HydroGlen

Supplementary Environmental Information Report

Client:	James Hutton Institute
Project/Proposal No:	6084
Version:	3.0
Date:	2023-12-18

Document Information

Project Name:	HydroGlen
Document Title:	Supplementary Environmental Information Report
Client Name:	James Hutton Institute
Client Contact:	A. Hester
Client Address:	The James Hutton Institute, Craigiebuckler, Aberdeen AB15 8QH
Document Status:	Final for Issue
Author:	Various
Reviewed:	C. Kenyon
Approved:	G. Spowage
Date:	2023-12-18
Version:	3.0
Project/Proposal Number:	6084
ITPEnergised Office:	4th Floor, Centrum House, 108-114 Dundas Street, Edinburgh, EH3 5DQ

Revision History

Version	Date	Authored	Reviewed	Approved	Notes
1.0	2023-12-01	AJ McDowall	C. Kenyon	G. Spowage	First Draft Client Issue
2.0	2023-12-13	AJ McDowall	C. Kenyon	G. Spowage	Second Draft Client Issue
3.0	2023-12-18	AJ McDowall	C. Kenyon	G. Spowage	Final Issue

Contents

1. Introduction

The James Hutton Institute (JHI) (hereafter referred to as 'the Applicant') is seeking to obtain planning permission to develop a proposed renewable energy development, comprising a single wind turbine (with associated infrastructure including cabling and access road route), small scale solar array and hydrogen plant with associated Battery Energy Storage System (BESS) (the 'Proposed Development' or 'HydroGlen' project) located on the Glensaugh Estate at Glensaugh, Laurencekirk, Aberdeenshire, AB30 1HB (the 'Site').

The Proposed Development is a green hydrogen demonstrator project funded by the Scottish Government's Just Transition Fund. This Supplementary Environmental Information Report (SEIR) provides an assessment of the potential effects the Proposed Development may have on a range of environmental and technical issues and has been prepared in support of the two following separate planning applications:

- Wind turbine and associated infrastructure including cabling and access route (the 'Proposed Turbine Development'); and
- Hydrogen plant, solar, BESS and electric vehicle charging development (the 'Proposed Hydrogen and Solar Development').

Although two separate planning applications, the Proposed Development comprises one singular renewable energy development assessed within this SEIR and associated technical reports. The energy created by the proposed wind turbine and solar PV array will be utilised to power the hydrogen plant which will support the power requirements of both the Glensaugh Farm and its community of seven associated households through 100% renewable energy.

2. Requirement for Environmental Impact Assessment

The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017 (as amended – hereafter referred to as 'the EIA Regulations 2017') require that before consent is granted for certain types of development, an Environmental Impact Assessment (EIA) must be undertaken. The EIA Regulations 2017 set out the types of development which must always be subject to an EIA (Schedule 1 development) and other developments which may require EIA, if they are above certain thresholds and are likely to give rise to significant environmental impacts (Schedule 2 development). The EIA Regulations 2017 provide screening criteria in Schedule 3 to give an indication as to whether a full EIA is likely to be required for Schedule 2 developments.

The Proposed Development falls under Schedule 2 of the EIA Regulations 2017 in that it is classified as an industrial installation for the production of electricity where the area of development exceeds 0.5 hectares (ha) and the hub height of the turbine exceeds 15 metres (m). A Schedule 2 development only requires EIA if it is likely to have significant effects on the environment by virtue of factors such as its nature, size or location.

A formal EIA Screening Opinion for the Proposed Development was requested from Aberdeenshire Council in March 2023. A Screening Opinion was received from Aberdeenshire Council in April 2023 (reference: ENQ/2023/0425; refer to **Appendix A**) which confirmed that the planning applications would not require to be accompanied by an EIA.

Although a full EIA is not required, it is recognised that assessment of potential environmental impacts, and identification of appropriate measures to mitigate such impacts, is an important part of the planning process. This SEIR has been prepared to provide sufficient information regarding the potential impacts of the Proposed Development (including reference to other supporting technical reports), to allow Aberdeenshire Council to consider the planning applications in full and with due consideration of planning policy.

3. Site Description

3.1 Site Status and Context

The Proposed Development is located on land within the JHI's research farm estate in Glensaugh, situated in the Grampian foothills of north-east Aberdeenshire. The Site is approximately 6.3 km north-west of the village of Laurencekirk and lies within the administrative boundary of Aberdeenshire Council at grid reference NO 67053 78193 (**Figure 3.1**).

Glensaugh was originally established as an experimental farm in 1943, comprising an area of approximately 1,000 ha. The primary land use is hill farming, which supports the research programme with innovation in land and agricultural practices, trialling and testing new farm methods, livestock and crops. The Site slopes steeply downwards north to south and is divided into strips of relatively flat grassland used to graze sheep and cattle interspersed with areas of steeply sloping banks, crossed with and bounded by stock and deer fences. The northern section of the Site (where the turbine location is proposed) is on Loch Hill which rises to 317 m above sea level. The summit of Loch Hill is relatively flat and is within an area of upland grassland and moorland. The elevation of Loch Hill is greater than that of the farm buildings and the majority of the Glensaugh Estate but lower than the neighbouring hills. The land in proximity to the farm buildings where the Proposed Hydrogen and Solar Development is to be located, comprises pasture fields and woodland. A small road follows the southern boundary of the Site and further farmland stretches south and south-west. There is no significant watercourse within the Site. A large man-made waterbody, Loch Saugh, is located in the south of the Site. A plan of the Glensaugh Estate, including the Proposed Development areas, can be found in **Figures 3.1a and 3.1b.**

The Proposed Turbine Development boundary covers an area of approximately 51 ha and is illustrated in **Figure 3.2**. The proposed turbine location is at grid reference BNG NO 367630 779983.

The Proposed Hydrogen and Solar Development covers an area of approximately two ha and is centred at BNG NO 67109 78185 and is illustrated in **Figure 3.3a and 3b**.

The closest residential properties outside the ownership of JHI but within the Glensaugh Estate are No 2 Cottage and the Old Lodge, both situated on the north side of the main road, opposite the farm entrance and approximately 500 m west of the farm entrance, respectively. There are seven residential properties within the Glensaugh Estate and under JHI ownership. A few scattered dwellings lie within 5 km to the south and east of Glensaugh Estate and the nearest settlement, Auchenblae, is located 3.7 km to the east. Residential receptors within 2 km are illustrated in **Figure 3.4**.

The Glensaugh Estate comprises a mosaic of woodland, pasture and moorland. The dominant indicative agricultural land classifications are Grade 5.3 (Land capable of use as improved grassland: few problems with pasture establishment but may be difficult to maintain) and Grade 4.1 (Land capable of producing a narrow range of crops, primarily grassland with short arable breaks of forage crops and cereal). These are both low-grade classifications.

3.2 Environmental Designations

Figure 3.5 shows the key environmental features and designations within 10 km of the Glensaugh Estate. A brief summary of these is provided below along with approximate distances from the Proposed Turbine Development and the Proposed Hydrogen and Solar Development, with full descriptions provided in the relevant technical assessments in support of this SEIR.

The Strathfinella Local Nature Conservation Site (LNCS) overlaps much of the Glensaugh Estate and is primarily designated for its geological interest but also designated for biological features such as Loch Saugh, located in the north-east of the Site.

The Site also lies within the Braes of the Mearns Special Landscape Area (SLA). An area of land designated as Ancient Woodland is located in the south-west of the Site, more than 500 m away from any proposed

development. There are no other environmental designations within the Site or the Proposed Development site boundaries.

The ecological and heritage designations situated outwith the Glensaugh Estate but within 10 km are outlined in **Table 3.1** below and illustrated in **Figure 3.5.**

Table 3-1: Environmental Designations within 10 km

Environmental Designation	Distance from Glensaugh Estate	Distance from Proposed Turbine Development	Distance from Proposed Hydrogen and Solar Development
Fasque House Garden and Designed Landscape (GDL)	~1.8 km south-west	~4.4 km south-west	~2.5 km south-west
River Dee Special Area of Conservation (SAC)	~2.4 km north-west	~5 km north-west	~6.1 km north-west
Auchenblae Conservation Area	~3.3 km east	~4.6 km south-east	~4.9 km north-east
Fettercairn Conservation Area	~3.8 km south-west	~6.6 km south-west	~4.7 km south-west
Feughside LNCS	~4.0 km north-west	~6.3 km north-west	~7.8 km north-west
Eslie Moss SSSI	~6.4 km south-west	~9.2 km south-west	~7.2 km south-west
Eslie Moss SSSI	~6.5 km south	~9.2 km south	~7.3 km south
Glenbervie House GDL	~8.1 km north-east	~9.0 km east	~9.7 km north-east
Saltire Wood LNCS	~8.1 km south-west	~10.6 km north-east	~8.8 km south-west
The Burn GDL	~8.7 km south-west	~11.1 km south-west	~9.3 km south-west
Gannochy Gorge Site of Special Scientific Interest (SSSI)	~8.8 km south-west	~11.2 km south-west	~9.6 km south-west
Glen Esk Geological Conservation Review Site (GCRS)	~8.9 km south-west	~11.1 km south-west	~9.5 km south-west
North Esk River GCRS	~9.2 km south-west	~11.7 km south-west	~9.9 km south-west
West Bradieston and Craig of Garvock SSSI	~9.6 km south-east	~12 km south-east	~10.5 km south-east
Arbuthnott House GDL	~10.5 km south-east	~11.4 km south-east	~11.3 km south-east

Additional heritage designations include five Scheduled Monuments and three Listed Buildings within 2 km, with 28 Scheduled Monuments and 230 Listed Buildings up to 10 km. Scheduled Monument, 'Kincardine Deer Dyke and Settlements N of Burn of Garrol', is located approximately 620 m south-west of the Proposed Hydrogen and Solar Development whilst Clatterin Bridge Over Devilly Burn Category B Listed Building is located approximately 500 m west (2.1 km south-west of the proposed turbine location). 'Glensaugh, farmstead and field system 900 m NW of' is the closest Scheduled Monument to the proposed turbine location, located approximately 1.4 km south-west.

There are also several areas listed on the Ancient Woodland Inventory as illustrated in **Figure 3.5** within 10 km. There are no known existing or proposed Core Paths within or adjacent to the Site.

3.3 Cumulative Developments

The Site currently generates renewable power through a 50 kW wind turbine, 50 kW of installed roof solar photovoltaics (PV) and a 70 kW biomass boiler.

Further afield, a review of the area including recent planning history has identified eight wind developments within 10 km of the proposed turbine location, either in operation or in planning. Other than the single small operational turbine within the Glensaugh Estate, none are within 5 km of the Proposed Turbine Development, as summarised in **Table 3.2** and illustrated in **Figure 3.6**.

Table 3-2: Cumulative Wind Developments within 10 km

Site Name	Number of Turbines	Status	Output generation	Approximate Distance & Direction from Site
Glensaugh	1	Operational	50 kW	Within the Glensaugh Estate, 1.5 km north-west of proposed turbine location
West Cairnberg	1	Operational	500 kW	5.2 km south-east
Herscha Hill (including extension)	3	Operational	800 kW	5.3 km east-northeast
Fordoun Sawmill	1	Operational	900 kW	7.5 km south-east
Mid Hill I	33	Operational	75.9 MW	7.1 km north-east
Mid Hill – Phase II	8	Operational	18.4 MW	7.1 km north-east
Droop Hill Wind Farm	2	Operational	4.6 MW	8.2 km north-east
Brighton Farm	1	Operational	850 kW	9.1 km south
Jacksbank Wind Farm (Glenbervie)	3	Operational	6.8 MW	9.5 km north-east

No operational ground solar PV, Hydrogen or BESS developments have been identified within 5 km of the Proposed Development.

4. Proposed Development

4.1 Background

The Proposed Development (the HydroGlen project) is a green hydrogen-powered farming community demonstrator project based at the JHI's research farm in Glensaugh, Aberdeenshire. The HydroGlen project is funded by the Scottish Government's 'Just Transition Fund' which supports projects in the Northeast and Moray that contribute to the region's transition to net zero.

Green hydrogen is made by using clean electricity from surplus renewable energy sources, such as solar or wind power, to electrolyse water. The electrolyser produces hydrogen by splitting water into its constituents (hydrogen and oxygen) using electrolysis, a process that induces a chemical reaction using a direct electric current (provided from a renewable electricity source). In the process of creating green hydrogen, the hydrogen is collected and stored for use whilst the oxygen can be either captured and used for other processes or it can be emitted to the atmosphere with no negative effect.

The Proposed Development will be based around the conversion of the existing farm and associated residential community to become 100% renewable energy powered, supplying all heating, transport fuel and energy needs with a focus on the electrolytic production and storage of green hydrogen as an energy store, carrier and transport fuel - making the most out of the potentially intermittent renewably-generated electricity. The development of renewable electricity generation and hydrogen will support the power requirements of both the farm and its community of seven associated households. Glensaugh's energy requirements include residential and commercial loads as well as the needs of planned electric vehicles and hydrogen-powered vehicles.

HydroGlen will play an important role in demonstrating how farming communities can contribute to the energy transition through green hydrogen production and use, representing a significant step for this sector in addressing the UK's net-zero goals.

The Proposed Development will offer the first-of-a-kind demonstration of this particular combination of renewable energy generation (solar and wind) and storage (BESS and hydrogen) technologies as part of a microgrid. Renewably produced green hydrogen offers an exciting and innovative opportunity to help agricultural and rural isolated communities meaningfully contribute to net-zero targets.

The indicative Proposed Development Site layout, including associated infrastructure, is illustrated in **Figure 3.2, 3.3a** and **3.3b** and described below.

4.2 Proposed Development Description

There are two separate areas at the Glensaugh Estate proposed to be developed. The first development area relates to the main Glensaugh Farm campus and surrounding agricultural fields to the east, where the Proposed Hydrogen and Solar Development will be located (**Figure 3.1a**).

The Proposed Turbine Development is located on Loch Hill, within the Glensaugh Estate and approximately 2 km north of the Proposed Hydrogen and Solar Development (**Figure 3.1b**).

The Proposed Turbine Development and the Proposed Hydrogen and Solar Development are being applied for by way of separate planning applications. Together, they form the Proposed Development which is described and assessed within this SEIR and supporting technical reports.

The Proposed Development comprises the following distinct elements:

- The Proposed Turbine Development:
    - A single wind turbine with an anticipated installed capacity of up to 1 MW, a proposed maximum hub height of 50 m and maximum tip height of 76 m with associated access track and cable;

- The Proposed Hydrogen and Solar Development:
    - A green hydrogen production facility with electrolyser stack, fuel cell (expected capacity 100-200 kW, subject to final design) including a hydrogen storage facility and associated Battery Energy Storage System (BESS) facility, and hydrogen vehicle fuelling station;
    - A small-scale mix of ground and/or roof mounted solar array with a maximum installed capacity of 210 kW; and
    - On-site electric vehicle charging facilities.

4.2.1 Proposed Turbine Development

4.2.1.1 Turbine and Turbine Foundations

The Proposed Turbine Development will comprise the construction and operation of one turbine with a maximum ground to blade tip height of 76 m and associated infrastructure. The total installed capacity of the proposed wind turbine would be a maximum of 1 MW.

The specific turbine manufacturer and model has not yet been selected as this will be subject to a pre-commencement tendering exercise and will be confirmed post consent. Therefore, for the purposes of the assessment, maximum turbine dimensions and operational attributes have been established using the Vestas V-52 as a candidate turbine model for the development scenario.

The turbine parameters for the Proposed Development will be one turbine with a maximum overall height (to blade tip) of 76 m and an indicative hub height of 50 m. The rotor diameter will be 52 m (refer to **Figure 4.1**). These dimensions are indicative and final turbine dimensions will be determined based upon final assessment including turbine availability and procurement prior to construction. The tip height of the chosen turbine will not exceed a blade tip height of 76 m. Given this committed maximum turbine capacity and tip height, and the range of turbine models likely to be available and suitable for the local wind conditions, there is considered to be no potential for the significance of environmental effects to be greater than as assessed based on the candidate turbine model. It is anticipated that confirmation of the final selected turbine dimensions will be required by a suitably worded planning condition.

The British National Grid coordinates denoting where the turbine is proposed to be located are listed in **Table 4.1**.

Table 4-1: Wind Turbine Coordinates

Turbine	X-Coordinate	Y-Coordinate
T1	367630	779983

The turbine comprises the following components:

- Blades;
- Tower;
- Nacelle;
- Hub; and
- Transformer and switchgear.

The wind turbine will have a nacelle mounted on a tapered tubular steel tower. The nacelle will contain the gearbox or direct drive, the generator, the transformer and other associated equipment. The hub, and rotor assembly, including three blades, will be attached to the nacelle. The turbine will be of a typical modern, three-blade, horizontal axis design in semi-matt white or light grey with no external advertising or lettering except for statutory notices.

A full ground investigation will be completed prior to construction; however, typical foundations would comprise concrete and steel reinforcement. For the purposes of this SEIR, it has been assumed that the turbine will have a typical gravity base foundation with a typical diameter of approximately 20 m and 4 m in depth. An indicative turbine foundation is illustrated in **Figure 4.2.**

The final foundation design will be specific to the turbine selected and the site conditions as verified during detailed site investigations undertaken before construction commences. In the unlikely event that ground conditions are unsuitable for the standard foundation design described above, a piled foundation design may be required, involving the installation of a series of concrete piles per turbine, with each pile being bored or driven until the underlying bedrock is reached.

4.2.1.2 Crane Hardstanding

To enable the construction of the turbine, a crane hardstanding area and turning area at the turbine location will be required to accommodate the assembly crane and construction vehicles. The actual dimensions will be subject to the specifications required by the selected turbine manufacturer and crane operator and following detailed site investigations prior to construction commencing. This area will be constructed from crushed stone and/or aggregate and it is expected that the hardstanding materials will be provided from a local quarry.

The crane hardstanding will remain in place during the lifetime of the Proposed Development to facilitate maintenance work and emergency access purposes.

Detailed construction drawings with final dimensions will be provided prior to commencement once the final turbine model has been selected. An indicative crane hardstanding is detailed in **Figure 4.2**.

4.2.1.3 Site Access Track

The wind turbine will be accessed from a mixture of new and upgraded access track and upgraded access junction from the unclassified road within the Glensaugh Estate, as illustrated in **Figure 3.2.**

Approximately 950 m of new access track and 700 m of upgraded track will be constructed to provide access to the turbine from the existing Glensaugh road network. The track will be formed largely of locally sourced stone and would follow the line of the existing farm track where possible. The track will have a typical running width of 5 m.

4.2.1.4 Electrical Infrastructure and Cabling

As the Proposed Development will include multiple renewable electricity generating assets, transformers and inverters will be required in several locations. The wind turbine will require:

- 1 x Inverter (if not provided within turbine tower);
- 1 x Step-Up Transformer (690v to 11 kV); and
- 1 x Step-Down Transformer (11 kV to 400v).

A typical transformer is illustrated in **Figure 4.3**. The turbine will be connected to the hydrogen plant and BESS (within the Proposed Hydrogen and Solar Development) via cabling. An outline of the cable route is provided in **Figure 3.2** and an indicative cable trench is provided in **Figure 4.4**. The cabling route has been designed to generally follow the route of the access track while minimising the cable length.

For the purpose of the assessment, the cable has been assessed as underground, aside from landscape and visual, which has assessed the cable as overhead as a worst-case scenario. An electric pole will be required for an overhead cable and would be located adjacent to the BESS, DNO substation and Private substation compound area (refer to **Figure 3.3a-b**) and would have a maximum elevation of 11 m. An indicative electric pole is outlined in **Figure 4.5**.

4.2.2 Proposed Hydrogen and Solar Development

4.2.2.1 Hydrogen Production Facility

The green hydrogen production facility will be located within the footprint of the current Glensaugh Farm buildings (refer to **Figure 3.3a-b**) and will require the demolition of some existing buildings and the construction of the new facility in their place (refer to **Section 4.2.2.3** below). An existing site plan is included in **Figure 4.6**. The hydrogen plant will be capable of producing green hydrogen at a rate of ~2.82 kilograms per hour (kg/hr). The hydrogen facility is proposed to include storage of compressed hydrogen and will comprise the following elements:

- Electrolyser stack consisting of 6 x 28.6 kW units;
- Six invertors (one per unit);
- Water treatment unit and treated water tank;
- 400 kWh of battery energy storage system (BESS) capacity;
- High pressure hydrogen refuelling station, including a compressor;
- Hydrogen fuel cell;
- Associated necessary electrical infrastructure including Distribution Network Operator (DNO) substation and private substation;
- Hydrogen storage facilities, likely to be storage cylinder tube racks, including a medium pressure buffer tank (main store), high pressure compressor and high pressure tanks associated with the refuelling station;
- Electrical connections to wider renewable energy operations (existing and proposed solar and proposed wind turbine elements).

The precise layout and specific technology selection will be refined and determined by the appointed contractor. An indicative layout of the hydrogen plant is included in **Figure 4.7** and indicative elevations provided in **Figure 4.8**. The Proposed Development is of a low scale with the maximum height of its structures not exceeding 17 m. Of the structures proposed, the tallest is the vent stack of the hydrogen production facility (17 m), with the majority of the buildings and infrastructure at a level lower than the existing agricultural buildings on site. For comparison, existing site elevations are provided in **Figure 4.9**.

The green hydrogen requirement of the project has three primary use-applications:

- Electricity via fuel cell;
- Heating as a thermal fuel; and
- Fuel for fuel-cell electrical / hydrogen combustion engine vehicle and machinery.

4.2.2.2 Substation and BESS

The Proposed Development will include a BESS, DNO substation and Private substation. The buildings will stand side by side in a single compound area to the west of the hydrogen plant, as illustrated in **Figures 3.3a-b.** The BESS container will reach a total height of up to 2.9 m and will be approximately 2.4 m wide and 12.2 m in length, whilst the DNO Substation will comprise an approximate area of 2.5 m in width and 2.8 m in length, with an approximate height of 2.4 m. The indicative dimensions for the Private substation comprise a width of 3.2 m, length of 6 m and total height of 3.3 m. Indicative elevations of the BESS, DNO substation and Private substation are shown in **Figures 4.10-4.12**.

4.2.2.3 Demolition

To make space for the hydrogen production facility and electrical infrastructure, two sheep sheds and an old, poor-condition barn known as the Camelid House, are proposed to be demolished. The location of these buildings is illustrated in the overall site plan (refer to **Figure 4.6** and highlighted further in **Figure 4.13**).

4.2.2.4 Electric Vehicle (EV) Chargers

Up to nine EV chargers are proposed (refer to **Figures 3.3a-3.3b**). These comprise seven chargers located outside the main office building within the Glensaugh Farm campus. Two domestic-type chargers for quad bikes are also required, which will be compatible with domestic 240v mains. An illustration of an indicative EV charger has been provided in **Figure 4.14**.

4.2.2.5 Construction and Operational Access

Access to the Proposed Hydrogen and Solar Development would be through the existing Glensaugh Farm access. This is via the rural road which bisects the farm and connects to the B974 road to the west leading to the A90, or east to the B966 and A90.

4.2.3 Solar Development

The Applicant is seeking permission for both ground-mounted and roof-mounted solar, however is it anticipated that only one of these will be required (pending final turbine selection and its capacity).

4.2.3.1 Ground Mounted Solar

The ground mounted solar (if required) will be located in a field immediately east of the Glensaugh Farm campus buildings (refer to **Figure 3.3-b**) and consist of an array of solar photovoltaic (PV) modules oriented in a south and south easterly direction, with an export capacity of up to 150 kW. The total development area for the ground solar will be approximately 0.47 ha. The modules will stand approximately 0.8 m Above Ground Level (AGL) at their minimum point and will be angled at approximately 25° to the horizontal and arranged in rows. Depending on the finalised angle of elevation and the number of rows of modules stacked, the maximum panel height will be up to 2.9 m AGL (refer to **Figure 4.15**).

Each module will be mounted upon a south/ south-east facing fixed tilt prefabricated alloy metal frame. The module frames will be anchored to the ground via steel piles which will be driven approximately 1.5 to 3 m below the ground.

4.2.3.2 Roof Mounted Solar

The roof mounted solar (if required) will be located on two existing agricultural buildings, as illustrated in **Figure 3.3a-b.** The roof mounted solar will consist of an array of solar photovoltaic (PV) modules orientated in a south and south easterly direction, with an export capacity of up to 59 kW. The modules will be positioned on a trapezoidal roof mounting system and angled at approximately 12.5 ° to the horizontal, arranged in rows.

4.2.3.3 Invertors

The solar development will include inverter stations in order to convert the Direct Current (DC) produced by the solar modules, into an Alternating Current (AC) which is compatible with the local electricity distribution network.

- The solar array will require:
- 2 x String inverter for roof mounted installation; and
- 1 x String inverter for ground mounted installation.

The locations of the invertor stations are shown in **Figures 3.3a** and **3.3b**.

4.2.3.4 Security Fencing and CCTV

Fencing will be established around the perimeter of the ground mounted solar and set back from boundaries, hedgerows and woodland. Elevations of indicative fencing are shown in **Figure 4.16**.

Closed Circuit Television (CCTV) will be deployed as a security measure around the ground mounted solar. Four CCTV will be mounted on posts each measuring approximately 4.5 m in height. An example of the CCTV is represented in **Figure 4.17**. The CCTV units will be installed inside and adjacent to the proposed security

fencing with the exact locations to be confirmed prior to construction. They will be installed at discreet locations and will be oriented away from external landowners and dwellings.

4.2.4 Micrositing

It should be noted that given that the Proposed Development relates to a new form of development, a degree of micro-siting should also be allowed for within the approved plans for the various buildings and structures. A 100 m micrositing allowance is sought for the wind turbine, access track and cabling elements. The locations of the various elements of the Proposed Hydrogen and Solar Development are less variable since they are proposed to be located within appropriate areas of the Glensaugh Farm campus. The final design and location of all elements will be subject to detailed design post-consent but will be within the red line site boundaries as shown on **Figure 3.1a-b**.

A regular dialogue will be maintained with the Local Planning Authority (LPA) throughout the site implementation to ensure that any large-scale deviation is addressed by subsequent non-material amendments or condition variation applications.

4.3 Site Selection and Design

4.3.1 Design Principles

The identification and assessment of environmental and technical constraints has informed the design process as more detailed site surveys have been undertaken. In this way, the findings of the technical and environmental studies have been used to inform the design of the Proposed Development, and hence achieve a 'best fit' within the Site.

The Applicant adopted the following principles during the design process to ensure the final design of the Proposed Development was the most suitable for the Site:

- Respected landscape, visual and cultural heritage constraints;
- Limited impact on habitats where possible;
- Limited impact on existing trees and hedgerows where possible;
- Respected the interests and concerns of the residents living close to the Proposed Development; and
- Maximised the potential renewable electricity generation.

4.3.2 Site Selection

4.3.2.1 General Considerations

The Site was identified as an area which would be appropriate for hydrogen, solar and wind energy development through initial feasibility work which considered the following key issues:

- Landscape and visual constraints;
- Presence of cultural heritage features;
- Location of residential receptors;
- Presence of protected habitats;
- Potential energy yield prediction; and
- Location of existing renewable energy developments.

4.3.2.2 Proposed Turbine Development Site Selection

- Suitable wind speeds, terrain and topography for development;
- Site access suitability for the delivery of components and equipment, and for operational maintenance;

- Distance from closest residential receptors;
- Proximity to the hydrogen and BESS components of the Proposed Development; and
- Few visual or landscape receptors in the area.

4.3.2.3 Proposed Hydrogen and Solar Development Site Selection

The Site was identified as an area that would be best suited for the hydrogen production facility for a number of reasons including:

- The location of the Site, in close proximity to the working farm buildings of Glensaugh Farm, allows for the hydrogen produced on-site to be used for the daily electricity needs of the site and for powering electric and hydrogen vehicle and machinery fuel via charging points and fuelling station, delivering a cost-effective decarbonisation solution for daily operations.
- Locating the facility on-site will reduce local traffic that would otherwise have to go off-site to refuel.
- Development of a brownfield site, in line with local planning policy.
- Sufficient irradiation levels for efficient solar PV.
- No constraining ecological or heritage designations.

4.4 Iterative Site Design

The scheme layout was developed following the completion of baseline studies, surveys and consultations. The aim was to maximise renewable energy yield while avoiding environmental and technical constraints, ensuring no significant adverse environmental effects. Consideration has also been given to the feedback and comments received from local residents through public engagement. The following summarises the key design considerations and changes that have been made during the iterative design process:

- The turbine has been positioned in open habitat at least 50 m from linear habitat features that may be used by foraging and commuting bats;
- The turbine and associated infrastructure are located at least 10 m from any water bodies;
- The turbine has been located as far away from residential receptors as practical;
- Roof mounted solar panels are to be installed on modern agricultural barns which have no ecological value for roosting bats;
- The ground mounted solar panels are to be installed within an area of modified grassland which has low ecological value;
- Existing on-site tracks and Glensaugh Farm campus footprint have been utilised as far as practical to minimise loss of habitat and landscape impacts; and
- The access track route has been designed to avoid impacting on areas of Ancient Woodland and any overly steep terrain.

The final design which has been taken forward for inclusion in the planning application is outlined in **Figures 3.2-3.3a-b**.

4.5 Construction

It is expected that the construction works for the Proposed Development would last around eight months and is anticipated to commence in 2024. A detailed construction programme will be developed and provided to Aberdeenshire Council within a Construction Environmental Management Plan (CEMP) prior to commencement of construction.

Normal construction hours will be between 07:00 and 19:00 Monday to Friday and 09:00 and 13:00 on Saturdays. These times have been chosen to minimise disturbance to local residents. It must, however, be

noted that out of necessity due to weather conditions and health and safety requirements, some generally quiet activities may occur outside the specified hours stated.

4.6 Operation and Maintenance

The lifetime of the Proposed Development is envisaged to be 40 years, from the final commissioning to commencement of decommissioning.

Once the Proposed Development is fully operational, it will require minimal maintenance. Maintenance is expected to consist mostly of routine Site inspections by technicians, as well as some unscheduled visits when required. Routine cleaning of the solar panels is occasional as rainwater will generally suffice.

4.7 Decommissioning

Planning permission is being sought for a period of 40 years for all aspects of the Proposed Development. At the end of the Proposed Developments operational lifetime of 40 years, it will be decommissioned, unless further consent is sought for life extension or repowering of the wind turbine.

Decommissioning is a relatively straightforward process and similar to the construction process, with the majority of structures and equipment able to be disassembled and removed in a straightforward manner (with inverters etc. being containerised and simply able to be detached from the piles they are placed on, and the solar arrays disassembled and piles pulled up).

It is anticipated that certain components of the turbine and electrolyser will be dismantled and removed from Site for disposal and/or recycling as appropriate and in accordance with regulations in place at the time. It is proposed to leave the buried portion of the foundations for structures in situ on decommissioning. This is considered to have less impact on the hydrological system which will have established itself during the lifetime of the Proposed Development than complete removal of the foundations.

During decommissioning, vehicles are expected access the Site by the same route used for delivery and construction of the Proposed Development.

Prior to decommissioning a Restoration and Decommissioning Plan (RDP) will be produced in consultation with Aberdeenshire Council to reflect the current legislation and policy at that point in time and will be agreed with the relevant statutory authorities.

4.8 Environmental Management

4.8.1 Construction Environmental Management Plan (CEMP)

The Contractor responsible for undertaking the construction of the Proposed Development shall adhere to a CEMP.

The CEMP shall be developed in accordance with good practice guidance. It shall describe how the Applicant will ensure suitable management of the following environmental issues during construction of the Proposed Development:

- waste;
- water quality;
- dust and noise;
- surface water drainage and groundwater;
- ecology (including protection of habitats and species);
- agriculture (including protection of livestock and land);
- archaeological protection;
- pollution incidence response (for both land and water); and

- Site operations (including maintenance of the construction compounds, working hours and safety of the public).

4.8.2 Pollution Prevention and Health and Safety

Prior to commencement of construction activities, a Pollution Prevention and Mitigation Plan, contained within the CEMP, will be agreed to ensure that appropriate measures are put in place to protect watercourses and the surrounding environment.

As with any development, during the construction stage there is the potential for threats to the quality of the water environment in waterbodies, watercourses and local ditches. These mostly arise from poor site practice so careful attention will be paid to the appropriate guidance and policies to reduce the potential for these to occur.

High standards of health and safety will be established and maintained. At all times, all activities will be undertaken in a manner compliant with applicable health and safety legislation and with relevant good practice, as defined under applicable statutory approved codes of practice and guidance.

4.8.3 Waste Management

In accordance with industry best practice, the Applicant requires a Site Waste Management Plan (SWMP). The SWMP would provide details on how waste reduction would be implemented at the Site and also how this would be monitored throughout the construction phase. The Contractor would nominate a site representative who would take responsibility for implementation and monitoring of the SWMP.

The Contractor would provide details of their proposed waste contractors (carriers, transfer station, waste recipient etc) as part of the SWMP, according to the provisions of the contract.

The requirements of the SWMP would be communicated to all site operatives during their induction. Furthermore, all operatives on-site would attend waste reduction toolbox talks to increase awareness of recycling/waste reduction.

The Contractor would provide adequate numbers of separate bins within the site compound (e.g., for paper, cans/plastic, kitchen waste etc) and skips / waste containers (e.g. for wood, metal, hazardous waste, general waste) to facilitate waste segregation and recycling. The Contractor would also provide a site plan showing all waste disposal and recycling locations.

The Contractor's environmental site representative would be responsible for regular checks on compliance with the SWMP and highlight any non-compliance.

4.8.4 Anticipated Waste Streams

A number of different waste streams would be likely to arise during construction of the Proposed Development. The Contractor would identify all waste streams and provide an estimate of expected waste volumes for each waste type generated within the waste stream. Possible waste streams arising from the Site could include food waste, paper, plastics, glass and other typically domestic refuse and sewage, concrete, waste chemicals, fuel and oils, packaging, e.g., paper, plastics and wood, polluted water from vehicle and wheel washes. The Contractor will determine how this will be managed prior to the commencement of construction.

4.8.5 Pre-Construction Surveys

Pre-construction surveys will be undertaken to validate the ecological and ornithological baseline and to perform detailed topographical and geotechnical surveys. Further details of these are provided in the relevant technical reports supporting the planning applications.

The Applicant will engage an Environmental Clerk of Works (ECoW) onsite during the construction phase. The ECoW will be responsible for pre-construction surveys and will monitor the construction process including to provide advice and support to the Contractor for implementation of the CEMP.

5. Consultation

5.1 Introduction

Consultation with relevant regulators and stakeholders was undertaken, including Pre-Application Consultation with Aberdeenshire Council, a request for an EIA Screening Opinion, and a public consultation event. The sections below summarise the consultation process for the Proposed Development.

5.2 Aberdeenshire Council

Two separate pre-application advice requests have been undertaken by the Applicant for the Proposed Turbine Development and Proposed Hydrogen and Solar Development as follows.

Pre-application advice was requested from Aberdeenshire Council on 9th November 2022 under planning reference ENQ/2022/1682 for the Proposed Turbine Development. Aberdeenshire Council provided a written response on 21st December 2022, with a focus on the potential for landscape and visual, ecological and cultural heritage impact as a result of the Proposed Turbine Development.

Pre-application advice was requested from the Council on 13th March 2023 under planning reference ENQ/2023/0387 in relation to the Proposed Hydrogen and Solar Development, and a written response received on 25th May 2023. The key concerns raised by the Council for this aspect of the development were again in relation to landscape and visual, cultural heritage and ecological impact. The response also stated that a glint and glare assessment is required to demonstrate the impact of the solar array on the amenity of surrounding properties. Further consultation was undertaken between Aberdeenshire Council and ITPEnergised in October 2023 which provided justification as to why a glint and glare assessment has not been included in support of the Proposed Hydrogen and Solar Development application (refer to **Appendix B**). It is considered that due to the lack of nearby ground and air-based receptors, along with existing mitigation measures in the form of tree rows and undulating landscapes, the proposed solar PV elements to not contravene local and national policy and that a glint and glare study is not required.

As noted in Section 2, Aberdeenshire Council provided its EIA Screening Opinion in letter in April 2023, concluding that an EIA is not required for the Proposed Development but that the Applicant should include sufficient information to allow the Council to assess the proposals subject to the employment of mitigation measures (Planning Ref: ENQ/2023/0425). Refer to **Appendix A**.

Further consultation has taken place with Aberdeenshire Council beyond the pre-application advice and screening request to agree the scope of the assessment for technical topics, with an overview provided in the relevant technical sections below.

5.3 Public Engagement

The Applicant has engaged in various methods of informing the local community about the Proposed Development, including contacting local residents, businesses and councillors to inform them of the HydroGlen project.

A public consultation event was held on 4th September 2023 between 2-7pm at the Dickson Memorial Hall, Laurencekirk, that allowed people living near Glensaugh and wider stakeholders to drop in and learn more about, as well as comment on, the vision and proposals comprising the HydroGlen project. The event was advertised through various means, including on the James Hutton Institutes' website (www.hutton.ac.uk), in newspapers including The Scotsman, on industry related websites including FuelCellsWorks, EnergyPortalEU and Hydrogen Central, a mail drop to local residents within 3 km of Glensaugh, on local community notice boards, LinkedIn and social media groups. Outreach was also undertaken with local sustainability groups including Sustainable Mearns and NESCAN Hub to publicise the event and arrange future talks on the project.

Further to the public consultation event, the Applicant has been committed to continuous outreach for the Proposed Development:

- Open Days held at Glensaugh Farm (HydroGlen drop-in day 21st October 2022; Climate Week North-East Glensaugh Farm walks 30th and 31st March 2023) to encourage local residents and the wider public, respectively to visit Glensaugh to learn and ask about the Proposed Development;
- Showcasing at the Royal Highland Show (held in Edinburgh in June 2023) which involved exhibiting information about the Proposed Development; and
- Press releases (e.g. in the Mearns Leader), information leaflet on the Applicant's website, and publicity through the Scottish Hydrogen Fuel Cell Association (SHFCA) and the UK Hydrogen Fuel Cell Association (UKHFCA).

6. Planning Policy

The Proposed Development offers an opportunity to harness renewable wind and solar energy and produce and use green hydrogen, creating a viable alternative to fossil fuels.

The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 was passed by the Scottish Parliament in 2019 and its measures were brought into force in March 2020. It amends the Climate Change (Scotland) Act 2009 and sets targets to reduce Scotland's emissions of all greenhouse gases to net zero by 2045 at the latest, with interim targets for reductions of at least 56% by 2020, 75% by 2030, 90% by 2040. The interim target of 75% by 2030 requires the current decade to be a transformative one. It also provides annual targets, which are not currently being met.

The Proposed Development is being brought forward in an environment where the need for renewable energy is critical to reach the greenhouse gas emission reduction targets set by law and the renewable energy generation targets set by the Scottish Government. Scottish planning policies at all levels strongly support renewable energy proposals unless significant adverse impacts arise that are not outweighed by the environmental benefits.

The assessment provided within this SEIR has taken into consideration relevant Scottish Government Planning Advice Notes (PANs) and the following national and local planning documents:

- National Planning Framework 4 (2023) (NPF4); and
- Aberdeenshire Local Development Plan 2023.

Wider material considerations for the Proposed Development also include:

- Climate Change (Emissions Reduction Targets) (Scotland) Act 2019;
- Draft Energy Strategy and Just Transition Plan (DESJTP) (2023); and
- Onshore Wind Policy Statement 2022.

Reference should be made to the Planning Statements which accompany the SEIR.

7. Landscape and Visual

7.1 Introduction

This section considers the potential for landscape and visual effects as a result of the Proposed Development. A full Landscape and Visual Appraisal (LVA) was undertaken by the Chartered Architects at Brindley Associates and can be found in **Appendix C** along with accompanying figures and visualisations. This assessment defines the existing landscape and visual baseline environments; assesses their sensitivity to change; describes the key landscape and visual related aspects of the Proposed Development; describes the nature of the anticipated changes and assesses the effects arising during construction and once operational. The key findings are summarised below.

7.2 Consultation

Consultation was undertaken with Aberdeenshire Council in October 2023 in order to determine the proportionate extent of assessment for the LVA of the Proposed Development. The size of the study area for the Proposed Turbine Development and Proposed Hydrogen and Solar Development, along with the location and number of representative views and approach to the cumulative assessment proposed were agreed to be acceptable.

7.3 Study Area

Two different scales of assessment have been utilised for the Proposed Turbine Development and Proposed Hydrogen and Solar Development:

- A 25 km study area for the appraisal of the effects on landscape and visual receptors of the Proposed Turbine Development; and
- A 2 km study area for the appraisal of the effects on landscape and visual receptors of the Proposed Hydrogen and Solar Development.

The reason for this was that the potential effects of the proposed wind turbine may occur over a much larger area than the potential effects of the other elements of the Proposed Development.

7.4 Landscape Character

The Proposed Development Site lies to the north-west of Laurencekirk and is wholly situated within Glensaugh Estate. The Proposed Hydrogen and Solar Development is situated within the farm buildings complex and the Proposed Turbine Development partly on Loch Hill, due north of the farm buildings. The high point of the Site lies to the north-east of the Glensaugh Farm buildings complex, reaching approximately 306 m AOD.

Land within the 25 km study area lies primarily within the Aberdeenshire Council area, though a large portion to the south-west is within Angus, and a small area to the north-east is within the City of Aberdeen. The extent of the study area includes:

- Braes of the Mearns Special Landscape Area (SLA);
- Fasque House Garden and Designed Landscape (GDL);
- The Burn Garden and Designed Landscape (GDL);
- Fettercairn Conservation Area;
- Auchenblae Conservation Area;
- A mixture of arable land in all directions from the Site boundary; and

- Hillside and valley commercial forestry land in the wider area surrounding the Proposed Development, particularly around Loch Saugh and Loch Hill.

The small village of Auchenblae is approximately 3.7 km to the east of the Proposed Development Site; the village of Fettercairn is approximately 3.9 km to the south-southwest and the town of Laurencekirk lies approximately 6.3 km to the south-southeast. Large parts of both Fettercairn and Auchenblae are Conservation Areas. In addition to the villages mentioned, settlements otherwise tend to be of town size (such as Brechin, Stonehaven and Montrose) within the 25 km study area.

Overall, the character of land within the 25 km study area can best be understood as though the transition from east to west were a kind of fault serving to separate the level coastal corridor and the Howe of the Mearns from the rapidly ascending topography to the west and north-west, with successions of smaller hill and mountain ranges ultimately culminating in the Cairngorms Massif. On the lower ground, the prime arable land gives a rigorous structure of diverse field patterns to the study area, with geometric woodland interspersed throughout. Woodland gives way to managed heaths to the west, north-west and north-east of the study area, and the vast expanses of moorland give a wild and rugged character to this area.

7.5 Zone of Theoretical Visibility

A Zone of Theoretical Visibility (ZTV) study was generated based on the proposed design and indicates areas of potential visibility. The ZTV study was used to aid the identification of those receptors that are likely to be most affected by the Proposed Development and those that do not require detailed consideration.

The 'Bareground' ZTVs produced for the assessment (**Figures 4a**, **4b** and **4c** of **Appendix C: LVA**) have utilised different source data. In the case of the Proposed Turbine Development, the manufacturer's data for this turbine was utilised in Windfarm software, with a tip height of 76 m being used to create the data required for the 25 km study area. In the case of the Proposed Hydrogen and Solar Development, the same software was used, with the hydrogen vents being calculated at heights of 17 m and 10 m, and the solar PV elements at heights of 8.5 m (roof-mounted solar PV panels) and 3 m (ground-mounted solar PV array) to represent these structures.

Following this, Modified ZTVs which took localised woodland and settlement into consideration (as illustrated on OS VectorMap), were prepared in order to better understand: the topography of the Site; the relationship between the Proposed Development and its immediate surroundings; and the influence of localised woodland and settlement when modelled at these aforementioned heights.

The ZTVs were then used to determine the main areas of theoretical visibility and identify suitable viewpoint locations for inclusion within the LVA. The Proposed Development has the potential to be theoretically visible from approximately:

- 12.66% of the 25 km study area (the Proposed Turbine Development) of which:
    - 2.40% would be turbine blade tip only; and
    - 10.26% turbine hub (and thus also blade tip).
- 20.59% of the 10km study area (the Proposed Turbine Development) of which:
    - 3.58% would be turbine blade tip only; and
    - 17.01% turbine hub (and this also blade tip).
- 44.81% of the 2 km study area (the Proposed Hydrogen and Solar Development) of which:
    - 1.04% would be the solar components only (ground and roof-mounted);
    - 1.26% would be the hydrogen vents only; and
    - 42.51% would be both groupings.

Landform, vegetation, woodlands, shelterbelt planting and intervening built form substantially modify the levels of theoretical visibility predicted. A Modified ZTV (refer to **Figure 5a** of **Appendix C: LVA**) comprising

the 10 km study area was produced. When these elements are factored in, the Proposed Development has the potential to be theoretically visible from approximately:

- 13.87 % of the 10 km study area (the Proposed Turbine Development) of which:
  - 2.63% would be turbine tip only; and
  - 11.24% tip and hub.
- 33.73% of the 2km study area (the Proposed Hydrogen and Solar Development) of which:
  - 1.17% would be the solar components only (ground and roof-mounted);
  - 1.74% would be the hydrogen vents only; and
  - 30.82% would be both groupings.

Special attention has been given to the scale under consideration for each landscape and visual receptor and theoretical visibility has largely concentrated on the following areas:

- The glen in the immediate vicinity of the Proposed Development Site;
- Agricultural land surrounding Fettercairn;
- The northern and north-eastern edges of Edzell Woods Estate and Edzell Business Base;
- The northern edge of Luthermuir, and agricultural land surrounding the settlement; and
- An area of agricultural land to the north and east of Auchenblae.

7.6 Viewpoints

A viewpoint assessment has been undertaken from a total of eight viewpoints (**Table 7.1** and **Figure 1** of the LVA included in **Appendix C**) to inform the assessment of the likely magnitude and significance of landscape and visual effects arising as a result of the Proposed Development. The viewpoints were identified and prepared following consultation with Aberdeenshire Council and are considered as representative of the range of visual receptors considered within the study area.

Table 7-1: Viewpoints

Viewpoint Number	Viewpoint Name	Representative of:
1a	Loch Saugh (Views across the Loch)	Recreational Users
1b	Loch Saugh (Views towards Glensaugh)	Recreational Users
2	Junction of Old Military Road and C-class road to Glensaugh	Road Users
3	Cairn O Mount Viewpoint	Road and Recreational Users
4	Glen Road, adjacent to Auchenblae	Road Users
5	Fettercairn	Road Users
6	Minor road east of Auchenblae	Road Users
7	B974 south of Fettercairn	Road Users
8	Clachnaben	Recreational Users

7.7 Landscape Effects

The Proposed Development would somewhat change the character of the land within the Proposed Development Site, given the necessary landform modifications required to level and terrace the access road

and hard standing of the Proposed Turbine Development, as well as minor modifications to landform to permit the installation of the ground-mounted solar panels within the Proposed Solar and Hydrogen Development. This would change the character of the land within the site boundary, but has the potential to complement the surrounding area, as well as benefit local biodiversity via the introduction of native planting.

7.7.1 Proposed Turbine Development Landscape Effects

The carefully considered placement of the elements of the Proposed Development would minimise the effect on landscape character to an area which largely includes locations within the Site, where effects of the proposed Turbine Development would be Major Adverse (refer to **Table 7.2** below). Major adverse effects of the proposed Turbine Development are also anticipated on the Braes of the Mearns SLA. Other landscape receptors considered within this assessment, including Landscape Character Types (LCTs), Conservation Areas and GDLS would experience between Moderate Adverse to no effects.

Table 7-2: Summary of Predicted Effects on Landscape Receptors within the Proposed Turbine Study Area

Landscape Receptor	Predicted Effect – Proposed Turbine Development
Landscape resources within the Site boundary	Major Adverse
LCT 29: Summits and Plateaux – Aberdeenshire	Moderate / Minor Adverse
LCT 22: Broad Valley lowlands – Aberdeenshire	Moderate / Minor Adverse
LCT 24: Coastal Farmed Ridges and Hills - Aberdeenshire	Minor Adverse
LCT 384: Broad Valley lowlands – Tayside	Minor Adverse
LCT 379: Foothills – Tayside	Minor Adverse
LCT 376: Summits and Plateaux – Tayside	Negligible
LCT 387: Dipslope Farmland	Negligible
Braes of the Mearns Special Landscape Area (SLA)	Major Adverse (Moderate Adverse during construction stage)
Fasque House GDL	Moderate Adverse (Negligible during construction stage)
The Burn Garden GDL	No effects
Fettercairn Conservation Area	Moderate / Minor Adverse (No effects during construction stage)
Auchenblae Conservation Area	Moderate / Minor Adverse (No effects during construction stage)

7.7.2 Proposed Hydrogen and Solar Development Landscape Effects

In the case of the Proposed Hydrogen and Solar Development, the magnitude of change is considered to be low during the construction stages, as well as upon completion. The relatively minor change in landcover resulting from the addition of the solar PV panels and array will not diverge greatly from the current conditions. Overall, the majority of the landscape receptors as outlined in **Table 7.3** would experience no effects as a result of the Proposed Hydrogen and Solar Development; four receptors would experience between Moderate and Minor Adverse effects.

Table 7-3 Summary of Predicted Effects on Landscape Receptors within the Proposed Hydrogen and Solar Study Area

Landscape Receptor	Predicted Effect – Proposed Hydrogen and Solar Development

Landscape resources within the Site boundary	Minor Adverse
LCT 29: Summits and Plateaux – Aberdeenshire	Moderate / Minor Adverse
LCT 22: Broad Valley lowlands – Aberdeenshire	Moderate / Minor Adverse (Negligible during construction)
LCT 24: Coastal Farmed Ridges and Hills - Aberdeenshire	No effects
LCT 384: Broad Valley lowlands – Tayside	No effects
LCT 379: Foothills – Tayside	No effects
LCT 376: Summits and Plateaux – Tayside	No effects
LCT 387: Dipslope Farmland	No effects
Braes of the Mearns Special Landscape Area (SLA)	Moderate Adverse
Fasque House GDL	No effects
The Burn Garden GDL	No effects
Fettercairn Conservation Area	No effects
Auchenblae Conservation Area	No effects

7.8 Visual Effects

Visually, the Proposed Development would result in some adverse effects though these would be offset considerably by the gains associated with the sustainability and emissions-reduction experiments being undertaken at Glensaugh Research Station.

7.8.1 Proposed Turbine Development Visual Effects

As outlined in **Table 7.4** below, a total of five settlements were identified as being representative of the range of visual receptors considered within the study area. Of these, Auchenblae and Fettercairn are likely to experience Moderate / Minor Adverse effects as a result of the Proposed Turbine Development, whilst the other three settlements would experience negligible effects.

Table 7-4: Summary of Predicted Residual Effects on Settlements (Proposed Turbine Development)

Settlement	Predicted Effect – Proposed Turbine Development
Fettercairn	Moderate / Minor Adverse (No effects during construction stage)
Auchenblae	Moderate / Minor Adverse
Edzell	Negligible
Luthermuir	Negligible
Drumlithie	Negligible

A total of nine sequential routes were identified and selected as being representative of the range of visual receptors considered within the study area. In relation to the Proposed Turbine Development, the predicted effect on four of these routes is Moderate Adverse, with a further two experiencing Moderate / Minor Adverse effects and the remaining three experiencing Minor Adverse effects (refer to **Table 7.5** below).

Table 7-5: Summary of Predicted Residual Effects on Sequential Routes (Proposed Turbine Development)

Route Name	Predicted Effect – Proposed Turbine Development
Old Mains Military Road and Cairn O' Mount Road (B974)	Moderate Adverse (Moderate / Minor Adverse during the construction stage)
C-class road between Glensaugh and Auchenblae	Moderate Adverse (Moderate / Minor adverse during the construction stage)
C-class road between Auchenblae and Glenfarquhar Lodge	Minor Adverse (Negligible during the construction stage)
B966	Moderate / Minor Adverse (Negligible during the construction stage)
B9120	Minor Adverse (Moderate / Minor Adverse during the construction stage)
A90	Minor Adverse (Minor Adverse during the construction stage)
Core paths around Auchenblae (including paths 501.2, 501.3 and 508.02)	Moderate Adverse (Moderate / Minor Adverse during the construction stage)
Core paths around Fettercairn (including paths 506.01, 506.02, 506.03 and 506.04)	Moderate Adverse (Moderate / Minor Adverse during the construction stage)
Laurencekirk – Fettercairn Circular Recreational Cycling Route	Moderate / Minor Adverse (Negligible during the construction stage)

Out of the eight representative viewpoints outlined in Section 7.6, the Proposed Turbine Development would result in Major / Moderate adverse effects on Viewpoints 1a (Loch Saugh – Views across Loch Saugh) and 3 (Cairn O Mount Viewpoint). Five would experience only negligible effects, as outline in **Table 7.6** below.

Table 7-6: Summary of Effects on Representative Viewpoints (Proposed Turbine Development)

No.	Name / Location	Predicted Effect – Proposed Turbine Development
1a	Loch Saugh (Views across the Loch)	Major / Moderate Adverse
1b	Loch Saugh (Views towards Glensaugh)	Negligible
2	Junction of Old Military Road and C-class road to Glensaugh	Moderate Adverse (Moderate / Minor Adverse during the construction stage)
3	Cairn O Mount Viewpoint	Moderate Adverse (Moderate / Minor Adverse during the construction stage)

4	Glen Road, adjacent to Auchenblae	Negligible
5	Fettercairn	Negligible
6	Minor road east of Auchenblae	Negligible
7	B974 south of Fettercairn	Minor Adverse (Negligible during the construction stage)
8	Clachnaben	Negligible

7.8.2 Proposed Hydrogen and Solar Development Visual Effects

As outlined in **Table 7.7** below, no effects are predicted as a result of the Proposed Hydrogen and Solar Development on the five representative settlements assessed.

Table 7-7 Summary of Predicted Residual Effects on Settlements (Proposed Hydrogen and Solar Development)

Settlement	Predicted Effect – Proposed Hydrogen and Solar Development
Fettercairn	No effects
Auchenblae	No effects
Edzell	No effects
Luthermuir	No effects
Drumlithie	No effects

No predicted effects as a result of the Proposed Hydrogen and Solar Development are expected on seven of the nine sequential routes identified, with two routes predicted to experience Moderate / Minor Adverse effects (refer to **Table 7.8** below).

Table 7-8 Summary of Predicted Residual Effects on Sequential Routes (Proposed Hydrogen and Solar Development)

Route Name	Predicted Effect – Proposed Hydrogen and Solar Development
Old Mains Military Road and Cairn O' Mount Road (B974)	Moderate / Minor Adverse
C-class road between Glensaugh and Auchenblae	Moderate / Minor Adverse
C-class road between Auchenblae and Glenfarquhar Lodge	No effects
B966	No effects
B9120	No effects
A90	No effects
Core paths around Auchenblae (including paths 501.2, 501.3 and 508.02)	No effects

Core paths around Fettercairn (including paths 506.01, 506.02, 506.03 and 506.04)	No effects
Laurencekirk – Fettercairn Circular Recreational Cycling Route	No effects

In relation to the representative viewpoints, The Proposed Hydrogen and Solar Development would have no effect on seven of the eight viewpoints, with Viewpoint 1b (Loch Saugh – Views towards Glensaugh) experiencing Moderate / Minor Beneficial effects (Major / Moderate Adverse during construction), as outlined in **Table 7.9** below.

Table 7-9 Summary of Effects on Representative Viewpoints (Proposed Hydrogen and Solar Development)

No.	Name / Location	Predicted Effect – Proposed Hydrogen and Solar Development
1a	Loch Saugh (Views across the Loch)	No effects
1b	Loch Saugh (Views towards Glensaugh)	Moderate / Minor Beneficial (Major / Moderate Adverse during the construction stage)
2	Junction of Old Military Road and C-class road to Glensaugh	No effects
3	Cairn O Mount Viewpoint	No effects
4	Glen Road, adjacent to Auchenblae	No effects
5	Fettercairn	No effects
6	Minor road east of Auchenblae	No effects
7	B974 south of Fettercairn	No effects
8	Clachnaben	No effects

7.9 Cumulative Effects

7.9.1 Proposed Turbine Development Cumulative Effects

The potential cumulative effects of the Proposed Development have been identified within a 25 km radius of the Proposed Turbine Development Site. All operational, consented and proposed wind turbine developments that adhere to the following parameters have been assessed and illustrated within cumulative wireframes (refer to Figures 12a-19c in **Appendix C: LVA**):

- All known wind turbine developments within 5 km of the Proposed Development; and
- All known wind turbine developments above 70 m to blade tip within 25 km of the Proposed Development.

The Proposed Turbine Development would not result in any Major cumulative effects during the construction or operational stage. Viewpoint 3 (Cairn O Mount Viewpoint) would experience a Moderate Adverse cumulative effect during the construction and operational stage of the Proposed Turbine Development. In addition, Old Mains Military Road and Cairn O' Mount Road and Viewpoints 7 would experience Moderate /

Minor Adverse effects (refer to **Table 7.10** below). LCT 29 would experience no cumulative effects during construction but Moderate / Minor Adverse during operation of the Proposed Turbine Development.

Table 7-10: Summary of Cumulative Effects (Proposed Turbine Development)

Landscape / Visual Receptor	Predicted Cumulative Effect (Construction Stage)	Predicted Construction Effect (Operational Stage)
LCT 29	No cumulative effects	Moderate / Minor Adverse
LCT 22	No cumulative effects	Negligible
LCT 24	No cumulative effects	Negligible
LCT 384	No cumulative effects	Negligible
LCT 379	No cumulative effects	Negligible
LCT 376	No cumulative effects	Moderate / Minor Adverse
LCT 387	No cumulative effects	Negligible
Old Mains Military Road and Carin O' Mount Road (B974)	Moderate / Minor Adverse	Moderate / Minor Adverse
VP3	Moderate Adverse	Moderate Adverse
VP7	Moderate / Minor Adverse	Moderate / Minor Adverse
VP8	Negligible	Negligible

7.9.2 Proposed Hydrogen and Solar Development Cumulative Effects

As no developments comparable to the Proposed Hydrogen and Solar Development were found within the study area, no cumulative effects associated with it were considered to exist.

7.10 Summary

The Proposed Development has been considered carefully and weighed against relevant policy and design guidelines, as outlined in full in **Appendix C**. It is the professional opinion of Brindley Associates that the Site would be capable of accommodating the Proposed Development without leading to unacceptable effects on landscape character and visual amenity. Whilst the assessment has concluded that the Proposed Development would result in a small number of Major Adverse effects, an individual may consider the visual effects as positive / beneficial or negative / adverse depending upon their predisposition towards landscape, landscape change and subjective opinion on the type of change proposed.

8. Ecology and Biodiversity

This section considers the likely effects on ecology and biodiversity from the construction and operation of the Proposed Development, with particular focus on Important Ecological Features (IEFs). A full Ecological Impact Assessment (EcIA) was undertaken by ITPEnergised and is provided in **Appendix D** of the SEIR. An Outline Biodiversity Enhancement Plan (OBEP) has been provided as part of the EcIA. Key findings are summarised below.

8.1 Assessment Overview

The area designated for the Proposed Development underwent surveys in both 2022 and 2023, with baseline surveys including a Habitat (UKHab) Classification survey to document any evidence of protected or noteworthy species such as badgers, pine martens, red squirrels, otters and water voles. Bat surveys, including a Preliminary Roost Assessment (PRA) and additional activity surveys, were completed in 2023. A suite of breeding bird surveys were completed during the period April to July 2023. The baseline data was also supported by an ecology desk study which reviewed recent records of priority species within a defined search area that extended beyond the Site boundary. This included a 5 km radius for national designations (i.e. Sites of Special Scientific Interest), a 20 km area for Special Protection Areas designated for geese, and a 2 km area for all non-statutory designated features (i.e. Environmentally Sensitive Areas).

Habitats within the Site and surrounding area comprise developed land including residential properties, farm buildings, roads and access tracks, modified grassland, other mixed woodland, dense mixed scrub, ponds, Loch Saugh reservoir and a mosaic of upland heathland and acid grassland habitats. Due to their highly managed nature and low associated species diversity, modified grassland and developed land habitats within the footprint of works were considered to be of low ecological value. Upland heathland and lowland dry acid grassland are both listed as Scottish Biodiversity List (SBL) Priority habitats and of local importance.

A bat roost (possibly *Myotis*, a widespread genus of the mouse-eared bat) was identified during the initial Preliminary Ecological Appraisal (PEA) survey undertaken in July 2022, with a single bat observed roosting within the Sheep Sheds, part of the Glensaugh Farm campus. As the Sheep Sheds are due to be demolished as part of the Proposed Development, further surveys including a detailed PRA and activity surveys were completed in 2023. No further evidence of roosting bats was found during these surveys, though common pipistrelle and soprano pipistrelle were confirmed to be active foraging and commuting around Glensaugh Farm. Since the Proposed Development will require the removal of the roost, a NatureScot development licence will need to be obtained prior to works commencing. The licence application must be supported by a Bat Species Protection Plan detailing measures to minimise the chance of bats being killed or injured as a result of the works.

Within the Site, woodland edges and field boundaries provide foraging and commuting habitat of Moderate suitability for bats. Open areas of heathland and modified grassland provide foraging habitat of Low to Negligible suitability due to their open and exposed nature. The turbine has been positioned to be at least 50 m from any linear habitat features and is situated in open heathland habitat to avoid risk of death or injury to bats. A sensitive lighting scheme is to be adopted during and post construction to avoid negative impacts on bats' (and other mammals') foraging and commuting behaviour.

The desk study confirmed that badger, pine marten, red squirrel and Scottish wildcat are present in the local area. Evidence of badger and pine marten presence was found though no setts or dens were identified within the Study Area. Reptiles and mountain hare may also be present within the Site's upland areas. No other evidence of protected species was found during the baseline surveys.

Mitigation will be implemented to avoid negative impacts on these priority species and to reduce damage to upland heath/acid grassland habitats during the construction and operational phases of the Proposed Development. This will include micrositing of the access road and cabling route works to follow the route of the existing access track as far as possible, along with restricting vehicle and machinery use to areas where is it required only. Best practice measures will be put into place to avoid adverse effects to habitats and species which will be incorporated within a Construction Environmental Management Plan (CEMP) and

within Species Protection Plans (SPPs). In addition, a Biodiversity Enhancement Plan (BEP) will be implemented during the construction and operation phases that will focus on the enhancement of upland heathland/acid grassland mosaic habitat within the Site and wider landholding to compensate for losses of this habitat.

8.2 Opportunities for Enhancement

An Outline Biodiversity Enhancement Plan (OBEP) has been prepared with reference to NatureScot Guidance 'Developing with Nature' (NatureScot, 2023), and sets out measures for enhancing the biodiversity of the Proposed Development Site through actions (refer to **Figure** '**Appendix 7.1'** included as part of the OBEP within **Appendix D**) including:

- Restoration of an area of approximately 99 ha of moorland through grazing control, plug planting and sensitive management (cessation of potentially harmful activities);
- Riparian planting along Cairn Burn and Birnie Burn covering approximately 1 km (linear distance), with native scrub and tree species;
- Expanding the area of native woodland, through new native woodland and scrub planting at various locations across the Glensaugh Estate;
- Creation of a species rich grassland/meadow at Glensaugh Farm; and
- Provision of additional bat and bird boxes at Glensaugh Farm.

The aim of the OBEP is to increase the diversity of plants and invertebrates within the Site which will benefit a number of protected species and others. It is intended that the OBEP will be finalised post-consent in agreement with Aberdeenshire Council and NatureScot.

With implementation of the OBEP, an area of 3.5 ha of upland heathland and acid grassland habitats on-site and within the wider landholding are to be enhanced which represents a positive and significant effect.

8.3 Summary

The Proposed Development area underwent comprehensive ecological surveys in 2022 and 2023. Baseline surveys recorded various protected or notable species including badgers, pine martens, red squirrels, otters and water voles within the Study Area although no specific setts or dens were identified. Bat surveys identified potential roosts and active bat species. A NatureScot development license will be required for works impacting a single roost within the Glensaugh Farm campus. Habitat assessments revealed varying suitability for bats, with measures planned to protect their foraging areas and minimise impacts.

Mitigation strategies are proposed to prevent negative impacts on protected species and their habitats, aligning with conservation policies.

The assessment highlighted the upland heath/acid grassland as the main habitat for evaluation, although only low adverse effects are predicted with the implementation of mitigation plans to reduce impacts. An OBEP has been produced to ensure compensation and enhancement measures for this habitat type. Biodiversity enhancements will be delivered across 3.5 ha of upland heathland and acid grassland, representing an overall positive effect.

9. Archaeology and Cultural Heritage

9.1 Introduction

This section assesses the potential for archaeology and cultural heritage receptors, both within the Site and in the wider area, to experience direct and/or indirect impacts as a result of the Proposed Development.

The full Heritage Impact Assessment (HIA) has been undertaken by CFA Archaeology and the full report, with accompanying graphics, can be found in **Appendix E**. Key findings are summarised below.

9.2 Study Area

An Inner Study Area has been utilised encompassing the indicative turbine area, access track and cable route and the solar PV and hydrogen plant area (including a 100 m buffer) in order to determine the potential for direct impacts upon known heritage assets previously recorded in the Historic Environment Record (HER), and as identified through desk-based assessment, in order to predict whether any similar hitherto unknown archaeological remains are likely to survive within the Site and thus be impacted by the Proposed Development.

Additionally, a 5 km Outer Study Area has also been utilised for the assessment of potential impacts on the setting of statutory and non-statutory designated heritage assets.

9.3 Baseline

A desk-based assessment was undertaken in order to define the assessment baseline.

There are no designated heritage assets within the Inner Study Area but there are seven non-designated assets identified within the Inner Study Area. These non-designated assets are associated with post medieval to modern agriculture or with the creation of Loch Saugh, and include Cleek Farmstead, documented as two assets in the HER, and Glensaugh Farmstead. Cleek farmstead, revealed as one unroofed building in the first Edition Ordnance Survey map, persists as remnants of four buildings and a probable kiln, signifying a historic farmstead with local heritage value and low sensitivity. Glensaugh Farmstead is depicted on the first Edition Ordnance Survey map (1868) as a farmstead and millpond. The farmstead remains in use today as the Glensaugh Agricultural Research Station. The further four non-designated assets comprise a gravel pit, reservoir and dam, and boathouse.

Twenty two designated heritage assets were identified within the Outer 5 km Study Area. These include:

- 8 Scheduled Monuments;
- 22 Listed Buildings, comprising:
    - 3 Category A
    - 6 Category B
    - 13 Category C
- 1 Inventory Garden and Designed Landscape; and
- 1 Conservation Area.

No World Heritage Sites or Registered Battlefields are recorded within 5 km of the Site.

9.4 Evaluation

Refer to **Appendix E** for the full assessment of potential impacts to cultural heritage assets.

9.4.1 Direct Impacts

Potential impacts on known or unknown buried archaeological remains which may survive relate to the possibility of disturbing, removing or destroying in situ remains and artefacts during ground-breaking works (including excavation, construction and other works associated with the Proposed Development) on this Site.

In terms of direct impacts, the proposed access track to the turbine passes through the general area of Cleek Farmstead. However, it will be routed along an existing access track and will be approximately 30 m from the recorded buildings and structures within this farmstead. It is therefore considered that any construction impact would be of at most negligible magnitude and the structures of the farmstead will be preserved in situ.

The solar and hydrogen plant facilities would be constructed within the area of Glensaugh Farm. While two modern Sheep Sheds would be demolished there would be no construction impacts on the historic fabric of the farmstead such that no mitigation is proposed.

The potential for operational impacts on the setting of designated cultural heritage assets as a result of the operation of the proposed turbine has been considered. It is assessed that there will be no impacts of greater than low magnitude on the setting of designated cultural heritage assets.

The potential for operational impacts on the setting of designated cultural heritage assets as a result of the solar and hydrogen plant facilities was considered. It is concluded that, due to the nature of this development, its location within a modern working farm, and its distance from designated cultural heritage assets, that there would be no potential operational impacts.

9.4.2 Setting Impacts

The potential for effects upon the settings of designated assets with potential visibility of the Proposed Development up to a distance of 5 km from the Site within the Outer Study Area have been considered.

Considering this is a single turbine development, the Proposed Development, despite its elevated location, would generally have minimal impact on the defining characteristics of the surroundings of heritage assets that contribute to their cultural importance and would not substantially modify these cultural settings.

The assessment also addressed the possibility of the solar PV and hydrogen plant impacting the setting of nearby cultural heritage assets. Considering their lower elevation, placement within a contemporary working farm, distance from designated heritage sites, and their absence from the setting of any designated heritage assets, it is concluded that these solar panels and hydrogen facilities pose no threat of altering the settings of cultural heritage assets in their vicinity.

9.5 Mitigation

In order to mitigate any potential effect on cultural heritage and archaeology, national planning policies and planning guidance, National Planning Framework 4 (NPF4) and Historic Environment Policy for Scotland (HEPS), as well as the local planning policies (Aberdeen Local Development Plan (2023)) have been considered. The policy and guidance require a mitigation response that is designed to take cognisance of the possible impacts upon heritage assets, both known and potential, by a proposed development and to avoid, minimise or offset any such impacts as appropriate. Additionally, Planning Advice Note (PAN) 2/2011: Planning and Archaeology (PAN2) (para 14) has been considered to implement a mitigation response that is designed to preserve important remains onsite where feasible and to record them where preservation is not possible.

As mentioned above, the proposed access track to the turbine passes through the general area of Cleek Farmstead. However, all visible structures and remnants of the farmstead buildings exist beyond a deer fence, positioned more than 30 m to the east of the Proposed Development Site. Preserving this deer fence will prevent inadvertent vehicular access within the vicinity of the farmstead remnants, thereby ensuring their preservation in their original location.

If required, a planning condition could be used to ensure all necessary measures are taken to address the potential discovery of previously undiscovered buried archaeological artifacts, and to mitigate the impacts of the Proposed Development in alignment with planning regulations. If a planning condition is required, this would be agreed with the Aberdeenshire Council Archaeology Service (ACAS), detailed in a comprehensive Written Scheme of Investigation (WSI), subject to the Council's approval, and executed before the commencement of the Proposed Development.

9.6 Summary

A desk-based assessment has been carried out that has established that, within 100 m of the Proposed Development's footprint, there are seven non-designated heritage assets associated with post medieval to modern agriculture or the creation of Loch Saugh. Adverse impacts of no more than negligible magnitude are predicted on two cultural heritage assets of low sensitivity, namely Cleek Farmstead (NO67NE0044, NO67NE0104) and Glensaugh Farmstead (NO67NE0049).

The findings of the study indicate that there is a low to moderate potential for previously unrecorded archaeological remains to survive within the Proposed Development Site.

The assessment has found that there are likely to be no adverse impacts on the settings of designated heritage assets in the local area as a result of the Proposed Hydrogen and Solar Development.

The assessment has found that there are likely to be adverse impacts of no greater than low magnitude on the settings of designated heritage assets in the local area as a result of the Proposed Turbine Development.

If required by a planning condition, the scope of any mitigation measures to avoid, reduce, or offset the effects of the Proposed Development will need to be agreed with ACAS, detailed in a WSI and implemented in advance of development.

10. Flood Risk and Drainage

10.1 Introduction

This section assesses potential flood risk to the Proposed Development from all possible sources in accordance with best practice and in accordance with guidance presented within the National Planning Framework for Scotland 4 (NPF4). The full Flood Risk and Drainage Assessment (FRDA) has been prepared by Pell Frischmann and is provided in **Appendix F.** The FRDA also provides the relevant design information for the proposed Site surface water drainage / sustainable drainage systems (SuDS) scheme.

10.2 Flood Risk

The Scottish Environment Protection Agency (SEPA) Flood Maps indicate that the Proposed Hydrogen and Solar Development Site is at minimal risk of river flooding, with less than a 0.1% annual chance of flooding from rivers. Additionally, SEPA mapping confirms that the Site falls beyond any projected flooding from reservoirs or significant water bodies.

The risk of groundwater and surface-induced flooding is also predicted to be relatively low, but specific mitigation measures are suggested to manage any potential heightened risk in areas prone to higher groundwater levels.

Flooding from sewer systems generally occurs when the network's capacity is exceeded or due to blockages in critical components. Although drainage plans have been outlined for the Proposed Hydrogen and Solar Development, no historical flooding data is accessible. Given the terrain of the surrounding area, it is unlikely that any surcharging of the network would affect the vicinity of the Proposed Development. Notably, there are no known sewers within the boundary of the Proposed Turbine Development Site. As a result, risk of flooding from local network surcharging is assessed as low.

Potential flood risk mitigation measures include the recommendation to place the battery storage installation in areas with the least flood risk. Placement in a low-risk area is considered viable and there are no flood plains in the vicinity.

10.3 Drainage Strategy

A detailed assessment of the proposed wind turbine in the FRDA is not necessary due to its elevated positioning, which is deemed to pose a low risk of flooding.

To mitigate potential flood risk arising from the introduction of new impermeable areas as a result of the construction of the Proposed Hydrogen and Solar Development, a surface water drainage strategy will be implemented that will adhere to sustainable drainage principles. This strategy will demonstrate how any increase in runoff due to the Proposed Development is managed on-site before being released into the local environment.

As mentioned earlier, the site of the Proposed Hydrogen and Solar Development has existing historical drainage plans that discharge into a local watercourse. The part of the Site that remains as hardstanding is proposed to maintain its current drainage pattern. The proposed solar and turbine aspects of the Proposed Development are situated on greenfield areas, subject to a natural runoff and infiltration regime where ground conditions permit. The Proposed Development plans should aim to replicate this natural drainage pattern, aligning with advice and guidance from local and national policies and improve runoff rates and water quality whenever feasible. Given the previously undeveloped solar and turbine sites, an equivalent runoff rate to that of greenfield conditions should be calculated. These calculations should estimate a mean annual flood runoff rate (referred to as the QBAR estimation) equivalent to greenfield conditions, acting as a limit for the discharge rate applied to the net developable area.

To manage the increased runoff resulting from new hard surfaces, attenuation features will be required that can hold a specific volume of water before releasing it into the local watercourses at the predetermined rate.

The amount of attenuation necessary will vary based on the projected impermeable area, with a focus on implementing above-ground solutions such as basins, ponds and/or swales to accommodate this volume.

The suggested approach adopts sustainable drainage (SuDS) principles to control surface water runoff throughout the Site. Additional SuDS features can be incorporated across the Proposed Development, potentially encompassing, among others, swales, rainwater harvesting and garden systems, permeable paving, filter drains and detention basins. A detailed drainage strategy will be developed post-consent.

10.4 Summary

The flood risk and drainage assessment findings illustrate that the Proposed Development is of minimal risk of flooding from rivers, groundwater, surface, sewers, reservoirs or any significant bodies of water.

The replacement of existing infrastructure by the proposed hydrogen development implies that the current drainage should be retained.

Both the solar and turbine developments aim to discharge into local watercourses at a runoff rate equal to that of the existing greenfield rate while the solar and turbine developments are designed to discharge into local watercourses at rates equivalent to the existing greenfield rate.

Where appropriate, the drainage design will include the incorporation of appropriate attenuation and SuDS features where recommended. Specific suggestions include considering finished floor and external level designs to redirect water away from BESS elements and toward positively drained areas to manage residual risks of overland flows. A detailed drainage strategy will be developed post-consent.

11. Transport and Access

11.1 Introduction

This section provides information on the Proposed Development in relation to construction and operational traffic, assesses the anticipated impact of the Proposed Development on the road network within the local area and sets out the proposed mitigation measures for use at the Site.

A combined Transport Statement and Construction Traffic Management Plan (CTMP) has been prepared by Pell Frischmann which is included in **Appendix G**. Key findings are summarised below.

11.2 Access

The transportation of construction materials to the Proposed Development will follow an approach from the east, connecting to the wider local road network and nearby local quarries through the A90 trunk road.

During both construction and operation phases, the existing Glensaugh Farm access will serve as the entry point to reach the solar PV and hydrogen components of the Proposed Development. This is via the rural road which bisects the farm and connects to the B974 road to the west leading to the A90, or east to the B966 and A90.

A Route Survey Report, including swept path analysis, was undertaken to address the issues related to transporting the abnormal indivisible loads (AIL) of the wind turbine components, based upon a worst-case scenario utilising EWT DW16 turbine component sections (of up to 50m in hub height). The access for AIL traffic to the Proposed Development will also be through the A90 (T) from the Port of Entry situated at the Port of Dundee, utilising established routes for abnormal load transportation. The proposed development area for the wind turbine will then be accessed from a newly provided access track and junction from the unclassified road within the Glensaugh Estate. An alternative route through Fordoun from the A90 has also been explored as a contingency plan in case the Abbeyton rail bridge replacement project (a potential constraint along the delivery route) is delayed.

11.3 Construction

The CTMP reviewed the type and volume of vehicles associated with the construction programme and the peak of construction activities identified. This peak in traffic has been used to review the likely impact that construction activities would have.

The construction activity will temporarily increase the level of traffic in the local road network. The peak impact of construction, estimated to occur in the month five of the indicative construction schedule, is foreseen to involve an average of 38 Heavy Goods Vehicle (HGV) movements daily. A further 31 additional car and Light Goods Vehicles (LGVs) trips would be created by construction staff and lighter deliveries travelling to and from Site.

Traffic management procedures will be agreed with Aberdeenshire Council to ensure the safe operation of the approach route to the Proposed Development during construction. Determination of the final details of these traffic management measures will occur once the Balance of Plant contractor has been appointed and can be secured via an appropriately worded planning condition.

11.4 Operation

Operational traffic is expected to be minimal, primarily comprising occasional maintenance and hydrogen collection. In a worst-case scenario, these activities might result in an extra two car/LGV movements and two HGV movements, should they coincide on a given day. Additionally, as the wind turbine will not be manned, operational traffic is expected to be minimal (approximately monthly maintenance visits) and would be conducted by smaller vehicles. The impact of this on the wider road network will be negligible.

11.5 Summary

The CTMP reviewed the type and volume of vehicles associated with the construction programme and the peak of construction activities identified. This peak in traffic has been used to review the likely impact that construction activities would have.

Construction will cause a temporary traffic increase in the local vicinity of the Proposed Development, while operational phase traffic is considered negligible and falls within regular daily fluctuations. Thus, there are no transport-related issues hindering the construction or operation of the Proposed Development.

Traffic management procedures have been proposed which would ensure the safe operation of the approach route to the Proposed Development during construction. These include the implementation of a Temporary Traffic Regulation Order, road signage, an Abnormal Load Transport Management Plan and convoy and escort systems for facilitating the delivery of AILs. Determination of the final details of these traffic management measures will occur once the contractor has been appointed and can be secured via an appropriately worded planning condition.

12. Noise

12.1 Introduction

This section considers the potential noise impacts associated with the operation of the Proposed Development. The section summarises an assessment of operational noise impacts, fully reported in **Appendix H.**

12.2 Consultation

A consultation request to Aberdeenshire Council Environmental Health Department was sent on 24th October 2023, with a follow up on 2nd November 2023, seeking to agree the scope of work and approach to the assessment. No response had been received at the time of writing the assessment, however, the assessment assumes that the lack of response indicates agreement with the proposed scope, which meets the requirements of the relevant guidance.

12.3 Method of Assessment

The baseline noise environment was undertaken at selected positions that represent the noise levels in the external amenity areas of the nearest identified Noise Sensitive Receptors (NSRs) (i.e., nearby residencies) nearest to the hydrogen plant and wind turbine.

A noise assessment was then undertaken separately for the wind turbine generator (WTG) and non-WTG components (i.e., the hydrogen plant) of the Proposed Development. The assessment has individually considered the noise generated from these as separate components due to their coverage by different guidance.

12.4 Findings

Noise levels at the nearest NSR due to worst-case operation of the Proposed Development align with criteria for low impact, assessed during both daytime and nighttime periods.

The anticipated noise levels from the new wind turbine align with the specified standard of 35 decibels (db) (dB_{LA90}) across various wind speeds. This compliance suggests that additional assessment or evaluation is not required, allowing approval for the wind turbine to operate within the 35 dB_{LA90} noise limit at all existing locations identified as NSRs. Furthermore, the noise assessment examined the combined effects of the new turbine with the existing small turbine operated by the Applicant and determined that the combined impact of both turbines is not considered significant in terms of noise.

Prior to installation the source noise terms of the selected wind turbine (if different to that assessed) will be compared with those used in the assessment to confirm expected compliance with the adopted noise limit.

Sources of noise associated with the hydrogen plant components will have minimal impact during both daytime and night-time, requiring no specific mitigation measures. Real noise levels are anticipated to be lower, resulting in fewer impacts.

The assumptions made regarding the operational noise from the electrolyser present the most uncertainty in the evaluation. The accuracy of these assumptions will be further defined once more details on the electrolyser design are available. In the unlikely event that the electrolyser generates more noise than initially assumed, an additional noise assessment will be conducted to ensure compliance with relevant criteria for the Proposed Development.

12.5 Summary

The expected noise from the new wind turbine meets the 35 dB standard across different wind speeds. This means there is no requirement for further assessment, allowing the turbine to operate within the 35 dB limit

at existing NSR locations. The noise cumulative assessment also found that the noise impact from both the new and existing turbines combined is not considered significant.

The predicted worst-case operational noise level due to the hydrogen plant meets appropriate noise limits at all NSRs, resulting in a low noise impact, both during the daytime and the night-time. Actual noise levels are expected to be lower, and impacts lesser.

Prior to construction of the electrolyser the assumptions will be confirmed by comparison with the design specification. In the unlikely event that the actual noise level of plant is considered likely to be higher than that assumed for the report's assessments, or the level of attenuation provided by the building is lesser, further assessment will be undertaken to confirm that appropriate noise limits can be met at all NSRs.

13. Shadow Flicker

13.1 Introduction

This section considers shadow flicker, which is an effect caused by the rotation of the turbine blades when the sun is shining, which can create a flickering or strobe like effect. It can be distracting and disturbing for people who are affected. Effects occur usually when the frequency of the flicker is less than 1.5 Hz.

The pre-application advice issued by Aberdeenshire Council (21 December 2022) included a response stating that a shadow flicker assessment is required for the Proposed Turbine Development and must consider properties at a distance of 10 x the diameter of the turbine blades.

13.2 Guidance and Legislation

There are at present no formal guidelines available on what exposure would be acceptable in relation to shadow flicker. There is no standard for the assessment of shadow flicker. The specific advice sheet from Scottish Government, Onshore Wind Turbines, a web-based guide (Scottish Government, 2014) sets out the potential geographic area which may fall under assessment: *"Where this (shadow flicker) could be a problem, developers should provide calculations to quantify effect. In most cases however, where separation is provided between turbines and nearby dwellings (as a general rule ten rotor diameters), 'shadow flicker' should not be a problem."*

Published research by the Department of Energy and Climate Change (DECC), Update of UK Shadow Flicker Evidence Base (DECC, 2011), evaluates the current international understanding of shadow flicker and confirms an acceptable study area for assessment is ten rotor diameters from each turbine and within 130 degrees either side of north.

13.3 Scope of Assessment

Potential for shadow flicker impacts has been assessed at all residential receptors within the shadow flicker study area (refer to **Figure 13.1**).

As detailed above, the shadow flicker study area includes the area within a distance of 10 times the rotor diameter and 130 degrees either side of north for each turbine. The study area has also accounted for a 100 m micrositing allowance.

13.4 Findings

As the nearest residential receptor is approximately 1.4 km south of the turbine location (refer to **Figure 13.1**), the Proposed Development is not expected to cause any shadow flicker impacts on residential receptors.

No impacts are anticipated during construction or decommissioning.

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E

Appendix F

Appendix G

Appendix H

References

Department of Energy and Climate Change (DECC) (2014), Update of UK Shadow Flicker Evidence Base. Available online at https://www.gov.uk/government/publications/update-of-uk-shadow-flicker-evidence-base (accessed December 2023).

NatureScot (2023). Planning and development: standing advice and guidance documents. Available online at https://www.nature.scot/professional-advice/planning-and-development/planning-and-development-advice/planning-and-development-standing-advice-and-guidance-documents (accessed November 2023).

Scottish Government (2014). Onshore wind turbines: planning advice. Available online at https://www.gov.scot/publications/onshore-wind-turbines-planning-advice/ (accessed December 2023).

UK Government (2017). Town and Country Planning (Environmental Impact Assessment) Regulations 2017.

ITPENERGISED

ITPEnergised is a leading international consultancy delivering expert energy, environmental, engineering, technical advisory and asset management services; facilitating the transition to net zero.

Visit the ITPEnergised group offices in:

Bristol, London, Edinburgh, Glasgow, Buenos Aires, Madrid, Delhi, Beijing, Canberra, Auckland

Sectors:

Onshore Renewables & Storage | Offshore Wind & Marine Renewables | Oil & Gas Transition
Property & Urban Regeneration | Corporate, Industrial & Manufacturing