approximately 144 m³ of water per day. As part of the EIA, sustainable sources of water for the electrolysis process will be assessed and be informed by both published and site-specific data. Surface water, groundwater and/or a combination of both water sources will be considered in the assessment.

Subject to testing and investigation of the water supply, pre-treatment of process water may be necessary prior to use by the electrolyser.

The quantity and quality of any discharge water (effluent) from the hydrogen process will be confirmed as part of the design process. Appropriate management and disposal of discharge will form part of the plant design and will form part of the assessment.

Consent would be required under the Water Environment (Controlled Activities) (Scotland) Regulations 2013 (CAR) to permit the abstraction and discharge of water. This would be regulated by Scottish Environment and Protection Agency (SEPA).

A Pollution Prevention and Control (PPC) Permit application will also be issued to SEPA for the Proposed Development and the requirements of the permit will be set out in the EIA Report.

2.2.3.3. Temporary Construction Compound

It is anticipated that a temporary construction compound would be required for the duration of the construction activities, as shown on **Figure 2**. Following completion of the construction works, the construction compound would be removed and the site reinstated.

2.3. HYDROGEN PRODUCTION

During peak production of the electrolyser scheme, it is anticipated that approximately 5 tonnes of green hydrogen would be produced per day. All hydrogen would be temporarily stored on site, in road going tube trailers of maximum capacity of 1 tonne, for transportation off site. Before the hydrogen is transported off site it would be compressed allowing it to be transported more efficiently and be ready for commercial use.

Once filled with compressed hydrogen, it is anticipated that the road going tube trailers would be driven off site daily except Sundays, in line with the agreed working hours of the wind farm extension: Monday to Friday (07:00 to 18:00) and Saturday (07:00 to 14:00). It is expected that up to 5 hydrogen filled tube trailers would leave the site and 5 empty trailers would be returned to the site per day (i.e. a total of 10 trips per day – 5 inbound and 5 outbound) during these hours.

2.4. CONSTRUCTION

Key tasks during construction of the Proposed Development would relate to:

- Site clearance
- Establishment of construction compound
- Creation of a level platform (impermeable and permeable surfaces)
- Trenching to interconnect all system components
- Foundations of all containers, including construction of site drainage
- Laying of site electrical and comms infrastructure
- Installation of electrolyzers and associated equipment
- Commissioning

2.5. SITE ACCESS

It is proposed that access to the site would utilise the same delivery route used for Gordonbush Wind Farm Extension. From the A9 trunk road at Brora, the route would turn west along an unclassified road past Clynelish Distillery to meet the C6 Strath Brora road. The route would continue along this road to Ascoile, entering the site at the wind farm entrance (see **Plate 4**) and thereafter utilising the existing track infrastructure developed as part of Gordonbush Wind Farm.

Additional works were made to the local road network to enable construction deliveries for the wind farm extension and whilst some of the areas widened along the public road have since been reinstated, it is considered that the current width of the road and the junction onto the wind farm access track, would be suitable for the vehicles used during construction and operation of the Proposed Development. Nevertheless, a swept path analysis exercise would be carried out by the Applicant to confirm this.

The existing wind farm tracks were constructed to a high standard with a width of around 4.5 - 5m (see **Plate 5**). No upgrade works are anticipated to the existing access tracks for the Proposed Development.

A Construction Traffic Management Plan would be developed by the Principal Contractor, in agreement with THC, to effectively manage construction traffic during the construction period.



Plate 4: Junction at C6 Strath Brora Road at Ascoile

Plate 5: Existing Gordonbush Wind Farm Access Track

2.6. PROJECT CONSTRUCTION

It is anticipated that construction of the project would take place over an approximately 6 months period, following the granting of consents. Detailed programming works will be the responsibility of the Principal Contractor in agreement with the Applicant.

3. Planning Policy Context

3.1. INTRODUCTION

This section provides an overview of the planning policy context for the Proposed Development. A more detailed discussion and evaluation of relevant policies will be included within the Planning Statement that will be provided as a supporting document with the planning application, as discussed further in Section 4.4: Supporting Documents. An up-to-date list of relevant planning policies will be contained within the EIA Report.

3.2. NATIONAL PLANNING POLICY

3.2.1. NATIONAL PLANNING FRAMEWORK 3

National Planning Framework (NPF) provides a framework for long-term spatial development in Scotland. The third NPF (NPF3) (Scottish Government 2014a) was laid before the Scottish Parliament and approved in June 2014. NPF3 sets out the Government's development priorities over the next 20-30 years and identifies national developments which support the development strategy. The central vision is set out over four key policy objectives for Scotland to be: a successful, sustainable place; a low carbon place; a natural, resilient place; and, a connected place.

3.2.2. NATIONAL PLANNING FRAMEWORK 4 CONSULTATIVE DRAFT

The development of NPF4, which will incorporate Scottish Planning Policy (SPP), was published in November 2021 for Parliamentary scrutiny and public consultation (Scottish Government 2021a), running until 31st March 2022. Scottish Ministers targeted adopting NPF4 in summer of 2022, subject to Parliament approving it. NPF4 sets out how planning and development will help Scotland to achieve a 'net zero, sustainable Scotland by 2045'. It confirms the necessary shift required to achieve net zero emissions by 2045. It will also 'play a critical role in supporting nature restoration and recovery' and will be followed by a Scottish biodiversity strategy which will set targets for 2030.

3.2.3. SCOTTISH PLANNING POLICY

Scottish Planning Policy (SPP) was published by the Scottish Government in June 2014 (Scottish Government 2014b) and sets out a national policy framework for land use planning. The SPP is a statement of Scottish Government policy on how nationally important land use matters should be addressed. The SPP is relevant to understanding the national context, and the material considerations for a project during the decision making process.

3.2.4. HYDROGEN POLICY STATEMENT

The first Hydrogen Policy Statement was published by the Scottish Government in December 2020 (Scottish Government 2020) which confirms support for the development of Scotland's hydrogen production capacity to meet an ambition of at least 5GW of renewable and low-carbon hydrogen by 2030 and at least 25GW by 2045. The Policy Statement sets out how hydrogen production will play an important role in the energy transition to net zero by 2045.

3.3. LOCAL PLANNING POLICY

The site lies entirely within the jurisdiction of The Highland Council. The Proposed Development would be considered against the following Local Development Plan documents.

3.3.1. HIGHLAND-WIDE LOCAL DEVELOPMENT PLAN

The Highland Wide Local Development Plan (HwLDP) 2012 provides the local planning framework for the area and provides the general policy context against which the Proposed Development would be assessed. It is anticipated that the proposal will be guided primarily by the following key HwLDP policies: Policy 57 (Natural, Built and Cultural Heritage) and Policy 67 (Renewable Energy Developments).

3.3.2. AREA LOCAL DEVELOPMENT PLAN

The Caithness and Sutherland Local Development Plan (CaSPlan) (adopted 2018) also forms part of the development plan. It replaces the Caithness Local Plan and Sutherland Local Plan and is used to guide decisions on planning applications. It sets out the policies and land allocations to guide development over the next 10-20 years.

4. Proposed Approach to EIA

4.1. THE OVERALL APPROACH TO THE EIA

The EIA process enables the likely significant effects of the Proposed Development on the environment to be fully understood and taken into account during consideration of the application. The process is also used to develop mitigation measures to avoid, reduce or offset any adverse effects of the Proposed Development.

The Applicant will appoint a team of independent competent experts to advise on the environmental issues associated with the Proposed Development. These specialists will work with the Applicant during the design process, carry out environmental impact assessment work, and will prepare chapters for inclusion in the EIA Report.

The EIA Report will be based on the Scoping Opinion and would be prepared in accordance with the EIA Regulations. Consideration will also be given to advice contained in Planning Advice Note 1/2013 and Planning Circular 1/2017 (Environmental Impact Assessment), where relevant.

The EIA work will comprise a series of specialist environmental studies which will be targeted to assess any potential significant effects which the Proposed Development may have on the environment. Each topic included within the EIA process will be incorporated as a separate chapter in the main body of the EIA Report.

Throughout the EIA Report, where an issue raised in the Scoping Opinion is addressed, this will be clearly referenced in the relevant chapter. A scoping matrix will also be included in the EIA Report which will detail all consultation responses received during the scoping and EIA process, with a reference to where these responses have been addressed in the EIA Report. A schedule of mitigation measures will also be included as an appendix and cross-referenced in the relevant assessment work.

4.1.1. CUMULATIVE EFFECTS

There are currently no other developments of a similar nature proposed in the local vicinity of the Proposed Development. As such, it is anticipated that the assessment of cumulative effects would be scoped out of each technical assessment of the EIA. However, the cumulative scenario will be reviewed prior to commencement of assessment work.

4.2. STRUCTURE OF THE EIA REPORT

It is anticipated that the EIA Report will be produced as four volumes:

- Volume 1: Non-Technical Summary;
- Volume 2: Written Statement;
- Volume 3: Figures; and
- Volume 4: Technical Appendices.

Volume 2 will include introductory chapters that describe the background and needs case for the Proposed Development, provide the relevant energy and national policy context and provide information with regard to the construction, operation and decommissioning of the hydrogen facility.

For each of the environmental features assessed in Volume 2, the following information will be included in the respective chapters:

- a summary;
- an introduction to the environmental feature;
- scoping and consultation responses;
- assessment scope, methodology and study area;
- baseline conditions;
- impact assessment and proposed mitigation; and
- references.

Volume 2 will conclude with a summary chapter outlining the main committed mitigation measures and an overall summary of significance in the context of the EIA Regulations.

Where required, a confidential appendix will be prepared containing any sensitive, confidential information to be provided to THC and relevant statutory consultees.

4.3. EIA REPORT FORMAT

The EIA Report will be made available via the THC's planning portal. Hard copies of the EIA Report will be made available at publicly accessible deposit locations, the exact details of which would be agreed with THC. Where requested, hard copies and electronic copies will be made available to consultation bodies and consultees.

4.4. SUPPORTING DOCUMENTS

A Planning Statement will be prepared in support of the planning application, however, as it is not a requirement under the EIA Regulations, it will not form part of the EIA Report. The Planning Statement will discuss the relevant energy and environment policies relating to hydrogen development, Scottish Government's policies on renewable energy development and the Development Plan context for the Proposed Development.

A Design and Access Statement will be prepared, setting out the design principles that have influenced and shaped the design of the Proposed Development, with an integrated section on Sustainable Design.

A Pre-application Consultation Report (PACR) will be prepared detailing engagement regarding the Proposed Development between the Applicant and local Community Councils, THC, other consultees and members of the public.

An Outline Construction Environment Management Plan (CEMP) will be provided as an appendix within the EIA Report and will contain general and best practice information applicable to the construction phase of the Proposed Development on the following subject-matters:

- Site Induction and Training;
- Pollution Prevention;
- Site Waste Management;
- Drainage Management;
- Water Quality Monitoring;
- Watercourse Crossings;
- Excavation Materials and Reinstatement;
- Ecological (Habitats and Species) Protection;
- Archaeological Protection;
- Land Use and Public Access; and
- Environmental Incident and Emergency Response.

5. Environmental Features

5.1. INTRODUCTION

The EIA Report will provide an assessment of effects during the construction, operation and decommissioning of the Proposed Development for the environmental features described in this section.

This section provides a brief overview of the baseline conditions, the potential effects associated with the Proposed Development and the assessment methodology for each environmental feature to be considered in the EIA Report.

The site of the Proposed Development has been subject to a number of surveys and assessments that were completed on behalf of SSE Renewables to support the submissions for both the Gordonbush Wind Farm (operational in 2012) and more recently Gordonbush Extension Wind Farm (operational in 2021).

The intention is to draw on much of the extensive information that has already been collected for the site and surrounding area to inform the EIA for the Proposed Development.

5.2. TERRESTRIAL ECOLOGY

5.2.1. BASELINE FINDINGS

The Gordonbush Estate and surrounding landscape has undergone a substantial amount of ecological assessment to inform the planning submissions and subsequent consenting of the Gordonbush and Gordonbush Extension Wind Farms. Further to these assessments, the Gordonbush Estate Habitat Management Plan (HMP) and updated Gordonbush Estate Combined HMP have been assessing and managing the ecological interests of the estate to mitigate for the predicted construction and operational effects of the wind farms to Important Ecological Features (IEF). This is particularly relevant to the Gordonbush Wind Farm that has been operational for the last 10 years with suites of annual monitoring of key receptors completed across the Gordonbush Estate through this period. Consequently, there is a significant baseline of existing ecological information that can be drawn upon to inform the assessment of potential effects of this Proposed Development to IEFs; this information will be summarised in the following sections.

5.2.1.1. Statutory Site Designations

There are no international or national designated sites within the Proposed Development. The nearest designations are two Sites of Special Scientific Interest (SSSI); Carrol Rock and Coir' an Eoin, which lie within 5km of the site, as shown on **Figure 4**. Carrol Rock SSSI lies to the south of the site, on the south-westerly shore of Loch Brora, and was designated in 1984 for its botanical importance, having the largest block scree birch wood in East Sutherland. The Coir' an Eoin SSSI lies north-west of the site, west of the Allt a' Mhuilinn, and was designated in 1996 primarily for its 'central watershed blanket bog' that contains rare or scarce moss species such as *Sphagnum fuscum* and *S. imbricatum*. It also contains the nationally scarce but locally abundant dwarf birch (*Betula nana*).

The Coir' an Eoin SSSI is also part of the Caithness and Sutherland Peatlands Special Area of Conservation (SAC) designated for its upland wetland and peatland habitats and species. The Annex I habitats of the EC Habitats Directive that are a primary reason for site designation are:

- Blanket bogs (Priority feature);

- Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelleteauniflorae* and/or of the *Isoëto-Nanojuncetea*; and
- Natural dystrophic lakes and ponds.

Other Annex 1 habitats present as a qualifying feature but not a primary reason for designation are:

- Northern Atlantic wet heaths with *Erica tetralix*;
- Transition mires and quaking bogs; and
- Depressions on peat substrates of the *Rhynchosporion*.

Annex II species that are a primary reason for site designation are:

- Otter; and
- Marsh saxifrage.

The River Brora has been identified as a salmonid water under the Freshwater Fish Directive (78/659/EEC) requiring certain, mainly chemical, standards to be met for quality of water.

5.2.1.2. Non-Statutory Site Designations

There are areas of ancient semi-natural woodland within Strath Brora and the lower parts of the Allt Smeorail valley (please refer to **Figure 4** for their geographical context). The Proposed Development would not directly affect any of these areas. There are no other non-statutory designated sites for nature conservation in the vicinity of the Proposed Development.

5.2.1.3. Habitats

Figure 6 provides the National Vegetation Classification (NVC) information available for the areas of the Proposed Development. This information was collected in 2013 for the Gordonbush Extension Wind Farm planning submission. The survey information shows the vegetation communities present to be typical of the surrounding landscape consisting of a mixture of wet heath (M15 – *Scirpus cespitosus* – *Erica tetralix* wet heath), blanket bog (M17 - *Scirpus cespitosus* – *Eriophorum vaginatum* blanket mire) and dry heath (H10 – *Calluna vulgaris* – *Erica cinerea* heath) depending on the topography of the ground and therefore the underlying watertable and the species able to colonise these areas. It should be noted however, that the construction compound for the Gordonbush Extension Wind Farm was located at the proposed site of the Hydrogen Production facility and as such, the mapped habitats are likely to have been altered through construction activities and would be a modified but restored form of the previously existing versions. Further surveys will be completed to update the habitat information available to enable a robust assessment of the potential effects of the development to habitats. Furthermore, habitat data for the proposed cable route of the Proposed Development will be ground truthed to assess the current relevance of the 2013 survey data and to capture areas not previously surveyed.

5.2.1.4. Protected Species

Desk studies and a suite of field based protected species surveys have been completed across the Gordonbush Estate and surrounding landscape to support the submission of both wind farm developments. Species identified within the areas of the wind farms and a surrounding buffer were otter, water vole, pine marten, bat species and Atlantic salmon. Activity for the majority of these species was limited to within or surrounding watercourses across the site which are used as foraging and commuting corridors, with the wider open hill side providing less attractive habitats. No evidence was found during any surveys for the

presence of badger (albeit habitats are suitable in the wider area for the species) or wildcat. Further to this, additional monitoring of known water vole and otter locations has been completed during the construction of the Gordonbush Extension Wind Farm to ensure their protection. **Figure 5** provides a summary of the evidence found for protected species through all planning submissions.

Of particular note is the presence of otter along the Allt a' Mhuilinn watercourse running north to south along the western boundary of the Gordonbush Wind Farm area and which discharges into the River Brora. Populations of otter associated with this watercourse are those which form a primary designating feature of the Caithness and Sutherland Peatlands SAC, and the use of the watercourse by the species has been well documented through the various stages of the Gordonbush and Gordonbush Extension Wind Farms. Further surveys of all watercourses in proximity to areas of the Proposed Development will be completed to update the baseline with regards to this species.

With regards to freshwater environments, fish surveys were completed for the Gordonbush Wind Farms and recorded Atlantic salmon, brown/ sea trout, eels and brook lamprey within the lower reaches of the Allt a' Mhuilinn. It should be noted that the River Brora to which the Allt a' Mhuilinn discharges is a known salmon fishery and salmonid spawning gravels have been reported to occur on the watercourse near Ascoile (see **Figure 5**). No evidence of freshwater pearl mussel (FWPM) has been recorded along the watercourses in proximity to the Gordonbush Wind Farms, although both the Allt a' Mhuilinn and Allt Smeorail watercourses in direct proximity to the wind farms offer excellent habitat suitability for the species. The presence of migratory salmon and the fact that a breeding population of FWPM exists further up the River Brora from its confluences with the Allt a' Mhuilinn and Allt Smeorail means that small unrecorded populations of FWPM might exist in these watercourses.

5.2.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

In light of the previously collated baselines of habitats and protected species, prior to appropriate mitigation being implemented there exists the potential for significant effects to a number of ecological receptors. With appropriate mitigation identified and implemented, the Proposed Development would seek to reduce these to a non-significant level.

Otters and fish may be affected from construction and operation of the Proposed Development as it would be constructed in proximity (c.140m upslope) of the Allt a' Mhuilinn watercourse. Significant effects might arise from pollution events associated with both construction or operation of the facility which might reduce the water quality of the burn and downstream watercourses, effecting fish populations present. This would also have a secondary effect to otter foraging along the watercourses through a decrease in prey abundance if this were to occur. The design and implementation of a Pollution Management Plan for both construction and operational phases of the Proposed Development would seek to reduce the likelihood and potential magnitude and associated effects of any pollution related event to ecological receptors.

Both construction and operational phases may also provide the potential for significant effects to otters from an increased risk of road related fatalities to the species whilst foraging away from areas surrounding the watercourses. Traffic in the area would increase both during the construction phase to enable all areas of the development to be built, and also during the operational phase when hydrogen would regularly be tankered away from the site. This effect might be both local to the Gordonbush Estate, or more widely within Strath Brora as the hydrogen would be tankered down the single road following the shores of Loch Brora which otter use for foraging. Mitigation to reduce the risk to road related fatalities would be implemented through a Species Protection Plan which would include: limiting construction traffic and deliveries during crepuscular and nocturnal periods when otters are most active; implementing a speed limit on Site; and the erection of warning signage to alert drivers to the risks of otters crossing along sections of the road running adjacent to Loch Brora where fatalities might occur. Effects to habitats would be from a loss to the footprint of the

development, and potential pollution events associated with the operational phase of the development. However, the Green Hydrogen Facility will be located in areas of previously disturbed land from the construction of the Extension Wind Farm, and as such, effects on undisturbed habitats would be greatly reduced.

Direct effects would occur on the habitats present from the proposed cable route to the substation and more widely in areas of blanket bog due to long term effects on the habitat's hydrology. Cables will be sensitively routed to avoid areas of sensitive habitat wherever possible.

These potential effects will be considered in detail during the assessment, suitable mitigation presented, and the potential residual effects to IEFs identified.

5.2.3. PROPOSED SCOPE OF ASSESSMENT

To provide an up-to-date baseline of the presence of sensitive ecological features, further field work will be completed. This will include:

- otter and water vole surveys of all suitable habitats within 250 m of the footprint of the Proposed Development; and
- ground truthing of the previously recorded NVC survey information in areas to be affected by the Proposed Development to assess its current validity to support the assessment of effects from its construction and operation. Where alterations to habitats are noted, the information will be updated to reflect this.

No further surveys will be completed for aquatic species as previous assessments for the wind farm developments collated a robust baseline. It is considered unlikely that the quality of the watercourses, or the populations of fish these support would have altered in the intervening years.

The assessment of ecological effects associated with the Proposed Development will be undertaken in accordance with the Ecological Impact Assessment (EclA) guidelines published by the Chartered Institute of Ecology and Environmental Management (CIEEM, 2018).

In accordance with this CIEEM guidance, the purpose of the assessment is to focus on those features that are most likely to be affected. As highlighted, these are termed IEFs and are either protected or are of sufficient value to merit consideration in the assessment process, rather than to consider effects upon every feature that may be present, many of which will be common, widespread and robust. For the Proposed Development these are likely to be otters, water voles, habitats and fish.

The likely impacts of the Proposed Development will be identified, including likely positive and negative impacts on the IEFs present. Such impacts may include direct habitat loss, changes in habitat quality or disturbance.

The likely magnitude of the impacts will be assessed during the construction and operational stages. Those for decommissioning are considered to be similar in nature or a lesser extent to those from construction and would not be considered in detail at this time. Both the magnitude of the predicted impact and the value of the feature will be taken into consideration in determining the significance of the effect. The assessment will consider any measures that form part of the Proposed Development and to which the Applicant is committed.

Embedded mitigation may be devised to avoid any significant impacts on IEFs from the construction and operation of the Proposed Development. All mitigation proposed will follow the mitigation hierarchy: avoidance, minimisation and mitigation. Following any mitigation measures considered appropriate, the impacts remaining once they are taken into account will be identified (the 'residual impact'). Where appropriate, opportunities for ecological enhancement will be considered, in liaison with stakeholders.

An assessment of the effects on otters, a qualifying feature of the neighbouring Caithness and Sutherland Peatlands SAC will be completed to inform the requirement of the Habitats Regulations Appraisal process.

5.3. ORNITHOLOGY

5.3.1. BASELINE FINDINGS

There is a robust baseline ornithological dataset covering the Site that can be drawn upon to inform the assessment of potential effects of this Proposed Development to Important Ornithological Features (IOFs). This includes the Gordonbush Wind Farm, the Wind Farm Extension and their associated survey buffers which have been subject to standard ornithological surveys to inform their planning submissions, post-construction monitoring and the Gordonbush Estate Combined Habitat Management Plan. Combined with bird monitoring completed by the Ecological Clerk of Works (EcoW) during construction of the Extension, this pre-existing data provides an extremely robust and comprehensive dataset.

5.3.1.1. Statutory Site Designations

The Proposed Development lies to the south-east of the Caithness and Sutherland Peatlands Special Protection Area (SPA) (**Figure 4**). The SPA qualifies under Article 4.1 of the EU Birds Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive: red-throated diver, black-throated diver; golden eagle; golden plover; hen harrier; merlin; short-eared owl; and wood sandpiper.

The SPA also qualifies under Article 4.2 of the EU Birds Directive (79/409/EEC) by supporting populations of European importance of the following migratory species: common scoter; dunlin; greenshank; and widgeon. One of the component parts of the SPA lies adjacent to the Proposed Development; this component is underpinned by the Coir' an Eoin SSSI, which has golden plover as a notified feature.

The SPA is underlain by the Caithness and Sutherland Peatlands Ramsar site, designated for its blanket bog and breeding bird assemblage, including curlew and greylag geese.

Given the separation distances and nature of the Proposed Development, there are no other statutory designations that need to be considered in the ornithological impact assessment.

5.3.1.2. Habitats

Baseline habitat data are available for the Site as described in Section 5.2. The small scale of the Proposed Development footprint means that loss of habitat is not anticipated to have a significant effect on IOFs.

5.3.1.3. Important Ornithological Features

For the purposes of the ornithological assessment, IOFs are the Annex 1 species, notably those that are qualifying species of the Caithness and Sutherland Peatlands SPA and Ramsar site, Schedule 1 species, and Red or Amber-listed Birds of Conservation Concern. Golden plover, for which the Coir' an Eoin SSSI is designated, is a SPA qualifying species so will be considered in that context.

Desk studies and a suite of bird surveys have been completed across the Gordonbush Estate and surrounding landscape to support the submission of both wind farm developments and in fulfilment of post-construction monitoring requirements. IOFs identified within the areas of the wind farms and a surrounding buffer are almost limited to breeding season interests, specifically breeding moorland waders (notably golden plover), and breeding raptors. It is therefore intended that the assessment primarily focusses on potential effects on birds during the breeding season.

5.3.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

In light of the previously collated baselines of habitats and birds, the construction and operational phases of the Proposed Development have no potential for significant negative habitat effects on IOFs, due to the limited land take.

There is potential for construction effects on IOFs however, and on nesting birds in general, due to physical damage to nests, as well as noise and visual disturbance to breeding Annex 1 or Schedule 1 birds during construction.

The potential for construction effects will be considered in detail during the assessment. However, as for the Gordonbush Wind Farm Extension (for which there were no significant construction effects identified once mitigation measures were put in place), it is anticipated that significant negative effects would be reduced or eliminated by adopting appropriate comparable mitigation to minimise disturbance during construction.

It is not anticipated that the operational phase of the development will cause significant negative effects on IOFs, taking into account of mitigation in the form of a traffic management measures.

5.3.3. PROPOSED SCOPE OF ASSESSMENT

There is an extensive baseline dataset covering the Site that can be drawn upon. In April 2022 breeding raptor survey and in May 2022 a moorland breeding bird survey were completed to check whether previous survey findings remain valid. The results were consistent with previous survey records regarding Annex 1, Schedule 1 and Red and Amber-listed Birds of Conservation Concern and so no further survey work is considered necessary.

The assessment of ornithological effects associated with the Proposed Development will be undertaken in accordance with the EclA guidelines published by CIEEM (2018).

In accordance with the CIEEM guidance, the purpose of the assessment will be to focus on the IOFs that are either protected or are of sufficient value to merit consideration in the assessment process, rather than to consider effects upon every species present where no significant effect is anticipated.

The likely impacts of the Proposed Development on IOFs will be identified, including likely positive and negative impacts. The impacts considered will be direct habitat loss, changes in habitat quality, and damage or disturbance to nesting birds.

The likely magnitude of the impacts will be assessed for the construction and operational stages. Those for decommissioning would be similar in nature or a lesser extent to those from construction and will not be considered in detail at this time. Both the magnitude of the predicted impact and the importance of the site for IOF will be taken into consideration in determining the significance of the effect. The assessment will consider any measures that form part of the Proposed Development and to which the Applicant is committed.

Embedded mitigation may be devised to avoid any significant impacts associated with the construction and operation of the Proposed Development on IOFs. All mitigation proposed will follow the mitigation hierarchy: avoidance, minimisation and mitigation. Following any mitigation measures considered appropriate, the impacts remaining once they are taken into account will be identified (the 'residual impact'). Where appropriate, opportunities for ornithological habitat enhancement will be considered, in liaison with stakeholders and in tandem with any ecological enhancement measures.

An assessment of the effects to qualifying species of the neighbouring Caithness and Sutherland Peatland SPA will be completed to inform the requirement of the Habitats Regulations Appraisal process.

5.4. LANDSCAPE CHARACTER AND VISUAL AMENITY

5.4.1. BASELINE FINDINGS

The Proposed Development is located in an area of moorland plateau and lies between 160m and 300m AOD, sloping gently in a south-west direction and bound by a series of high peaks to the east including Beinn Smeórail (486m AOD) and Meallan Liath Mor (510m AOD). The site is located on an elevated moorland plateau between Strath Brora and Strath of Kildonan on the eastern edge of a very extensive area of upland moorland and mountains, which stretches to the north and west and includes the mountains of Ben Klibreck and Ben Armine.

The site and its immediate vicinity is characterised by the operational turbines of the Gordonbush Wind Farm and Extension, associated access tracks and an existing substation. In addition, the Beauly to Dounreay 275kV overhead transmission line crosses the estate along its western boundary.

5.4.1.1. Designations

The Proposed Development would not be located within or close to any nationally designated landscapes. However, it would be located on the edge of Wild Land Area (WLA) 35: Ben Klibreck – Armine Forest, with the proposed facility lying within 2 km of its boundary. Although not a statutory designation, this area is identified as a nationally important asset and given protection within Scottish Planning Policy (SPP). However, given the situation of the Proposed Development features, within the operational wind farm, the potential for significant effects to the qualities of the WLA is considered very low.

At a regional / local level, the Proposed Development is situated 2.7 km to the west of the Loch Fleet, Loch Brora and Glen Loth Special Landscape Area (SLA), identified and designated by THC in its document 'Assessment of Highland Special Landscape Areas', 2011.

5.4.1.2. Landscape Character

NatureScot has undertaken detailed review and classification of the various landscape areas and types of Scotland (SNH, 2019 [online]²). The Proposed Development site straddles two landscape types; the proposed Green Hydrogen Production Facility would fall within and directly influence LCT 134 – Sweeping Moorland and Flows Landscape Character Types, while the cables which connect the Green Hydrogen facility to the wind farm would cross over into LCT 135 – Rounded Hills – Caithness and Sutherland. There is also the potential to indirectly influence LCT 142 – Strath – Caithness and Sutherland which lies immediately to the south of the Green Hydrogen Production Facility.

5.4.1.3. Visual Amenity

As the Proposed Development would be located within an operational wind farm site in a relatively remote area, potential visual receptors who may gain views of the Proposed Development during operation would be largely limited to operational staff, estate workers and recreational users on the existing wind farm access tracks.

Some wider visibility of the Proposed Development, likely to be largely limited to construction activities, may also be obtained by visual receptors within Strath Brora, including residents and visitors at a few scattered properties, a Core Path and the minor road.

² Scottish Natural Heritage (SNH) formally changed their name to NatureScot on 24 August 2020. Many of their documents were published prior to this date. As such reference is still made to SNH where appropriate.

There would also be some potential for longer range views from Ben Horn, 6 km from the Proposed Development, which is a relatively popular local hill summit.

A preliminary Zone of Theoretical Visibility (ZTV) has been prepared for the proposed electrolyser, being the tallest plant, with the inclusion of lightning rod protection, at 9 m, and is presented in **Figure 7**. This indicates that potential operational visibility of the Proposed Development would likely be relatively contained. A study area of 7 km is considered sufficient to cover all potential landscape and visual effects.

5.4.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

Given the relatively localised nature of the Proposed Development, located within an existing wind farm, the potential for landscape and visual effects as a result of the Proposed Development is considered low. However, the potential for a wider range of temporary effects during the construction phase is acknowledged.

5.4.3. PROPOSED SCOPE OF ASSESSMENT

It is proposed that a Landscape and Visual Impact Assessment (LVIA) will be undertaken for the Proposed Development to identify potential landscape and visual effects. The LVIA will also inform design and mitigation proposals for the Proposed Development in order to help accommodate the Proposed Development within the baseline landscape.

5.4.3.1. Proposed LVIA Study Area

The potential visibility of the Proposed Development, particularly the permanent features, is likely to be relatively limited. An initial study area of 7 km from the Proposed Development boundary is anticipated to encompass all potential landscape and visual effects, based on the ZTV.

5.4.3.2. Scope of LVIA

The LVIA will be presented in two parts discussing the anticipated effects on the separate aspects of landscape character and visual amenity during both the construction and operational phases of the Proposed Development. The assessment of operational effects will assume the implementation of any mitigation measures proposed.

The assessment will be supported by figures and appendices as required.

The key aspects of the LVIA are set out below:

5.4.3.3. Zone of Theoretical Visibility

The LVIA will be informed by a ZTV. The ZTV is a computer-generated diagram which uses a terrain model to indicate areas from which elements of proposed development would theoretically be visible. It is proposed that the ZTV would be produced of the main constructed elements of the proposal to give an idea of where these individual elements may form a feature within views. A preliminary ZTV of the electrolyser (with lightning rod protection), as these are the tallest plant within the Proposed Development, is included as **Figure 7**.

5.4.3.4. Landscape Assessment

The Landscape Character Assessment will include assessment of the Proposed Development in relation to all the LCTs within the Study Area considering potential for effects on the fabric and character of the landscape. This will include the direct effect of potential physical change to landscape elements, experiential

effects on the character of the Proposed Development site and surrounding areas, and potential indirect effects to the broader landscape resource.

The assessment of effects on landscape character will also consider the potential for effects to the Special Qualities of the Loch Fleet, Loch Brora and Glen Loth SLA.

5.4.3.5. Visual Assessment

The visual assessment will comprise a receptor-based assessment, considering the potential for effects on visual amenity within the study area. This will take into consideration all visual receptors located at residential properties and workplaces, and route-based receptors using the minor road and Core Paths and any other recreational routes within the study area.

5.4.3.6. Items to be Scoped out of the LVIA

Wild Land Assessment

Given the location of the Proposed Development within the vicinity of the operational wind farm the potential for wild land effects is considered very low. The preliminary ZTV (see **Figure 7**) indicates that there would be very limited intervisibility of the proposed electrolyzers within WLA 35. It is therefore proposed that a Wild Land Assessment should not be required for the Proposed Development. However, a brief review of the key WLA Qualities would be included within the LVIA to clarify the lack of significant effect.

Visualisations

The preliminary ZTV indicates that there would be very little theoretical visibility occurring within strath and glen areas. From initial site visits, it has been established that from sections of the C1022 Brora – Balnacoil – Rogart public road where potential views are indicated by the ZTV, roadside woodland would affect the availability of the view, meaning any visualisation produced from these locations would be unlikely to show the Proposed Development. As such, due to the lack of easily publicly accessible locations where the Proposed Development would be visible, we consider that it should not be necessary to include visualisations to accompany the LVIA in order to illustrate the potential visual effects. In addition, the proposed electrolyser would not exhaust any visible emissions or heat haze as the process looks to capture and reuse the heat through a roof mounted air extraction system and via heat exchangers.

5.5. WATER, GEOLOGY AND SOILS

The water environment (hydrology and hydrogeology), geology and soils of the Gordonbush site and surrounding area is very well understood as it has been characterised and assessed previously in support of the original and extension wind farm applications. Further, verification of ground and water conditions was obtained during construction of both of these schemes.

It is proposed to use this existing information, where applicable, and supplement this with updated information and data in order to prepare a contemporary assessment of water, geology and soils in support of the Proposed Development.

5.5.1. BASELINE FINDINGS

5.5.1.1. Designations

No element of the Proposed Development lies within a designated site.

Part of the Caithness and Sutherland Peatlands SPA, SAC and RAMSAR site lies northwest of the existing wind farms, but is not considered to be in hydraulic connection with the Gordonbush site as the Allt a' Mhuilinn lies between the site and the designated site.

There are no geological or water dependent designated sites downstream of the Proposed Development that are in hydraulic continuity with the site or within 2 km of the site.

5.5.1.2. Geology, Peat and Soils

Published mapping shows discrete areas of peat are present at Gordonbush. Regionally a mantle of Glacial Till lies above the bedrock and below deposits of peat. The bedrock comprises solely of Kildonan Psammite.

The presence and distribution of peat across the wider Gordonbush site and beneath elements of the Proposed Development has been confirmed by a comprehensive programme of peat depth probing. The data shows that the depth of peat beneath the proposed hydrogen facility is <1m (see **Figure 9**).

The proposed hydrogen production facility is located within the footprint of the temporary construction compound used during construction of the wind farm extension. This area has been restored following completion of the wind farm with site derived soils.

5.5.1.3. Hydrogeology

The bedrock beneath the site has a low bulk permeability. Groundwater is present in the near surface weathered zone and secondary fractures in the bedrock. The presence of groundwater has been confirmed by boreholes and wells which abstract groundwater locally from the bedrock.

Groundwater will also be present as perched groundwater within more permeable horizons (sands and gravels) of the Glacial Till. Any groundwater flow in shallow weathered deposits is likely to locally follow topography.

All of Scotland's groundwater bodies have been designated as drinking Water Protected Areas under the Water Environment (Drinking Water Protected Area) (Scotland) Order 2013 and require protection for their current use or future potential as drinking water resources. The current status of groundwater bodies in Scotland has been classified by SEPA in accordance with the requirements of the Water Framework Directive (WFD). The site is located within the Northern Highlands Drinking Water Protection Area, which has been classified by SEPA as being of 'Good' overall status.

5.5.1.4. Hydrology and Flood Risk

All elements of the Proposed Development lie within the Allt a' Mhuilinn surface water catchment, which flows south-westward on the western site boundary. The Allt a' Mhuilinn is a tributary of the River Brora.

Water quality of the Allt a' Mhuilinn and River Brora is monitored by SEPA and classified in accordance with the requirements of the WFD. Both watercourses are classified as 'Good with high confidence'.

No element of the Proposed Development is located in an area shown by SEPA mapping to be at risk of flooding (coastal, river, surface water or groundwater).

5.5.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

The Applicant has comprehensive knowledge of the wider Gordonbush site, including all areas where the Proposed Development is located, ground conditions and potential sensitive receptors. Previous construction works have been undertaken using site specific and documented method statements and a site specific CEMP that have been developed specifically for this site to protect potential receptors. These same plans

would be used to manage construction and any maintenance associated with the Proposed Development. These plans have previously been agreed with statutory consultees.

Further, a programme of additional site investigation is proposed and will be used to inform the emerging site design. This will ensure, if required, mitigation to safeguard sensitive receptors, including peat, soils, the water environment and water dependent habitat is embedded in the development proposals.

5.5.2.1. Designated Sites

Given the existing knowledge of the site, and the mitigation that will be incorporated in the development proposals, no significant effects on hydrological or geological designated sites are anticipated.

5.5.2.2. Geology, Peat and Soils

With the exception of peat, the soils and geology present at site are commonplace and not rare locally or regionally. With safeguards, which would be implemented as industry best practice, no significant effects on soils or geology are anticipated during construction or operation of the Proposed Development.

Peat is a sensitive receptor and in recognition of this the Proposed Development take cognisance of the distribution and depth of peat at site in order that potential effects are minimised. This will be shown in the assessment. Mitigation, if required, will also be included in the assessment, to illustrate how the integrity of peat deposits at site will be maintained. Accordingly, no significant effects on peat are anticipated during construction or operation of the Proposed Development.

If required, and following the programme of proposed site investigation, a Peat Management Plan (PMP) and a Peat Landslide Hazard Risk Assessment (PLHRA) would be prepared, but at this stage, and given the existing knowledge of the Site and the distribution and thickness of peat, it is possible that these assessments may not be required.

5.5.2.3. Hydrology and Flood Risk

The potential for the Proposed Development to result in significant effect on watercourses, flood risk, private water supplies or licensed water users during construction or operation of the Proposed Development would be fully assessed in the EIA Report.

The assessment will consider the potential water requirements of the hydrogen production facility and the location and operation of any surface water abstraction. The assessment will also consider the quality and quantity of any effluent produced by the facility and how this will be managed and discharged. The assessment will be undertaken in accordance with legislation and best practice guidance and regulated by SEPA. It is expected, during preparation of the assessment, further consultation will be undertaken with SEPA and NatureScot. Mitigation measures, if required, will be identified and monitoring proposals specified which can be used to safeguard surface water, private water supplies and water dependant habitat.

The existing CEMP and method statements provide comprehensive details and procedures to manage the quality of surface water runoff from construction areas. These have been used very successfully at site during previous construction campaigns, and it is proposed these would be used again, to ensure the quality of water resources are not impaired during the construction phase of the project.

Surface water runoff from new impermeable surface areas could exacerbate flood risk, as an increase in the rate and volume of runoff compared to pre-development conditions without mitigation. Drainage measures would be put in place, in accordance with industry standard best practice, to mitigate this potential impact. These can be easily incorporated in the development proposals as the design components are developed.

5.5.2.4. Hydrogeology

Published information and previous construction campaigns have confirmed that significant quantities of groundwater will not be intercepted during construction of the Proposed Development.

There is potential that groundwater will be abstracted and used by the hydrogen plant. The quantity of groundwater and its quality will be assessed, and like surface water, the assessment of a viable and sustainable groundwater abstraction will be undertaken in accordance with legislation and best practice guidance and regulated by SEPA. The assessment will consider potential effects to other water users, including licensed and unlicensed groundwater abstractions, private water supplies, and water dependent habitat, including Groundwater Dependant Terrestrial Ecosystems (GWDTE).

The same safeguards to ensure surface water resources are not impaired during construction will also safeguard groundwater quality.

5.5.3. PROPOSED SCOPE OF ASSESSMENT

Notwithstanding the above, an assessment of the potential impacts of the Proposed Development on geology, soils and water will be undertaken with reference to relevant legislation, policies and best practice guidance, including the following:

Geology, Peat and Soils

- SEPA Regulatory Position Statement, Developments on Peat, Scottish Environment Protection Agency, 2012;
- Good Practice during Windfarm Construction. A joint publication by Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Historic Environment Scotland and Marine Scotland Science. Version 4, 2019;
- Peat Landslide Hazard and Risk Assessments: Best Practice Guide for Proposed Electricity Generation Developments, Scottish Government, January 2017;
- Developments on Peatland – Guidance on the assessment of peat volumes, re-use of excavated peat and the minimisation of waste, Scottish Renewables, SEPA, 2012;
- Managing Geotechnical Risk: Improving Productivity in UK Building and Construction, Institution of Civil Engineers, 2001;
- Ground Engineering Spoil: Good Management Practice, CIRIA Report 179, 1997;
- Scottish Roads Network Landslides Study Summary Report, Scottish Executive, 2005; and
- Guidelines for the Risk Management of Peat Slips on the Construction of Low Volume/Low Cost Roads on Peat, Forestry Commission, 2006.

Water Environment (Hydrology and Hydrogeology)

- EC Water Framework Directive (2000/60/EC);
- Scottish Planning Policy (SPP), Scottish Executive, June 2014;
- Water Environment and Water Services (Scotland) Act 2003;
- Water Environment (Controlled Activities) Regulations 2011;
- Land Use Planning System – SEPA Guidance Note 31 (Guidance on Assessing Impacts of Development Proposals on Groundwater Abstractions and Groundwater Dependent Terrestrial Ecosystems), Version 3, SEPA, 11/09/2017;
- Good Practice during Windfarm Construction. A joint publication by Scottish Renewables, Scottish Natural Heritage, Scottish Environment Protection Agency, Forestry Commission Scotland, Historic Environment Scotland, Historic Environment Scotland and Marine Scotland Science. Version 4, 2019;

- The SuDS Manual C753, CIRIA, 2015; and
- Environmental Good Practice on Site C692, CIRIA, 2010.

A desk-based assessment of the Proposed Development will be undertaken initially and then a field programme of investigation undertaken to verify (or otherwise) the desk study. The desk study and field programme will be used to inform the emerging site design. The desk study will make use of the extensive existing site records regarding peat depth, presence of GWDTE and drainage patterns etc.

The hydrological assessment specialists will liaise closely with the project ecologists and geology/geotechnical specialists to ensure that appropriate information is gathered to allow a comprehensive assessment to be completed.

Having regard to the nature of the Proposed Development and key baseline characteristics, at this early stage it is considered that the assessment will include:

- The results of additional peat probing / site investigation to confirm the depth of peat and assessment of peat condition at elements of the Proposed Development, and if required, the re-use of peat will be assessed so that the existing peat deposits on the site can be safeguarded. At this stage, given the extensive knowledge of the depth and distribution of peat at site, it is not considered a Peat Landslide Hazard and Risk Assessment will be required.
- Informed by the results of additional peat depth survey, a PMP or carbon management plan would be developed and would include details on the likely volumes of surplus peat generated and its reuse and preventative / mitigation measures to avoid significant drying or oxidation of peat during construction. This will show how carbon in the peat will be safeguarded. A draft PMP would be included within the EIA Report if required. The management plan will consider peat used to restore the temporary construction compound where the hydrogen plant will be located.
- A hydrological site walkover survey to determine the likely effects of the Proposed Development on the hydrological regime, including water quality, flow and drainage.
- A request will be made to THC and SEPA for current water use data near to site. At this stage no new water users are anticipated but regardless the existing site PWS risk assessment will be reviewed and updated if necessary to take account of the Proposed Development.
- In consultation with the project ecologists, and if required as a consequence of the Proposed Development, assessment of potential effects on water (including groundwater) dependent habitats during construction and operation.
- Assessment of potential flood risk and drainage during construction and operation.

Having regard to the nature of the Proposed Development and key baseline characteristics, at this stage it is considered the following can be scoped out of requiring further assessment:

- Detailed Flood Risk and Drainage Impact Assessment. Published mapping confirms that the Proposed Development is not located in an area identified as being at flood risk. It is proposed, therefore, that a simple screening of potential flooding sources (fluvial, coastal, groundwater, infrastructure etc.) is presented in the EIA Report and measures that would be used to control the rate and quality of runoff will be specified in the CEMP.

5.6. TRAFFIC AND TRANSPORT

5.6.1. BASELINE FINDINGS

The Proposed Development would be accessed via the existing site access junction to Gordonbush Wind Farm Extension from the C6 Strath Brora Road. The existing wind farm tracks would be used to access the Proposed Development which are approximately 4.5 - 5m in width and constructed to a high standard. No upgrade works are anticipated to the existing access tracks as a result of construction or operation of the Proposed Development.

To facilitate construction deliveries associated with Gordonbush Wind Farm Extension along the Clynelish Distillery Road and C6 Strath Brora Road, a number of improvement works were made to the local road network, which included the provision of passing places and localised widening works. As such, it is considered that both the Clynelish Distillery Road and C6 Strath Brora Road, along with the current access junctions, are of a suitable standard to accommodate both construction and operational vehicles associated with the Proposed Development.

It is proposed that the local road network traffic data which was used as part of the Gordonbush Wind Farm Extension EIA will be used to calculate baseline traffic flows for the Proposed Development. This 2014 data is being reused as Covid 19 has influenced traffic flows across the UK and new surveys may underestimate traffic movements, leading to a false baseline in the assessment.

Traffic count data taken in 2021 from the UK Department for Transport database or from the Traffic Scotland database will be used for the A9 and wider trunk road network. National Road Traffic Forecast (NRTF) Low Traffic Growth assumptions will be used to provide a common future year baseline to coincide with the expected peak level of construction traffic and to allow the older data to be fairly compared to the wider trunk road data.

5.6.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

5.6.2.1. Construction

Potential effects of the Proposed Development during the construction phase which will be considered are as follows:

- Severance for residents and users of the study roads;
- Driver delay;
- Pedestrian delay;
- Pedestrian amenity loss during the construction phase;
- Temporary increase in fear and intimidation from increases in traffic; and
- Potential increase in accidents and safety arising from changes in the traffic composition.

It is highly unlikely that the level of traffic associated with the construction phase will be greater than that already encountered at the peak of construction activities at Gordonbush Wind Farm Extension. In similar fashion, the impact of the construction traffic associated with the Proposed Development will be mitigated by standard good site practices and the provision of a Construction Traffic Management plan (CTMP).

5.6.2.2. Operational

It is anticipated that the operational phase of the Proposed Development will not generate significant levels of traffic as it is forecast that there will be approximately 5 collections per day (i.e. a total of 10 trips per day –

5 inbound and 5 outbound). These trips are expected to be undertaken 6 days per week (Monday to Saturday) and in accordance with the agreed working hours of Gordonbush Wind Farm Extension Monday to Friday (07:00 to 18:00) and Saturday (07:00 to 14:00). Other HGV trips associated with the operation of the Proposed Development are expected to be intermittent / infrequent associated with routine maintenance and repair work. Staff access to the site is low and will not result in significant traffic levels.

The predicted level of traffic is minimal and equates to two HGV trips per hour. As such, no significant effects are anticipated. An impact review of the operational phase will be undertaken and details of how operational traffic will safely interact with other road users will be provided.

5.6.3. PROPOSED SCOPE OF ASSESSMENT

The assessment would consider the construction and operational phases of the project, as these represent the peak of traffic generation associated with the Proposed Development. The decommissioning phase of the project is proposed to be scoped out of assessment due to the construction phase attracting significantly more trips than the later phases of the Proposed Development. However, a commitment to reviewing the impact of this phase will be made immediately prior to decommissioning works proceeding.

It is not anticipated that a formal Transport Assessment would be required for the Proposed Development, as these are not generally considered necessary for temporary construction works. Instead, a reduced scope Transport Assessment would be completed in accordance with relevant guidance, as follows.

- Transport Assessment Guidance (Transport Scotland, 2012);
- The Guidelines for the Environmental Assessment of Road Traffic (Institute of Environmental Assessment (IEA), 1993);
- Scottish Planning Policy (Scottish Government, 2014);
- National Roads Development Guide (Society of Chief Officers of Transportation in Scotland, 2017); and
- Transport Assessment Guidelines, (THC, 2014).

The assessment would include mitigation where appropriate, likely to be in the form of the production of a Construction Traffic Management Plan and Staff Travel Plan.

It is assumed that a hazardous load assessment would not be required for the assessment given the low volume and frequency of traffic movements. Swept path drawings for any proposed abnormal loads associated with the construction phase will also be provided between the War Memorial Bridge in Brora to the site entrance.

Given the likely level of traffic generation associated with the delivery of construction materials and the likely sources of materials, the study area is proposed to include the A9 (in the vicinity of the access junction), Clynelish Distillery Road and C6 Strath Brora Road.

Traffic accident data would be obtained from Crashmap UK for the study network to inform the accident review for Clynelish Distillery Road and C6 Strath Brora Road over a five-year period.

5.7. NOISE AND VIBRATION

5.7.1. BASELINE FINDINGS

The local area is sparsely inhabited where the background acoustic environment is predominantly that of naturally generated sounds (for example wind disturbed vegetation, running water and wildlife). It is considered that this type of acoustic environment does not increase in noise level with time in the same manner as would occur in urban areas exposed to creeping increases in road traffic, new commercial

developments and increasing housing density. The operational Gordonbush Wind Farm and Extension also contribute to the local acoustic environment but are regulated through the application of compliance monitoring planning conditions.

Hoare Lea undertook an extensive environmental noise survey and robust background noise level assessment between 18th August and 15th September 2014, as part of the Gordonbush Wind Farm Extension EIA, at each of three local residential properties (Ascoile, Home Cottage and Keepers Cottage) and considered representative of three other properties (Gordonbush Lodge, Moulin Cottage and Kilbraur) which experienced similar conditions. It was determined from analysis of the data in different wind directions that the Gordonbush Wind Farm and Kilbraur Wind Farm and its extension did not significantly affect the measured noise levels. This is consistent with the separation distances of at least approximately 4 and 2 km with the Gordonbush and Kilbraur Wind Farms respectively.

It is considered that this previous survey and establishment of background noise levels remains valid and is representative of the local inhabited area. Table 5.7.1 below provides the measured range of background noise levels at approximately 1.5 m above local ground level for wind speeds measured up to 5 m/s at a reference height of 10 m at Gordonbush Wind Farm Extension. This provides a conservative approach to the up to a wind speed of 5 m/s reliability of measurements guidance, in accordance with BS 4142:2014.

Further background measurements were undertaken at Ascoile commencing on 11th August 2020 for an approximate four week period to support the discharge of planning conditions for the consented Gordonbush Wind Farm Extension. The background measurements were acquired during a shutdown period of Gordonbush Wind Farm. These are included in the ranges of Table 5.7.1 below.

Table 5.7.1: 2014 and 2020 Combined Measured Background Noise Levels

Location / Sensitive Receptor	Period	10 m Height Wind Speed Between 0 m/s and 5 m/s Background Noise Level Range $L_{A90,10min}$ dB
Ascoile	Daytime	25 to 34
	Night	25 to 34
Home Cottage	Daytime	31 to 34
	Night	32 to 33
Keepers Cottage	Daytime	22 to 32
	Night	22 to 29
Gordonbush Lodge [1]	Daytime	22 to 32
	Night	22 to 29
Moulin Cottage [2]	Daytime	25 to 34
	Night	25 to 34

Kilbraur [2]	Daytime	25 to 34
	Night	25 to 34
Yellow House [1]	Daytime	22 to 32
	Night	22 to 39

Notes
[1] by reference to Keepers Cottage
[2] by reference to Ascoile

5.7.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

The potential for significant effects has been analysed by a desktop comparison of the Proposed Development to the previous noise impact assessment submitted as part of the EIA for Gordonbush Wind Farm Extension. In addition, the Major Pre-application Advice from THC (March 2022) has been used to corroborate the analysis.

During the construction stage there will be similar activity to form concrete foundations and dig trenches for underground cables. Therefore, the following has been considered at this stage:

- Construction noise associated with the installation of the hydrogen production facility is considered to be of a similar magnitude or lower than that predicted for the temporary construction site compound of Gordonbush Wind Farm Extension. The Gordonbush Wind Farm Extension considered an overall source sound power level of L_{WA} 120dB and predicted an $L_{Aeq,T}$ 43dB noise level contribution at Ascoile, with lower levels at other sensitive receptors. This is unlikely to be significant and is temporary during the construction stage. The advice received from THC was *"It is therefore unlikely that noise from construction at these sites will be an issue at noise sensitive locations"*;
- Construction road traffic noise was previously assessed for Gordonbush Wind Farm Extension as a slight effect with the predicted potential to generate $L_{Aeq,T}$ 60dB during a drive-by event at Moulin Cottage and lower levels when averaged across the construction working daytime period. It was concluded previously to be of a slight effect which is not significant. Similar quantities of movements and similar types of vehicles are expected to be involved in the proposed works. Therefore, a similar outcome is expected with construction road traffic noise not being significant. The advice from THC during pre-application consultation was *"there may still be some noise arising from construction traffic. It is therefore expected that the developer/contractor will employ the best practicable means to reduce the impact of noise from construction activities. The Applicant will be required to submit a scheme demonstrating how this will be implemented. Attention should be given to construction traffic and the use of tonal reversing alarms"*; and
- Construction vibration is considered to be not significant based on the distances involved;

Operational activities will be different in nature to that of the Gordonbush Wind Farm Extension and these have been considered through desktop review of available information at this stage. The review of findings are listed below:

- The proposed hydrogen production facility is in the order of 1150 m from Ascoile, the nearest sensitive receptor. The advice received from THC during pre-application consultation was *'Environmental Health advise that given the separation distances from houses, operational noise is unlikely to be an issue and can be scoped out of further assessment'*. However, the hydrogen production facility fixed plant and

equipment is not fully confirmed at this stage, therefore, there could still be potential for a significant effect;

- Operational road traffic is expected to be up to five two-way (potentially) heavy goods vehicle movements a day, restricted to the daytime hours of Monday to Friday (07:00 to 18:00) and Saturday (07:00 to 14:00). This avoids the common most sensitive times for noise being evenings and at night. On average this equates to less than one two-way movement per hour during the access period. Although lower than the temporary construction movements previously assessed to be of a slight effect, as this represents a potential long-term effect the associated noise impacts will be assessed further; and
- Operation of the hydrogen production facility is not likely to give rise to a significant magnitude of vibration, either close to the plant or at the distance of any sensitive receptors. The facility itself will be vibration sensitive and will be designed to run in an optimal manner.

5.7.3. PROPOSED SCOPE OF ASSESSMENT

Based on the potential for significant effects and the potential expectations of stakeholders, the following aspects of the proposed works are intended to be included in the EIA Report:

- Construction noise from road traffic, will be assessed for the daytime working periods only using prediction methodology and the 'ABC Method' from guidance contained in BS 5228 Part 1:2009 + A1:2014, in addition to the prediction methodology of Calculation of Road Traffic Noise (CRTN, 1988) and the guidance in the Design Manual for Roads and Bridges, LA 111 (2019);
- Operational noise from the fixed plant and equipment of the hydrogen production facility; and
- Operational noise from road traffic, will be assessed by considering the frequency of movements, the period of the day and the type of vehicles in use, with comparison to the prevailing external ambient noise levels and with the impact on external amenity and internal noise levels considered through guidance contained in BS 8233:2014.

The assessment will include all seven sensitive receptor locations as listed in Table 5.7.1 above.

A Framework Construction Traffic Management Plan will be produced and submitted with the EIA Report. This will contain information on the best practice approach to minimising construction noise.

The following aspects of the proposed works are not intended to be included in the assessment as there is expected to be negligible impact on the nearest sensitive receptors:

- Re-establishment by measurement of the baseline noise environment;
- Temporary construction works noise;
- Temporary construction vibration; and
- Operational vibration.

5.8. CULTURAL HERITAGE

5.8.1. BASELINE FINDINGS

5.8.1.1. Designations

No designated heritage assets are located within the footprint of any element of the Proposed Development.

Within the wider area of Strath Brora and the higher ground, there are a number of cultural heritage sites of national importance with statutory protection (see **Figure 8**). The nearest to the Proposed Development being the Scheduled Monument of Ascoile; an earthwork, possible henge. Other Scheduled Monuments

within 5 km of the Proposed Development include, Caisteal na Coille (broch), Balnacoll Hill (cairn), Kilbraur (broch, hut circle and field system), and Killin (chambered cairn).

There are 2 Listed Buildings within 5 km of the Proposed Development; Gordonbush Lodge (B Listed) and Balnacoll Lodge (B Listed).

Only the site of Kilbraur broch and hut circle would receive theoretical visibility of the Proposed Development (see **Figure 8**).

5.8.1.2. Cultural Heritage Assets

There have been several field surveys carried out across the site which include the areas covered by the Proposed Development elements. This includes the original Gordonbush Wind Farm ES (2002-2004); the Beauly to Dounreay 275 kV Overhead Transmission Line ES (2006-2008); and more recently the Gordonbush Wind Farm Extension EIA Report (2014).

Previous survey work confirmed that the Proposed Development is located in a landscape of sparse features of settlement and cultivation dating from Iron Age to the early 19th century. The Proposed Development has the potential to directly impact the following features (HER / RCAHMS reference noted), all of local importance, as shown on **Figure 8** and as follows:

- Site 1: Allt a'Mhuillinn (MHG31738), bridge of local heritage importance. This asset has already been disturbed by temporary construction compound that was used during the construction of the wind farm extension and since been reinstated.
- Site 2: Allt a'Mhuillinn (MHG31737), peat cuttings of local heritage importance. This asset has already been disturbed by the temporary construction compound that was used during construction of the wind farm extension and since been reinstated.
- Site 3: Cnoc a'Ghrianain (MHG31862) and Site 4: Cnoc a'Ghrianain (MHG31865), both peat cuttings of local heritage importance.

5.8.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

No direct effects would occur on any designated heritage assets.

It is unlikely that there would be any significant indirect effects on designated heritage assets given the lack of theoretical visibility expected in the wider area from the findings of the ZTV. In addition, intervening topography and existing vegetation would also serve to screen views and mitigate indirect effects from designated heritage assets in the wider area. Screen planting would be proposed as part of the final landscape mitigation design to further reduce indirect effects.

The Proposed Development has the potential to directly impact four heritage assets, but these would all be of sites identified as being of local importance. In addition, three of these assets have already been disturbed by construction works associated with the wind farm extension.

The construction of the Proposed Development has the potential to adversely affect unknown archaeological sites and as such measures to safeguard any archaeological remains that may be unearthed as part of excavation works, will be captured in the site-specific CEMP.

5.8.3. PROPOSED SCOPE OF ASSESSMENT

Detailed field survey has already been carried out across the site and its surroundings through the EIA process of the original Gordonbush Wind Farm (2002-2004) and its Extension (2014) and as such it is considered that no further site survey will be required.

As two designated sites receive theoretical visibility of the Proposed Development, it is proposed that an assessment on designated assets is included in the EIA Report.

As results from previous site work has identified that the Proposed Development has potential to interact with heritage assets of local importance only, some of which have already been disturbed during previous construction works at the site, it is not considered that any significant direct effects would occur, and as such it is proposed to scope out an assessment on non-designated assets in the EIA Report.

5.9. RISK OF MAJOR ACCIDENTS AND / OR DISASTERS

The Proposed Development is not in a location which is susceptible to natural disasters or extreme weather.

Given the nature of the Proposed Development and the chemical substance involved, there is a risk associated with leaks which could give rise to fires and explosions. However, these risks will be factored into the design of equipment and measures will be put in place to prevent, control and mitigate any risk. These measures include but are not limited to:

- The equipment will be designed to maintain containment using materials of construction which are suitable for hydrogen service and with adequate safety margins. The integrity will be assured throughout the life of the plant using planned preventative inspections and maintenance.
- Process control will be used to maintain the process within its design parameters and to initiate emergency shutdowns if required. Emergency shutdowns will include fire and gas detection along with automated isolation.
- Control of ignition sources through appropriate equipment selection as well as consideration of layout.
- Comprehensive grounding system would also be installed to eliminate the risk of static charge accumulations.
- The design and construction of firewalls to mitigate the effects of any ignited release.
- Suitable bunding underneath the electrolyser stack containers with sufficient capacity to contain a leakage of lye until it is neutralised or removed from site.
- Pressure relief devices would be installed to manage risk of explosions and 'exclusion zones' would be factored into the design process.

The Proposed Development would be constructed and operated in accordance with relevant health and safety legislation including the Health and Safety at Work etc Act 1974 and the Control of Major Accident Hazard regulations 2015 (COMAH). Furthermore, the Principal Designer would fully assess risks and mitigate as appropriate during the design stage as part of the requirements of the Construction (Design and Management) Regulations 2015.

A separate application under the Planning (Hazardous Substance) Consent has been submitted to THC and is currently under consideration.

The EIA Report will set out the risks associated with the Proposed Development and the measures that would be put in place to control risks.

5.10. SCHEDULE OF MITIGATION

A Schedule of Mitigation will be provided in the EIA Report to summarise all mitigation measures identified that are considered necessary to protect the environment prior to and during construction, operation or decommissioning of the Proposed Development.

6. Recommended Features to be Scoped Out

Assessment for the following environmental features are proposed to be scoped out of the EIA for the Proposed Development.

6.1. FORESTRY

There are no areas of commercial forest within the site itself. No significant effect on commercial forestry is anticipated as a result of the Proposed Development and therefore, it is proposed that an assessment of forestry would not be required.

6.2. AIR QUALITY

In relation to air quality, the key issues that require consideration from the Proposed Development are impacts from emissions of fugitive particulate emissions from construction works and pollutant emissions from the additional vehicles generated on the local road network.

Aspects of the Proposed Development that require consideration within the air quality assessment would comprise:

- site clearance and construction of suitable platforms for the hydrogen production facility;
- trenching to interconnect all system components; and
- associated vehicle movements on the local road network.

The requirements of the following pieces of guidance have been considered and applied, as necessary to screen air quality impacts:

- IAQM Guidance on the assessment of dust from demolition and construction (v1.1 2016);
- Environmental Protection Scotland (EPS) and the Royal Town Planning Institute Scotland (RTPIS): Delivering Cleaner Air for Scotland: Development Planning and Development Management;
- Defra Technical Guidance on Air Quality (LAQM.TG (16), 2021); and
- Highways Agency Design Manual for Roads and Bridges (DMRB), Volume 11: Environmental Assessment, LA 105 (2019).

6.2.1. BASELINE FINDINGS

The closest dust sensitive human receptor is an isolated dwelling 'Ascoile' to the south of the Site. The dwelling is located greater than 1 km from the Proposed Development and greater than 200 m from the road which would be used by vehicles accessing the Site.

Statutory designated conservation sites include the Caithness and Sutherland Peatlands Ramsar, SPA and SAC and Coir' an Eoin SSSI, which are all located greater than 1 km from the Proposed Development (referred to as 'ecological receptors').

The Proposed Development lies within the administrative boundary of THC. As part of the Local Air Quality Management Process, THC have declared one Air Quality Management Area (AQMA); a location known as the "Inverness City Centre AQMA". The AQMA is located more than 70 km from the Site and does not include any of the primary routes that may be used by site traffic. As such, the AQMA does not represent a constraint to the Proposed Development. All other Air Quality Strategy pollutants, including PM₁₀ and PM_{2.5}, were below the relevant air quality standards at locations of relevant public exposure, and as such no further AQMAs have been declared within the Council's administrative area.

There is limited air quality monitoring data within the site locale, with the nearest automatic monitor located at Inverness (monitoring NO₂ and PM), at a distances of 68 km. THC operate a series of passive diffusion tubes monitoring for NO₂ which are located within Inverness city centre. Due to the distance between the Site and the monitoring locations, similar pollutant concentrations are not anticipated and therefore the monitoring data would not be included within the assessment.

Annual mean mapped background pollutant concentration estimates of NO₂, PM₁₀ and PM_{2.5} (2018 reference year) have been sourced from the Scottish Air Quality (SAQ) and Defra databases for the grid squares containing the Proposed Development, in addition to the grid squares containing the closest residential and ecological receptors (Table 6.9.1). It is observed that concentrations of PM₁₀, PM_{2.5} and NO₂ in the Site locale are 'well below' the relevant air quality standards.

Table 6.9.1: Projected Background Concentrations

NGR Grid Square (m)	2021 Mapped Background Concentrations (µg/m ³)		
	PM ₁₀	PM _{2.5}	NO ₂
284500, 915500	5.09	3.18	1.35
283500, 913500	4.99	3.16	1.35
283500, 912500	5.05	3.15	1.36
282500, 911500	4.99	3.16	1.37
Standard	18	10	40

Table Notes: a) Source: <http://www.scottishairquality.scot/data/mapping?view=data>

6.2.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

6.2.2.1. Construction Phase

A number of construction activities associated with the Proposed Development have the potential to generate medium to high source emissions. These include:

- Earthworks to instate the project platform, including the movement of soils;
- Stockpiles of stripped soils prior to reinstatement / landscaping;
- Earthworks to install cables;
- On-site vehicular movements; and
- Off-site vehicle movements.

Potential road traffic emissions associated with off-site vehicle movements (particularly HGV movements) on the public road network have the potential to result in increased concentrations of combustion related pollutants, such as NO₂ and PM₁₀. The construction work required on site is considered to be minimal with regard to daily movements off site. Mobile plant will require transfer onto site, and offsite at the end of the construction phase.

6.2.2.2. Operational Phase

As per movements on the public road networks during the construction phase, movements during the operational phase (particularly HGVs) have the potential to result in increased concentrations of combustion related pollutants, such as NO₂ and PM₁₀.

Activities during the operational phase will be limited to maintenance activities and collection of the hydrogen tube trailers. Road traffic emissions on the public road network are unlikely to be significant on the basis that the proposed vehicle trips associated with the hydrogen collection would be 5 HGV trips per day (10 daily movements). Other trips associated with the operation of the Proposed Development are expected to be intermittent/infrequent associated with routine maintenance and repair work.

6.2.3. SCREENING OF AIR QUALITY ISSUES

6.2.3.1. Construction Phase

The IAQM Guidance on the assessment of dust from demolition and construction provides the following screening criteria for the need to consider a detailed assessment:

- human receptor is located within 350 m of the Site, and/or within 50 m of routes used by construction vehicles, up to 500 m from the site entrance(s); and/or
- ecological receptor is located within 50 m of the Site, and/or within 50 m of routes used by construction vehicles, up to 500 m from the site entrance(s).

The closest human and ecological receptors are located greater than 1 km from the Proposed Development. On the basis that there are no human or ecological receptors within the IAQM screening distance criteria, the construction phase is considered unlikely to result in significant effects. It is not considered that a dust risk assessment is required in support of the Proposed Development, given the controls and measures the Applicant has previously agreed with statutory consultees for dust management at site.

Given the short-term nature of the construction phase (approximately 6 months) and the comparatively low volume of vehicle movements that will likely arise, it is unlikely that significant air quality effects from development related road traffic emissions during the construction phase will arise. Such potential effects are therefore scoped out from requiring detailed assessment based on their assumed insignificant impact.

Furthermore, construction works are expected to have a duration of circa 6 months, and as such any consequential impacts on the local area and local road traffic flows are believed to be temporary, with no long-term deterioration of conditions.

The above consideration of screening criteria have identified that impacts on air quality from the construction phase are unlikely to result in significant effects, with no further assessment required in the EIA Report. No additional mitigation is considered to be required.

6.2.3.2. Operational Phase

Potential road traffic impacts associated with the operational phase on sensitive receptors can be considered against screening criteria provided in accordance with EPS & RTPIS and DMRB guidance, as follows (specific to a development located outside of an AQMA):

- Stage 1: Comparison of operational phase traffic flows with reference to EPUK and IAQM thresholds to determine the extent of the affected road network;
 - a change of LDV flows of more than 500 AADT; and/or
 - a change of HDV flows of more than 100 AADT.

- Stage 2: Spatial review with use of satellite imagery to determine whether relevant exposure exists within 200m of an affected road (as per the DMRB LA 105).

In relation to likely operational vehicle movements, it is anticipated that during peak production of the scheme, there would be deliveries 6 days per week with around 5 collections per day during the hours of Monday to Friday (07:00 to 18:00) and Saturday (07:00 to 14:00). This equates to a maximum of 10 HGV Annual Average Daily Traffic movements.

The predicted traffic generation from the operation of the Proposed Development is below the EPUK & IAQM screening criteria. As such, operational road traffic effects on human and ecological receptors can be screened out within Stage 1 and viewed as insignificant. No further assessment and no mitigation measures are therefore considered to be required in the EIA Report.

6.3. CLIMATE CHANGE

With regard to climate change, in the context of the EIA process climate change is considered both in relation to the contribution of the Proposed Development to increasing or decreasing gaseous emissions with global warming potential (GWP) and in relation to climate change adaption.

Emissions associated with the Proposed Development would be limited to temporary and short-term emissions of exhaust gases from vehicles and construction plant, and the potential for the release of carbon dioxide as a result of dewatering and exposing peat and peat soils during construction. Neither source is considered likely to be significant in terms of GWP.

In terms of climate adaption, consideration would be given to the potential implications of climate change on design of infrastructure (e.g. design for increased flood risk); however, no potential for significant impacts have been identified and it is therefore proposed that an assessment of climate change is scoped out of the EIA.

6.4. HUMAN HEALTH

Potential effects on human health as a result of the Proposed Development could relate to noise or impacts to air and/or water quality during construction and operation.

An assessment of construction and operational noise will be considered as part of the EIA Report, along with the potential impact on water quality (through the water and soils assessment). However, it is not considered that air quality will result in a significant effect and is proposed to be scoped out of the EIA (see Section 6.2).

It is therefore considered that an assessment of human health will be adequately covered in the EIA Report and a separate assessment be scoped out.

6.5. SOCIO ECONOMIC

The Applicant is already a major employer throughout the UK, including the North of Scotland, providing direct employment through the development and construction of generation or infrastructure projects. In the local vicinity this has been demonstrated through realisations of Gordonbush Wind Farm and its Extension. These developments have made significant contributions to the local economy.

The projected socio-economic effects of the Proposed Development would take the form of a short-term effect during development and construction through employment, spending of employees and purchase of materials and services. There will also be an opportunity for long terms jobs during operation and maintenance phases of the project, and the project would support local and Scottish supply chain initiatives.

This will create jobs and leave a lasting legacy in the area as well as supporting the renewables sector as a whole. It is the intention of the Applicant that the Green Hydrogen produced at Gordonbush would be used within the Highland region and SSE are currently in discussions with local off takers.

It is considered that the effects on socio-economics resulting from the Proposed Development are largely positive with no residual effects which could be considered significant within the context of the EIA Regulations and therefore an assessment would not be required.

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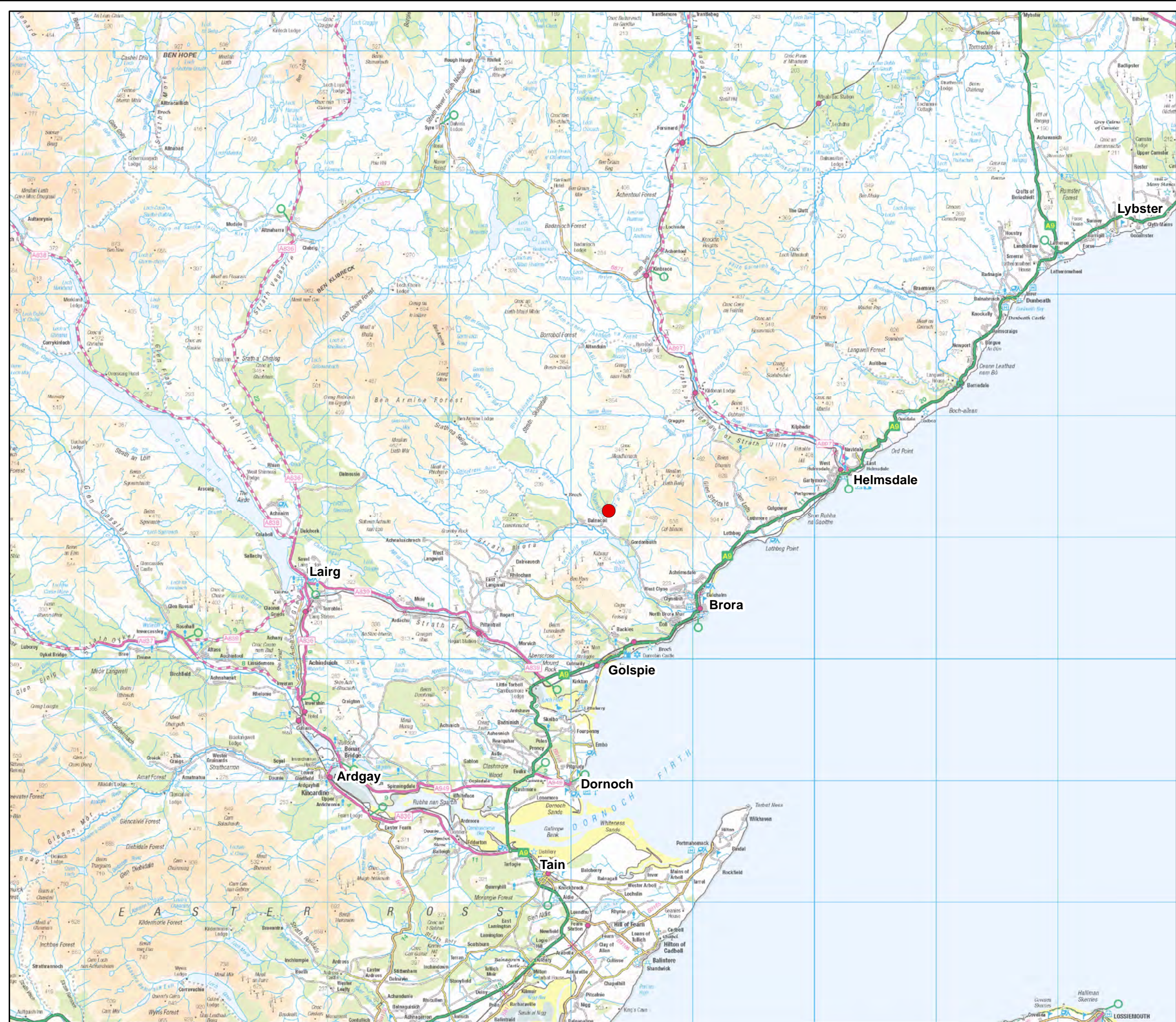
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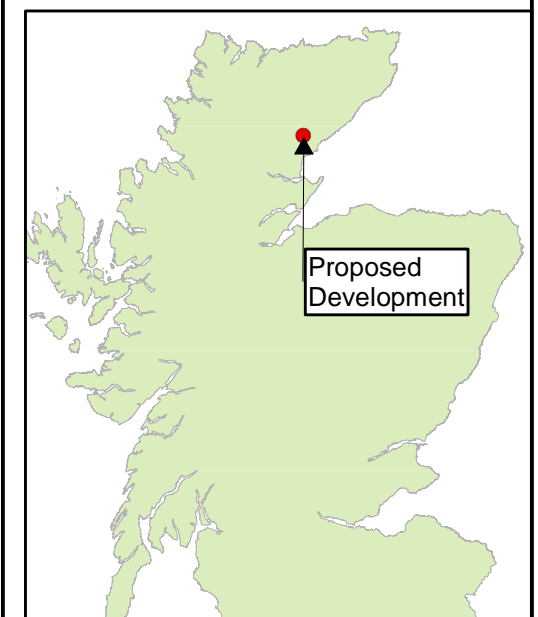
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FIGURES



Key

- Site Location

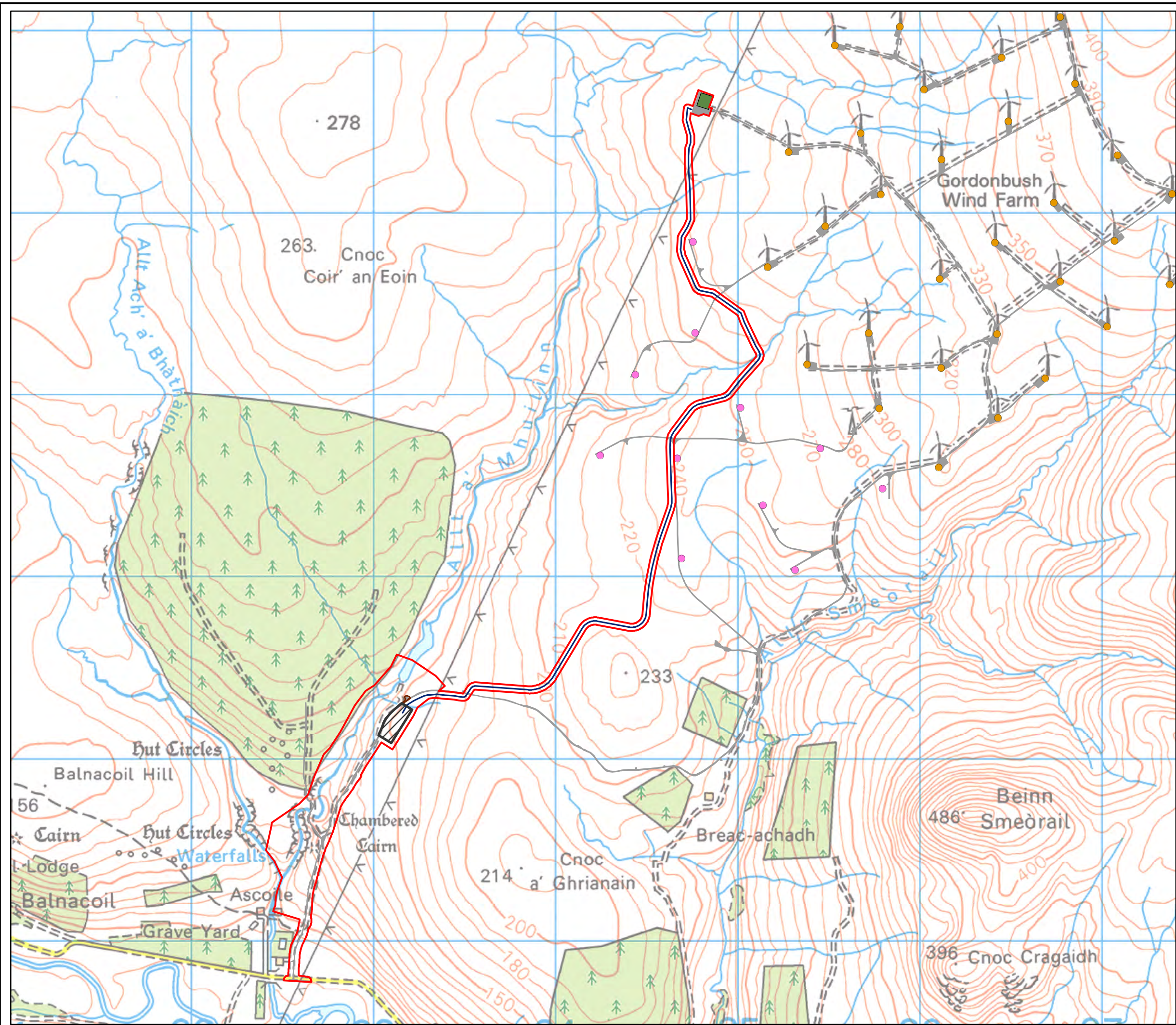


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Figure 1
Location Plan

Gordonbush Wind Farm Extension:
Proposed Green Hydrogen Facility



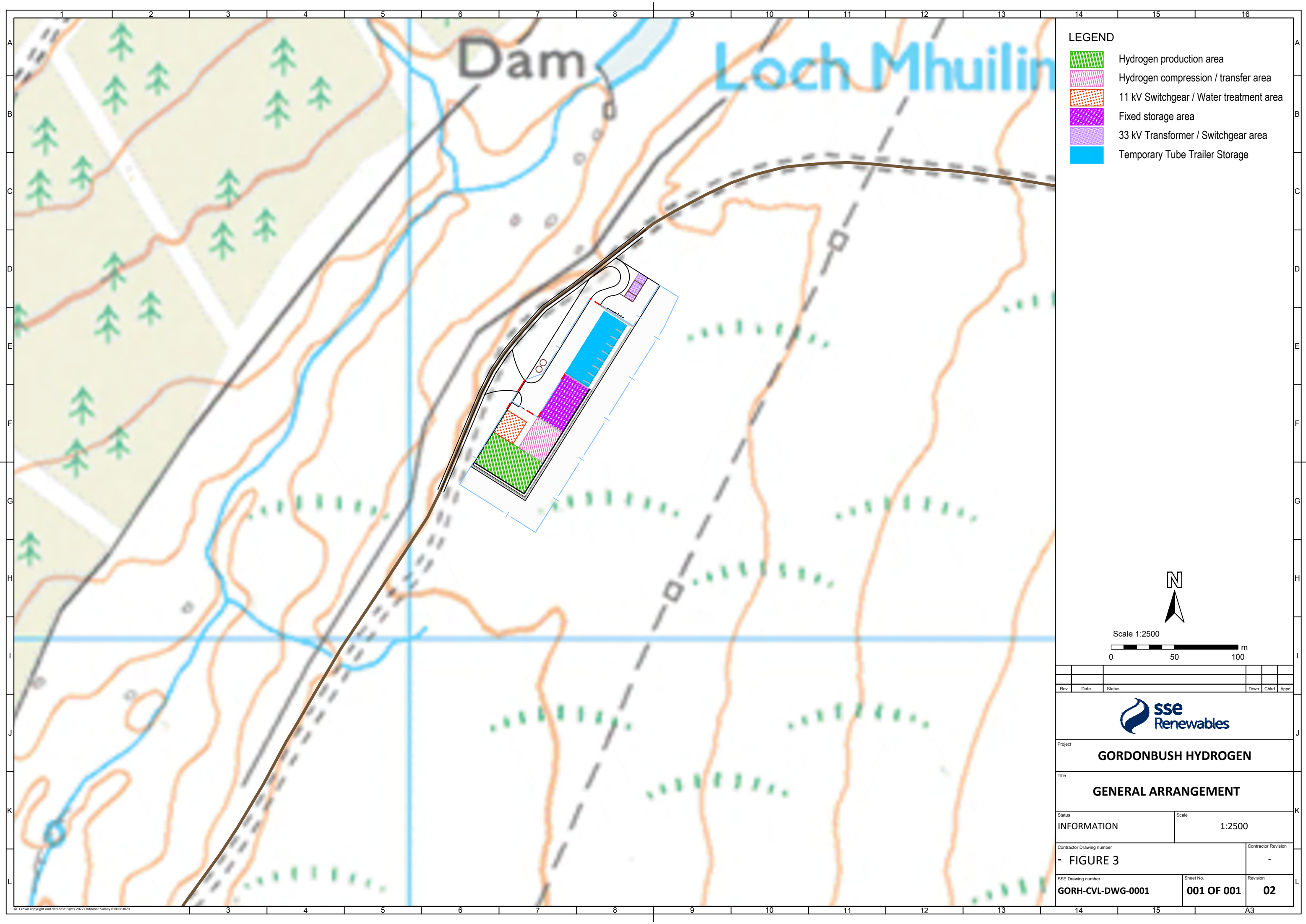
- Key**
- Site Boundary
 - Proposed Hydrogen Facility
 - Proposed Underground Cable
 - Proposed Construction Compound
 - Existing Substation
 - Existing Access Track
 - Existing Gordonbush Wind Farm Turbine
 - Existing Gordonbush Wind Farm Extension Turbine

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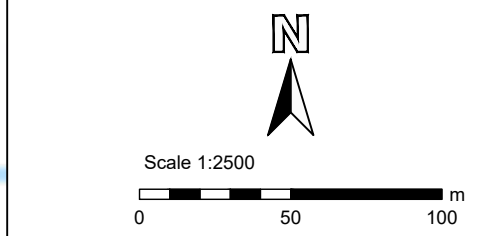
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Figure 2
Proposed Development

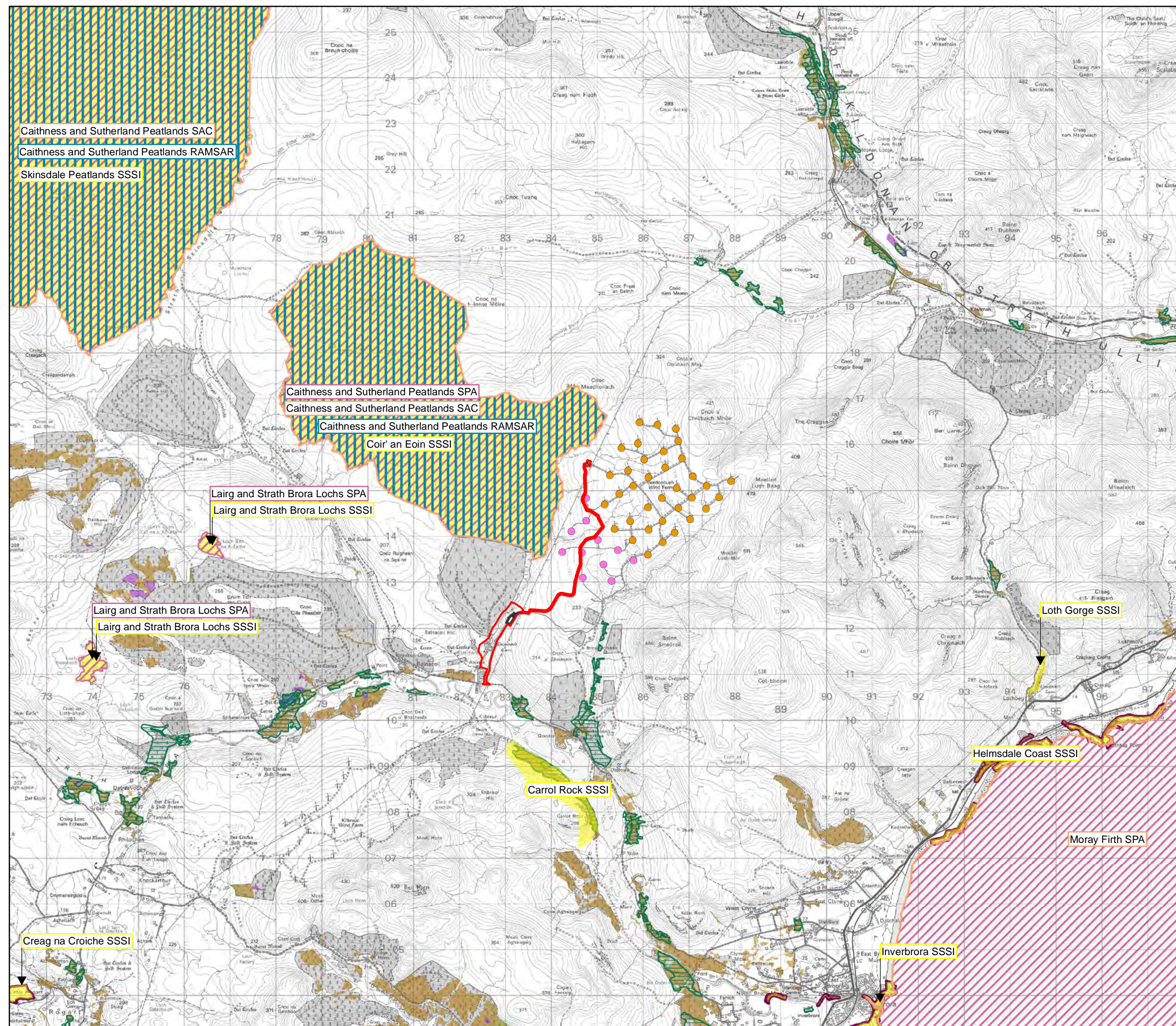
Gordonbush Wind Farm Extension:
Proposed Green Hydrogen Facility



- LEGEND
- Hydrogen production area
 - Hydrogen compression / transfer area
 - 11 kV Switchgear / Water treatment area
 - Fixed storage area
 - 33 kV Transformer / Switchgear area
 - Temporary Tube Trailer Storage



Rev	Date	Status	Drwn	Chkd	Appd
					
Project GORDONBUSH HYDROGEN					
Title GENERAL ARRANGEMENT					
Status INFORMATION			Scale 1:2500		
Contractor Drawing number - FIGURE 3				Contractor Revision -	
SSE Drawing number GORH-CVL-DWG-0001			Sheet No. 001 OF 001	Revision 02	



Key

- Site Boundary
- Proposed Hydrogen Facility
- Proposed Underground Cable
- Proposed Construction Compound
- Existing Substation
- Existing Access Track
- Existing Gordonbush Wind Farm Turbine
- Existing Gordonbush Wind Farm Extension Turbine

Ecological and Geological Designations

- Special Area of Conservation (SAC)
- Special Protection Area (SPA)
- Site of Special Scientific Interest (SSSI)
- Ramsar Wetland of International Importance
- Geological Conservation Review (GCR)
- Site Included on the Inventory of Ancient Woodland (AWI)

Native Woodland Survey of Scotland (NWSS)

- Native Woodland
- Nearly-native Woodland
- Open Land Habitat
- PAWS

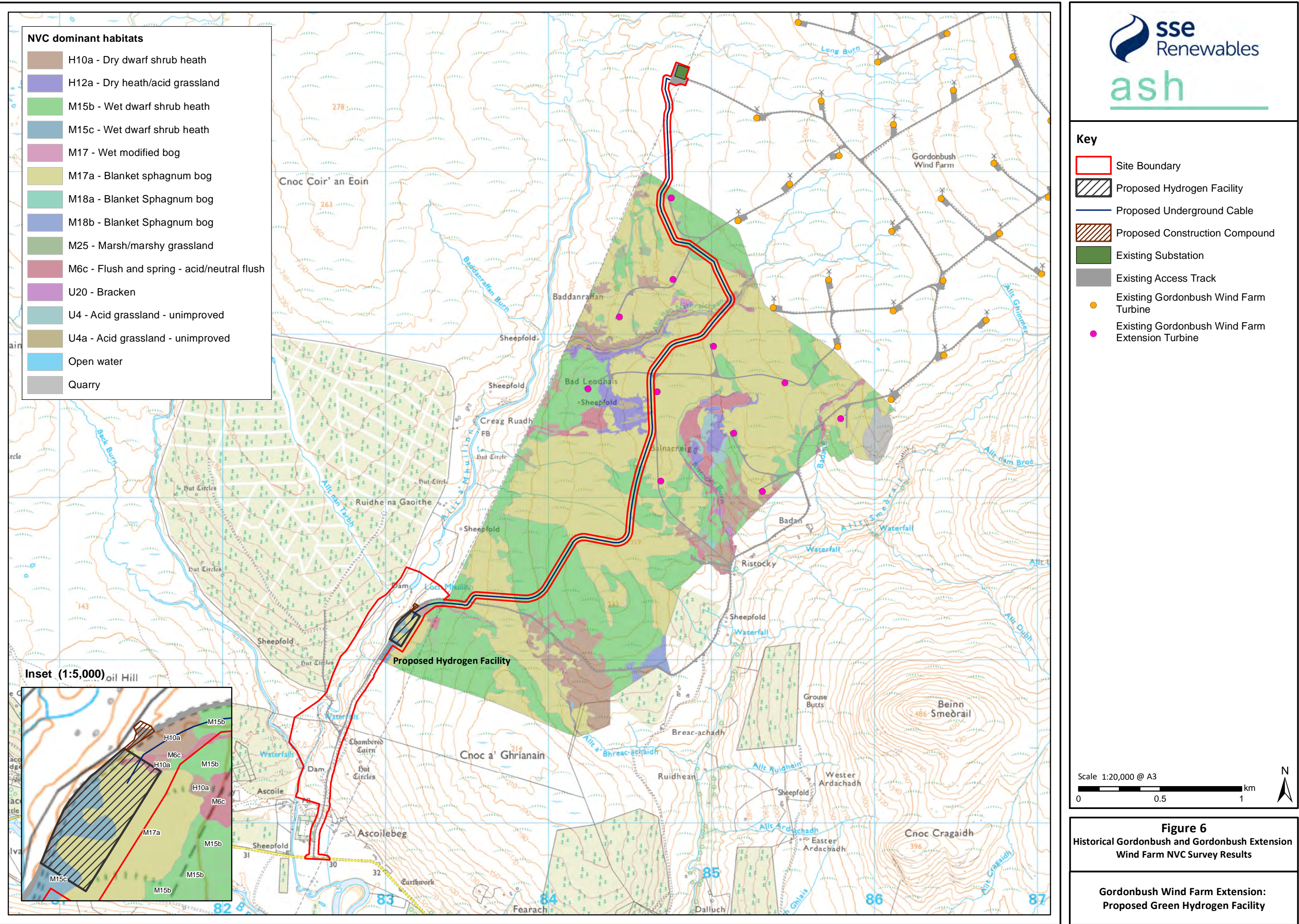
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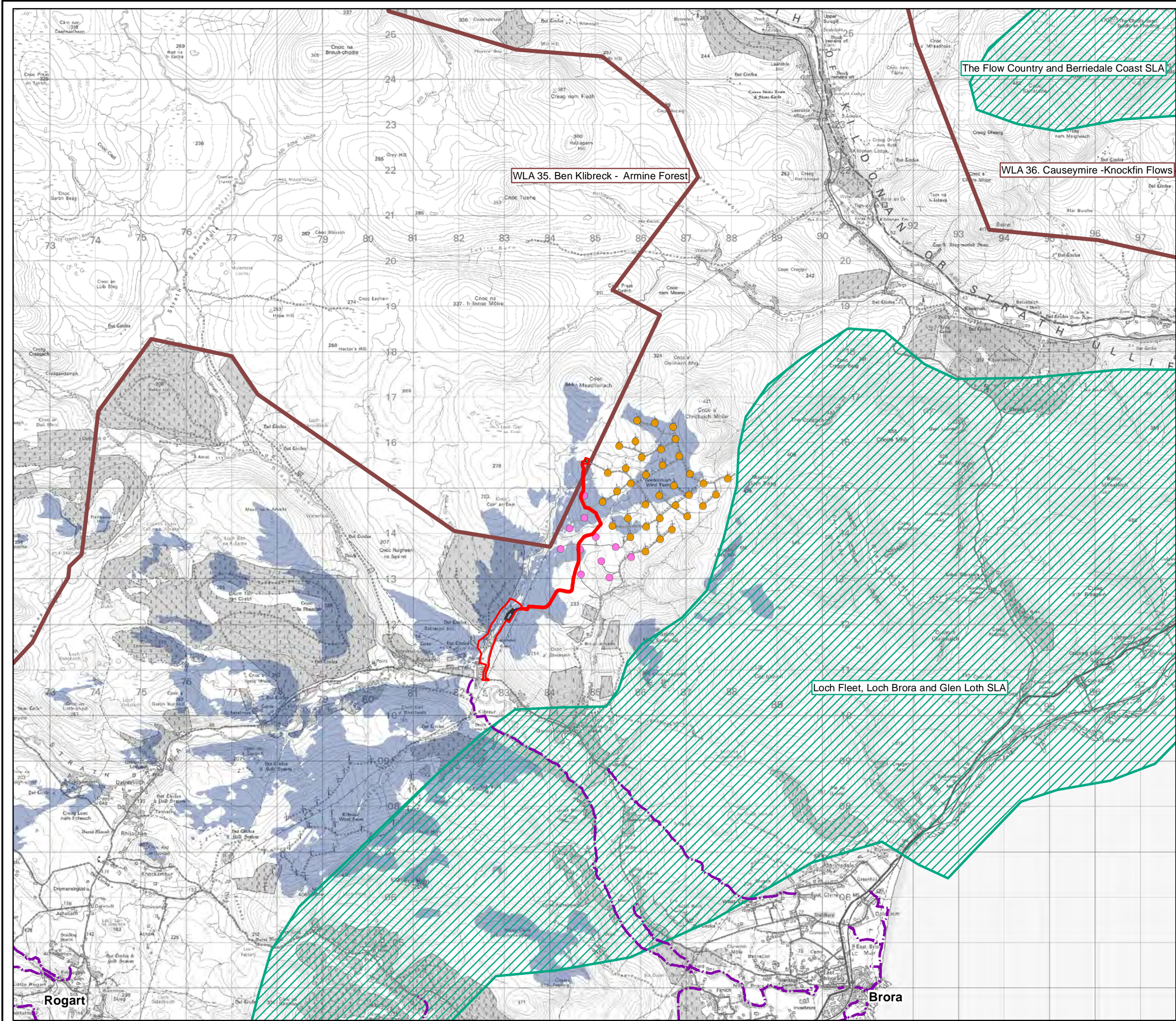
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Figure 4
Natural Heritage Designations

Gordonbush Wind Farm Extension:
Proposed Green Hydrogen Facility





- Key**
- Site Boundary
 - Proposed Hydrogen Facility
 - Proposed Underground Cable
 - Proposed Construction Compound
 - Existing Substation
 - Existing Access
 - Existing Gordonbush Wind Farm Turbine
 - Existing Gordonbush Wind Farm Extension Turbine
 - Zone of Theoretical Visibility (ZTV)
- Landscape and Visual Constraints**
- Special Landscape Area (SLA)
 - Wild Land Area (WLA)
 - Core Path

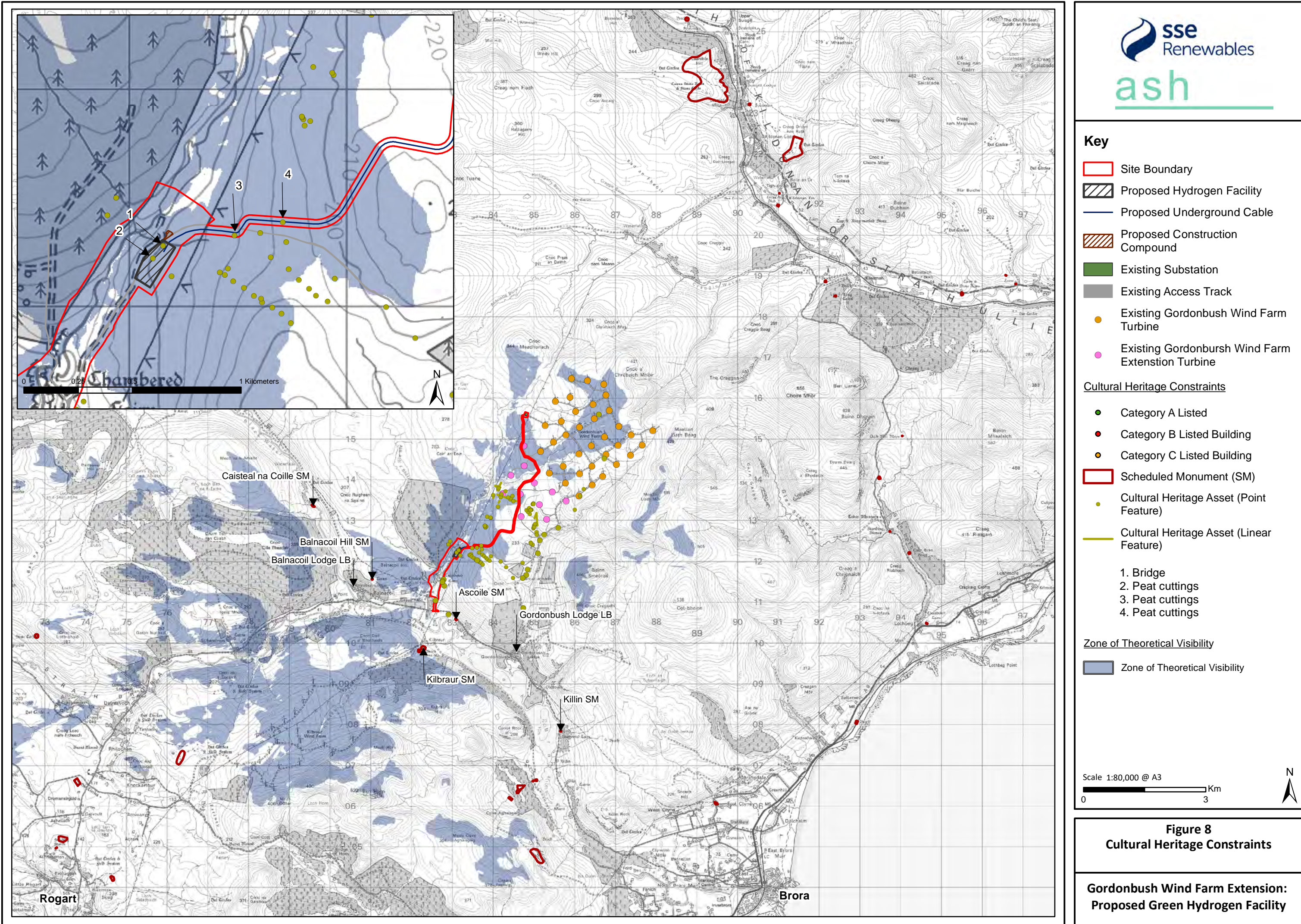
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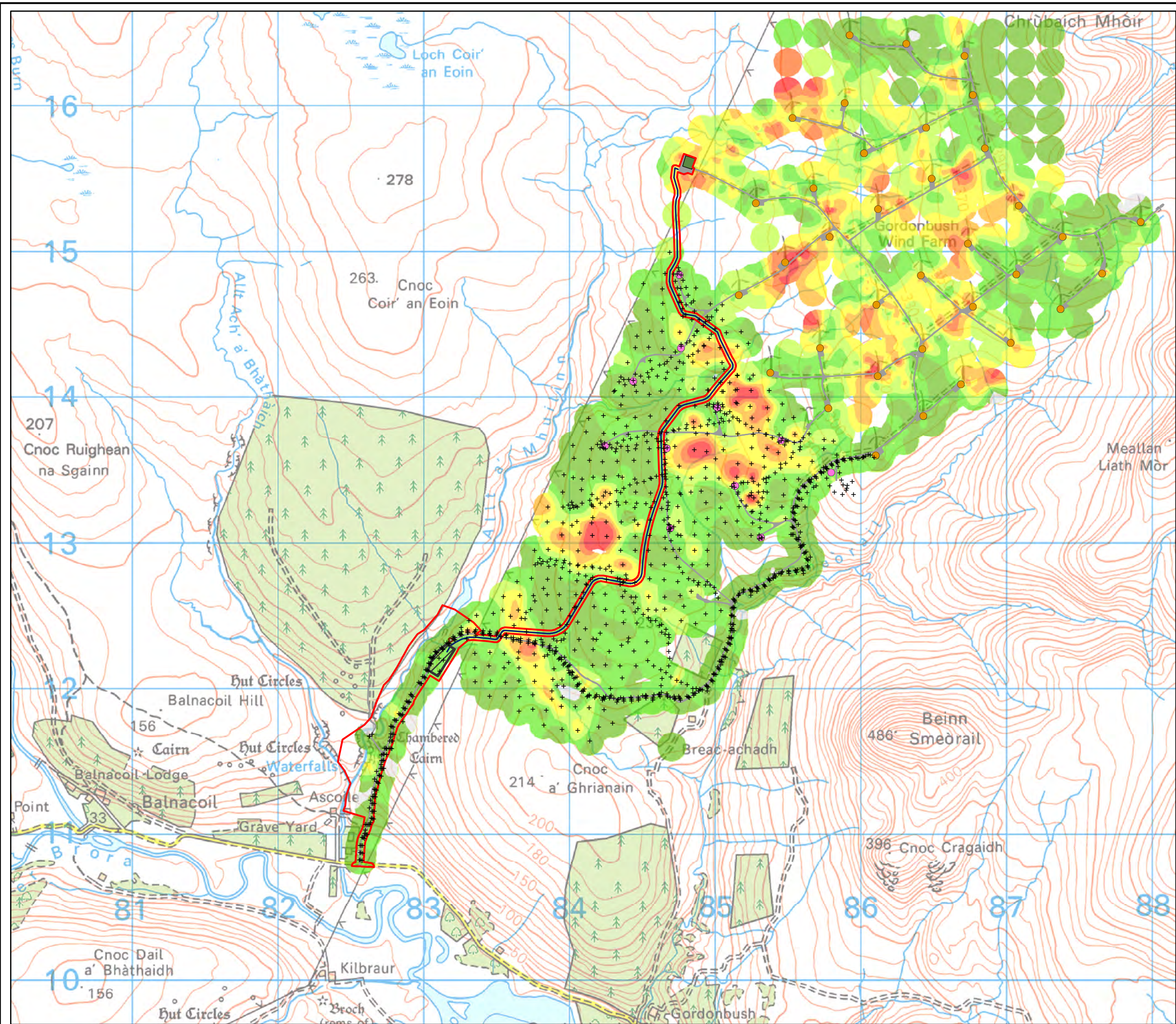
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Figure 7
Landscape and Visual Constraints

Gordonbush Wind Farm Extension:
Proposed Green Hydrogen Facility





Key

- Site Boundary
- Proposed Hydrogen Facility
- Proposed Underground Cable
- Proposed Construction Compound
- Existing Substation
- Existing Access Track
- Existing Gordonbush Wind Farm Turbine
- Existing Gordonbush Wind Farm Extension Turbine

Peat Depth (m)

- 0
- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 2
- 2 - 2.5
- 2.5 - 3
- >3

Scale 1:25,000 @ A3
0 0.5 Km



Figure 9
Peat Depths

Gordonbush Wind Farm Extension:
Proposed Green Hydrogen Facility