atmos CONSULTING

Environmental Impact Assessment Report

Lairdmannoch Energy Park

Chapter 3: Description of Development

Lairdmannoch Energy Park Limited

wind2

May 2025

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Glossary of Terms

Term	Definition
The Applicant	Lairdmannoch Energy Park Limited
The Agent	Atmos Consulting Limited
Environmental Advisors and Planning Consultants	Atmos Consulting Limited
Environmental Impact Assessment	Environmental Impact Assessment (EIA) is a means of carrying out, in a systematic way, an assessment of the likely significant environmental effects from a development
Environmental Impact Assessment Regulations	The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (EIA Regulations)
Environmental Impact Assessment Report	A document reporting the findings of the EIA and produced in accordance with the EIA Regulations
The Proposed Development	Lairdmannoch Energy Park
The Proposed Development Site	The full application boundary as per Figure 1-1
Solar Development	The area of the Proposed Development that contains the Solar Arrays and associated infrastructure. As shown on Maps 7, 8 and 9 of Figure 3-1.
Wind Development	The area of the Proposed Development that contains the Wind Turbines and associated infrastructure. As shown on Maps 1, 2 and 4 of Figure 3-1.

List of Abbreviations

Abbreviation	Description
ACoW	Archaeological Clerk of Works
BPA	Borrow Pit Appraisal
CAR	Controlled Activities Regulations
CEMP	Construction Environmental Management Plan
ECoW	Ecological/Environmental Clerk of Works
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
NPF4	Scotland's Fourth National Planning Framework
SCADA	Supervisory Control and Data Acquisition
D&GC	Dumfries and Galloway Council
NSA	National Scenic Area

3 Description of Development

3.1 Introduction

This Chapter describes the Proposed Development, including the current site conditions, the site selection and design process, and details the finalised design proposed in this application.

3.2 Site Selection and Design Evolution

3.2.1 Site Selection

In accordance with Schedule 4, paragraph 2 and Regulation 5 of The Electricity Works (Environmental Impact Assessment) (Scotland) Regulations 2017 (the 'EIA Regulations'), reasonable alternatives (in terms of project design, technology, location, size and scale and characteristics) of the Proposed Development were considered.

The site of the Proposed Development (the 'Proposed Development Site') is provided in **Figure 1-1** in **Volume 4** and has been selected as suitable by the Applicant because it met the following criteria:

- Has a commercially viable electricity grid connection point with available capacity;
  - A connection date of 2030 has been secured which is currently on track subject to planning;
- Land is available for development i.e. landowners willing to offer land for development;
- It hosts good wind resource plus suitable orientation/topography and insolation levels for solar development;
- Other than a small section of the existing commercial forestry track that will be used to access the Proposed Development Site from the south west, the proposed infrastructure is not located within nationally designated areas;
- In line with NPF4 the Proposed Development Site offers an opportunity to maximise the renewable energy generation across 3 different technologies whilst also balancing environmental impacts;
  - The Proposed Development Site is suitable for biodiversity enhancement and for restoration of peatland;
- The Proposed Development has the capacity to maintain suitable distance from the nearest residential properties and settlements; and
- The Proposed Development Site benefits from a good existing road network.

3.2.2 Site Design

As part of the development design process, the Applicant has reviewed and discounted alternative infrastructure siting (turbines, solar panels, sections of new access track) due to a variety of factors including environmental, planning, technical and commercial constraints.

The design of the Proposed Development has been driven by the principle of positioning the wind turbines, solar panels and associated infrastructure so that it

captures the maximum wind and solar energy as possible within a suitable area determined by environmental and technical constraints.

The key constraints to site design, which were assessed during the design and EIA Scoping process are presented in **Figure 1-3** in **Volume 4** and include:

- Landscape character and visual amenity;
- Presence of cultural heritage assets and receptors;
- Ground conditions, topography and peat;
- Proximity to noise sensitive receptors;
- Presence of watercourses, private water supplies and related infrastructure;
- Presence of corepaths, public roads, fixed telecommunication links;
- Presence of woodlands;
- Presence of sensitive ornithology receptors;
- Presence of ecological receptors; and
- Proximity to suitable grid connection.

The final layout of the Proposed Development is illustrated on **Figure 3-1 Detailed Site Layout** in **Volume 4.**

Table 3-1 sets out the key design iterations that have taken place including feasibility/pre-application layout, scoping layout, post scoping layout (Design Chill) and final layout (design freeze).

The design evolution layouts are shown on **Figure 3-2a & b Design Evolution** in **Volume 4.**

Table 3-1: Energy Park Layout Design Iterations

Layout	Turbines	Tip Height (m)	Design Changes
1: Feasibility Layout / Pre Application Layout	12	180m	Initial feasibility based on preliminary environmental and technical considerations including: • Consideration of wind resource including optimisation of energy yield and consideration of surrounding forestry; • Initial review of landscape and visual baseline conditions and potential impacts upon residential amenity and key views (particularly the Fleet Valley Regional and National Scenic area), consideration of fitting the design within local topography; • Initial review and appraisal of the historic environment of the Site and surrounding area, including historical landscapes and cultural heritage assets (particularly the Loch Mannoch Cairn and Stone Circle and Loch Mannoch Archaeologically Sensitive Area); • Initial review of ornithological and ecological baseline conditions and potential impacts including nearby SPA's, SSSI and SAC's; • Initial review of hydrology, hydrogeology and soils through a desk-based assessment; • Initial review of various access options including abnormal loads access; • Consideration of site gradient; • Initial review of telecoms links and offsets through a

Layout	Turbines	Tip Height (m)	Design Changes
			desk-based assessment; and • Initial review of other baseline conditions for disciplines including noise and aviation.
2; Scoping Layout (also includes ground mounted solar and BESS)	9	180m	Following advancements in market technology and policy support of mixed-use (hybrid) technologies in order to maximise the potential energy output of the Proposed Development Site, ground mounted solar and battery storage have been added to the project increasing the potential MW capacity to 100MW. The number of wind turbines have also been reduced from 12 to 9 to reduce Landscape and Visual Impacts as described below, as well as to respond to market changes in wind turbine technology since the pre-application process, allowing fewer turbines with larger rotors. <u>Landscape and Visual</u> The number of turbines have been reduced from 12 to 9 in order to reduce the potential for the stacking of wind turbines from key viewpoints, particularly from key receptors within the Fleet Valley National Scenic Area (NSA). This was to address concerns raised during the pre-application stage from the D&GC landscape officer and NatureScot on potential impacts on the Fleet Valley NSA. Appropriate buffers from surrounding residential properties were maintained. <u>Cultural Heritage</u> During the heritage walkover survey, previously recorded non-designated heritage assets, such as field systems and farmsteads, were identified and matched records in the National Record of the Historic Environment. The scoping layout has been designed to avoid direct impacts to these assets as much as possible (including the Loch Mannoch Archaeologically Sensitive Area). ZTV analysis has been undertaken to determine potential impacts on two scheduled monuments within 1km of the Proposed Development (Loch Mannoch scheduled cairn and stone circle and Edgarton Mote fort) with the positioning of the turbines and solar infrastructure taking into consideration these sensitive receptors. <u>Ecology</u> National Vegetation Classification surveys identified priority peatlands on the Proposed Development Site including NVC habitats M15, M15b, M25 and M25a. The scoping layout has evolved to prioritise avoidance of these habitats (alongside other constraints) where possible. The scoping layout also considered other ecological constraints including maintaining appropriate buffers from potential bat roosts, red squirrel dreys and neighbouring woodland. <u>Hydrology, Hydrogeology, Peat and Soils</u> The following changes were made to the Proposed Development as a result of the findings of the phase 1 peat probing: • The access track up to T2 was adjusted to avoid deep

Layout	Turbines	Tip Height (m)	Design Changes
			peat; and • Areas of peat greater than 0.5m were avoided where possible, or where this was not possible due to other environmental constraints, infrastructure has been moved to as shallow peat as possible. The scoping layout took into consideration watercourse buffers where other constraints allowed. <u>Transport & Access</u> Access to the Proposed Development included two options either directly from the east (taking the A762 and accessing the Proposed Development Site directly from the east) or directly from the north (continuing along the B795 to the existing forestry tracks).
3; Design Chill	9	180m	<u>Wind Development</u> • T8 has been moved west to avoid deeper peat and priority peatland habitat (M15/M25); • T9 has been also moved west in order to avoid steeper gradients on the Proposed Development Site; • T6 has been moved northeast to remove it from appropriate woodland buffers and to avoid deeper peat and priority peatland habitat (M15/M25); • T1 has been moved east to avoid deeper peat and priority peatland habitat (M15/M25); • T5 has been moved northeast to avoid watercourse and woodland buffers; Access tracks and associated infrastructure has been updated to account for the new turbine locations to avoid locations with peat greater than 0.5m deep (where possible). <u>Solar Development</u> • Solar panels have been removed from the west side of the northern Solar Development to avoid a higher ridgeline and to limit visibility from the Loch Mannoch scheduled cairn and stone circle (SM1033); • Solar panels have been added to small pockets in the centre of the northern Solar Development to bring continuity to the layout by avoiding visible gaps in the solar panels; and • Solar panels have been removed from the southern side of the southern Solar Development to avoid visibility to residential properties.
4; Design Freeze Layout	9	180m	Following community consultation, the Applicant has discounted the previously considered access from the North to address the local communities concerns in relation to access. The Proposed Development now features two site access routes: directly from the east as previously proposed (A762) and a new route from the south west following the B727 before turning onto an existing forestry track. The final design has seen further minor micrositing of T9, T6, T5 and T4 in response to further consideration in relation to peat and non-designated cultural heritage assets.

Layout	Turbines	Tip Height (m)	Design Changes
			As the Proposed Development Site access now considers an access point from the south west, the internal access tracks have been redesigned to allow for sufficient access of components to the Proposed Development Site, and to avoid the constraints previously identified within the Proposed Development Site. The final internal access design also takes into consideration engineering constraints and minimisation of required excavation works.

Final layout turbine location grid references are provided in **Table 3-2.**

Table 3-2: Turbine Location Co-ordinates and Base Elevations

Turbine ID	Easting	Northing	NGR	Base Elevation AOD (m)
T01	265239	562342	265239	207
T02	264844	562621	264844	200
T03	265108	561474	265108	210
T04	264650	561311	264650	197
T05	264681	561843	264681	211
T06	264319	562695	264319	210
T07	264389	562152	264389	224
T08	263755	562598	263755	235
T09	263821	562108	263821	230

3.3 Development Description

3.3.1 Development Overview

The Proposed Development would consist of nine wind turbines each with a tip height of 180m above ground level (agl), ground mounted solar panels, battery energy storage system (BESS) and associated infrastructure including:

- 6.1 kilometres (km) of upgraded existing access track;
- 12.64km of new access track (of which 12.15km will be cut and 0.49km will be floated);
- Turbine foundations and crane hardstandings;
- Substation;
- One borrow pit;
- Underground cabling;
- Temporary construction compound;
- Solar infrastructure including a power station and switching and breaking station; and
- Up to eight watercourse crossings.

The Proposed Development is made up of two renewable energy generation technologies (wind and solar) which are discussed in individual detail within this EIA Report. The Proposed Development will also feature a BESS which will support the

integration of low carbon power generated by the two renewable technologies for export to the National Grid.

Access to the Proposed Development Site is anticipated to be from the southwestern access point which travels north on the B727 before turning onto an existing forestry track. From here it travels a distance of approximately 7km before leaving the existing forestry track and turning north to the Proposed Development infrastructure. The southwestern access point will be used to transport the abnormal loads (such as the wind turbines) as well as servicing the western side of the Proposed Development.

The Proposed Development features two access points to the east off the A862 which are anticipated to serve the solar infrastructure. The access routes in the east of the Proposed Development Site will be used to service the eastern side of the Proposed Development.

The above access route design will reduce traffic load on any one road into the Proposed Development Site by virtue of splitting up the vehicle movements across different roads and access points.

The Proposed Development will have an indicative electricity export output of approximately 60MW from wind generation, 20MW from solar and a battery storage capacity of up to 20MW. The total project capacity will be approximately 100MW.

The Proposed Development has been designed with an operational life of 40 years at the end of which it will be decommissioned unless further consents are granted.

The Proposed Development components are summarised in Table 3-3**.** 'Permanent Infrastructure' in the context of this EIA Report means infrastructure that will be in place for the operational life of the Proposed Development.

Following expiry of planning permission, the decommissioned above ground infrastructure will be removed and reinstated in an environmentally sensitive way agreed with statutory consultees. The above ground infrastructure is permanent only for the duration of the planning permission.

Once the turbines have been installed, the access tracks and hardstand areas around the turbines will remain in place as permanent infrastructure.

The permanent and temporary infrastructure is shown on **Figure 3-1 Detailed Site Layout** in **Volume 4.**

Table 3-3: Proposed Development Components

Proposed Development Components - Maximum Parameters	
Turbines and Solar	
• Nine wind turbines up to 180m to tip height, the maximum rated output of the wind turbines is approximately 60MW. • Ground mounted solar panels, the maximum rated output of the solar panels is approximately 20MW.	
Permanent Infrastructure (Area, m²)	
New Access track	70,041m²
Turbine Foundation (9 No.)	4,778m²
Crane Hardstanding (9 No.)	13,680m²
Borrow Pits (1 No.)	35,943m²
Substation/BESS	7,500m² - approx. 5,000m² substation and 2,500m² BESS

Proposed Development Components - Maximum Parameters	
Solar – Transformer / Power Station (2 No.)	60m² (2 x 30m²)
Solar – Switching and Breaking Station (1 No.)	32m²
Temporary Infrastructure (Area, m²)	
Auxiliary Crane Hardstanding (9 No.)	2,052m²
Turbine Installation Areas – blade storage (9 No.)	11,268m²
Turbine Installation Areas – tower storage (9 No.)	5,940m²
Construction Compound Areas (1 No.)	7,210m²
Total permanent land take	**265,300m²**
Total temporary land take	**19,000m²**

The following sections expand on the various elements of the Proposed Development.

3.3.2 Wind Turbines

The Proposed Development comprises 9 three-bladed horizontal axis wind turbines with a 180m tip height. Indicative turbine dimensions are shown on **Figure 3-3 in Volume 4.**

The final choice of turbine model will be subject to a selection process which considers technical and commercial aspects of the turbine and will be based on the turbine models which are commercially available at the time of construction.

The wind turbine generator will be mounted on a tapered tubular steel tower and will consist of a nacelle containing the generator and associated equipment to which will be attached a hub and rotor assembly including three glass/carbon fibre-reinforced polyester blades.

Turbines are typically of a variable speed type so that the turbine rotor speed varies according with the energy available in the wind. Wind turbines typically generate power in wind speeds between 5 and 25 meters per second (m/s) (Scottish Renewables, 2020).

The turbine stops for high wind speed when the exponential mean wind speed averaged over 100 seconds is greater than 25m/s (i.e., over storm force 10) (Scottish Renewables, 2020).

Turbines are computer controlled and contain wind sensors to determine when there is sufficient wind speed for operation. The turbines are pitch regulated to ensure the blades are pitched in the optimum angle during production and standby situations. The rotor blades of all turbines will rotate in the same direction.

When operating, the rotational speed of the wind turbine blades is transferred and increased to drive the generator. This produces a three-phase power output typically of 720 Volts (V) which is transferred from the generator to the turbine transformer.

If necessary, the location of each turbine will be micro-sited to achieve more favourable ground conditions. This is discussed further in Section 3.3.13.

3.3.3 Turbine Foundation

Actual turbine foundation design and dimensions will be specific to the site conditions as verified during the detailed geotechnical site investigation undertaken before commencing installation and once the final turbine type has been chosen and manufacturer's specification has been finalised.

It is proposed that the foundation for the turbine will comprise a standard concrete gravity foundation constructed on poured concrete with steel reinforcement. Each foundation will require approximately 1,000m³ of steel reinforced concrete. The foundation will be approximately 26m diameter and 3m deep.

The ground excavation methods will vary depending on the local ground conditions and the nature of the surface vegetation. The general processes will be as follows:

- Topsoil/turf will be stripped and stored in order to be reused in restoration of the turbine construction area;
- Subsoil (if present) will be stripped and stored, keeping this material separate from the topsoil/turf;
- Excavation of turbine foundations will then take place followed by the installation of the steel reinforcement bars and casting of concrete; and
- After the foundation has been poured the area will be backfilled as soon as practicable with spoil, pending turbine installation.

Indicative turbine foundation dimensions are shown on **Figure 3-4 in Volume 4.**

3.3.4 Crane Hardstandings

It is expected that the wind turbine will be erected using a set of large all-terrain cranes. A set consists of the main lifting crane and the tail crane. The main lifting crane will have a lifting capacity of up approximately 850 tonnes while the second, or tail crane will have a lifting capacity of approximately 500 tonnes.

The area for the crane hardstanding beside the turbine base will be approximately 40m x 38m. Indicative crane hardstand dimensions are shown on **Figure 3-5 in Volume 4.**

Two cranes will lift turbine tower sections and blades from the delivery vehicles either onto temporary working areas for storage or directly into their assembly position. The larger crane will be used to lift the tower sections, turbine nacelle and the hub and blade assembly into their final positions. The tail crane will help to align and position the components whilst being installed.

3.3.5 Auxiliary Crane Hardstandings and Turbine Installation Areas

Hardstand working areas are proposed for the construction of the Proposed Development. These will be used for ancillary equipment, vehicles and cranes during the erection of the wind turbines.

Once the turbines have been installed, the boom assembly areas and hardstand working areas will be restored using the retained topsoil or turf.

3.3.6 Temporary Construction Compound

One temporary construction compound is proposed during the construction phase of the Proposed Development. The approximate dimensions of the temporary construction compound will be 125m x 60m at its widest point, however the shape is not a perfect rectangle. The total area of the construction compound is 7,210m².

An indicative layout for the temporary construction compound including dimensions is shown in **Figure 3-6 in Volume 4.**

The compound will house staff offices and welfare facilities as well as a car parking area for staff and visitors. The compound will also include an area for materials storage. Once the construction of the Proposed Development has been completed the temporary construction compound will be restored using retained topsoil or turf.

3.3.7 Solar Panels

The solar panels will broadly comprise a series of linear rows (also known as arrays) of photovoltaic (PV) ground mounted solar modules.

The solar farm will use state-of-the-art Bifacial Monocrystalline PV modules. The modules ensure optimal use of solar irradiation and perform very efficiently at different angles to the sun. The PV modules will generate electricity with no air emissions, no waste production and no water use. The modules are fixed to a simple aluminium supporting frame with a 30 degrees inclination.

In order to avoid shading by adjacent rows and to ensure optimum energy yield in the winter months the rows will be spaced approximately 6.7m apart, depending on local variations in topography. The rows would be aligned east to west and south facing.

The supporting structure is made of aluminium frames, mounted vertically into the ground to a depth of approximately 1.5m. When the modules are fixed to the supporting frame, the modules will reach a maximum height of 3.2m above the ground level. The lowest point of the modules is approximately 0.80m above ground.

An indicative elevation plan for the solar panels is shown in **Figure 3-7 in Volume 4.**

3.3.8 Solar Power Station

Two total power stations will be located in the Solar Development. One power station to each solar area, as shown on **Figure 3-1 Detailed Site Layout**.

The approximate dimensions of each power station is 12.2m by 2.4m, with a maximum height of 2.9m above the ground level.

An indicative elevation plan for the solar power station is shown in **Figure 3-8 Solar Power Station.**

3.3.9 Solar Switching and Breaking Station

One solar switching and breaking station is located in the northern Solar Development.

The approximate dimensions of each solar switching and breaking station is 6.82m by 2.43m, with a maximum height of 2.2m above the ground level.

An indicative elevation plan for the solar power station is shown in **Figure 3-9 Solar Switching and Breaking Station.**

3.3.10 Security Fence

For security and safety purposes the solar farm will be closed to the general public throughout the construction and operational phases via security fencing and a locked access gate.

An approximately 2m high security fence will be installed around the perimeter of the solar farm. The fence will be placed around the site at the start of the construction programme and will remain for the duration of the operation of the solar farm.

The fence will be designed to allow small animals to pass through the site and will be placed behind existing and proposed hedges to ensure it blends into the natural setting and existing environment.

Figure 3-10 Solar Site Fencing in Volume 4 illustrates indicative solar fencing.

3.3.11 Battery Energy Storage System (BESS)

A battery energy storage facility of up to 20MW is proposed to be located adjacent to the substation compound in the BESS compound.

The proposed design is a low-key containerised scheme involving proven lithium-ion battery technology battery storage facility that will provide back-up power to the National Grid for the benefit of providing stability to the electricity supply network and the integration of more renewable energy generation.

The battery storage facility will consist of batteries, inverters, heating, ventilation and air conditioning (HVAC) units, fire protection and auxiliary components all contained and bunded within secure steel shipping like containers.

The components are housed within the BESS compound as noted above and will be accessed by the wind farm track network and be enclosed within the compound by appropriate fencing. It is anticipated it will be connected by an underground cable to the same substation as proposed for the Proposed Development.

Up to twelve units are anticipated. Each battery storage unit will be approximately 9.3m x 2.6m, with a height of up to 1.7m. The proposed height of the battery storage arrangement is within the parameters of the other supporting infrastructure proposed, for example the substation building, which is anticipated to be up to 8m in height.

An indicative design is shown on **Figure 3-11 in Volume 4**. The exact technology will be confirmed at the time of procurement.

3.3.12 Electrical Connections

Cabling

The electrical power produced by the individual turbines and solar panels will be fed to an onsite substation via underground cables. The grid connection will be subject to a separate application.

On site cabling will typically consist of array cables, at 33,000 volts (33KV). The typical installation depth for cables of this voltage is shown in **Figure 3-12 of Volume 4.** It is anticipated these cables will be sited within the footprint of the existing and proposed access track and will be suitably marked on the surface.

Substation and Control Building

One onsite substation would accommodate 33KV equipment to collect electricity from the site. The substation compound would include a control and metering building.

The substation compound will comprise an approximate area of 55m x 75m in total.

Typical elevations for the control and metering building are presented in **Figure 3-11 of Volume 4.**

SCADA System

A Supervisory Control and Data Acquisition (SCADA) system will be installed to gather information from each turbine and to enable each turbine to be controlled from an external location. A fibre optic communications cable will be laid adjacent to the power cables in the same cable trench to link the turbines to the SCADA system. The SCADA system allows remote monitoring of the turbines via a communication link.

3.3.13 Site Access

The Site is anticipated to feature three access points as described above with the southwestern access track used for the delivery of materials associated with the construction of the wind farm infrastructure (including wind turbine components) with the solar components expected to be delivered via the A762 and into the Site via the eastern access points.

Wind turbine components are expected to be delivered by sea and follow a designated route from King George V Docks, traverse a series of roundabouts before joining the M8 and travelling east and joining the M74 heading south towards Carlisle. Due to the size of the vehicles and turbine components, it is not possible to join the A75 at Gretna. The existing junction at the southwestern access point will be upgraded to create a bellmouth capable of accommodating abnormal load deliveries.

3.3.14 Access Track

Access to the Wind Development section of the Proposed Development is anticipated to be from the South West travelling north on the B727 before turning onto a (private) existing forestry track through the Glengap Forest for approximately 7km before entering the Proposed Development Site boundary to the south. It is anticipated that all abnormal loads and construction materials for the wind development will be delivered via this route.

Access to the Solar Development section of the Proposed Development is anticipated to be from the east at two entry points off the A762 (with separate points to serve both the northern and southern section of solar). It is anticipated that all construction materials for the solar development will be delivered via this route.

It is proposed that the Wind Development and Solar Development sections of the Proposed Development are connected via an onsite access track to allow for sufficient internal movement around the Proposed Development Site.

Once operational it is anticipated that operational maintenance vehicles will utilise either three of these access points dependent on the requirements.

The above access route design will reduce traffic load on any one road into the Proposed Development Site by virtue of splitting up the vehicle movements across different roads and access points.

New Access Track

A maximum of up to 12.64km of new access track will be constructed to the specification required by the wind turbine supplier, typically with a running width of 5m in straight sections, increasing at bends, passing places and junctions.

The tracks will be designed to have sufficient radii for turning of the construction vehicles, abnormal loads and associated plant. The access tracks have been designed to avoid sensitive features.

The access tracks will be constructed using 'cut track' design. Topsoil is stripped to expose a suitable rock or sub-soil horizon on which to build the track. Subject to final design by a qualified contractor, the track might consist of granular material layers.

Generally, the surface of the track will be flush with or raised slightly above the surrounding ground level.

Where the presence of peat has been identified to be greater than 0.5m in depth, floating tracks are proposed to be used (where gradients allow and where lengths and cut and fill requirements do not preclude their construction). Layers of crushed stone (depth dependant on ground conditions) will be laid on geotextile/geogrid reinforcement to form the track, which results in the site track being raised above the peat surface.

An indicative track construction design, showing both cut and floated track can be found in **Figure 3-13 in Volume 4.**

Soils removed from the excavated area will be stored separately in piles, no greater than 3m in height, directly adjacent to, or near the tracks on ground appropriate for storage of materials i.e. relatively dry and flat ground, a minimum of 50m away from any watercourses. Wherever possible, reinstatement of ground disturbed to facilitate construction of the track will be carried out as track construction progresses.

Prior to the commencement of site construction, detailed engineering specification for the access track design will be submitted to the planning authority as part of a Planning Conditions Compliance Statement, which will include Construction Method Statements for all aspects of construction.

Access Track Drainage

The drainage design will comply with General Binding Rules (GBR's) 10, 11 and 21 for the track drainage, under the Water Environment (Controlled Activities) (Scotland) Regulations (CAR) 2011 (as amended) (Scottish Environment Protection Agency (UK Government, 2021).

Consideration of Alternatives

The preferred on-site track routes have been designed to allow access to the turbine locations taking environmental constraints into account.

The proposed on-site access routes have sought as far as possible to be sited in areas of appropriate topography, to avoid areas of deep peat and sensitive habitats, minimise the effects on landscape receptors and heritage assets.

3.3.15 Watercourse Crossings

The Proposed Development has been designed to minimise construction works in the vicinity of mapped watercourses and to minimise the need for new water crossings in order to reduce the risk of pollution and changes to watercourse morphology.

Up to eight new watercourse crossings (visible on OS 1:25,000 mapping) will be required for the proposed new access tracks within the Proposed Development Site, these locations are shown in **Figure 3-1 of Volume 4** and summarised in Table 4.

The watercourse crossings will be designed in accordance with relevant guidance as described in **Chapter 8** and **TA 8-3**, and designed to accommodate 1 in 200-year events. **Figure 3-13 in Volume 4** illustrates typical indicative bottomless and closed culvert designs.

Table 3-4: Major Watercourse Crossing Summary

Crossing ID	Easting	Northing	Proposed Crossing Type
WX01	264953	559942	Bridge
WX02	265084	560154	Culvert
WX03	265089	560322	Culvert
WX04	264902	560795	Culvert
WX05	264860	562138	Culvert
WX06	265845	562366	Bridge
WX07	267431	561415	Culvert
WX08	267696	560894	Bridge

3.3.16 Borrow Pits

A Preliminary Borrow Pit Appraisal (BPA) (Technical Appendix 3-1) for the Proposed Development has been prepared to identify potential sources of rock within the Proposed Development Site required for the construction of the Proposed Development. The purpose of the appraisal is to:

- Assess a potential area for the extraction of rock;
- Identify overlying potential superficial soils;
- Identify underlying rock types; and,
- Provide an estimate of the available aggregate from the source location.

The total estimated volume of aggregate required for the Proposed Development will be in the region of 96,101m^3 with a 20% contingency added onto this to allow for discrepancies totalling approximately 115,321m^3.

One borrow pit location has been identified as suitable to service the Proposed Development with the maximum recovery volume from this borrow pit as approximately 147,421m^3, with an estimated aggregate yield volume of 118,000m^3.

Note, intrusive site investigation is required to confirm anticipated ground conditions, including but not limited to confirmation of quality aggregate yield rate, and overburden depth prior to commencement of works.

The traffic assessment, Chapter 9 Transport and Access of this EIA Report assumes that 100% of stone will be imported to site for a conservative assessment, although it is

anticipated that greater than 30% will be sourced from the on site borrow pit as indicated by the borrow pit assessment.

The final borrow pit arrangement will be refined through further assessment prior to construction.

3.3.17 Site Signage

The Proposed Development will have suitable signage to provide directions, contacts and health and safety information. There will be signs at the site entrance providing the operator's name, the name of the development and an emergency contact telephone number.

3.3.18 Micrositing

Micrositing refers to the precise locating of site infrastructure following detailed design. The location of infrastructure would be revised within a specified distance in response to the findings of the more detailed ground investigations that will be carried out as part of the preparations for construction.

Any such repositioning will be limited so as not to involve encroachment into environmentally sensitive or technically constrained areas. In addition, micrositing provides scope to mitigate potential geo-environmental and geotechnical constraints which may be identified during detailed site investigation works or preparatory ground works. It also allows for further mitigation of detailed environmental constraints that might be identified during preparatory works.

It is proposed that wind turbines, solar panels and associated infrastructure including tracks and other hardstandings will have a micrositing allowance of up to a radius of 50m.

Any mitigation measure specified in this EIA Report will be applied during micro-siting of the turbines and associated infrastructure in order that there is no resultant significant additional adverse effect on protected species, habitats or hydrological features.

3.3.19 Construction Programme

Subject to receipt of consent and deemed planning permission and discharge of pre-commencement conditions; construction works are anticipated to commence in 2026 with a total duration estimated at approximately 12 - 18 months. 12 months has been assessed as this is the worst case scenario for the Proposed Development. The work will proceed in four phases as summarised in Table 5.

Table 3-5: Construction Programme

Phase	Summary of Works
Phase 1 (months 1 and 2); Enabling/Access Works;	Construction of new access routes from existing access tracks to the turbine locations.
Phase 2 (month 3 to 10); Development (Main Site)	Establishment of site facilities, turbine foundation and turbine cabling. Delivery of turbine components & installation with cranes.
Phase 3 (month 10 to 12); Commissioning	Testing and commissioning equipment and turbines.
Phase 4 (month 12); Reinstatement and Restoration	Removal of temporary facilities and re-instatement of temporary working areas.

Phase	Summary of Works
	Restoration of working areas as set out in the Schedule of Mitigation and CEMP.

The proposed normal hours of operations for construction activity are between 07:00 - 19:00 Monday to Friday, and 07.00 – 13.00 on Saturdays. During construction and installation, there may be a requirement for extended working hours as some critical elements of installation cannot be stopped once started such as concrete pouring, this will be agreed in advance with D&GC.

3.3.20 Construction Methods

An outline CEMP for the Proposed Development has been prepared as part of the EIA Report (Technical Appendix 15-1). The outline CEMP details the principles and procedures for the environmental management of the Proposed Development during construction.

It is intended to be read as an indicative and iterative document, noting that the Final CEMP will be developed in collaboration with D&GC and will comply with the terms of any planning consent and attendant planning conditions as well as any other relevant agreements and commitments made during the consenting process.

The outline CEMP is considered a live document and methods and processes provided in the document are for guidance only and will be expanded upon and/or amended prior to construction once the Applicant has selected a main Contractor.

3.3.21 Construction Materials

The key materials required for the construction of the track, turbine foundation, hardstanding, cable trenches, solar panel mounting system, solar power station, solar switching and breaking station, and the substation are as follows:

- Crushed stone;
- Geotextile;
- Cement;
- Sand;
- Concrete quality aggregate;
- Steel reinforcement; and
- Electrical cable.

Materials will be sourced and transported to the site from local suppliers, where possible.

The foundation concrete will be of a grade that accords with the turbine manufacturer's requirements.

3.3.22 Construction Movements

Various vehicle types are required during the construction stage of the Proposed Development. Of these, the majority will be standard road vehicles of similar type to those using local roads on a daily basis. In addition, there will also be dumper trucks, concrete mixer trucks, and lorries. However, the delivery of the main wind turbine

components will require vehicles and transport configurations that are longer and/or wider and/or heavier than standard road vehicles.

3.3.23 Health and Safety

High standards of health and safety will be established and maintained throughout the project.

At all times 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. This includes:

- The Health and Safety at Work etc. Act 1974, (UK Government, 1974);
- The Construction (Design and Management) Regulations 2015 (as amended) (UK Government, 2015);
- The Work at Height Regulations 2005 (UK Government, 2005); and
- Onshore Wind Health & Safety Guidelines (Renewable UK, 2015).

3.3.24 Environmental Management

The risk of potential environmental impact during the construction phase will be managed by the Site Manager, with specialist advice as required from an Ecological/Environmental Clerk of Works (ECoW) and Archaeological Clerk of Works (ACoW). The Site Manager will ensure that construction and activities are carried out in accordance with the CEMP and mitigation measures outlined in the EIA Report.

3.3.25 Waste Management

Waste will be removed off-site for safe disposal at a suitably licensed waste management facility in accordance with current waste management regulations. Wherever possible, excavated stone or soils will be re-used on site, primarily for the restoration of disturbed ground. Details of this will be included within the CEMP.

The main items of construction waste and their sources are:

- Hardcore, stone, gravel from temporary surfaces to facilitate construction waste, and concrete;
- Subsoil from excavations for foundations and roads;
- Timber from temporary supports, shuttering and product deliveries;
- Miscellaneous building materials left over from construction of the control building;
- Sanitary waste from chemical toilets (if used);
- Plastics packaging of material, and
- Lubricating oils, diesel - unused quantities at end of construction period.

Subsoil not required for reinstatement purposes will be collected at the end of the construction phase and disposed of according to best practice and existing waste legislation. Waste oils and diesel will be removed from the Proposed Development Site and disposed of by an approved waste contractor in accordance with provisions of the relevant legislation.

3.3.26 Post Construction Restoration

Reinstatement will be undertaken as soon as practicable after each stage of the project is completed.

Materials and other temporary infrastructure will be removed off-site.

The proposed access tracks will be left in place after completion of the construction phase as they will provide access for maintenance, repairs and the eventual decommissioning phase.

Hardstanding areas at each turbine location will be retained for use in on-going maintenance operations, with the edges as far as possible blended to the adjacent contours with natural vegetation being allowed to re-establish.

3.4 Operation

3.4.1 Operational Lifespan

The Proposed Development will have an operational period of generation of up to 40 years.

3.4.2 Infrastructure Maintenance

On-going track maintenance will be undertaken to ensure that safe access is maintained. The wind turbines, solar panels and the battery energy storage system will also undergo regular maintenance to ensure safety, cleanliness and efficiency.

3.4.3 Waste Management

Wastes arising as a result of servicing and maintenance (e.g., lubricating oils, cooling oils, packaging from spare parts or equipment, unused paint etc.) will be removed from the Proposed Development Site and reused, recycled or disposed of in accordance with best practice and applicable legislation.

3.5 Decommissioning

Once the Proposed Development ceases operation after the period of generation, the wind farm decommissioned and above ground infrastructure dismantled and removed from the Proposed Development Site.

Unless required in connection with ongoing land management operations, tracks and crane hardstands will be left in situ and allowed to grass over or will be covered with soil and reseeded.

All underground cables will be left in place and de-energised. The crane hardstanding adjacent to a turbine will be removed, if required, and reinstated.

The upper sections of the turbine foundations will be covered with filling material, leaving the foundation completely buried which will permit the continuation of current land use practices.

Peat or topsoil will be replaced and the area reseeded. Tracks and crane hardstands will be left in situ and allowed to grass over or will be covered with soil and reseeded. Cabling will be left in-situ. At least six months prior to the decommissioning of the

Proposed Development Site, a Decommissioning Method Statement will be prepared, for agreement with the local authorities and relevant consultees.

It is estimated that this process will take up to 18 months. Unless otherwise agreed, the upper sections of the foundations will be removed to a depth which will permit the continuation of current land use practices.

3.5.1 Waste Management

The decommissioned turbine components will have sufficient salvage value to ensure their proper recycling.

Potentially contaminating material (e.g., lubricating/cooling oils etc.) will be removed and disposed of in accordance with best practice and applicable legislation.

3.5.2 Site Reinstatement

At the expiry of the Proposed Development's lifespan of up to 40 years, it is proposed that the turbines and their transformers will be removed.

The upper sections of the turbine foundations will be removed to a depth which will permit the continuation of current land use practises and backfilled with appropriate material.

Peat or topsoil will be replaced and the area reseeded. Tracks and crane hardstands will be left in situ and allowed to grass over or will be covered with soil and reseeded. Cabling will be left in-situ.

The solar arrays, power stations and the switching and breaking station will be removed from the site. The land on the solar arrays will be returned to the previous land condition, any foundation on the power stations and the switching and breaking station will be allowed to grass over or will be covered with soil and reseeded.

At least six months prior to the decommissioning of the site, a Decommissioning Method Statement will be prepared, for agreement with the local authorities and relevant consultees.

3.6 References

Dumfries and Galloway Council (D&GC) (2017) Local Development Plan 2. Available at : https://www.dumfriesandgalloway.gov.uk/sites/default/files/2024-07/Adopted_LDP2_OCTOBER_2019_web_version.pdf (Access 11/03/2025).

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UK Government (1974) The Health and Safety at Work etc. Act 1974. Available at: https://www.legislation.gov.uk/ukpga/1974/37/contents [Accessed: 03/03/2025]

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