

PROPOSED GREEN HYDROGEN FACILITY

Screening Request and Outline Scope
of Assessment Work

March 2022



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1. Introduction

1.1. PURPOSE OF THIS REPORT

This report is a formal request for an Environmental Impact Assessment (EIA) Screening Opinion under the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017, hereafter referred to as the 'EIA Regulations'.

SSE Generation (SSE), hereafter referred to as 'the Applicant', intends to submit an application for planning permission under the Town and Country Planning (Scotland) Act 1997 (as amended) to construct a Green Hydrogen production facility (referred to as 'The Proposed Development').

It is our view, with appropriate design, application of appropriate mitigation and the application of best practice measures, the Proposed Development is unlikely to lead to any significant environmental effects and accordingly should not be considered EIA development, as explained in this report and thus would not be subject to an EIA and the preparation of an EIA Report.

However, an appropriately scoped Environmental Appraisal (EA) detailing the results of surveys, and any appropriate mitigation, would accompany the planning application. This report sets out the proposed scope of assessment that would be covered in the EA. The results of the EA would be submitted to The Highland Council (THC) and Statutory Consultees.

1.2. REQUIREMENTS FOR AN EIA SCREENING REQUEST

The Proposed Development falls within Schedule 2, Section 3(c) as an Industrial Installation that exceeds 2 hectares (Ha). It is the determining authority's responsibility, in this case THC, to provide a screening opinion on whether an EIA is necessary for such developments.

The EIA Regulations set out under Regulation 8(2) that a request for a screening opinion must be accompanied by the following documentation:

- A description of the characteristics of the proposed development (Section 2 of this Report);
- A description of the location of the proposed development (Section 3 of this Report); and
- A description of the aspects of the environment likely to be significantly affected by the proposed development (Section 4 of this Report).

Regulation 8 of the EIA Regulations requires that the relevant criteria set out in Schedule 3 be taken into account during EIA Screening.

2. The Characteristics of the Proposed Development

2.1. THE PROPOSED DEVELOPMENT

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**.

2.1.1. THE PROCESS

The facility would produce hydrogen via the proven method of Alkali 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. The alkali electrolyte at the Proposed Development is proposed to take the form of a solution, typically lye.

2.1.1.1. Infrastructure

The Proposed Development would consist of an electrolyser system producing around 2000 tonnes of Hydrogen gas per annum. The area of the site would extend to 1.87 Ha, based on the site platform of approximately 217 metres (m) x 67 m. The initial indicative layout of the facility is set out in **Figure 3** and would involve the following infrastructure:

- containerised units for the electrolysers;
- 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 electrolysers at 5.2 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

2.1.1.2. Electricity

Electricity required for the electrolysis process would be sourced from Gordonbush Wind Farm Extension. The arrangement of using surplus electricity from the wind farm 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.

The electrolyzers would be connected to the wind farm via underground cables. There are currently two cable route options being considered by the Applicant, as illustrated on **Figure 2** and described below:

- **Cable Route Option 1:** This option would involve two separate cables initially being routed alongside the existing access track before turning in a north-easterly direction to take a more direct route across open ground. As the cables approach a section of access track near the wind farm extensions Lidar, the cable would diverge; each cable would run alongside the existing access track to connect into separate circuits of the wind farm extension. The total length of this route option would be 5.5 km.
- **Cable Route Option 2:** This option would involve two separate cables running alongside the existing access track. As the track diverges at Ristocky so too would the cables, with one cable being routed in a north-westerly direction and the other in a north-easterly direction, remaining alongside the tracks prior to connecting into separate circuits of the wind farm extension. The total length of this route option would be 7 km.

Two options of installing the underground cable are currently being considered by the Applicant; via cable ploughing technique (see **Plate 2**) or 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

2.1.1.3. Water Supply

The hydrogen facility would require approximately 112 m³ of water per day. Adequate water supply has been confirmed at the site for the hydrolysis process. This would be from borehole(s) that would be located within the footprint of the facility. The Applicant is currently carrying out investigations to confirm the most appropriate option for the Proposed Development.

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

The potential for the proposed process to produce discharge will be confirmed as part of the design process. Appropriate management and disposal of discharge will form part of the plant design.

2.1.1.4. Hydrogen Production

During peak production of the electrolyser scheme, it is anticipated that approximately 8 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.

It is anticipated that there would be deliveries 6 days per week (Monday to Saturday) and 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 there would be up to 8 collections per day during these hours.

2.1.1.5. Temporary Construction Compound

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

2.1.1.6. Borrow Pit

Stone required during construction of the hydrogen facility compound, is expected to be obtained from an existing borrow pit which was utilised for the existing wind farms (as shown on **Figure 2**).

2.2. 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 electrolysers and associated equipment
- Commissioning

2.3. ACCESS DURING CONSTRUCTION

It is proposed that construction 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 The Highland Council, 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

2.4. PROGRAMME

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.

2.5. USE OF NATURAL RESOURCES

2.5.1. LAND

The proposed Green Hydrogen Facility would be entirely located on land previously disturbed and recently reinstated with the anticipated land take being approximately 1.87 ha.

The Proposed Development may give rise to effects on biodiversity, either through habitat loss or proximity to protected species. This is discussed further in Section 4.

2.5.2. WATER

The electrolyser facility would require approximately 112 m³ of water per day.

The source of water supply for the hydrogen process would be sourced from a borehole(s) that would be located within the footprint of the facility. The Applicant is currently carrying out investigations to confirm the most appropriate option for the Proposed Development.

The water supply would also facilitate toilet facilities and a sink for the use by maintenance staff, as the facility would not be permanently manned.

3. The Location of Development

3.1. SITE LOCATION

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, as shown on

Figure 1, would be located within the site boundary of Gordonbush Wind Farm Extension, which became operational in 2021.

The Green Hydrogen Facility and temporary construction compound would be located to the south-west of the turbines on land that was formerly used as the temporary construction compound during construction of the wind farm development. This area has since been reinstated.

It is anticipated that existing infrastructure from the operational wind farms would be utilised for the Proposed Development, including the existing access tracks and a reinstated borrow pit.

Figure 4 and **Figure 7** shows the Proposed Development in relation to any statutory and non-statutory designations.

4. Characteristics of the Potential Impact

4.1. INTRODUCTION AND BACKGROUND

4.1.1. INTRODUCTION

This section of the report sets out a review of the Proposed Development against environmental sensitivities as identified within Schedule 3 of the Regulations.

4.1.2. SITE BACKGROUND

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

Both wind farm developments are located on Gordonbush Estate. To mitigate the predicted effects on the natural heritage assets of the Estate, each development committed to preparing a Habitat Management Plan (HMP) as part of the planning consent. However, given the proximity of the developments to one another and to ensure the Estate is managed effectively, the HMPs have been combined into one strategy¹. Post construction bird monitoring work for the extension is also being captured under the Combined HMP.

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 Environmental Appraisal for the Proposed Development.

Sections 4.2 to 4.11 set out below, reviews the Proposed Development against baseline findings previously identified across the site, to be able to consider the potential for significant effects.

4.2. TERRESTRIAL ECOLOGY

4.2.1. 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 and updated Gordonbush Estate Combined Habitat Management Plan 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.

4.2.1.1. 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

¹ Gordonbush Estate Combined Habitat Management Plan, February 2021

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 a number of 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.

4.2.1.2. 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.

4.2.1.3. 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 show 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 associated species that are able to colonise 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 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 cabling routes of the Proposed Development will be ground truthed to assess the robustness of the 2013 survey data.

4.2.1.4. 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 areas 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. No evidence of freshwater pearl mussel (FWPM) have been recorded along the watercourses in proximity to the Gordonbush Wind Farms, however 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 populations of unknown FWPM might exist in these watercourses.

4.2.2. 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 none-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 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, but 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 will be using for forage as part of a wider territory. Mitigation to reduce the risk to road related fatalities would be implemented through a Species Protection Plan which would

include limiting traffic during crepuscular and nocturnal periods when otters are most active, and implementing a speed limit along roads 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 development, and as such, the effects to habitats would be reduced. Depending on the proposed route of the Proposed Development's cables, these could also have a direct effect on the habitats present 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 discussed, and the potential residual effects to ecological receptors identified.

4.2.3. PROPOSED SCOPE OF ASSESSMENT WORK

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 250m 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 accuracy 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 the CIEEM guidance, the purpose of the assessment will be to focus on those features that are most likely to be affected. These are termed Important Ecological Features (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 IEF 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 would be 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 associated with the construction and operation of the Proposed Development on IEF. 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 to 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.

4.3. ORNITHOLOGY

4.3.1. 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.

4.3.1.1. 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: black-throated diver; golden eagle; golden plover; hen harrier; merlin; red-throated diver; 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 wigeon. 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.

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.

4.3.1.2. Habitats

Baseline habitat data are available for the Site as described in Section 4.2. The small scale of the Proposed Development footprint means that loss of habitat is not anticipated to have a significant effect on IOFs.

4.3.1.3. 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 any 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. 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.

4.3.2. 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 have the potential to generate significant negative effects on IOFs.

4.3.3. PROPOSED SCOPE OF ASSESSMENT WORK

Given the extensive baseline dataset covering the Site that can be drawn upon, 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 (as set out above), rather than to consider effects upon every feature that may be present, many of which will be common and widespread species.

The likely impacts of the Proposed Development will be identified, including likely positive and negative impacts on the IOFs present. 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 during the construction and operational stages. Those for decommissioning would 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 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 ecological enhancement will be considered, in liaison with stakeholders.

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.

4.4. LANDSCAPE CHARACTER AND VISUAL AMENITY

4.4.1. 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 – Dounreay 275kV overhead transmission line crosses the estate along its western boundary.

4.4.1.1. 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 electrolyzers lying within 2km 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 and adjacent to the existing substation, 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 The Highland Council in its document 'Assessment of Highland Special Landscape Areas', 2011.

4.4.1.2. 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 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 Facility.

4.4.1.3. 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 electrolyzers, being the tallest plant at 5.2 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.

4.4.2. 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.

4.4.3. PROPOSED SCOPE OF ASSESSMENT WORK

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.

4.4.3.1. 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.

4.4.3.2. 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:

4.4.3.3. 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 electrolyzers, as these are the tallest plant within the Proposed Development, is included as **Figure 7**.

4.4.3.4. 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.

4.4.3.5. 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.

4.4.3.6. Items to be Scoped out of the LVIA

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 with 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.

4.5. WATER, GEOLOGY AND SOILS

The geology, soils, and water environment (hydrology and hydrogeology) 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 and soils in support of the Proposed Development.

4.5.1. BASELINE FINDINGS

4.5.1.1. 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 2km of the site.

4.5.1.2. 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 areas 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 8**).

4.5.1.3. Hydrogeology

The bedrock beneath the site is impermeable, and generally without groundwater except in the near surface weathered zone and secondary fractures.

Groundwater will be present as perched groundwater within more permeable horizons (sands and gravels) of the Glacial Till and within weathered zones, fractures or fault zones within the bedrock. 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.

4.5.1.4. 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).

4.5.2. 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 Construction and Environmental Management Plan (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.

4.5.2.1. 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.

4.5.2.2. 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.

4.5.2.3. Hydrology and Flood Risk

Given the location of the Proposed Development it is not likely that there would be any significant effects on watercourses, flood risk, private water supplies or licensed water users during construction or operation of the Proposed Development.

The existing CEMP and method statements provide comprehensive details and procedures to manage the quality of surface water runoff from development 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.

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.

4.5.2.4. Hydrogeology

Published information and previous construction campaigns have confirmed that significant groundwater resources are not present beneath the site and thus will not be intercepted by the Proposed Development.

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

No significant effects on hydrogeology (water level, quality or yield) are anticipated during construction or operation of the Proposed Development

4.5.3. PROPOSED SCOPE OF ASSESSMENT WORK

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 Peat Management Plan (PMP) 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. A draft PMP would be included within the EA.
- 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.

- Assessment of potential cumulative or in-combination effects.

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 EA and measures that would be used to control the rate and quality of runoff will be specified in the CEMP.
- Water Quality Monitoring. Classification data is available from SEPA for the watercourses at site and there are no known sources of potential water pollution that might give rise for the need for water quality monitoring as part of the EA. The assessment might conclude that water quality monitoring is required prior to, during and post construction if the project were it to be granted planning permission, and this would be specified in the site CEMP.
- Detailed Assessment of Water Abstraction and Discharge associated with the Hydrogen facility. Any water abstraction required for the hydrogen facility and discharge of water from the hydrogen facility would be regulated by SEPA in accordance with the Controlled Activity Regulations. Authorisation for these activities would be sought from SEPA following grant of any planning permission. Details of required water abstraction and discharge will, however, be presented in the EA.

4.6. TRAFFIC AND TRANSPORT

4.6.1. 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. As such, it is considered that both 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 current Covid 19 restrictions are influencing 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 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.

4.6.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

4.6.2.1. 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).

4.6.2.2. 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 8 collections per day (i.e. a total of 16 trips per day – 8 inbound and 8 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 trips associated with the operation of the proposed Development are expected to be intermittent/infrequent associated with routine maintenance and repair work.

The predicted level of traffic is minimal and equates to less than two 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.

4.6.3. PROPOSED SCOPE OF ASSESSMENT WORK

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, updated 2020);

- 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 Sustainable Access 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 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, Clynelish Distillery Road and C6 Strath Brora Road.

It is proposed that Department for Transport (DfT) data for the A9 in 2021 and the 2014 local traffic data used as part of the Gordonbush Wind Farm Extension EIA would be used to calculate baseline traffic flows for the Proposed Development. National Road Traffic Forecast (NRTF) Low Traffic Growth assumptions would be used to provide a common future year baseline to coincide with the expected peak level of construction traffic.

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 three-year period.

4.7. CONSTRUCTION AND OPERATIONAL NOISE AND VIBRATION

4.7.1. 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 4.7.1 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 4.7.1 below.

Table 4.7.1: 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
Notes [1] by reference to Keepers Cottage [2] by reference to Ascoile		

4.7.2. 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 has been used to corroborate the analysis.

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

- Construction noise associated with the installation of the hydrogen production process plant 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”*;
- Construction vibration (excluding rock blasting) is considered to be not significant based on the distances involved; and
- Construction noise and vibration from rock blasting operations can be significant in some cases. In this instance, the intended borrow pit is in the order of 2600 m from the nearest receptor of Ascoile, and therefore associated effects in terms of vibration and air overpressure are likely to be negligible at these receptors. Blasting is a regulated process requiring a separate approval to be sought from the mineral planning authority. The scheme for approval will include mitigation in the form of restricted hours for blasting. The expected blasting operations would be no different to that already conducted for the Gordonbush Wind Farm Extension. Considering the above, it is unlikely to be significant when managed and is temporary during the construction stage.

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 findings are listed below:

- The proposed hydrogen process plant is in the order of 1150m from Ascoile, the nearest sensitive receptor. The potential for significant effects from operational noise from the proposed plant is likely to be not significant, given the separation distances. The advice received from THC during pre-application consultation was *‘Environmental Health advise that given the separation distances from houses, operation noise is unlikely to be an issues and can be scoped out of further assessment’*;
- Operational road traffic is expected to be up to eight 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 process plant 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 plant itself will be vibration sensitive and will be designed to run in an optimal manner.

4.7.3. PROPOSED SCOPE OF ASSESSMENT WORK

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 assessment:

- 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); 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 six sensitive receptor locations as listed in Table 4.7.1 above.

A Framework Construction Traffic Management Plan will be produced and submitted with the EA. 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;
- Temporary rock blasting noise and vibration;
- Operational hydrogen processing plant and compound activities; and
- Operational vibration.

4.8. CULTURAL HERITAGE

4.8.1. BASELINE FINDINGS

4.8.1.1. 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 7**). 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), Balnacoil Hill (cairn), Kilbraur (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 Balnacoil Lodge (B Listed).

None of these designated sites would receive theoretical visibility of the Proposed Development (see **Figure 7**).

4.8.1.2. 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), with the majority being identified of local significance and two sites of regional significance, as shown on **Figure 7** and as follows:

- Green Hydrogen Facility:
 - Local Importance: Allt a'Mhuilinn (MHG31737), peat cuttings. 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.
- Cable Option 1 (Access Track):
 - Local importance: Allt a'Mhuilinn (MHG31738), bridge; Cnoc a'Ghrianain (MHG31864, MHG31866), peat cuttings; and Allt a'Bhreac-achaidh (MHG318740), Fox's earth.
 - Regional importance: Breac-achadh (MHG31943), clearance cairns
- Cable Option 2 (Cross Country):
 - Local importance Cnoc a'Ghrianain (MHG31862 and MHG31865) peat cuttings
 - Regional importance: Ristocky Burn, clearance cairns

4.8.2. 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 cultural heritage assets, but these would mostly be of sites identified as being of local importance. Two features, both clearance cairns were identified in the Gordonbush Wind Farm Extension EIA as being of regional importance with the potential to be directly impacted by the proposed cable routes. The final design of the cable alignment would look to avoid these assets and should this not be possible, further consultation will take place with THC Historic Environment Team.

The construction of the Proposed Development has the potential to adversely affect unknown archaeological sites and as such an appropriate Construction Environment Management Plan (see Section 5) would be put into practice, including measures to safeguard any archaeological remains that may be unearthed as part of excavation works.

4.8.3. PROPOSED SCOPE OF ASSESSMENT WORK

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 would be required. Both EIA assessments concluded that subject to

proposed mitigation measures being put in place, the effects on cultural heritage assets were assessed as being 'not significant' in the context of the EIA Regulations.

It is not considered that the Proposed Development would give rise to any additional significant effects, subject to measures being put in place such as review of assets of regional significance during detailed design stage of the cable route, and therefore we proposed to scope out any further assessment on Cultural Heritage from the EA.

4.9. 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 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).

4.9.1. BASELINE FINDINGS

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

The statutory designated conservation sites of Caithness & Sutherland Peatlands a Ramsar, Special Area of Protection (SPA) and Special Area of Conservation (SAC) and Coir' an Eoin a Site of Special Scientific Interest (SSSI) are located greater than 1km from the Proposed Development.

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 PM2.5, 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 4.9.1). 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 4.9.1: 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>

4.9.2. POTENTIAL FOR SIGNIFICANT ENVIRONMENTAL EFFECTS

4.9.2.1. 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 platforms, 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.

4.9.2.2. 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 8 HGV trips per day (16 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.

4.9.3. SCREENING OF AIR QUALITY ISSUES

4.9.3.1. 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 350m of the Site, and/or within 50m of routes used by construction vehicles, up to 500m from the site entrance(s); and/or
- ecological receptor is located within 50m of the Site, and/or within 50m of routes used by construction vehicles, up to 500m from the site entrance(s).

The closest human and ecological receptors are located greater than 1km 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. No additional mitigation is considered to be required.

4.9.3.2. 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 8 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 16 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.

4.10. 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 EA, 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 EA (see Section 4.9).

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

4.11. 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 fire, leaks and explosions. However, these risks will be factored into the design of equipment and measures will be put in place to mitigate any risk. These measures include but are not limited to:

- The design and construction of firewalls and installation of flame detectors in storage facilities to mitigate the risk of fire.
- The installation of various leak detection measures to mitigate the risk of gaseous hydrogen leaks, and 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. A comprehensive grounding system would also be installed to eliminate the risk of static charge accumulations.

The Proposed Development would be constructed and operated in accordance with relevant health and safety legislation including the Health and Safety at Work Act 1974 and the Control of 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 will be submitted to THC.

5. Description of Measures to Avoid or Prevent Significant Adverse Effects

Regulation 8(3) allows the developer to include a description of any measures to offset or prevent potential significant environmental effects.

As discussed in this report, the potential for significant effects from the Proposed Development are considered unlikely if the following measures to minimise or offset potential effects are adopted:

- Undertaking further environmental survey work to understand the potential for impacts and allow key issues to be taken into account during construction;
- A Construction Environment Management Plan (CEMP) would be developed by the successful contractor during the pre-construction phase. The principal objective of this document would be to provide information on the proposed infrastructure and to aid in avoiding, minimising and controlling adverse environmental impacts associated with the Proposed Development. Furthermore, this document will aim to define good practice as well as specific actions required to implement mitigation identified in the Environmental Appraisal, the planning process and / or other licencing or consenting processes. The CEMP would be updated during the pre-construction phase and would form part of the contract documents between the Applicant and the appointed construction contractor;
- Production of a Pollution Management Plan for both construction and operational phases of development to reduce the potential magnitude and associated effects of any pollution related events to ecological receptors;
- Preparation of Species Protection Plans (SPP) for otters;
- Advice from an ECoW, as required, on site specific issues during the construction of the Proposed Development;
- Where construction is scheduled during the nesting period (March to July inclusive) the following measures would be implemented to protect nesting birds:
 - A pre-construction survey to check whether any birds are settling to nest close to proposed construction sites, where there might be a risk of the nest being destroyed.
 - Monitoring of construction sites should be undertaken throughout the nesting season, to detect birds settling to nest on areas close to construction activity.
 - Postponement of construction activities which would risk disturbance or the destruction of a birds nest or other legally protected species, until deterrence or nest protection measures have been put in place.
 - Implementation of deterrence measures within potential construction sites to deter any such birds from settling or protection of any nests discovered. Measures include providing information to all construction personnel concerning the law relating to birds and actions to be taken if nesting birds were detected, use of scaring devices to prevent settling birds and protection of established nests and broods by marker tape, with buffer distances advise by the ECoW.
- Advice from an Archaeological Clerk of Works should anything be discovered during construction;
- Screening by mounding and native planting which will also create new habitat opportunities and enhance biodiversity to the area;
- A Construction Traffic Management Plan (CTMP) would be developed to ensure road safety for all other road users during construction works. The CTMP would be developed in consultation with the local roads authority;
- The timing of construction activities would be undertaken during daytime periods to limit disruption to the local residents;

- Site restoration measures specific to the proposal to ensure that disturbed ground is reinstated as quickly as possible on completion of the works; and
- Measures would be factored into the design to mitigate risks associated with fire, leaks and explosions.